

1

Including a First Workbook of English

ENGLISH

THROUGH PICTURES



I.A. RICHARDS / CHRISTINE M. GIBSON

PREFACE

ENGLISH THROUGH PICTURES

This book will teach you the first steps of English. It gives you about 500 important words in sentences, with the meaning shown through pictures.

Read each page like this:

1	2
3	4

The sentences will take on meaning for you as you compare them with the help of the accompanying pictures, page by page. The load on your memory is kept light. All your attention can be given to seeing how changes in the sentences go along with changes in the meaning. Learning English this way is more like play than hard work.

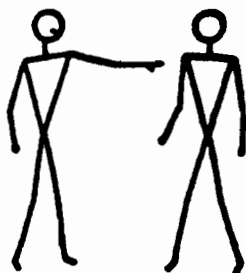
If you have to work alone, it is best to work through writing and wait for the pronunciation until you have help. Study two or three pages together until you can give the sentences that go with the pictures. When you are forming the sentences do not rely on your memory alone: try to understand in English what the pictures say. If you do this you will be thinking in English from the very start and that is the way to a mastery of the language.

When you have worked through thirty pages of the book in this manner, test your knowledge by answering in English the questions on pages 31, 32 and 33. Compare your answers with those given on page 34. Further questions with answers are provided at intervals throughout the book.

I



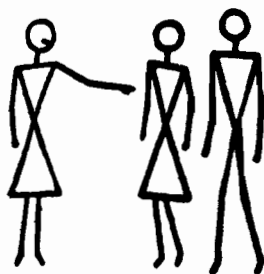
YOU

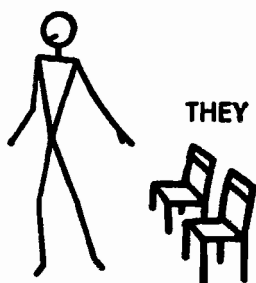
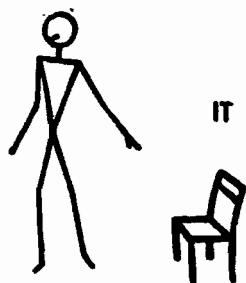
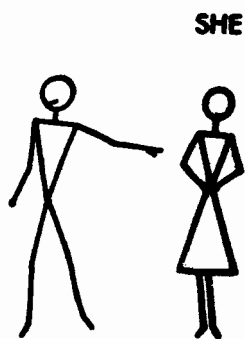
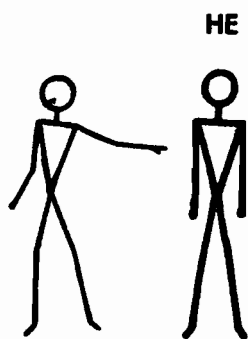


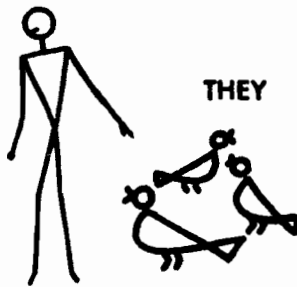
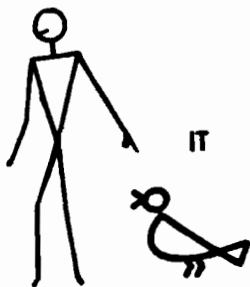
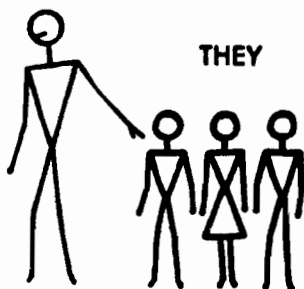
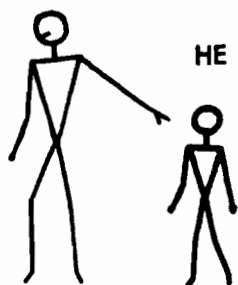
I



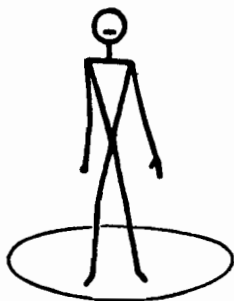
YOU



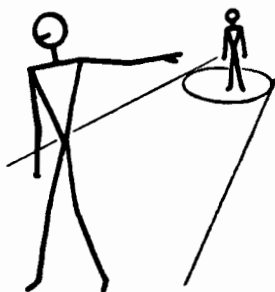




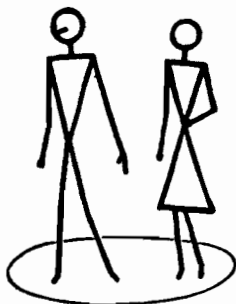
I am here.



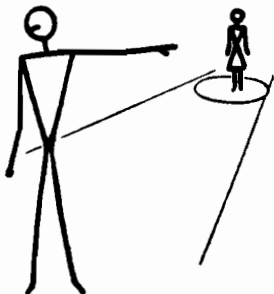
He is there.



She is here.



She is there.





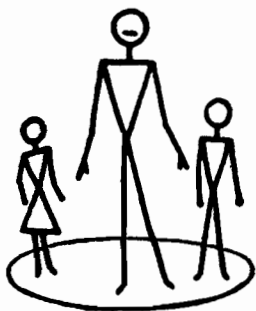
It is here.



It is there.



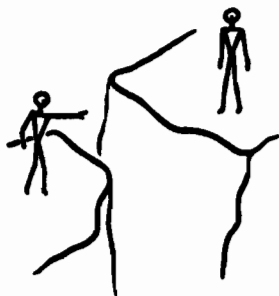
They are here.



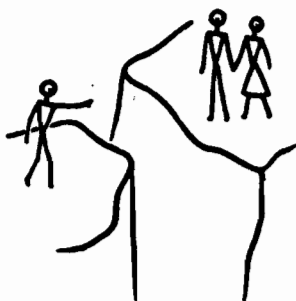
They are there.



You are there.



You are there.



You are here.



We are here.



It is there.



They are there.



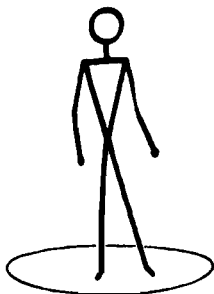
We are here.



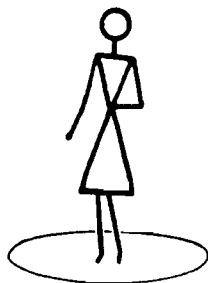
They are here.



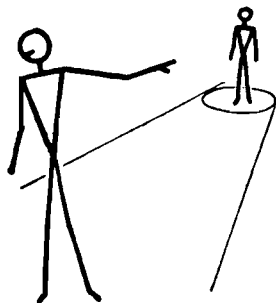
This is a man.



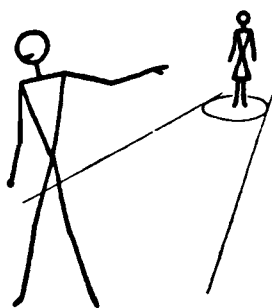
This is a woman.



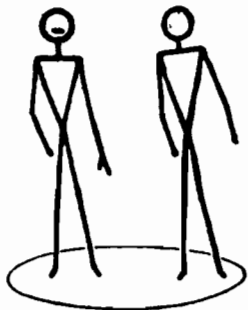
That is a man.



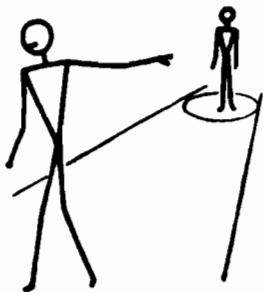
That is a woman.



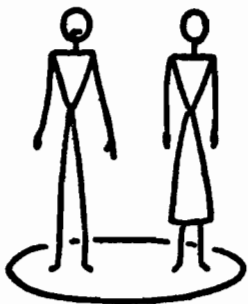
This man is here.



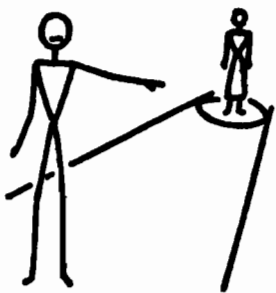
That man is there.



This woman is here.



That woman is there.



This is a table.
This table is here.



That is a table.
That table is there.

It is there.



This is a hat.
It is a hat.



This is a hand.

This is the thumb.

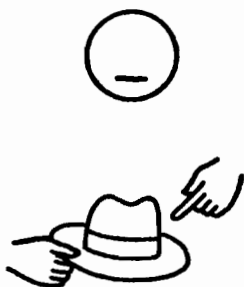


These are the fingers.

This is my head.



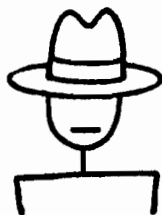
This is my hat.



**My hat is in my hand.
It is in my hand.**



**My hat is on my head.
It is on my head.**



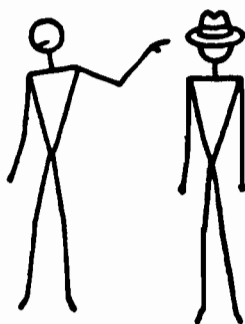


**This is
my hat.**

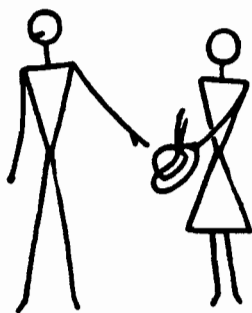


**That is
his hat.**

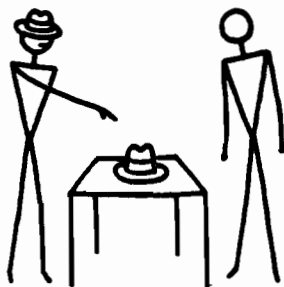
**His hat is
on his head.**



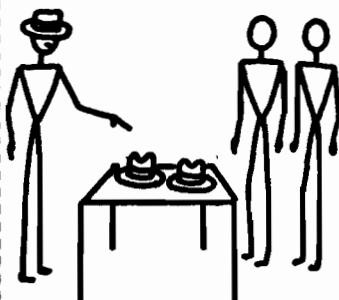
**Her hat is
in her hand.**



That is your hat.
It is on the table.



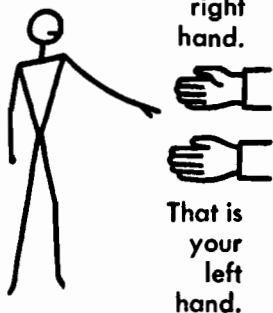
Those are your hats.
They are on the table.



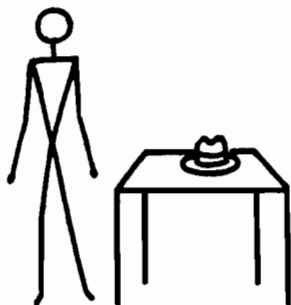
These are my hands.



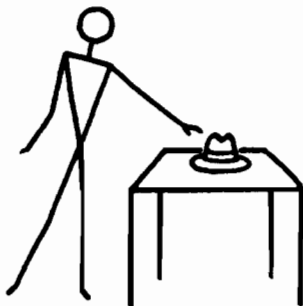
Those are your hands.



His hat is on the table.



He will take his hat off the table.



He is taking it off the table.



He took it off the table.



He will put his hat on his head.



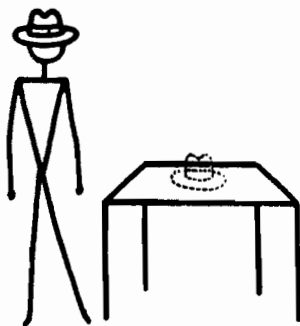
He is putting his hat on his head.



He put his hat on his head.
He put it on.



It was on the table.
It is on his head.



He will take his hat off
his head.



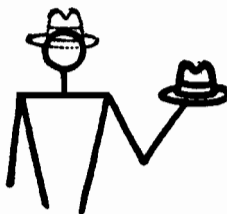
He is taking his hat off
his head.



His hat is in his hand.
It was on his head.



He took his hat off.



It is in his hand.

This is a hat.



These are hats.



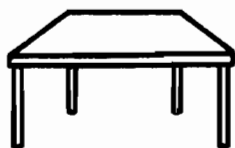
This is a hand.



These are hands.



This is a table.



These are tables.



This is a man.



These are men.



This is a woman.



These are women.



This is a man.



**This is
his hand.**

It is the man's hand.

This is a woman.



**This is
her hand.**

It is the woman's hand.



**This is a man's hat.
It is on a man's head.**

**Now it is in the man's
hands.
It is in his hands.**

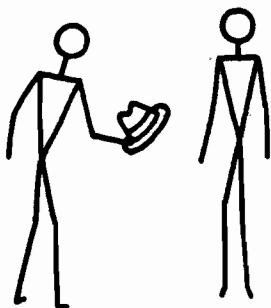


**This is a woman's hat.
It is on a woman's head.**

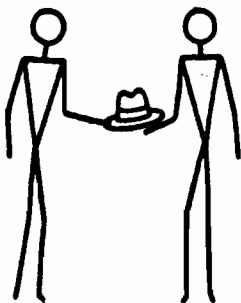
**Now it is in the woman's
hands.
It is in her hands.**



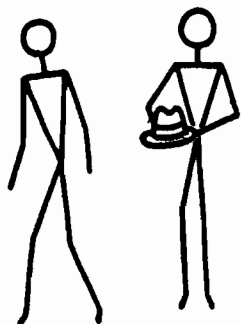
He will give his hat to
the man.



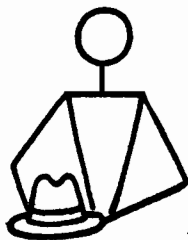
He is giving his hat to
the man.



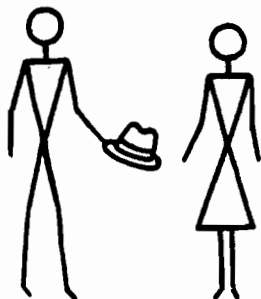
He gave it to the man.
He gave it to him.



It is in the man's hands
now.



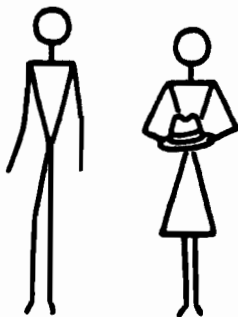
**The man will give his
hat to the woman.**



**He is giving his hat
to the woman.**



**He gave it to the
woman.
He gave it to her.**



**It is in the woman's
hands now.**



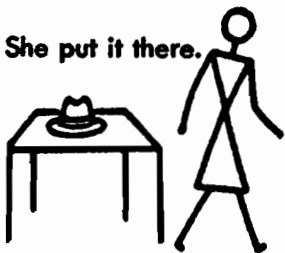
**The woman will put the
hat on the table.**



She is putting it on the table.



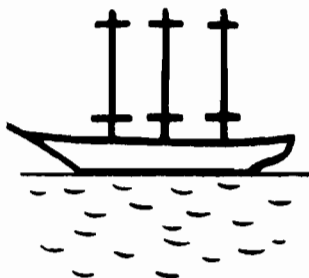
She put it there.



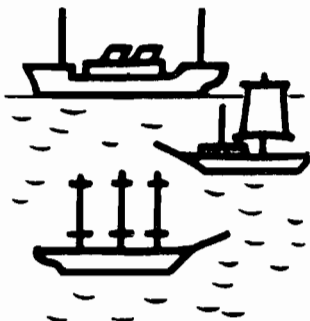
**It was in her hand.
It is on the table.**



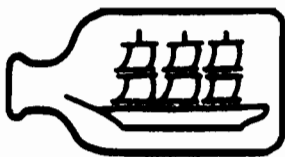
This is a ship.



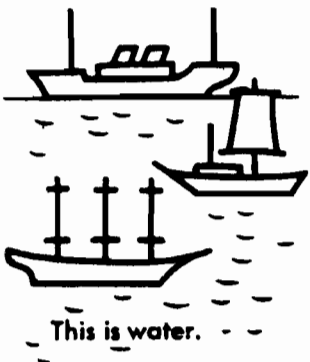
These are ships.



This ship is in the bottle.



These ships are on the water.



This is water.

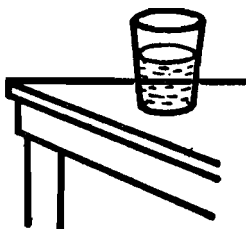
This is water.

This is a bottle.

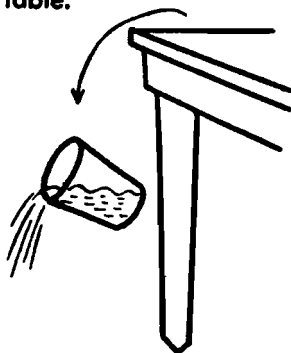
**The bottle
is in a
man's hand.**



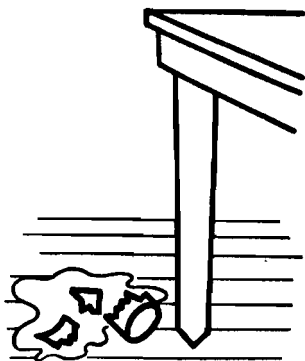
**This is a glass.
It is on the table.**



**Now the glass is off the
table.**



**The glass and the water
are on the floor.**





This is a bottle

**and this
is a bottle.**



**This
and
this are bottles.**



This is a glass

**and this is
a glass.**



**These
are glasses.**



**That is a bird and
that is a bird.
Those are birds.
They are birds.**



**That man and that
woman are there.**



**This man and this
woman are here.**

This is a man.

These are his arms.



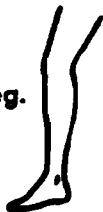
These are his legs.

These are his feet.

This is an arm.



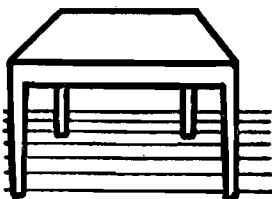
This is a leg.



This is a foot.



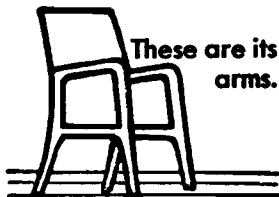
This is a table.



These are its legs.

Its feet are on the floor.

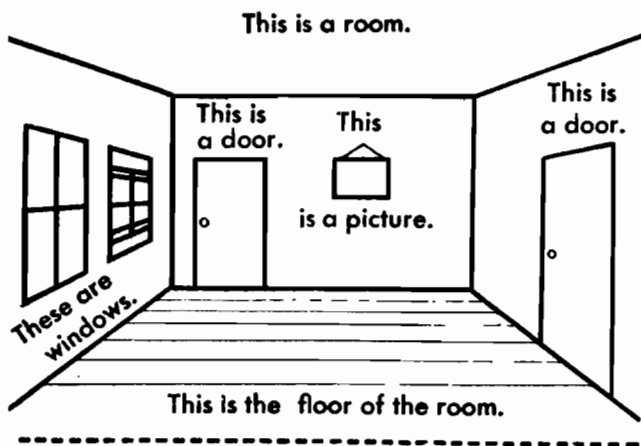
This is a seat.



These are its arms.

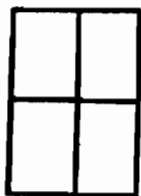
These are its legs.

Its feet are on the floor.



These are the windows of the room.

This is a window and this is a window.

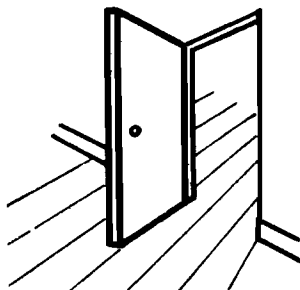


This window
is shut.

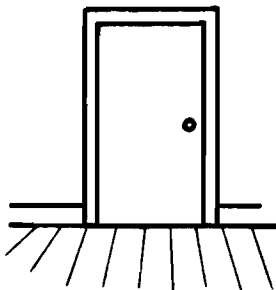


This window
is open.

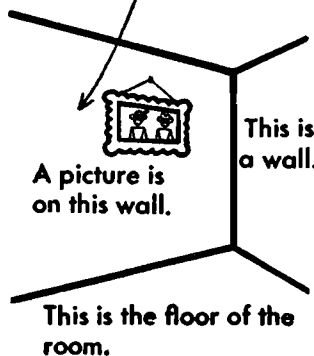
This door is open.



This door is shut.



This is a wall of the room.

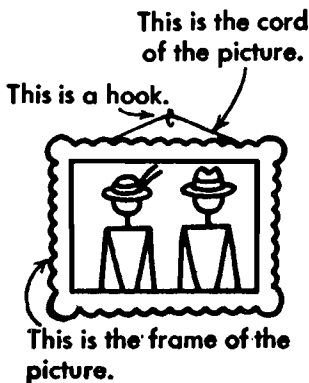


A picture is on this wall.

This is a wall.

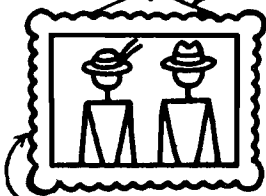
This is the floor of the room.

This is a picture of a man and a woman.

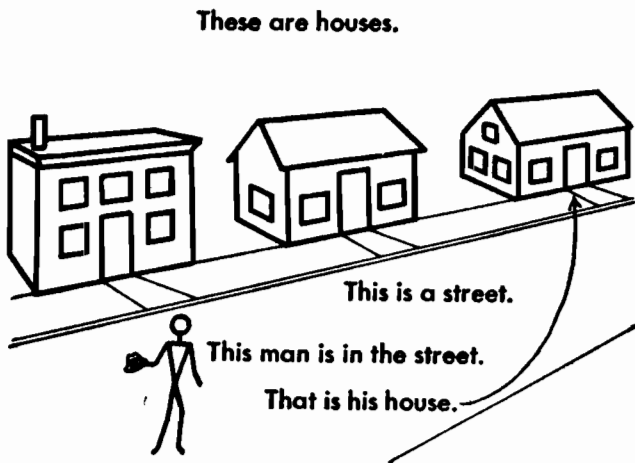
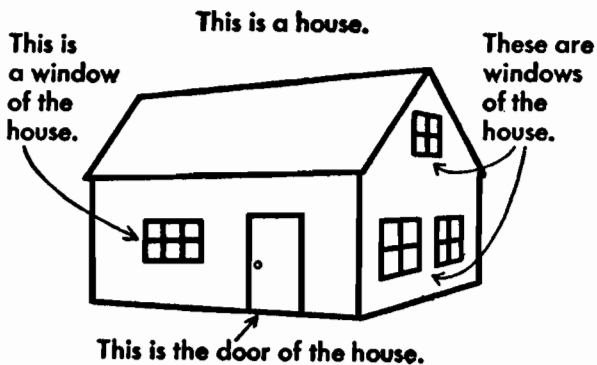


This is the cord of the picture.

This is a hook.



This is the frame of the picture.



**The man
will go
to his house.**



**He
is going
to his house.**



**The man went
to his house.
He is there.**



He went there.



He was here.

He is at his door.

**He is at the door
of his house.**





What is this?

It is a hat.

"What is this?" is a question.

"It is a hat," is an answer.

This is a question mark.



We put question marks after questions.



"Is this a hat?"

That is a question.

"Yes, it is."

That is an answer.



"Is this a hat?"

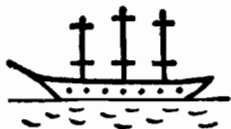
"No, it is *not* a hat. It is a hand."

That is an answer.

QUESTIONS



a What is this?
It is a



b What is this?

c What is this?



d What is this?



e What is this?



f What is this?



g What is this?



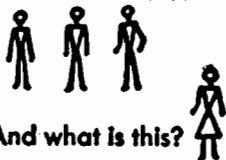
h What is this?



This page is page 31. The answers are on page 34.

QUESTIONS

a What are these?



And what is this?

b What are these?



And what is this?



c What are these?



And what is this?

d What are these?



And what is this?



e What are these?



And what is this?

f What is this?



And what is this?



g What are these?



And what is this?

h What is this?



What is in it?

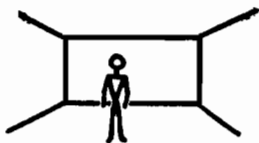
This page is page 32. The answers are on page 34.

QUESTIONS

a Is the hat on the table?



b Is the man in the room?



c Is the picture on the wall?



d Is the bird on the seat?



e Is the glass in the woman's hand?



f Is the water in the glass?



g Is this ship in a bottle?



h Are the man and the woman at the door?



This page is page 33. The answers are on page 34.

These are answers to questions on pages 31, 32, and 33. This page is page 34.

Page 31

- | | |
|------------------------------|---------------------------|
| a It is a house. | b It is a ship. |
| c It is a table. | d It is a bottle. |
| e It is a leg. | f It is an arm. |
| g It is a leg of
a table. | h It is an arm of a seat. |

Page 32

- | | |
|--|--|
| a They are three
men. That is a
woman. | b They are glasses.
That is a glass. |
| c They are fingers.
That is the thumb. | d They are windows.
That is a door. |
| e They are houses.
That is a street. | f It is a picture of a
man and a house.
That is the frame of
the picture. (Its frame) |
| g They are feet.
That is a foot. | h That is a room
A table is in it. |

Page 33

- | | |
|---|---|
| a Yes, it is. | b Yes, he is. |
| c No, it is not.
It is on the floor. | d No, it is not.
It is on the floor. |
| e No. It is in the
man's hand. | f No, it is not in the
glass. |
| g No. It is on the
water. | h Yes, they are at the
door. |



What is this?
This is a clock.
What is the time?
The time is one (1:00).
One hand is at one.



What is the time?
The time is two (2:00).
It was one (1:00).
It will be three (3:00).



What is the time?
The time is four (4:00).
It was three (3:00).
It will be five (5:00).



What is the time?
Now the time is six (6:00).
It was five (5:00).
It will be seven (7:00).



What is the time?
Now the time is eight (8:00).
It was seven (7:00).
It will be nine (9:00).



What is the time?
Now the time is ten (10:00).
It was nine (9:00).
It will be eleven (11:00).



What is the time?
The time is twelve (12:00).
It was eleven (11:00).
It will be one (1:00).
The two hands are at twelve now.



These are the numbers from one to twelve.

One, two, three, four, five, six, seven, eight, nine, ten, eleven, twelve.

What are things?



**A house is a thing.
Houses are things.**



**A hat is a thing. Hats
are things.**

**Doors and windows are
things.
Tables and seats are
things.**

This is a man.



This is a woman.



This is a boy.



This is a girl.



**Men and women and
boys and girls are not
things. They are
persons.**

You are a person.

**There are two persons
in this room.
They are a boy and a
girl.**



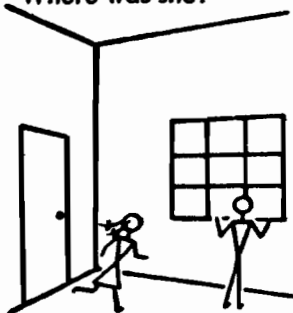
**The girl is at the door.
The boy is at the
window.**

**The girl will go to the
window.**



**She will be with the boy
at the window.
She will be with him at
the window.**

**The girl is going to the window.
Where was she?**

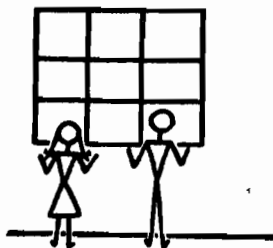


She was at the door.

**She went to the window.
Where is she now?
She is at the window now.**



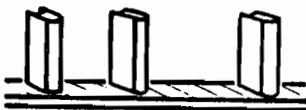
She is with the boy.



**They are at the window together.
She is with him at the window.
He is with her at the window.**



**These books are together
on the shelf.**



**These books are not
together. They are on
the shelf, but they are
not together.**

The girl and the boy will
go from the window.

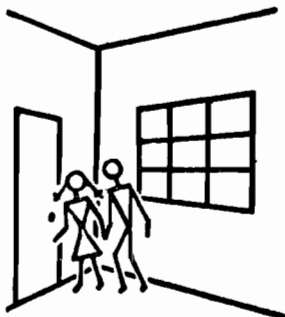


They are going from the
window.
They were at the
window.

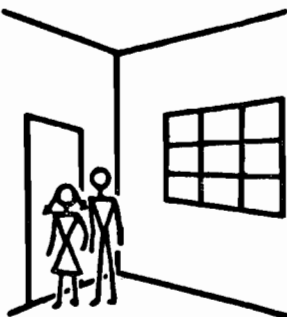


They went from the
window.

She went with him and
he went with her.



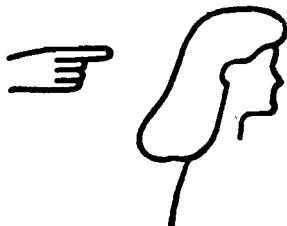
Now they are at the
door together.
The boy is with the girl
at the door.
She is at the door again.



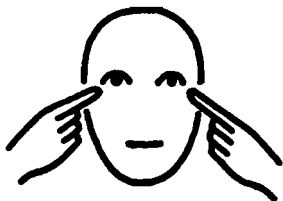
This is my head.



That is her head.



These are my eyes.



**This is
one
eye.**

**This is
the
other
eye.**

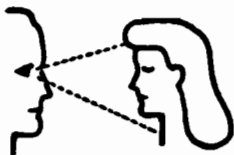
Her eyes are open.



Her eyes are shut.

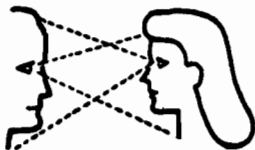


My eyes are open.
I see.
Her eyes are shut.
She does not see.



I see her.
She does not see me.

Now her eyes are open.
She sees.
What does she see?
She sees me.



I see her.
Our eyes are open.

Her eyes are open.



She sees.
They were shut.
She did not see.



She did not see me.

Her eyes are shut.



They were open.
She saw.
What did she see?



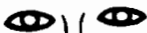
She saw me.

A man has two eyes.
I have two eyes.



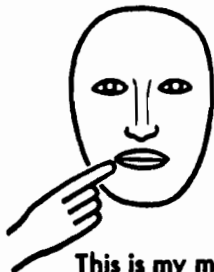
These are my eyes.

A man has a nose.
I have a nose.



This is my nose.

A man has a mouth.
I have a mouth.



This is my mouth.

This man's mouth is
open.
He is saying "mouth."



mouth

His mouth is shut.



He is not saying
"mouth."

His mouth is shut.
He will say "mouths."



mouths



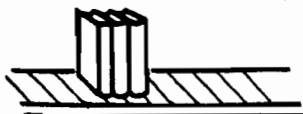
He is saying "mouths."

He said "mouths."
He is not saying
"mouths" now.

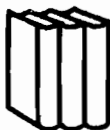


His mouth is shut again.

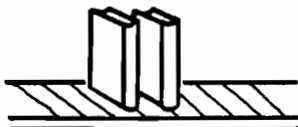
These are three books.



They are on a shelf.



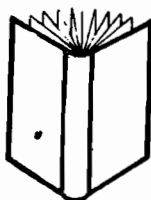
This book is between the other two books.



I have the book in my hand now.

It was on the shelf. It was between the other two books on the shelf.

These are the pages of the book.



These are the covers of the book.

The pages are between the covers of the book.

These are the fingers of my hand.



This finger is between these other two fingers of my hand.



My nose is between my eyes.



And it is between my eyes and my mouth.

My mouth is under my nose.



**My nose is over my mouth.
Our noses are over our mouths.**

The light is over the table.

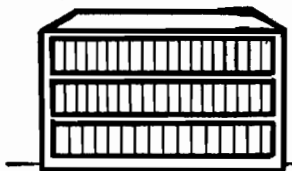


The dog is under the table.

This is a clock.



**It is on the wall.
It is over the bookshelves.**



The bookshelves are under the clock.

**This is his hair.
It is short.**



These are his ears.



**Where are her ears?
They are under her hair.**

**This is her hair.
It is long.**



Her hair is over her ears.

This is his head.



**This is his face.
His eyes, his nose, and
his mouth are parts of
his face.**

This is a clock.



**It has a face.
This is the face of the
clock. The clock has two
hands, a long hand and
a short hand. The long
hand is at 5. The short
hand is between 7 and 8.**

A clock has a face.



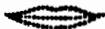
It has no nose.



It has no eyes.



It has no mouth.



It has no ears.



It has no hair
but it has a face.



It has a face and two
hands, the long hand

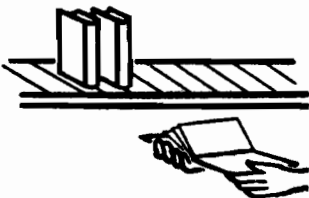


and the short hand.



The long hand of the
clock is between one
and two.

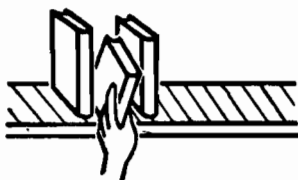
One is before two. Two
is between one and
three. Three is after two
and two is after one.



I have this book in my
hands.

It was on the shelf with
the other books.*

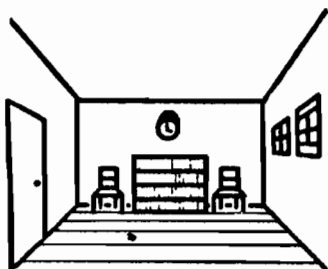
It was between the
other two books before
I took it from the shelf.



**I have it in my hand.
I am putting it between
the other two books.
Then it will be with the
other books.**



**Now it is on the shelf
again. It was in my
hand. I had it in my
hand. It is not in my
hand. Where is it?**



**This is a room.
What do you see in the
room?
Do you see the floor
and three walls of the
room?
Do you see them?**

**Do you see a door and
two windows?
Is one of the windows
open?
Is the other window
shut?
Do you see two seats
and the bookshelves
between them?
Do you see the clock
over the bookshelves?
Yes. I see them.
These things are in the
room. The room is in a
house.**



This is a face.

**Eyes, nose, and mouth
are parts of a face.**

**Which are the eyes?
Which is the nose?
Which is the mouth?**

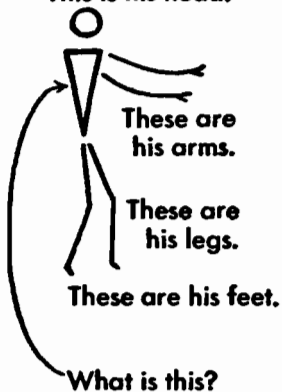


**These are my hands.
Which is my right hand?
Which is my left hand?
Which are my thumbs?
Which are my fingers?**



**This is a man.
Which are his arms?
Which are his hands?
Which are his legs?
Which are his feet?**

This is his head.

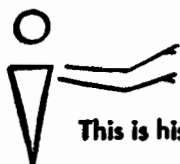


**These are
his arms.**

**These are
his legs.**

These are his feet.

What is this?

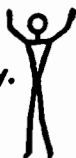


This is his body.



**His head, his arms,
his legs, and his body
are parts of a man.**

He has a body.



She has a body.

**All men and
women and boys and
girls have bodies.**

**This baby
has a body.**



This dog has a body.

This is his tail.



This is his body.

**He has four legs and a
head and a tail. He has
no arms or hands, but
he has feet. His head, his
body, his legs, and his
tail are parts of a dog.**

This is a dog's head.



**Which is his mouth?
Which are his eyes?
Which are his ears?
Which is his nose?**

This is a foot.



**These are
toes.**

**They are parts of a foot.
These parts of a foot are
its toes.**

This is a toe. 

This is a leg



**This is a knee.
It is part of a leg.**

**This part of a leg is its
knee.**

Our legs are parts of us.



This is a neck.

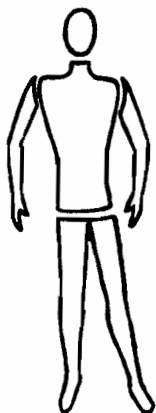
**It is a part of a man. It is
between his head and
his body.
The part which is
between his head and
his body is his neck.**

This is a man's head.



**This is his chin.
It is under his mouth.
It is a part of his face.
The part which is under
his mouth is his chin.**

This is a man's body.



The part which is between his head, his arms, and his legs is his body.

This is his body.



This part of him is his chest.

This is a chest of drawers.



This man has his finger on his chin.



This man has his hand on his chest.



This baby is on his hands and knees.



This baby is on his hands and feet.

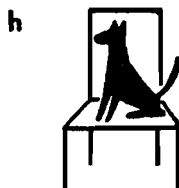
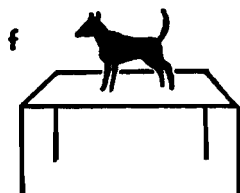
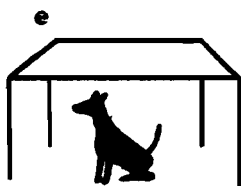
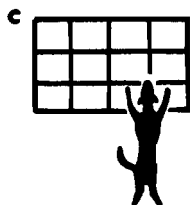
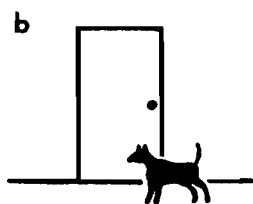
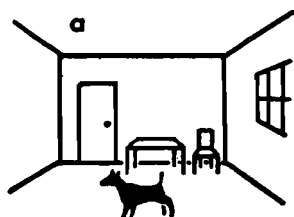
This baby is on his knees.



This baby is on his feet.

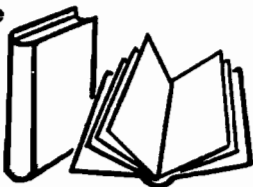


QUESTIONS**Where is the dog?**



Answers to these questions are on page 56.

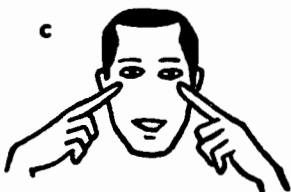
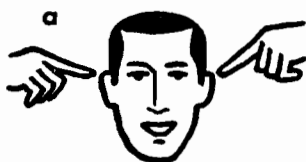
QUESTIONS**What do you see?**

a**b****c****d****e****f****g****h**

Answers to these questions are on page 56.

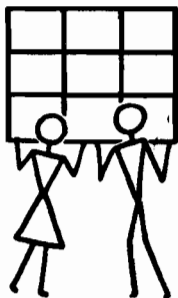
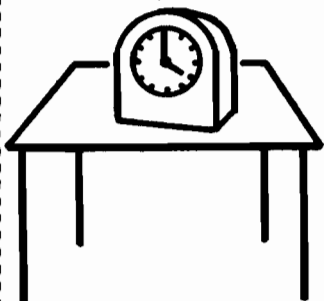
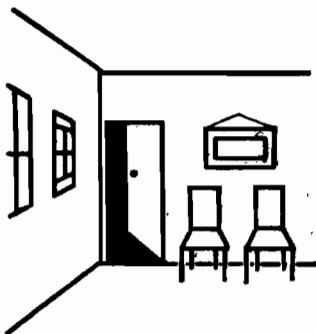
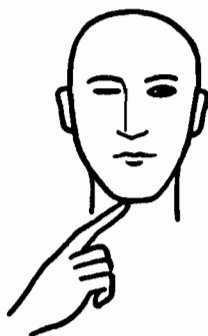
QUESTIONS

What is he saying?



Answers to these questions are on page 57.

QUESTIONS**What do you see?**

a**b****c****d**

Answers to these questions are on page 57.

Answers to questions on pages 52-53.

Page 52

- | | |
|--|-------------------------|
| a The dog is in a room. | b He is at the door. |
| c He is at the window. | d He is under the seat. |
| e He is under the table. | f He is on the table. |
| g He is between the
table and the seat. | h He is on the seat. |

Page 53

- | | |
|---|---|
| a I see a clock.
The time is four. | b I see a man's face. |
| c I see a woman's face. | d I see a baby. He is on
his hands and knees. |
| e I see two books. One
of them is open. The
other is shut. | f I see two girls. One
of them is giving a
book to the other. |
| g I see two babies. One
of them is on his
hands and knees. The
other is on his feet. | h I see a chest of
drawers. |

Answers to questions on pages 54-55.

Page 54

- a He is saying, "These are my ears."
- c He is saying, "These are my eyes."
- e He is saying, "This finger is between these fingers."
- g He is saying, "This is my hair."
- b He is saying, "This is my mouth."
- d He is saying, "This is my thumb."
- f He is saying, "This is my nose."
- h He is saying, "This is my head."

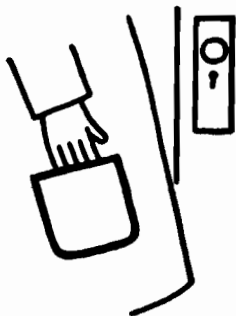
Page 55

- a I see a boy and a girl. They are at a window.
- c I see a room. It has two seats in it. It has two windows and a door. One of the windows is open. The other window is shut. The door of the room is open. A picture is on the wall.
- b I see a clock on a table. The time is four.
- d I see a man. He has his finger on his chin. One of his eyes is open. The other eye is shut. His mouth is shut. He has no hair on his head.

Who is this?
He is John Smith.
His name is John Smith.
Where is John Smith?
He is at the door of
his house.



He has his hand in
his pocket.



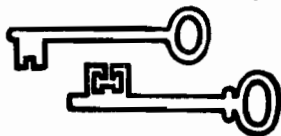
He is taking a key from
his pocket.



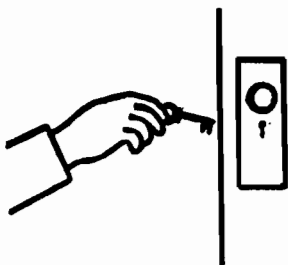
This is a key.



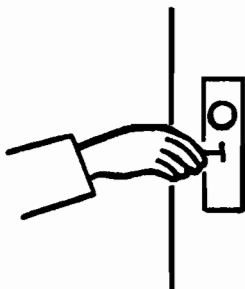
These are other keys.



He will put the key in the lock of the door.



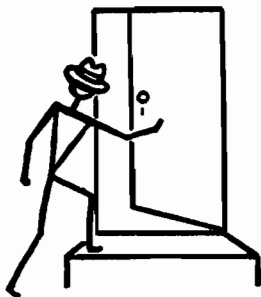
He is putting the key in the lock.



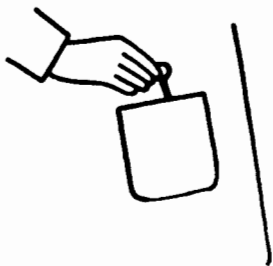
He is giving a turn to the key.



**He is giving a push to the door.
The door is open now.**



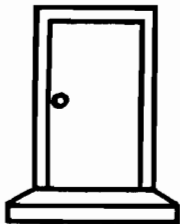
John took the key
from the lock.
He is putting it in
his pocket.
He will go into his house.



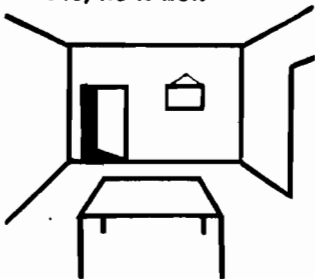
He is going into the
house.



He went into the house.
He is in the house.
The door is shut.

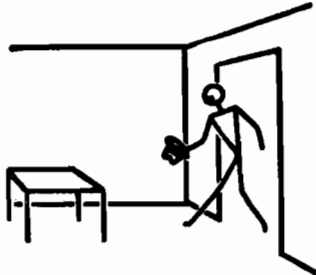


This is a room in the
house.
Is John in the room?
No, he is not.



He will come into the
room.

He is coming into the room.
He will go to the table.



Mr. Smith came into the room.
He went to the table.



Is Mrs. Smith in the room?



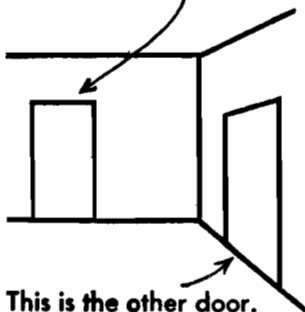
No, she is not.

She is in the house but she is not in the room.
She is in another room in the house.



Who is this?
This is Mary Smith. She is Mrs. Smith.
Her name is Mary Smith.

This is one of the doors
of the room.



This is the other door.

This is one of the
windows of the room.

This is another window.



And this is another
window.

One window is open.
The other windows are
shut.

This is one of my hands.
It is my left hand.



This is my other hand.
It is my right hand.

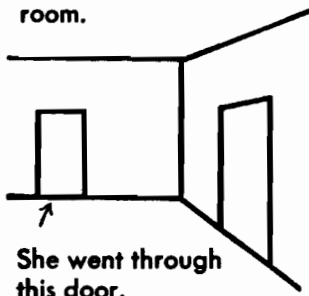
This is one of my fingers.



This is my left thumb.

These are the other
fingers of my left hand.

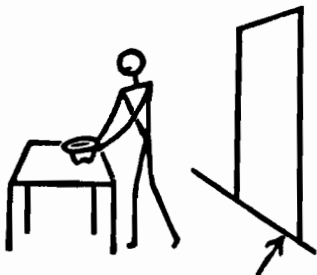
Mrs. Smith is not in the room.
She went out of the room.



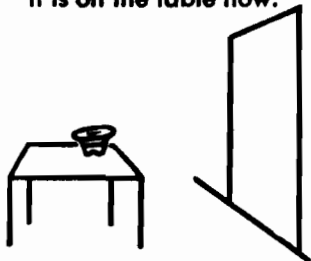
Mr. Smith is in the room.
He came into the room.



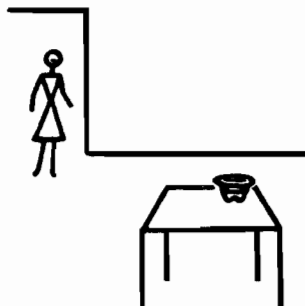
Mr. Smith is putting his hat on the table.



He put his hat on the table.
It is on the table now.



Mary is coming into the room.



She is going to the table.



She will see the hat.



She sees it.



She saw it.
When did she see it?
She saw it after she went
to the table.



What is that?



John's hat!



What is that?
John's hat!



She will take the hat in her hand.



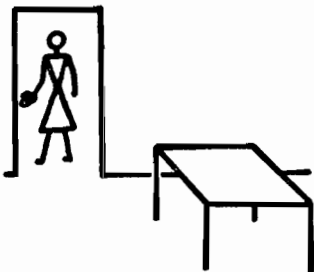
She is taking it.



**She took it in her hand.
She is going out of the room.**



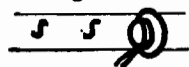
She went out of the room with John's hat.



She has the hat in her hand.

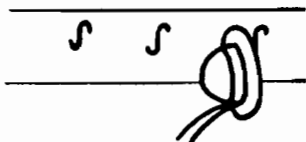
She is in another room now.

She came into this room through this door.



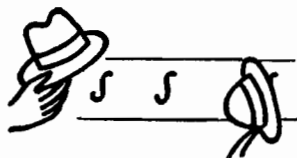
She has the hat with her.

What are these?
They are hooks.



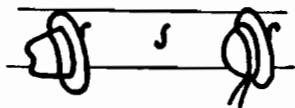
That is another hat.
It is on a hook.

She will put John's hat on a hook.



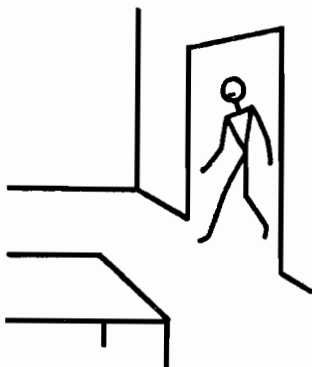
She will put it on a hook with the other hat.

She put it on the hook.



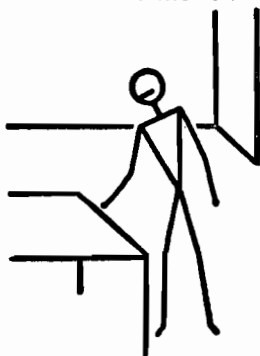
Now it is with the other hat.

The other hat is one of Mary's hats.



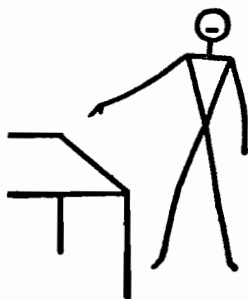
John is coming into the room again.

He came into the room.
He went to the table.



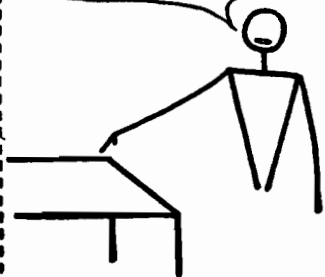
He is there now.

The hat is not on the table.



He is saying,

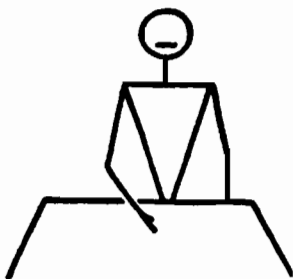
Where is my hat?
I put it on the table.



"Where is my hat? It is not on my head. It isn't here."



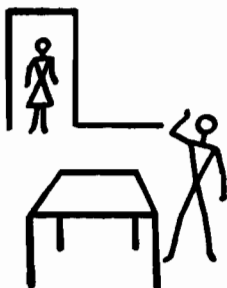
"It isn't (is not) here."



"Where is it? Mary, where is my hat? Where are you, Mary?"



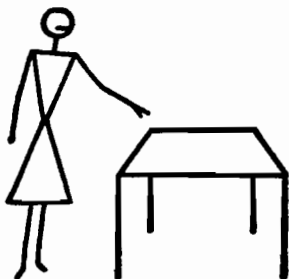
Here is Mary. She is coming into the room. She says, "Here I am."



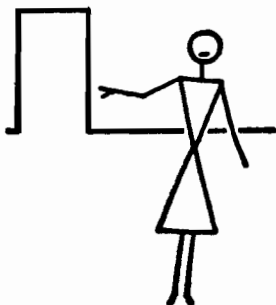
"Where is your hat?"



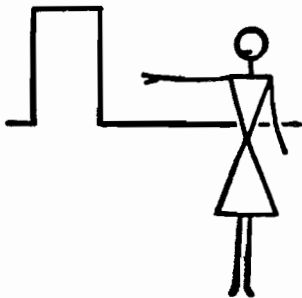
**"You put it on the table.
It was on the table."**



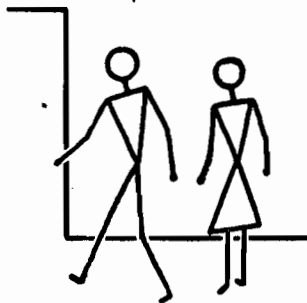
**"I took it. I put it in the
other room."**



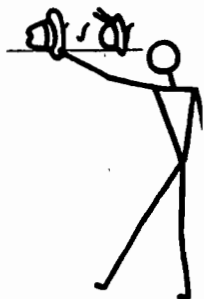
**"It is on a hook there.
You will see it there."**



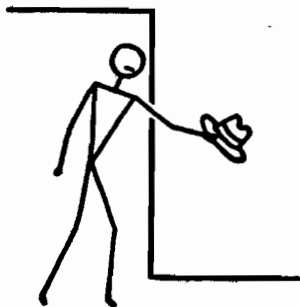
John says, "I will get my hat."



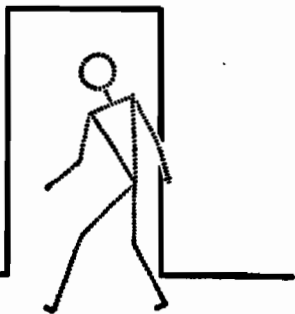
He is getting it.



Did he get it? Yes. He has it.



He went out of the room.



When he saw the hat he
took it off the hook.



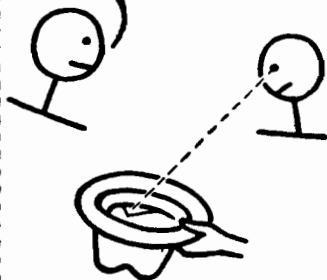
He came into the room
again with the hat in his
hands.
He got it.



He is giving the hat to
Mary.



"See what is in the hat,
Mary!"



What is in the hat?
Mary will see.



What is she taking from
the hat?



What is that in her
hand?
It is money.



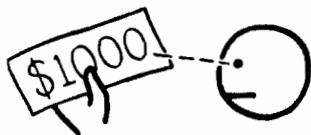
"Do you see?"



She sees.



What does she see?
One thousand dollars.



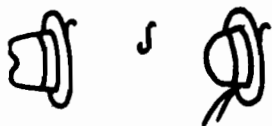
The money is in her
hand.
It was in the hat.

Where was the hat?
It was on the table.



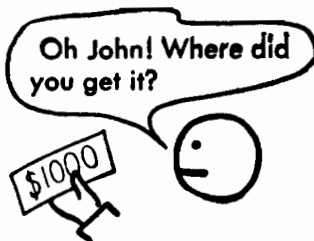
What did she see?
She saw the hat.
She did not see the
money.

She put the hat in the
other room.
John went there and
got it.

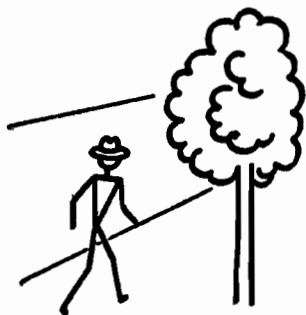


Who got it? John did.

Does she see the money
now?
Yes, she sees it.



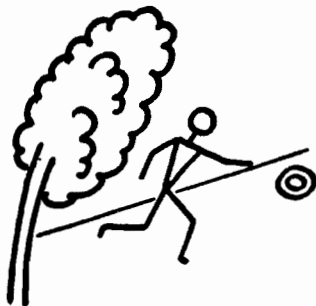
I was in the street.
I was coming here.



The wind came. It took
my hat off.



I went after my hat.



When I took it up, there
was this money.

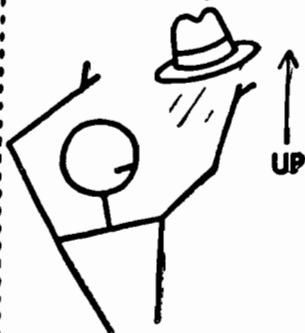


The money was under the hat.

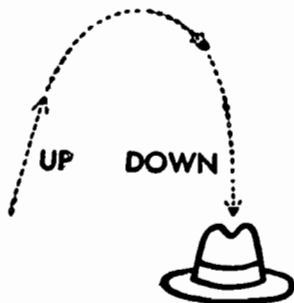


The hat was over the money.

The wind came. My hat went up.
When the wind came, my hat went up.



The hat came down again.



It was over the money.
The money was under the hat.



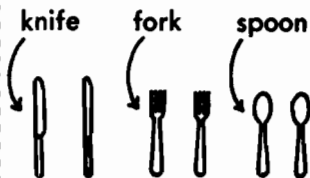
What is Mary doing?



She is taking things from a drawer.

What are those things in the drawer?

They are knives, forks and spoons.



The drawer has knives, forks and spoons in it.

Mary has a knife, a fork and a spoon in her right hand.



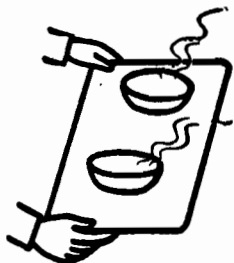
She took them from the drawer.

She will put them on the table.



These are drawers.
One of them is open.
The other two drawers are shut.

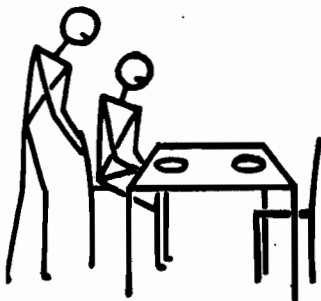
**Mary is getting the soup.
These are plates of soup.**



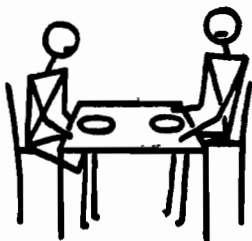
**John is taking the seats
to the table.**



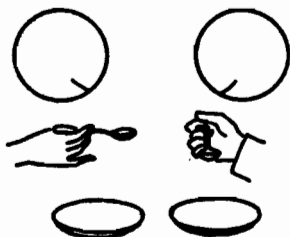
**Mary is in her seat at
the table.**



**John is in his seat.
They are in their seats
at the table.**

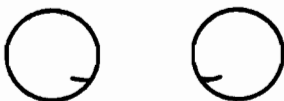


Now they are taking
their soup.



They have their spoons
in their hands.

John is saying to Mary,
"I took the hat up."



Mary is saying to John,
"Where did the money
come from?"

John said, "I saw it
there under the hat."



Mary said, "But who
put it there?"

John said, "Nobody
put it there. The money
was there and the
wind came and put the
hat down over the
money."

Nobody=no man or
woman or boy or girl
or baby.



Mary is getting the new dress. She is in a store. The other woman has two dresses in her hands.



This is the store.



Dresses and hats and shoes are in the window of the store.



These are shoes.
They are women's shoes.



These are gloves.
Dresses and stockings
and shoes and gloves
are clothing.



These are stockings.

This is a tree.
This is a branch of the tree.
An apple is on this branch.
It is over the girl's head.



She will take the apple from the branch.
She will put her hand up.

She put her hand up.
She took the apple. It is in her hand.
She took the apple which is in her hand.
She has it in her hand.
She is putting it in her basket.



She put it in her basket.
She had it in her hand before she put it in her basket.
It was on the branch before she put her hand up and took it.



After she took the apple she put it in the basket.
Then she put her basket down. The apple was up on the tree.
Now it is down in the basket.





When was the apple on the branch?
When was it over her head?
It was on the branch before she took it. It was on the branch then.



When did she take it?
She took it after she put her hand up.
She took it then.

When did she put it in the basket?



She put it in the basket after she took it from the branch.

When did she have the apple in her hand?



She had it in her hand after she took it from the branch and before she put it in the basket.

This is a box.



This is the front of the box.

This is a house.



This is the front of the house.

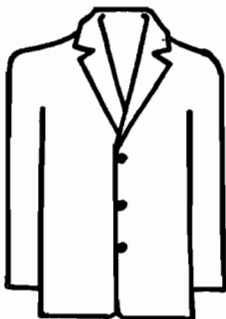
This is the front door.

This is the back of the box.



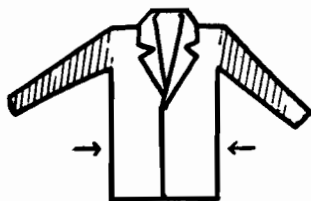
And these are the sides of the box.

This is a coat.

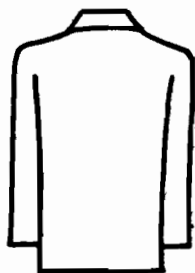


This is the front of the coat.

**These are the arms of
the coat.**

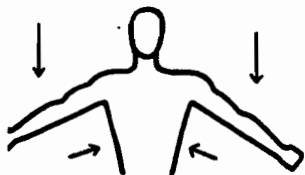


**These are the sides of
the coat.**

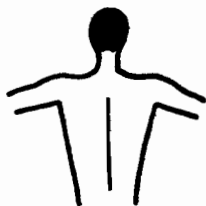


**And this is the back of
the coat.**

These are a man's arms.



These are his sides.



And this is his back.

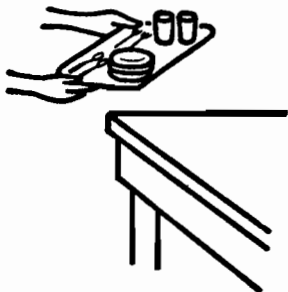
Who is this?
This is Mrs. Smith.
She is Mary Smith.
"Mary Smith" is her
name.



What is that? What is
in her hands?
It is a tray.
She has a tray in her
hands.



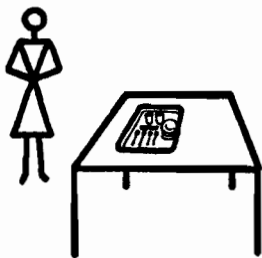
She will put the tray on
the table.



She is putting the tray
on the table.

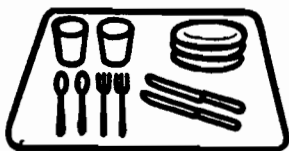


She put the tray on the table.



**It was in her hands.
It is on the table now.**

Here is the tray.



**What are these things
on the tray?**

These are glasses.



**What are these?
They are forks.**



**What is this?
It is a knife.**



**What are these?
They are two other
knives.**



**What are these?
They are spoons.**



**What is this?
It is another spoon.**



**What is this?
It is a plate.**



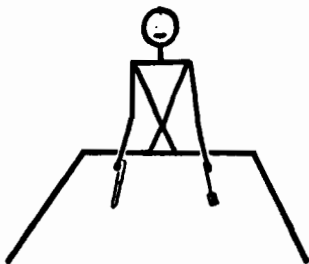
**These are three other
plates.**



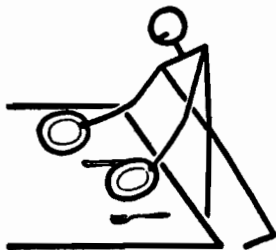
**Mrs. Smith is taking a
knife and fork off the
tray.
She has them in her
hands.**



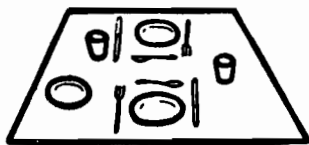
**She is putting them on
the table.**



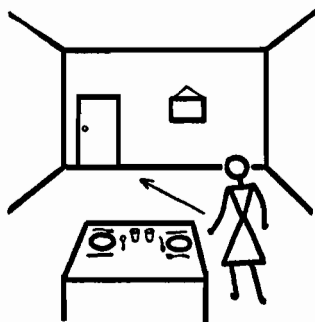
**Now she is putting the
plates on the table.**



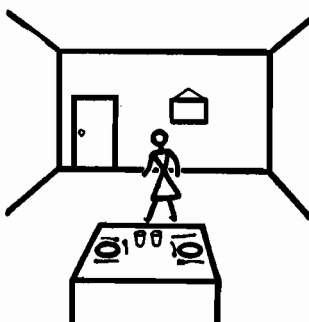
**She put the knives and
forks and spoons and
plates and glasses on
the table.
She put these things on
the table.**



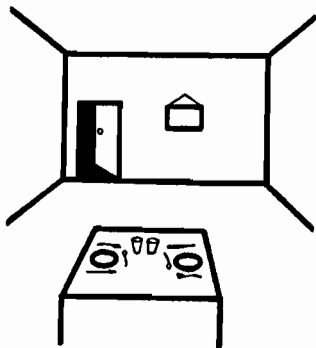
**Mary Smith will go from
the table to the door.**



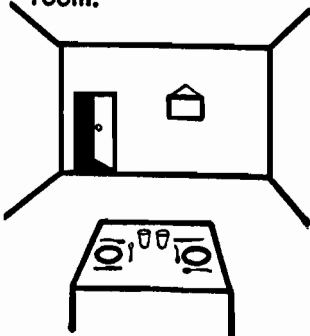
**She is going to the door.
The door is shut.**



**She went out of the
room.
The door is open now.
It was shut.**



**Mary Smith is not in the
room.
She was in the room.
She went out of the
room.**



What is this?
It is a knife.



What is this?



What is this?



What is this?



What are these?



What is this?



What is this?



What is this?



What is this?



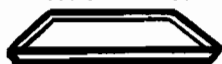
What are these?



What is this?



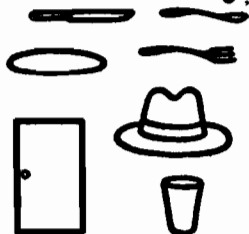
What is this?



What is this?



What are these things?



Mary is making soup.



This is a plate of soup.



She will make the soup
from milk and potatoes.

These are potatoes.



This is a bottle of milk.
It is cow's milk.



This is a cow.



Cows are animals.
These are some other
animals.

a pig



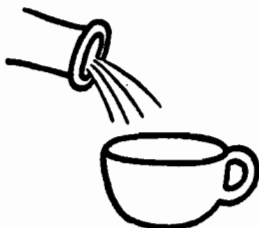
a sheep



a horse



We get milk from cows.
Mary is putting some
milk in a cup.



The milk is going into
the cup.

Mary has a potato in her hand.



She is taking its skin off with a knife.



We get potatoes from the roots of a plant.



Here they are in the earth.

We get them up with a fork.



This is a plant.

This is its flower.



These are its leaves.

These are its fruit.

This is a branch.

This is its stem.

These are its roots.



These are roots of other plants.



Mary is making the soup.



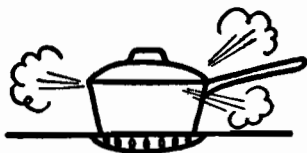
This is the pot.



This is the cover of the pot.

She will make the soup in this pot.

**She put the potatoes in the pot.
The water in the pot is boiling.**

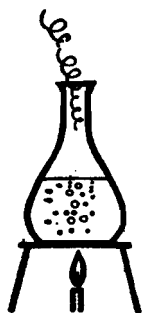


This is a flame.

This is steam.



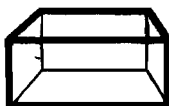
**The pot is over the flame.
The flame is under the pot.**



**This water is boiling.
It is giving off steam.
The heat of the flame is
making it give off steam.**

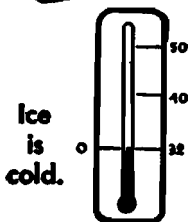
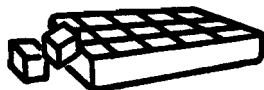
Ice is solid.

This is ice.



**Water is a liquid.
This is water.**

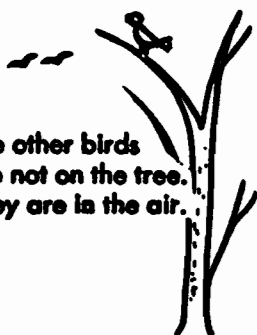
**This is a tray.
It is a tray of ice.**



**The room is warm.
The heat of the flame is
making the room warm.
The things in the room
are warm.
Ice is not warm. It is
cold.**



**This is a bird.
It is on a tree.**



**The other birds
are not on the tree.
They are in the air.**



**This is a plane.
It is in the air.**

**It is going through the
air.**

These are planes.



**We take in air through
our mouths and through
our noses.**



**The air comes in. Then
it goes out. That is a
breath.**

in out one breath

**in out two breaths
in out**

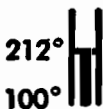
**The air is coming
out. It is warm.
When it comes
out it is warm.**



**Put your hand
here. Your breath
is warm.**



The room is warm.
The water in the pot is
very warm.
It is boiling.



The air over the flame
is very warm.
It goes up.



The air under the flame
is not very warm. It goes
up to the flame.

This is the fridge
It has ice in it.
The air in the fridge is
cold.



This is
milk.

These are
eggs.



This is the fridge
Mary keeps the milk in
the fridge
She keeps it in the cold
air.

The air in the fridge is
cold.

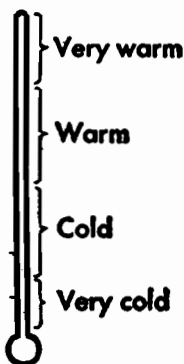
The cold air keeps the
milk cold.

This is a clock.

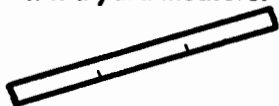


**A clock is an instrument
for measuring time.**

**This is an instrument for
measuring heat.**

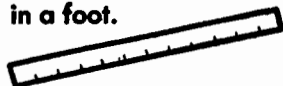


**This is a measure.
It is a yard measure.**



**There are three feet in
a yard.**

**There are twelve inches
in a foot.**



**This is
Mary's foot.**



These are her feet.



**This is John's foot.
It is ten inches long.**

The walls and floor of the fridge are thick.



This is a thin line.

This is a thick line.

Warm
air



Warm
air

The thick walls keep the heat of the room out of the fridge.

They keep the heat from the milk.

The cold air in the fridge keeps the milk good.

John is having a drink.
He is having a drink of milk from a glass.



The milk is good.
John is happy.

This milk is not good.
It is bad.



John is not happy.

This is meat.



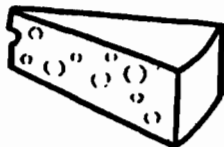
Mary keeps the meat in the fridge.

This is bread.



**Mary does not keep the bread in the fridge.
She keeps it in a bread-box.**

This is cheese.



**We make cheese from milk.
We get milk from cows.**

This is butter.



**We make butter from milk.
Mary keeps the butter with the milk in the fridge.
She keeps the cheese there.**

These are apples.



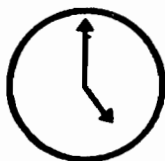
These are oranges.



Apples and oranges are fruit.

Does Mary keep the fruit in the fridge?

What is the time?



The time is five (5:00).

It is five.

Mary will make the soup.

What is the time?



It is five-thirty (5:30).

Mary is making the soup.

The potatoes are in the pot. The water in the pot is boiling.

It is five-forty (5:40).



Mary has a fork in her hand.



She is putting the fork into the potatoes.

**The potatoes are hard.
The fork does not go
into them.**



**It is five-fifty (5:50).
Mary is putting the fork
in again.
She is doing it again.**



**The potatoes are soft.
The fork goes into them.**



**She is taking them out
of the pot and putting
them on a plate.**

The potatoes are on the plate.



**They were in the pot.
They were hard.
They are soft now.**

Mary is crushing them with a fork.



**They are not hard now.
They are soft.**

Bread is soft.



Meat is soft.



Glass is hard.



Butter is soft.



John has a bit of
cheese in his fingers.



He is putting the bit of
cheese in his mouth.



Now it is between his
teeth.



This is his mouth.

This is a tooth.



These are teeth.



The cheese is not soft.



It is hard.



John's teeth do not go
into the cheese.

Mary put the potatoes
and the milk and other
things into the pot.
This is salt.
(See page 242)

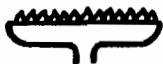


She put the pot over
a low flame.
She put the cover on
the pot.



The low flame is under
the pot.

This flame is low.



This flame is high.



This building is high.



This building is low.



**What is the time?
It is six (6:00).**



**Mary is tasting the soup.
It has a good taste.
The soup is ready.**

**Now she is putting the
soup in the plates.**



It was in the pot.



Now it is in the plates.

**She made the soup.
She put it in the plates.
She took them to
the table.**



**The plates are on
the table.
The soup is ready.
It is good soup.
Mary made it.**



are food.

They are different
sorts of food.

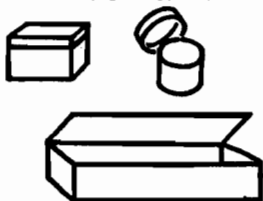


Apples and oranges
are different sorts of
fruit.

These are different
sorts of glasses.

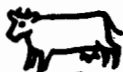


These are different
sorts of boxes.



Glasses and boxes and
fingers and dresses
and flames are things.
They are different
sorts of things.

Cows



and sheep



and pigs



and horses



and goats



are animals.

They are different
sorts of animals.

These are different
sorts of plants.



This is the leaf of
one sort of plant.



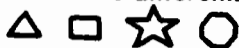
This is the leaf of
another sort of plant.



These are the same.



These are different.



These are the same.



These are different.



These plates are the
same.



These plates are
different.



These glasses are the
same.



These are different.



**Here are a woman
and a boy.**



**The boy is the
woman's son.
She is his mother.
He is her son.**

**Here are a woman
and a girl.**



**The girl is the
woman's daughter.
The woman is her
mother.**

**Here are a man and
his son.**



**The man is the father
of the boy.
He is the boy's father.**

**Here are a man
and his daughter.**



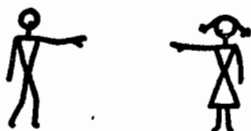
**He is the father
of the girl.
He is the girl's father.
She is his daughter.**

**The boy is the brother
of the girl.**



**He is the girl's brother.
He is her brother.**

**The girl is the sister
of the boy.
She is the boy's sister.
She is his sister.**



This man and woman



**have
two sons**



**and
three daughters.**

**This boy has one
brother and three
sisters.**

**This girl has two
brothers and two
sisters.
They are a family of
seven (7).**

Here are Mrs. Smith,
her daughter Jane,
and her son Tom.



They are at the table.
They are having their
potato soup.



Potato soup is a thick
soup. It is not clear.
Thick soup and clear
soup are two different
sorts of soup.

This water
is clear.
When a
liquid is
clear we
see
through it.



The air is clear. I see
the mountains.
When the air is not
clear I do not see them.

Milk is not
a clear
liquid. We
do not see
through it.





This soup is clear. We see the spoon through it.

Potato soup is a thick soup. We do not see the spoon through it.

Who is this?



This is Mary Smith.
She made the soup.
This is Mary who made the soup.



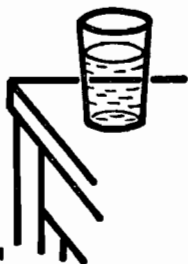
This is the soup. Mary made it.
This is the soup which Mary made.



This is the milk. Mary put it in the soup.
This is the milk which Mary put in the soup.



**This is a spoon. It is in
my hand.
This is a spoon which
is in my hand.**



**That is a
glass of
water. It is
on the table.
That is a glass of water
which is on the table.**



**This is a bone. It was in
the dog's mouth.
This is a bone which
was in the dog's mouth.**



**This is a dog. He had
the bone.**

**This is the dog who
had it.**

QUESTIONS



a What is the time?



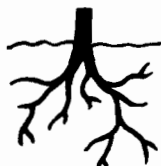
b What are these?



c What is this?



d What are these?



e What are these?



f What is this?



g What is this?



h What is this?

Answers are on page 116.

QUESTIONS



a What is the time?



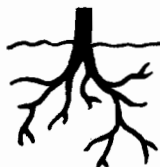
b What are these?



c What is this?



d What are these?



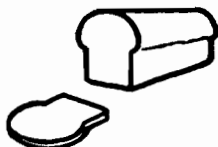
e What are these?



f What is this?



g What is this?



h What is this?

Answers are on page 116.

QUESTIONS

a What is this?



b What is this?



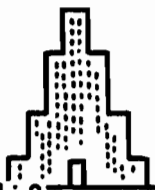
c What are these?



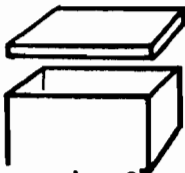
d What is this?



e What is this?



f What are these?



g What is this?



h What is this?



Answers are on page 116.

QUESTIONS

a This is a family.



What do you see?

b This is a plant.



Which parts of the plant do you see?

c This is a fridge.



What do you see in it?

d This is a dog.



Which parts of the dog do you see?

e What do you see?



f What do you see?



g What do you see?



h What do you see?



Answers are on page 116.

Answers to questions on pages 113-115.

Page 113

- a The time is four-forty-two (4:42).
- c It is a pot.
- e They are roots.
- g It is butter.
- b They are apples.
- d They are leaves.
- f It is a bottle of milk.
- h It is bread.

Page 114

- a It is cheese.
- c They are flames.
- e It is a high building.
- g It is a pig.
- b It is a cup.
- d It is a horse.
- f They are a box and its cover.
- h It is a sheep.

Page 115

- a I see a father and mother and their son and daughter.
- c I see a bottle of milk and four eggs and two roots.
- e I see a bone. It is on the floor. And I see the leg of a table.
- g I see a woman. She has a spoon in her hand. She is tasting the soup.
- b I see its roots and its stem and its leaves and its flower.
- d I see its head and ears and nose, its body, its legs, and its tail.
- f I see two glasses. One of them has liquid in it.
- h I see a man. He has a glass in his hand. He is having a drink from the glass.

QUESTIONS

a Where are the women?



What has one woman in her hands?

b What are these?



c What is the girl doing?



Where is the apple?

d Where will she put the apple?
Where was it before she took it?
(See pages 82-83)

e What are some different sorts of food?

f What are some different sorts of animals?

g What are some different sorts of fruits?

h What are some different sorts of persons?

Answers are on page 120

QUESTIONS

- a This is a glass of milk.
Is it clear? Do you see through it?



- b Is the glass in this window clear?
What do you see through the window?



- c Is glass hard?

- d Is meat soft?

- e Is ice warm?

- f Are flames cold?



- g What is he doing?



- h What is she doing?

Answers are on page 121.

QUESTIONS

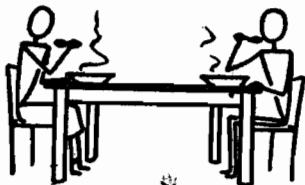
a What do you see?



b What is he doing?



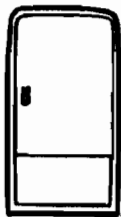
c What are they doing?



d What are these?



e What do we keep in the fridge?



f What are some different sorts of things? Give the names of ten different things which you see in a house.

Answers are on page 121.

Answers to questions on page 117.

- a They are in a store. It is a clothing store. She has two dresses in her hands.**
- b These are shoes (women's shoes) and stockings and gloves.**
- c The girl is putting her hand up to the apple. It is on a branch of an apple tree.**
- d She will put it in her basket. Before she took the apple it was on the tree.**
- e Bread, butter, milk, cheese, meat, eggs, and fruit are different sorts of food.**
- f Cows, pigs, sheep, goats, and horses are different sorts of animals.**
- g Apples and oranges are different sorts of fruit.**
- h Men, women, boys, girls, and babies are different sorts of persons.**

Answers to questions on pages 118-119.

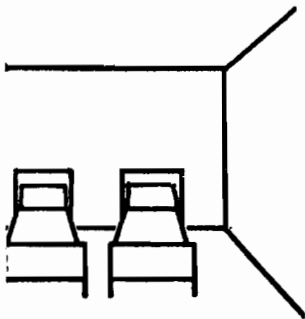
Page 118

- a No, it is not clear.
No, I do not see through it.
- c Yes. Glass is hard.
- e No. Ice is cold.
- g He is taking potatoes out of the earth with a fork.
- b Yes. The glass in the window is clear. I see some mountains and a house.
- d Yes. Some meat is soft. But some meat is hard.
- f No. Flames are not cold.
- h She is putting some salt in the potato soup.

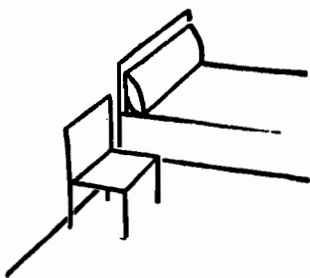
Page 119

- a I see a man. He is in a street. His hat is in the air. The wind is taking it up. The wind took it off his head.
- c They are in their seats at the table. They have their spoons in their hands. They are taking their soup.
- e We keep the milk, butter, cheese, eggs, meat, and fruit in the fridge.
- b He is putting his hat on his head.
- d One of them is a clock. The other is an instrument for measuring heat.
- f Rooms and doors and windows and tables and seats and boxes and knives and spoons and forks and shelves . . . are different sorts of things.

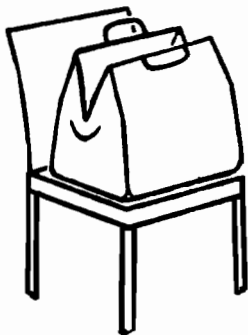
This is a bedroom.
There are two beds in it.



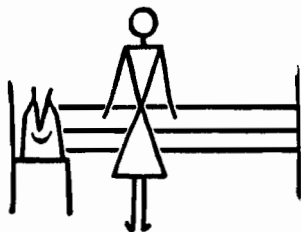
This seat is by the bed.



What is on the seat?
A bag is on the seat.



A woman is by the bed.
Who is she?
She is Mrs. Smith.





What is she doing?
She is putting things
into the bag.

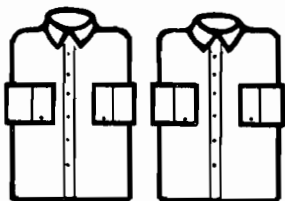


What is she putting into
the bag? She is putting
Mr. Smith's things into it.

Mr. Smith is going to
California. Mr. and Mrs.
Smith are in New York
State.

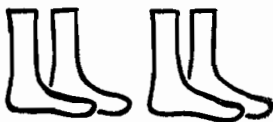


He will go by train. This
is a train. From New
York State to California
is a long journey.



What will he take with
him to California?
He will take some shirts.

He will take some socks.



He will not take old
socks. Old socks have
holes in them.

He will take new socks.
New socks have no
holes in them.



These trousers have a
hole in them.
They are old trousers.



He will take some shoes.



He will put them in a shoe bag.



The shoe bag will keep the other things clean.



The bag is between the shoes and the shirt. The shoes will not make the shirt dirty.

My hands are dirty.



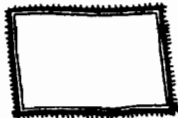
My hands are clean.



This cloth is dirty.



This cloth is clean.



This plate is clean.



His face is dirty.



This plate is dirty.



His face is clean.



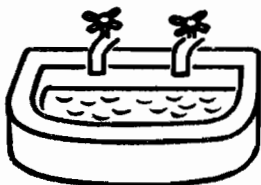
**The plate is dirty but
the cloth is clean.**



**Now the cloth is dirty
but the plate is clean.**



This is a basin.



This is warm water in it.

This is soap.



What is she doing?



She is washing her hands with soap and warm water.



Her hands are wet now but they are clean. They were dirty.

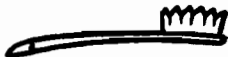


What is she doing?
She is drying her hands
on a cloth.

Her hands were wet.

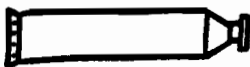


Now they are dry.
They were dirty.
Now they are clean.



What is this?
It is a brush.
It is a toothbrush.

She is putting some
toothpaste on the brush.



What is this?
It is toothpaste.



Now she is brushing her teeth.



Her teeth will be clean.
They will be clean and white.

What is this?
It is a comb.

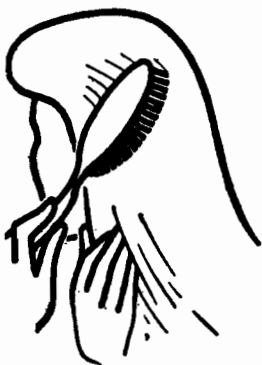


And this?



It is a brush.
It is a hairbrush.

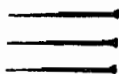
She is brushing her hair.



Now she is combing her hair.



What are these?



They are pins.

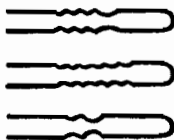
**One pin is very like
another pin.**

This pin



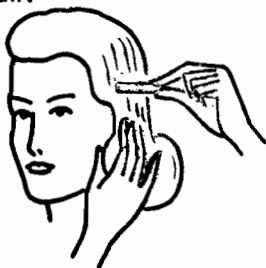
is like this pin.

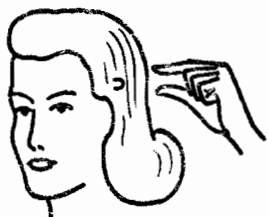
**But they are two pins.
They are not the same
pin. They are different
pins.**



**These are three hairpins.
They are different
hairpins.**

**She has a hairpin in
her hand.
She is putting it in her
hair.**





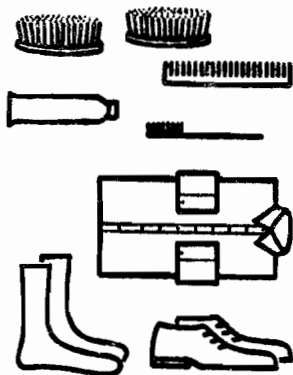
Now it is in her hair.
It was in her hand.
It is in her hair now.
But it is the same
hairpin.



He is brushing his hair.
He does not put pins in
his hair.

Mrs. Smith put some
shirts and some socks
and shoes (in a shoe
bag) and a comb and
brushes and toothpaste
and soap and a wash
cloth in Mr. Smith's bag.

She put all these things
in his bag.



Mr. Smith will go to the station in a taxi.



This is a taxi.
Mr. Smith is getting into it.
He has his bag with him.



This is the station.
The taxi is in front of the station.
The time is 8:00.
The train will go at 8:30.

Mr. Smith is getting out of the taxi.



Now he is going into the station.



**This is the waiting room
in the station.**

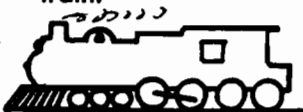


**Those men and women
on the seats in the
waiting room are
waiting. They are
waiting for their trains.**

Here is a train.



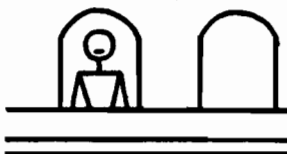
**This is the engine of a
train.**



**These are rails. The train
goes on these rails.
It is a railroad train.**

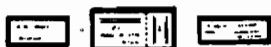


TICKETS



**Here is the ticket office
in the station.
Mr. Smith got his ticket
here.**

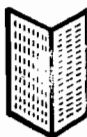
Here is his ticket.
He gave \$132.35 for his ticket.



These are tickets.

How much was his ticket for the journey to Los Angeles?

It was one hundred and thirty-two dollars and thirty-five cents (\$132.35).



How long is the journey?

Four days.

Which days will he be on the train?

He will be on the train

Sunday, Monday,

Tuesday, Wednesday.

The other days of the

week are Thursday,

Friday, Saturday.

How much money did he take with him for his journey?

He took five hundred and nineteen dollars (\$519.00).

Much money: \$5000

Little money: \$5

Mr. Smith has friends in California.



Mr. Smith His friends
Here are his friends.
He and his friends are
shaking hands.

(See page 254)

His friends were waiting
for him at the station.



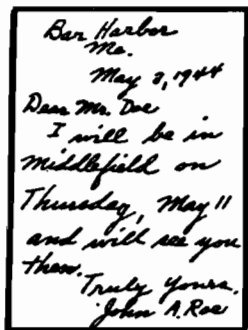
They say, "Did you have
a good journey?"
He says, "Yes, but it
was a long journey."



His friend says, "Let me
have your bag, please."
He will go with his
friends to their house.



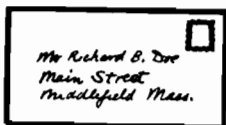
This is a letter: a.
These are letters: a, b, c.
This is a word: man.
Three letters make
the word man.
The man is writing a
letter.
He is writing on paper
with a pen.



This is the letter:
It is in Mr. Roe's writing.
Mr. Roe will send the
letter to Mr. Doe.

Here is the letter ready
for the post.

Here is the stamp.



Mr. Doe's name and
street and town are on
the letter.
Mass. is short for
Massachusetts.
Middlefield is in
Massachusetts.

This is the back of the
letter.
Mr. Roe's name, and the
town where he is living



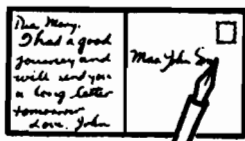
are on the back of the
letter.
Me. is short for Maine.
Bar Harbor is in Maine.
Massachusetts and
Maine are two states
of the United States
of America.

Mr. Smith is writing a card to Mrs. Smith. He is in San Francisco. On one side of the card is a picture of the harbor. Here is the picture. This is a picture post card.



Here is the other side of the card.

Mr. Smith is putting Mrs. Smith's name on it.

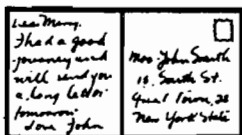


He will put her street under the name.

He will put her town under the street.

Then he will put the state where her town is.

Now the card is ready for the post.



There is a stamp on the card.

Mrs. Smith's name and street and town are on the right hand side of the card.

Mrs. Smith's town is in New York State.

Mr. Smith is taking the card to the Post Office. He is going up the steps.

POST OFFICE



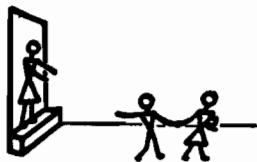
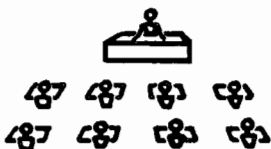
He will put the card in the letter box on the wall of the Post Office.

He is sending the card to Mrs. Smith.

This morning Mrs. Smith got the card which Mr. Smith sent to her from San Francisco. She is reading it now. She is reading: "I had a good journey. . . ."



Reading and writing are parts of our education. We get a great part of our education at school. These boys and girls are at school. The teacher is teaching them.



Mrs. Smith is sending Jane and Tom to school. They will be at school before nine. They get good teaching at school.

At school, Tom and Jane are learning. They were reading and now they are writing.



Tom is writing the word *learning* on the board. The teacher is teaching him the word *learning*.

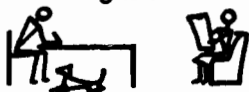
Now Tom and Jane are back from school. Jane is reading a story.

It is eight-thirty.



Tom is writing at the table.

Tom's dog is at his feet.



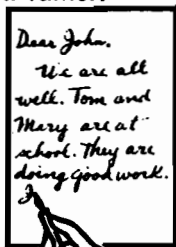
Mrs. Smith is reading the newspaper.



Tom and Jane are getting a good education. They get some of it at school, and they get some of it from their mother and father. Mrs. Smith is taking a look at Tom's work. It is good work.



Now Mrs. Smith is writing a letter to Mr. Smith. She sends love from Tom and Jane to their father.



She will send the letter to Mr. Smith.



She has the letter in her hand.

Now she is sending the letter.



She sent the letter.



QUESTIONS

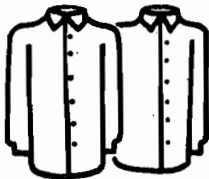
a What are these?



What is this boy doing?



b What are these?



What is the man doing?



c What are these?



What is the girl doing?



d What is this?



What is the woman doing?



Answers are on page 148.

QUESTIONS

- a On page 133, where did Mr. Smith get his ticket?



- b How much was the ticket?

- c How long was the journey to Los Angeles?

- d Did he go in an airplane?

- e What did his friends say to him when they saw him?

- f What did he say on the card which he sent to Mrs. Smith?

- g What are Tom and Jane learning at school?

- h What did Mrs. Smith send to Mr. Smith from Tom and Jane?

Answers are on page 148.

**This is a plate.
The plate is round.**



**This is an orange.
The orange is round.**



**The face of
the clock is
round.
The hands of
the clock go round.**



This is the earth.



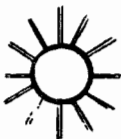
The earth is round.

This is the moon.



The moon is round.

This is the sun.



**This is
the sky.**



This is a cloud in the sky.

This is the earth.

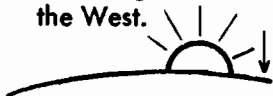
The sun comes up in the East.



It comes up every morning.



The sun goes down in the West.



It goes down every night.

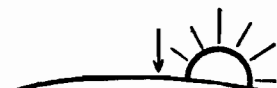


What is the time?
It is five-eight A.M.



The sun is coming up now
at five-eight (5:08) A.M.

What is the time?
It is five-twenty
(5:20) P.M.



The sun is going down,
now at five-twenty
(5:20) P.M.

Yesterday the sun came up at five-seven (5:07) A.M. and went down at eight-nineteen (8:19) P.M.

Today the sun came up at five-six (5:06) A.M. and will go down at eight-twenty (8:20) P.M. Tomorrow it will come up at five-five (5:05) A.M. and will go down at eight twenty-one (8:21).

This is night.

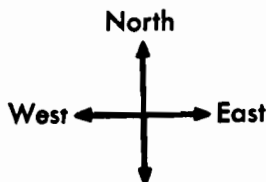


This is the earth.
That is a star.

This is morning.



The sun is coming up.



North, South, East, West
are four directions.

There are twenty-four hours in one day.
Twenty-four hours make one day.
Two and two make four.
Three and five make eight.
What do five and six make?
Do they make ten, or eleven, or twelve?
That is a question.
The answer is "Eleven."

Say these numbers: 1, 2,
3, 4, 5, 6, 7, 8, 9, 10, 11,
12.

What number comes
after 12?

Thirteen.

What comes after 13?

Fourteen.

What comes after 14?

Fifteen.

What numbers come
after 15?

Sixteen 16

Seventeen 17

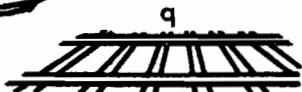
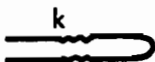
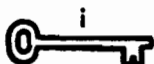
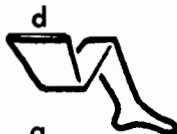
Eighteen 18

Nineteen 19

Twenty 20

Twenty 20	Twenty-one 21	Eighty 80	Ninety 90
Thirty 30	Thirty-one 31	A hundred 100	
Forty 40	Forty-one 41	A hundred and one 101	
Fifty 50	Fifty-one 51	A thousand 1000	
Sixty 60	Seventy 70	A million 1,000,000	

WHAT ARE THESE THINGS?

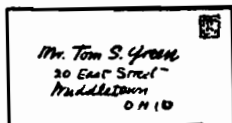


Answers are on page 149.

QUESTIONS

- a What do seven and eleven make?
What do twenty and forty make?
What do thirteen and thirty make?
What do two hundred and three and three hundred and four make?

- b Where does the sun come up and where does it go down?
Does day come after night? Does night come after day?



- c This is a letter. Where do we put Mr. Green's street and town and state on the letter?
- d Tom's work at school is learning. He is a learner. What is the teacher's work?

Answers are on page 149.

Answers to questions on pages 140-141.

Page 140

- | | |
|---|---|
| <p>a They are shoes.
He is putting his shoes on his feet.</p> <p>c They are toothpaste and a toothbrush.
She is brushing her teeth.</p> | <p>b They are shirts.
He is putting his things in his bag.</p> <p>d It is soap.
She is washing her hands.</p> |
|---|---|

Page 141

- | | |
|---|---|
| <p>a He got his ticket at the ticket office in the station.</p> <p>c The journey was four days long.</p> <p>e They said, "Did you have a good journey?"</p> <p>g They are learning reading and writing at school.</p> | <p>b The ticket was \$132.35.</p> <p>d No. He did not go in an airplane. He went in a train.</p> <p>f He said, "I had a good journey and will send you a long letter tomorrow. Love. John."</p> <p>h She sent love from Tom and Jane.</p> |
|---|---|

Answers to questions on pages 146-147.

Page 146

a a bed	b a bag	c a sock
d a stocking	e a shoe	f a hairbrush
g a toothbrush	h a comb	i a key
j a lock	k a hairpin	l a fork
m an engine	n a plate	o two pins
p a pen	q rails	r a card
s a stamp	t a flame	u a frame
v a hook	w a book	x a bell
y a bottle	z a glove	

Page 147

- | | |
|---|---|
| <p>a Eighteen. Sixty.
Forty-three. Five
hundred and seven.</p> <p>c We put his street
under his name and
we put the name of
the town under the
name of the street.
And under that we
put the name of the
state.</p> | <p>b The sun comes up in
the East and goes
down in the West.
Yes, day comes after
night. Yes, night
comes after day.</p> <p>d The teacher's work
is teaching.</p> |
|---|---|

This boy's name is Tom.



This girl's name is Jane.



Tom is making something.



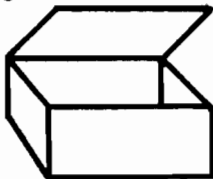
Jane is saying, "What are you making, Tom?"



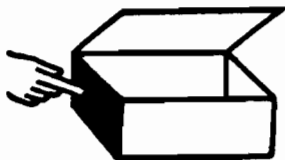
Tom is saying, "I am making a house."



This is a box.



This is one side of the box.



This is the opposite side of the box.



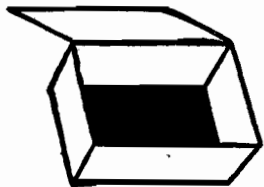
This is the front of the box.



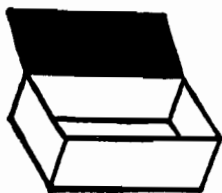
And this is the back of the box.



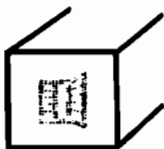
This is the floor of the box.



And this is the cover of the box.



Now this side will be
one wall of the house.



I will put a window in
here.

This will be the opposite
wall of the house.



I will put another
window in this opposite
wall.

The front of the box will
be the front of the house.



I will put a step under
the door.

This is a step.



These are steps.

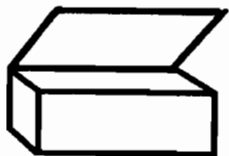
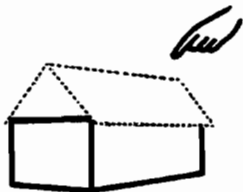


Three
steps.

Jane said, "A house has a roof. Will you put a roof on the house? How will you make the roof?"



I will make the roof from the cover of the box.



No. There is not enough wood in the cover.

The cover is not long enough.
It is not wide enough.

How long is the cover?

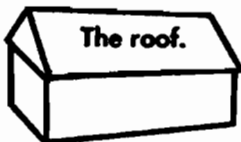


The roof is like this.

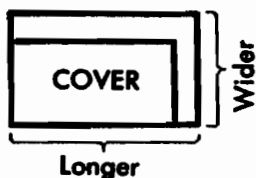


How wide is the cover?

I am measuring it.



Here is a wider bit of wood.



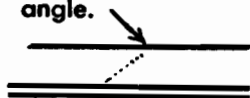
I will make the roof from this other bit of wood.



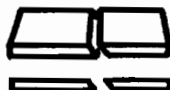
It is wider and it is longer.

I will make a cut in this wood.

I will make a cut at this angle.



A cut.



This is an angle.



This is an angle.



This is a right angle. This is another right angle.

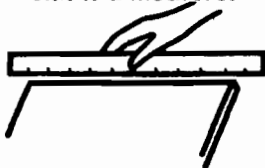


**"What are you doing,
Tom?"**

**"I am measuring the
wood."**

It is good wood.

This is a measure.



We get wood from trees.

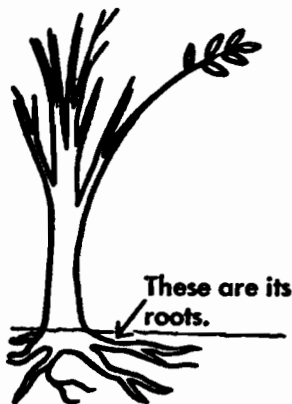
These are trees.



Some wood is hard.

Some wood is soft.

This is a tree.



**These are its
roots.**

**We get hard wood
from some trees.**



**They give hard wood
to us.**

**Other trees give soft
wood to us.**



Now I am making a cut
at this angle in this bit of
wood.



The blade is going
through the wood.

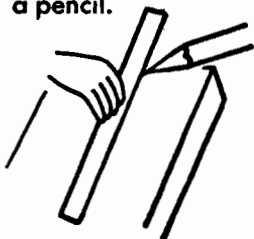
This is my knife.



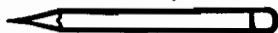
This is the blade of my
knife.

I am making a line on the
wood.

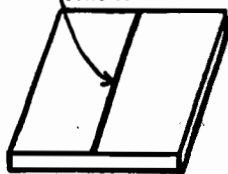
I am making a line with
a pencil.



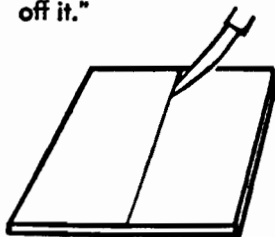
This is the pencil.



This is the line.



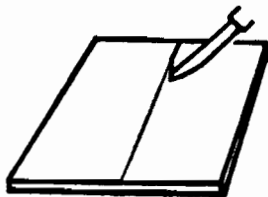
**"Keep on the line when
you are cutting. Don't go
off it."**



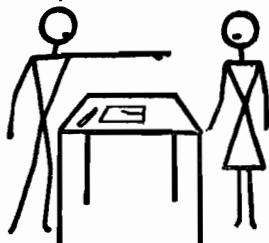
**Oh! You are going off
the line!
The cut is not on the line.**



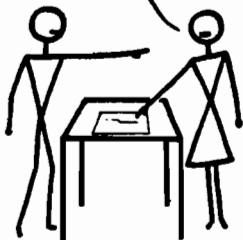
**That is bad! The cut is
off the line.**



**You did that! You gave a
push to the table.**



No, I did not! Your knife went off the line.



Yes. It went off the line.

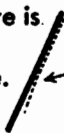
Do it again!



It's not very bad.

Here is the line.

And here is the cut.



a straight line

a bent line

Tom is making another attempt.

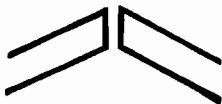


That is better. The cut is straight. The blade of the knife went straight. Good!

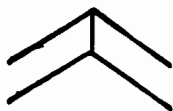
Now I have these two bits of wood.



I will put them together like this.



There is the roof of the house.



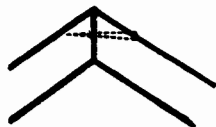
Now I will put the two parts of the roof together with nails.



These are nails.



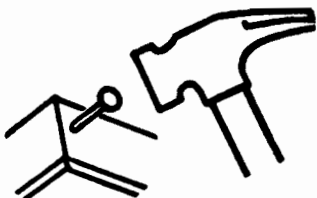
I will make a hole through this part of the roof into the other part of the roof.



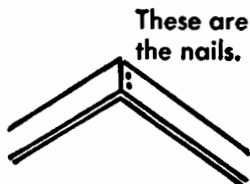


Tom is making the holes for the nails.

Now he is putting the nails in with his hammer.



Now the two parts of the roof are together.



The roof is ready.

Oh yes,
it is very
strong.

Is it
strong?



Don't do that!
Oh, now it
is broken!



But you said,
"It is very strong!"
It wasn't strong.



I will make
it stronger.
Give the roof
to me, please.

I'm giving
it to you.



Is this line long?

This line is longer.

Is this bit of wood strong?



This bit of wood is
stronger.



Here are the supports for
the roof.



Will you put another
support for it in the
middle?

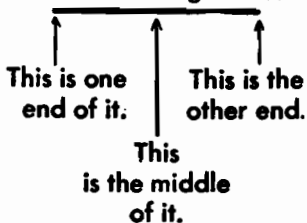
Where?



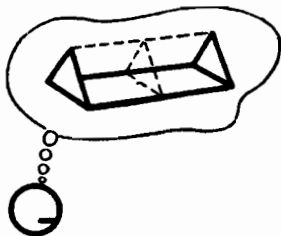
In the middle.

Yes, that is better.

This is a straight line.



This is a bent line.



That will be better.
That will make the roof
stronger.

Jane is making something.



What are you doing, Jane?



I am making a coat and trousers.



Here are the trousers.



Here is the coat.



"Has your coat a collar?"



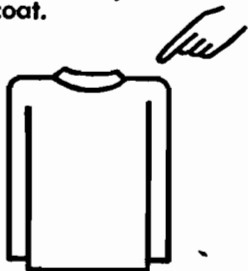
"Yes, it has. Here is the collar."

This is the front of the coat.

Here is the collar of the coat.



This is the back of the coat.



This is one side of it.

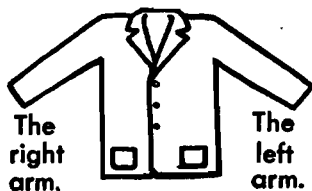


This is one pocket of it.

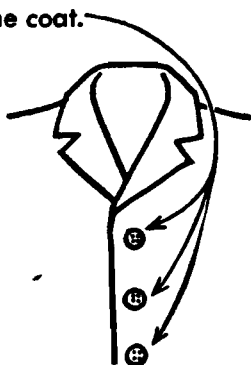
Here is the other side.



These are the arms of the coat.



These are the buttons of the coat.



This is a button.



This is a needle.



This is a button-hole.



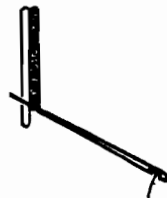
This is thread.



**What are you doing with
your needle now?**

**And I am making the
button-holes.**

**I am putting this button
on the coat.**



The girl will put the end of the thread through the needle..



She has the needle in the fingers of one hand and the thread in the fingers of the other hand.

This is the end of the thread.



This is the hole in the needle.



It is the eye of the needle.

The end of the thread is not going straight. It is not going through the hole in the needle.



The thread did not go through the needle. It is not through the hole in the needle now.



It is on one side of the needle.



It is on this side of the needle.



Now the girl is doing it again.

Is the end of the thread through the hole?

No, it is not. It is on the other side of the needle.

The girl is making another attempt. This time the thread will go through the hole. The end of the thread is straight.



It went through. The girl is taking the end of the thread in her fingers. The thread is through the needle.



Where are your
scissors?
Here they are.

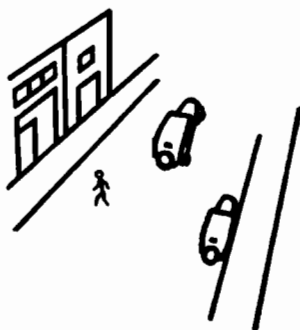


This blade is narrow. This blade is wide.

Narrow?
This is a narrow street.



This is a wide street.



These trousers are wide.

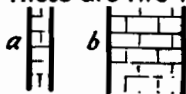


These trousers are narrow.



QUESTIONS

a These are two walls.



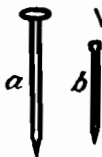
Which of them is thicker? Is wall A or wall B thicker?

b These are two cuts.



Which of them is wider? Is cut A or cut B wider?

c These are two nails.

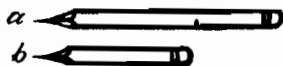


Which of them is longer?

d Which of these two men is stronger?



e Which of these two pencils is shorter?

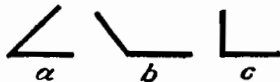


f Which of these two cards is longer?



Which is wider?

g Which of these three angles is a right angle?



h Which of these things are broken?



Answers are on page 174.

QUESTIONS

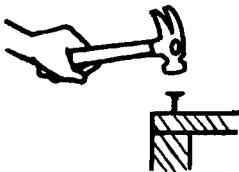
a What is he doing?



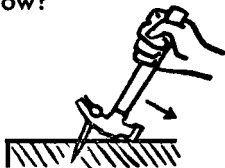
b What is she doing?



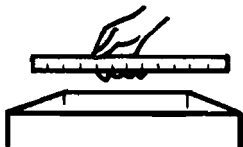
c What is he doing?



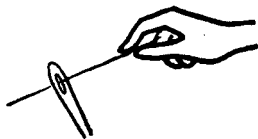
d What is he doing now?



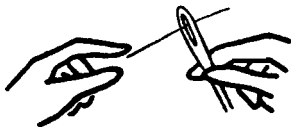
e What is he doing?



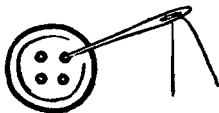
f What is she doing?



g What is she doing now?

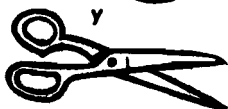


h And what is she doing now?



Answers are on page 174.

QUESTIONS



A What are these things?

C Which of them go on their feet?

B Which of them go through the air?

D Which of them go on the water?

Answers are on page 174.

Answers to questions on pages 171-173.

Page 171

- | | |
|-----------------------------|--|
| a Wall B is thicker. | b Cut B is wider. |
| c Nail A is longer. | d The man who is on his feet is stronger. |
| e Pencil B is shorter. | f Card B is longer.
Card A is wider. |
| g Angle C is a right angle. | h The cup, the hammer, and the plate are broken. |

Page 172

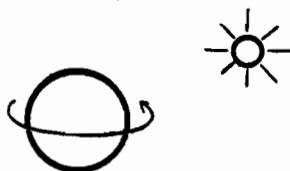
- | | |
|---|---|
| a He is going up the steps. | b She is going down the steps. |
| c He is putting a nail in with a hammer. | d He is taking a nail out with a hammer. |
| e He is measuring a box. | f She is putting a thread through the hole in a needle. |
| g She is taking the end of the thread between her finger and thumb. | h She is putting a button on with a needle and thread. |

Page 173

- | | | | |
|-------------|--------------|-------------|------------|
| A a a train | b its engine | c a plane | d a seat |
| e a ship | f a flower | g mountains | h trees |
| i a star | j a cloud | k the sun | l the moon |
| m a pig | n a sheep | o a horse | p a cow |
| q a dog | r a goat | s a coat | t a bird |
| u trousers | v a cup | w a knife | x a spoon |
| y scissors | | | |

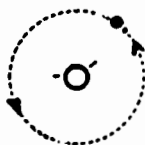
- B** Airplanes and birds go through the air.
- C** Pigs, sheep, horses, cows, dogs, birds, and goats go on their feet.
- D** Ships and some birds go on the water,

The earth goes round in
twenty-four hours.



There are twenty-four
hours in every day.
The sun comes up and
goes down every day
because the earth is
turning round.

The earth goes round
the sun in a year.



There are three hundred
and sixty-five days in a
year.
Three hundred and
sixty-five days make a
year.

There are seven days in a week. Seven days make a week.
Here are the names of the days of the week: Monday, Tuesday,
Wednesday, Thursday, Friday, Saturday, Sunday. Monday
is before Tuesday. Tuesday is after Monday.

There are thirty-one
or thirty or
twenty-eight days in a
month.
Here are the names of
the months:
January (31)
February (28)
March (31)
April (30)
May (31)

June (30)
July (31)
August (31)
September (30)
October (31)
November (30)
December (31).
January is before
February . . .
February is after
January . . .

These are the winter months: December, January, February.
These are the summer months: June, July, August.
These are the spring months: March, April, May.
These are the fall months: September, October, November.

In the North, the earth is cold in the winter.
The wind is cold.
Snow comes down from the sky.
There are no leaves on the trees.
There is ice over the water.
The days are short.



In the North, the earth and the air are warm in the summer. There are leaves on the trees.
The days are long.
There is no ice or snow.



In the spring the leaves come out on the trees.
Plants come up out of the earth, and flowers come out on the plants.



In the fall, the leaves
come down from the
branches of the trees.
Fall is the time of the
fall of the leaves.
They are coming down.
They are falling.

In the spring the days
get longer.
Every day is longer than
the day before it.
In the spring today is
longer than yesterday.

In the fall the days get
shorter.
Every day is shorter
than the day before it.
In the fall tomorrow will
be shorter than today.

This line
_____ is longer than
_____ this line.

The time between three
and four is shorter than
the time between three
and five.

One hour is a shorter
time than two hours.

Fifteen minutes make a
quarter of an hour.



Thirty minutes make
half an hour.

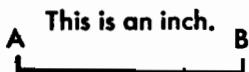


Forty-five minutes make
three-quarters of an
hour.



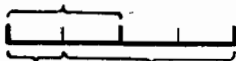
Which is shorter—a quarter of an hour or half an hour?

Which is shorter—the minute hand or the hour hand of a clock?



The distance from A to B is one inch.

Half an inch is a shorter distance than an inch.



A quarter of an inch Three-quarters of an inch

Twelve inches make a foot.



This is a foot.

How long is it?
It is ten inches long.

Three feet make a yard.

This is a yard measure.



There are thirty-six inches in a yard.

These are feet.



They are not twelve inches long.

Seventeen hundred and sixty yards (1760) make a mile.

In half a mile there are eight hundred and eighty yards.

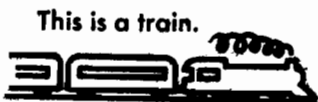
Miles, yards, feet, and inches are measures of distance.



What are this man and this girl doing?
They are taking a walk.

In one hour he will go two miles, and she will go four miles.

He is slow. She is quick.
She is quicker than he is.
He is slower than she is.



This is a train.

Trains are quicker than horses or men.

This is a plane.



Planes are quicker than trains or horses or men.

This baby is one year old.



This boy is ten years old.



This man is thirty years old.

This old man is ninety years old.

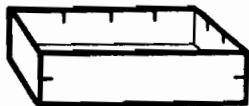
That is a stick in his hand.



The baby is very young. How old is he? He is one year old.

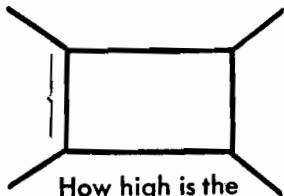
The old man is very old. How old is he? He is ninety years old.

This box is four inches long and three inches wide and two inches high.



How long is it?
It is four inches long.

This room is twenty feet long and sixteen feet wide and twelve feet high.



How high is the room? It is twelve feet high.

This is a
short coat.



This is a
longer coat.



This is the
longest coat
of the three.



This is a thin
book.



This is a thicker
book.



This is the thickest
book of the three.



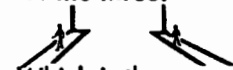
This is a narrow street.



This is a wider street.



This is the widest street
of the three.



Which is the narrowest
street of the three?

This is a dirty face.



This is a cleaner face.



This is the cleanest face
of the three.



Which is the dirtiest
face?

Glass
is harder than
wood.



Wood is harder than
bread.



Bread is harder than
butter.



Which is the softest of
these?
Which is the hardest?

This man is
older than
this boy.

The boy is
older than
this baby.



Which of
them is the
oldest?



The baby is the
youngest. He is very
young.

This man
is stronger
than this
boy.



The boy
is not as
strong as
the man.



He is not as old as the
man.

The baby is not as old
as the boy or as strong
as the boy.

This line



is as long as this
line.



The two lines are
equal (=).

This line



is not as long as
this line.



They are not equal.

A train may go eighty
(80) miles in an hour.

An airplane may go
three hundred (300)
miles in an hour.

Trains and airplanes
are different sorts (see
page 106) of transport.

What are some other
sorts of transport?



Ships are another sort
of transport.

How far may a quick
ship go in an hour?
A quick ship may go
thirty miles in an hour.



Automobiles

are an other
sort of transport.

Airplanes, trains, ships,
automobiles

take us from one place
to another.

We may go on our feet
from one place to
another.



When we go on our
feet, we are walking.

Or we may go in a train
or in a ship or in an
automobile or in a
plane.

Some places are near
to one another.



Some places are far
from one another.



Places in Washington
are near to one
another.

The distance from one
place to another is not
far.

But some places in the
United States are far
from one another.

This is a map of North America.

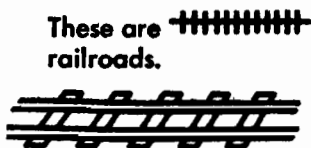


These are mountains.



Men go up mountains.
Mountains are high.

These are
railroads.



Trains go on railroads.



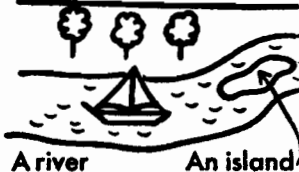
A road



These are roads.



These are rivers.



A river

An island

**Ottawa, Washington,
Mexico City, New York,
and Los Angeles are
towns.**



This is a town.

**The government of
Canada is in Ottawa.**

**The government of the
United States is in
Washington.**

**The government of
Mexico is in Mexico City.**

**How far is Ottawa
from Mexico City?
The distance from
Ottawa to Mexico City
is about twenty-three
hundred miles.**

**How far is New York
from Los Angeles?
The distance between
New York and Los
Angeles is about
twenty-five hundred
miles.**



**How far is the mouth
of the Mackenzie River
from the mouth of the
Mississippi?**

**The distance is about
3300 miles.**

**The mouth of a river is
the place where it goes
into the sea.**

This is the earth. We are seeing it from the north.



There is more land than water on this side of the earth.

This is the earth. We are seeing it from the south.

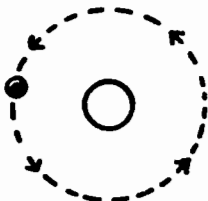


There is more water than land on this side.

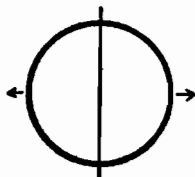
This is the moon.



The moon goes round the earth in a month.

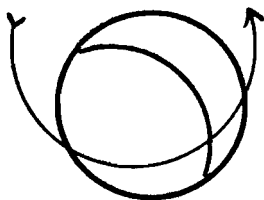


**Do we ever see the other side of the moon?
No.**



**We see the same side of the moon at all times.
Why?**

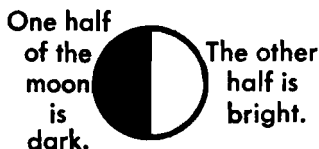
We see the same side at all times because the moon is turning round.



The earth

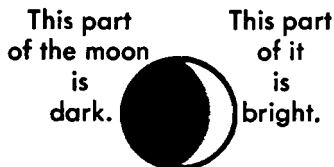
It is going round the earth and it is turning round itself.
It keeps the same side to the earth.

We see the same side of the moon at all times.
Sometimes we see it like this.



This is a half moon.

Sometimes we see the moon like this.



This is a quarter moon.

Sometimes we see it like this.

This is a new moon.



This is a new hat.



This is an old hat.



And sometimes we see it like this.

This is a full moon.



This glass is full.



This glass is not full.



These are the changes of the moon.

Full, 

three-quarters, 

half, 

a quarter, 

new, 

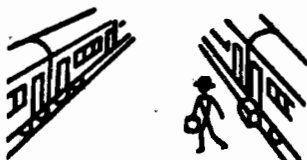
But at all times we see the same side of the moon.

Change? What is that?

Here is a change in the direction of this line.



And here is another change.



Here are two trains.
The man was in this train.
He is going to the other train.
He is making a change.
He is changing trains.



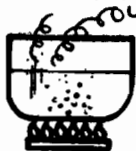
The potatoes were hard.
After a time they were soft.
There was a change in the potatoes.



This water was cold.



Now it is boiling.
That is a change.



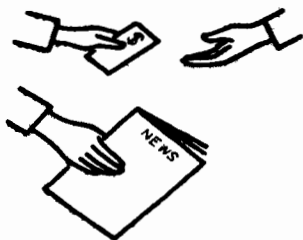
There was a change in the water.



In the summer the leaves are on the trees.



In the fall the leaves come down off the trees.
That is a change.



I took a newspaper and gave a dollar (\$1) to the man.

He took the dollar and he gave

a half dollar 

and a quarter (dollar) 

and twenty cents 

This is the money which he gave to me with the paper.

The price of the paper was five cents. I got the paper and ninety-five cents from him.

$$\begin{array}{r}
 \$1.00 - 100 \text{ cents} \\
 \text{Paper} - \quad 5 \text{ cents} \\
 \hline
 95 \text{ cents}
 \end{array}$$

That money was my change.

I had a dollar.

After I got the paper I had the paper and ninety-five cents. I did not have the dollar. That was a change.

QUESTIONS

- a Is the boy nearer to the woman than the girl is?



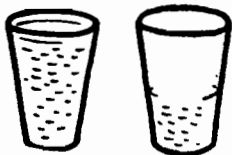
Is the girl nearer to the boy than to the woman?

- b Which of these two is farther from the tree?



Is the boy farther from the tree than from the girl?

- c Which of these two glasses is full of water, the glass to the right or the glass to the left?



- d Is there more land than water on the south side of the earth?

Answers are on page 194.

QUESTIONS



A

B

C

D

- a** Which of these is a half moon, which is a full moon, which is a quarter moon, and which is a new moon?

- b** I got a book. I gave three dollars to the man in the bookstore. He gave me the book and fifty cents. What was the price of the book? How much was the book? How much change did he give me?

- c** How far may a quick train go in an hour? How far may you go on your feet in an hour, four miles or forty?

- d** What are some different sorts of transport? Which is the quickest sort of transport?

Answers are on page 194.

Answers to questions on pages 192-193.

Page 192

- a No, the girl is nearer to the woman. Yes, the girl is nearer to the boy than to the woman.
- c The glass to the left is full of water.
- b The girl is farther from the tree. Yes, the boy is farther from the tree than from the girl.
- d No. There is more water than land on the south side of the earth.

Page 193

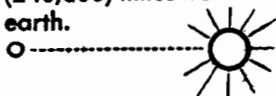
- a C is a half moon; B is a full moon; D is a quarter moon; and A is a new moon.
- c A quick train may go a hundred miles in an hour. I may go four miles but not forty.
- b The price of the book was \$2.50. It was \$2.50. He gave me 50 cents change.
- d Ships, trains, horses and carriages, and airplanes are different sorts of transport. The airplane is the quickest of these.

The distance through the earth from North to South is seven thousand nine hundred (7900) miles.



The distance round the earth is twenty-four thousand nine hundred (24,900) miles.

How far is the moon from the earth?
It is two hundred and forty thousand (240,000) miles from the earth.



How far is the sun from the earth?

The distance of the sun from the earth is ninety-three million (93,000,000) miles.

What is that in your hand?



It is a ball.
The ball is small.

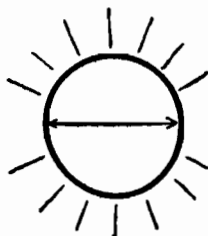
What is that in the sky?



It is the sun.
The sun is great.
The sun is a great ball of fire.

What is the size of the sun?

It is 864,000 miles through from one side to the other.



What is the size of the moon?

It is two thousand one hundred and sixty (2160) miles through from one side to the other.

Is the moon smaller than the earth?

Is the earth smaller than the sun?

Is the sun greater than the moon?

The moon is near the earth. The earth is far from the sun.

New York is near Washington. San Francisco is far from Washington.



Are the stars smaller than the sun?

No. Some of the stars are much greater than the sun.

Are they nearer than the sun?

No, they are much farther than the sun.



How far from the earth is the nearest star?

It is over four light-years from the earth.

What is a light-year?

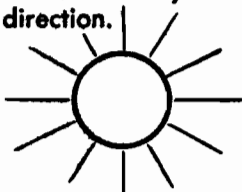
It is the distance which light goes in a year.

**This is a flame.
It sends out light.**



**Light goes 186,300 miles
in a second.
How far does it go in a
year?**

**The sun sends out light.
The light goes out from
the sun in every
direction.**



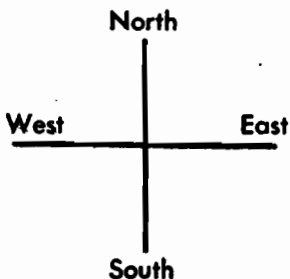
**It goes about
6,000,000,000,000
miles in a year.**

**A light-year is
6,000,000,000,000
miles.**

**The nearest star is over
four light-years from
the earth.**

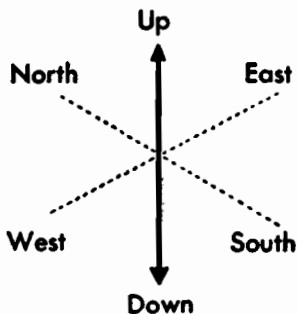
**The nearest star is
25,000,000,000,000
miles from the earth.
The nearest stars are
very far from us.
Some of the stars are
very much farther.
The farthest stars are
thousands of light-years
from us.**

The sun sends its light out in every direction.



These are four directions.

Up and down are two other directions.

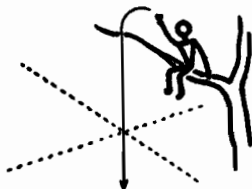


This boy has six apples in his hands.
He is on a branch of a tree.



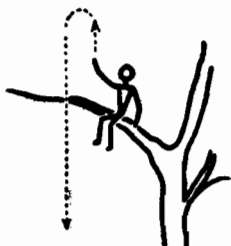
He will send the six apples in different directions.

He sent one apple north, another apple south, another east, and another west.



He sent another apple down.

He sent five apples in five directions.



He sent the last apple
up. But then it came
down.
Why did it come down?

The first apple went
north and then it came
down. The other apples
went south and east and
west and then they all
came down to the earth.



They all came down
to the earth?
Why did they come
down?

The first apple ...
The last apple ...
What is "the first" ... ?
What is "the last" ... ?

These men are in a line.
This is the first man.



This is the last man.

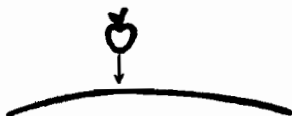


Here are three dogs.
Which is the first dog?
Which is the last dog?
The other dog is the
dog in the middle.
He is between the first
dog and the last dog.
Two of the dogs are
white.
The other dog is black.
The dog in the middle
is black.



Here are two bodies.
One is a great body.
It is the earth.
The other is a small
body. It is an apple.
The apple is coming
down to the earth.
Why?

It is coming down
because there is an
attraction between the
two bodies.
The attraction between
them makes the apple
come down.



All bodies which have
weight have an
attraction for one
another.

Here are two bodies.
These are springs.



Which body has the
greater weight?

Here are two men.

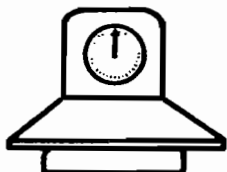


This man
is thin.
His body
is thin.



This man
is fat.
His body
is fat.

Which man's weight is
greater?



This is a scale.

**A scale is an instrument
for measuring weight.**

**Which man's weight
is greater?
They are on the scale.**

**The weight of
the thin man is
100 pounds.**



**The weight of
the fat man is
200 pounds.**



**Clocks are instruments
for measuring time.**

This is a watch.



**Watches and clocks
are instruments for
measuring time.**

**This is an
instrument for
measuring
heat.**



**A yard
measure is an
instrument for
measuring
distance.**



**Inches, feet, yards,
metres, and miles are
measures of distance.**

All bodies have an attraction for one another.

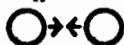


If the bodies are great the attraction between them is great.



If the bodies are small the attraction is small.

If the bodies go farther from one another the attraction gets smaller.



Distance	Attraction
1	1
2	1/4
3	1/9
4	1/16
5	1/25

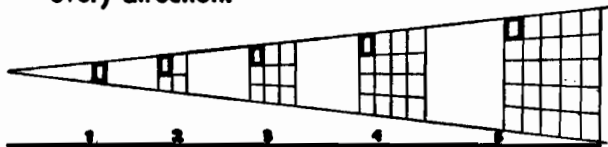


Here is a light.

It sends out light in every direction.



← Here is a square.



I put the square at different distances from the light. At distance 1, it gets all the light which is going out between the lines. At distance 2, it gets one-fourth of the light. At distance 5, it gets one twenty-fifth. It is the same with the attraction between bodies.



What keeps the moon
up in the sky?
Why does not the
moon come down?

The moon is a great
body. Its weight is
great.

The earth is a great
body. Its weight is
eighty-one times the
weight of the moon.
Two times three is six.
 $2 \times 3 = 6$

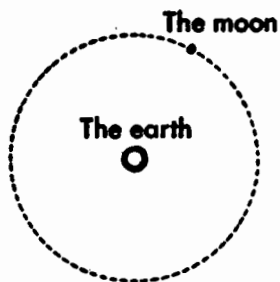
The moon and the
earth are not very far
from one another.
The distance between
them is about two
hundred and thirty-nine
thousand (239,000)
miles.

Because they are great
bodies and near one
another, the attraction
between the moon and
the earth is very great.
Why does the moon not
come down to the
earth?

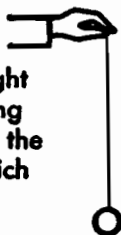
That is a question.



The answer is: "Because it is going round the earth."



This is a cord in my hand. The cord has a weight at its end.



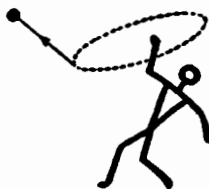
The weight is hanging down on the cord which is in my hand.

I make the weight go round on the cord.



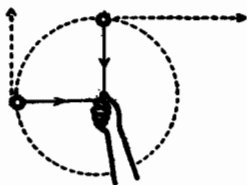
I keep the end of the cord in my hand.

Now I let the end of the cord in my hand go.

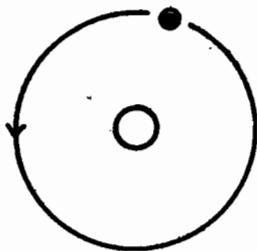
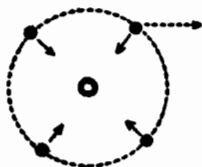


The weight goes off in a straight line. It takes the cord with it.

The pull of the cord in my hand kept the weight from going off in a straight line.

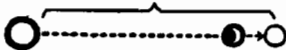


The attraction between the earth and the moon keeps the moon from going off in a straight line.

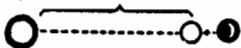


The moon goes round and round the earth . . month after month

It does not get farther from the earth



or nearer to the earth.



It keeps about the same distance from the earth.

Here is Sir Isaac
Newton, the great
man of science. Newton
had a great mind.



He is under an apple
tree.

It is the year 1666.

Those are apples which
are over his head.

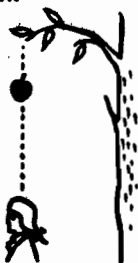
The seat has three legs.



Here is an apple which
was over his head.
The apple was on a
branch of the tree.



The apple came off the
branch.
It came down.



It came down on
Newton's head.

That is the story.
The story may be true
or it may not be true.



But that is the story.
It comes from the great
writer, Voltaire.

True?

$2 + 2 = 4$. That is true.

$2 + 2 = 5$. That is not
true.

It is a false statement.

"Apples are fruit."

That statement is true.

"Apples are animals."

That statement is false.

False = not true

Short = not long

Shut = not open



In this story the fall of
the apple on Newton's
head was the cause of
the idea.

The blow which the
apple gave to Newton's
head gave an idea to
Newton. It made a
question come into
Newton's mind.



This was the question:
"Have the fall of the
apple and the motion
of the moon the same
cause?"

Here is a ball. It is hanging on a cord.



I will give a blow to the ball with this stick.

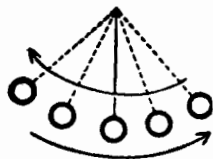


**I gave the blow.
Now the ball is in motion.
What was the cause of the motion?
The blow of the stick was the cause of the motion.**

**The ball was not in motion before the blow.
It was at rest. It was hanging on the end of the cord.**



The blow was the cause of the motion.



**After the blow the ball was in motion.
The motion came from the blow.
The motion was the effect of the blow.**

Which of the statements on this page are true and which are false? Put a T before the true statements and an F before the false.

- a**
- 1. The earth is in motion.**
 - 2. The earth is turning round.**
 - 3. The earth goes round the moon.**

- b**
- 1. The moon is greater than the sun.**
 - 2. The sun is colder than the moon.**
 - 3. The moon goes round the earth.**

- c**
- 1. The attraction between two bodies gets greater as they go farther from one another.**
 - 2. The attraction between two bodies is greater when they are nearer.**
 - 3. When two great bodies are near one another the attraction between them is small.**

- d**
- 1. When a blow puts a ball in motion, the blow is the cause of the motion.**
 - 2. When a blow puts a ball in motion, the motion is the effect of the blow.**
 - 3. When a body is in motion it is at rest.**

Answers are on page 212 .

QUESTIONS

Milk comes from a cow. Heat comes from the sun, or a fire. Where do these things come from?

- | | | |
|-------------------|------------------|----------------|
| a potatoes | b cheese | c light |
| d letters | e flowers | f snow |
| g oranges | h meat | i eggs |

Which of these things have a face?

- | | | | |
|--------------------|----------------|----------------|-----------------|
| a man | a dog | a bone | a fridge |
| a clock | a tree | a goat | a bird |
| an airplane | a river | a table | |

Which of them have a mouth?

Which of them have hands?

Which of them have a door?

Answers are on page 212.

QUESTIONS

- a** We put a bottle on a shelf.
Which of these things may we put on a shelf:
a book, a mountain, a cup, a box, a star, a clock, a horse, a distance, a plate, a carriage, a river, a house, a spoon, a garden?
- b** We put potatoes in a pot.
Which of these things may we put in a pot: water, windows, food, streets, tables, milk, soup, trains, salt, colors, eggs, wood, ideas?
- c** We put money in our pockets.
Which of these things may we put in our pockets: pipes, education, letters, pencils, offices, islands, maps, hands, governments, buttons, watches, distance, balls, roofs, knives?
- d** We put our hats on.
Which of these things may we put on: feet, boots, seats, gloves, shirts, walls, directions, coats, buildings, soap, scissors, collars, locks, socks, trousers, branches, trays, shoes, apples?

Answers are on page 212.

Answers to questions on pages 209-211.

Page 209

- a** 1. T
2. T
3. F

- b** 1. F
2. F
3. T

- c** 1. F
2. T
3. F

- d** 1. T
2. T
3. F

Page 210

- a** from the roots of a plant **b** from milk **c** from the sun or flames
d from persons **e** from plants or from seeds **f** from the sky or clouds
g from orange trees **h** from animals **i** from birds

**A man, a dog, a clock, a goat, a bird may have a face.
A man, a dog, a goat, a bird, a river may have a mouth.**

A man and a clock may have hands.

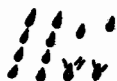
A fridge and a plane may have a door.

Page 211

- a** a book, a cup, a box, a clock, a plate, a spoon.
b water, food, milk, soup, salt, eggs.
c pipes, letters, pencils, maps, hands, buttons, watches, balls, knives.
d boots, gloves, shirts, coats, collars, socks, trousers, shoes.



What is this?
The man has an
umbrella in his hand.
It is open.
He has it over his head.
Why?

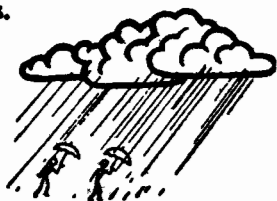


Because it is raining.
Water is coming down
from the sky.
The water is rain.
Rain is coming down.
Rain is falling.
It is raining.

The rain made the
man put up his
umbrella. That was the
effect of the rain.
Today is Monday. 
Yesterday (Sunday)
the sun was bright.
There were no clouds
in the sky.



Today there are dark
clouds in the sky.
They come between us
and the sun.
The dark clouds keep
the light of the sun from
us.



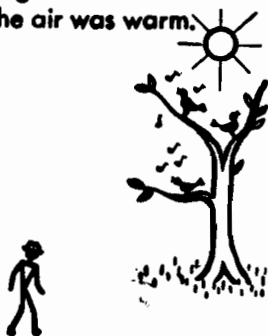
The rain comes down
from the clouds on me.
It comes down on my
head.



The rain comes down
from the clouds on us.
It comes down on our
heads.



Why is it raining today?
Yesterday the weather
was good. The sun was
bright.
The air was warm.



Today the weather is
bad. The rain is coming
down. The wind is
blowing. It is cold and
the rain makes us wet.

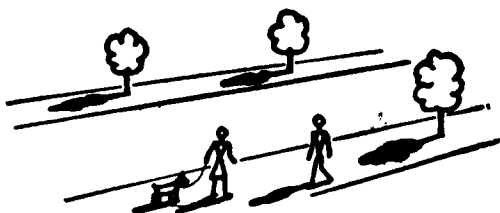


Tomorrow the weather may be worse.
It may be very cold. All the water may be ice.
Snow may be coming down making everything
white.

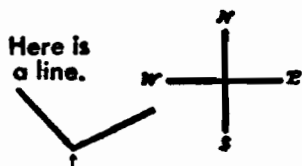
Will tomorrow be like
this?
Is this winter or summer?



Or tomorrow the weather may be better.
The sun may be bright again. The air may be
warm again and the streets may be dry again.
Will tomorrow be like
this?



What are the causes of these changes in the weather? Change? What is that?(See page 190.)



Here is a change in the direction of the line.

This bird was wet. It was in the rain.



Now it is dry.

That is a change. It was wet. It is dry.



What is the cause of these changes in the weather?

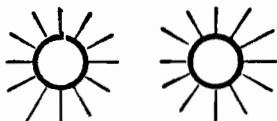
Good	Bad
Dry	Wet
Warm	Cold
Weather	

There is not one cause only. There are numbers of causes. Changes in the heat which comes to us from the sun are one cause of changes of weather.

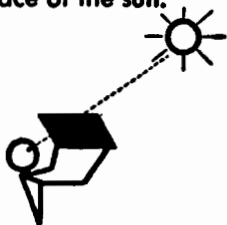


Why are there these changes of weather?

The amount of heat which the earth gets from the sun is different from time to time. There are changes in the sun.



If you take a look at the sun through a bit of dark glass you may see small marks on the face of the sun.



Amount? One dollar is a small amount of money. A million dollars is a great amount of money.

A drop of rain is a very small amount of water.



There is a small amount of water in this glass.



There is a great amount of water in the sea. This is the sea. Those are ships which are on the sea.

Changes in the heat which comes to the earth from the sun are one cause of changes in the weather. This discovery is new. A man of science made the discovery in 1944.

He made it by measuring the heat which comes to the earth every day from the sun. The amount of heat is different from day to day.

On some days the sun sends more heat to the earth. On other days it sends less heat to the earth.

Men are making new discoveries every day. Columbus made the discovery of America in 1492. Columbus came to America in his ship in 1492,

There is more water in this glass than in that.



More



Less



What were some other great discoveries?
One of them was fire.



Fire is of very great use to men. It gives us heat.

Another great discovery was the wheel.

Wheels are round.



They go round.



A cart

They are of very great use to man.

Another great discovery was clothing.



What are these?
These are some other sorts of clothing.



A skirt



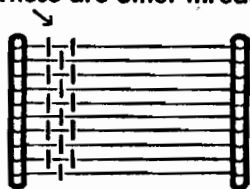
A shirt

The making of cloth was a great discovery.
This is how we make cloth.

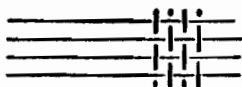


These are threads. (See page 167.)
They go across from one side to the other of a frame.

These are other threads.



They go across the first threads,



They go under and over them.

This is cloth.



This is a roll of cloth.
We make clothing of
cloth. We make cloth of
threads.

We make threads from
wool and cotton and
silk.



We get wool from sheep.



Wool is the thick warm
hair of sheep.
Men take the wool off
the sheep's back with
scissors.

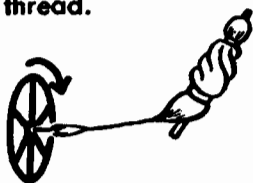


We make threads from the wool by twisting the hairs round and round.

That wheel is going round.

It is giving a twist to the thread..

It is twisting the thread.



We get cotton from the cotton plant.

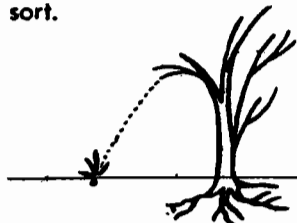


Cotton is the soft white hair round the seeds of the plant.

These are different sorts of seeds.



Plants come up from seeds which come from other plants of the same sort.



We get silk from the silkworm.



This worm makes a soft strong thread of silk and puts it round itself like a coat.

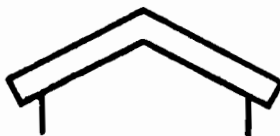
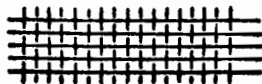


Wool, cotton, and silk are different sorts of cloth. We make clothing of all these sorts of cloth. (See page 81.)

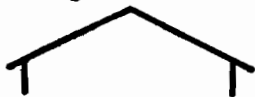


When the weather is cold we put on thick warm wool clothing. When the weather is warm we put on thin cotton clothing. Cotton clothing is not as warm as wool clothing.

Thick clothing keeps us warm. It keeps us warmer than thin clothing. Thick cloth keeps air in it, between the threads. The air does not let heat go through it.



A thick roof keeps the heat of the house in. A thin roof lets the heat go through it.



A thick roof keeps the heat of the sun out.

Here is a pencil.
It is straight. It is not bent.



Here is a glass of water.

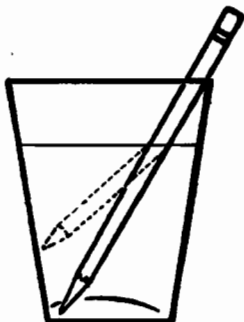


I put the pencil in the water.

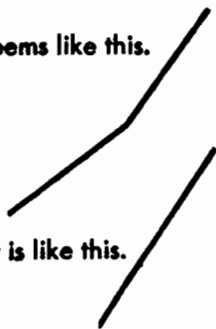


The pencil seems bent
where it goes into the
water.

The pencil is straight
but it seems bent.



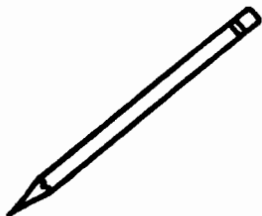
It seems like this.



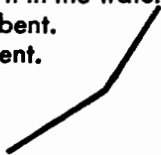
But it is like this.

It is straight, not bent.
It seems bent, not
straight.

Before I put the pencil
in the water it seemed
straight. It was straight.



After I put it in the water
it seemed bent.
It wasn't bent.

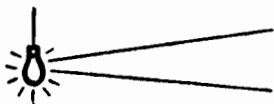


When it is in the water it
seems bent.

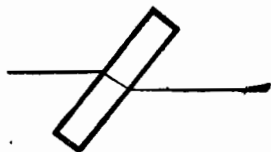
When it is out of the
water we see that it is
straight.



Why did it seem bent
when it was in the water?

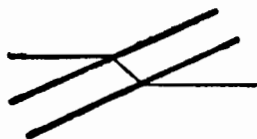


This is a light.
A light sends out light.
The light which it sends
out goes in straight lines.



Here is a bit of glass.
A ray of light is going
through the glass.

Where the light goes
into the glass, it is bent.



It is bent again where it
comes out of the glass
into the air.

Here is your eye. 



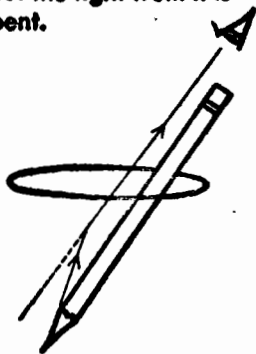
You are looking at the
pencil in the glass of
water.

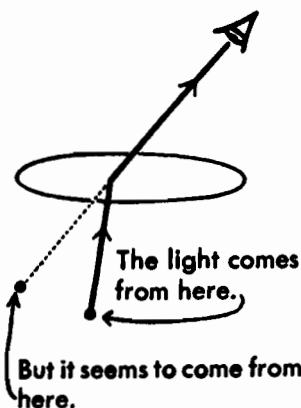
The light from the pencil
is bent where it comes
out of the water into the
air.



It is bent here.

The pencil is not bent.
But the light from it is
bent.





The part of the pencil which is under the water seems to be where it is not.

The light from the pencil is bent here.

Here is your eye.

It comes out of the water here.

The point of the pencil seems to be here.

It is here.

The light is bent where it comes out of the water.

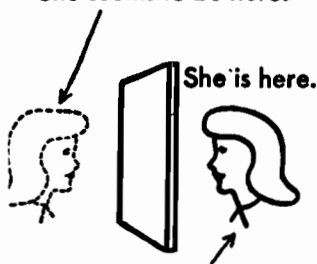
This is a looking glass.



What do you see in the looking glass?
I see a girl's face in the glass.

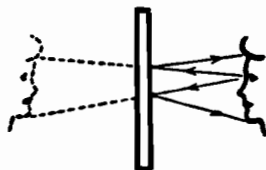
She is looking at herself in the glass.
What does she see in the looking glass?
She sees herself in the glass.

She seems to be here.

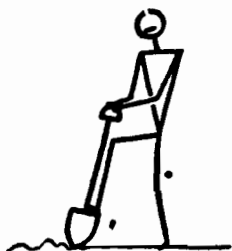


She is on this side of the glass.
She seems to be on the other side of the glass.

Why? Because the glass sends the light back.



There seem to be two girls in this picture. There is only one.



What is this man doing?
He is working with a
spade. That is his work.

What is this woman
doing?



She is working with her
needle. That is her work.



What is this man doing?
He is making shoes. He is
a shoemaker. That is his
work.



These are shoes.



These are boots.

He makes boots and
shoes. That is his work.



What is this man doing?
He is putting paint on the
door. He is painting the
door. He is a painter.
That is his work.

This is his paint.



This is his brush.



He puts the paint on with
his paint brush.

$$\begin{array}{r} 2 \\ 2 \\ \hline 4 \end{array} \quad \begin{array}{r} 3 \\ 7 \\ \hline 10 \end{array} \quad \begin{array}{r} 14 \\ 26 \\ \hline 40 \end{array}$$

This is addition.

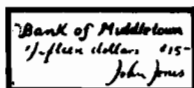


The boy is doing
addition. That is his
work.

This is a bank.



This is a check.



We keep money in banks.
Banking is an important sort of business.
Men and women in banks and business houses keep accounts.

This is an account.

					20	00
					10	00
					5	55
						35 55

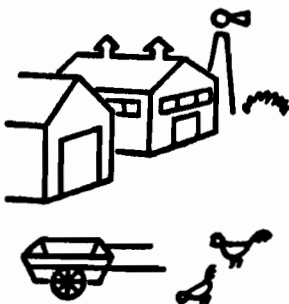
Keeping accounts is an important part of business.

Keeping accounts is one sort of work.



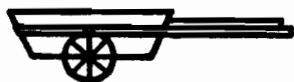
These are account books.

Farming is another sort of work.

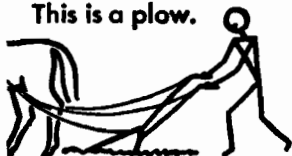


This is a farm.

This is a cart.

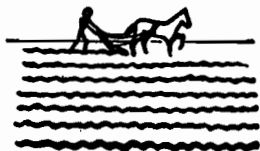


This is a plow.



**The plow is turning up
the earth.**

This is a field.



**The farmer is plowing
the field.
That is part of his work
as a farmer.**

**The farmer has an
account with his bank.
He puts his money in the
bank.
He keeps money in the
bank.
He gets money from
the bank.**

**The account says how
much money he has in
the bank.
Farming and keeping
accounts are two
different sorts of work.**

What sort of work is this man doing?

He is cutting wood.



What sort of work is this woman doing?

She is washing stockings and dresses.

What sort of work does this man do?

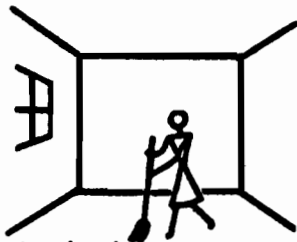
He keeps a store.



It is a fruit store.
He is a storekeeper.

What sort of work does this woman do?

She keeps a house.



It is her house.
She is a housekeeper.

Put your fingers across one another like this.



I have my first and second fingers across one another.

Across?



These two lines go across one another.

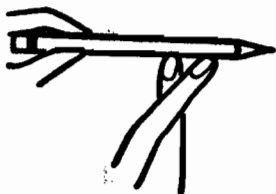
My second finger is over and across my first finger.



**Did you put your fingers across one another?
That is right.
You have your fingers across one another.**

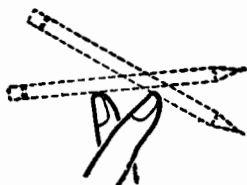


Now take a pencil and give a touch to one finger, and then a touch to the other and then put the pencil between them. Do this with your eyes shut.



You will have a strange feeling.

Are two pencils touching your fingers, or is only one pencil touching them?



Do you have the strange feeling that two pencils are there? When you are touching one finger only, you seem to be touching the other?

Why is that? Here is the answer.



When the fingers are like this, or like this, they do their work together.



But when they are across one another they do not do their work together. Then a touch to one sometimes seems to be a touch to the other.

What is their work?
What do the ends of our
fingers do?
Their chief work is
touching.



Those fingers are
touching the cover of a
book.
Touching gives us
knowledge.
When our eyes are shut,



or when we are looking
in another direction,
(She is touching the
book)



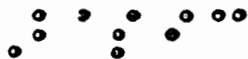
or when we are not able
to see, we get knowledge
through touching and
feeling with our fingers.



The chief work of the ends of our fingers is touching.
Here is a man who is not able to see.



That is a Braille book which he has before him.
He is reading the book with the ends of his fingers.



Braille letters and words are like this.
He is touching them with the ends of his fingers.

This other man is reading with his eyes.
He is not reading with his fingers.



What are those things on his nose?
They are his glasses.

What is the work of the eyes?



Seeing. Their work is seeing.

What is the work of the ears?



Hearing. Their work is hearing.

What is the work of the legs?



Walking. Walking is their chief work.

What is the work of the mouth?



Is talking or taking in food the chief work of the mouth?



This is talk.



What is the work of the hands?

Taking things up, putting them down, getting things, giving things, making things. We do things with our hands.

QUESTIONS

- a Is there more water in the sea than in a river?
- b Give the names of three great discoveries.
- c What is wool? What is cotton? Where do we get silk from?
- d Why is thick clothing warmer than thin clothing?
- e What is the chief work of the eyes, the ears, the mouth, and the fingers?
- f What sorts of transport go on wheels?
- g Where does smoke come from? Where does steam come from?
- h Where do we get wood from?

Answers are on page 240.

WHAT ARE THESE THINGS?

a



b



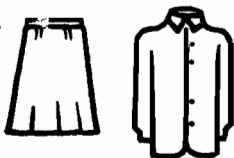
c



d



e



f



g



h



i



i



Answers are on page 240.

Answers to questions on pages 238-239.

Page 238

- a There is more water in the sea than in a river.
- b Fire, the wheel, and clothing were three great discoveries.
- c Wool is the hair of sheep. Cotton is the hair round the seeds of the cotton plant. We get silk from the silkworm.
- d Because thick clothing keeps heat from going through it.
- e The chief work of the eyes is seeing, of the ears is hearing, of the mouth is taking in food, and of the fingers is touching.
- f Carts, automobiles, and trains go on wheels.
- g Smoke comes from fire.
Steam comes from boiling water.
- h We get wood from trees.

Page 239

- a a cart
- b a plow
- c a boot
- d a looking-glass
- e a skirt and a shirt
- f a wheel
- g a fire
- h a spade
- i a roll of cloth
- j an umbrella

Seeing and hearing and touch are three of our senses.

We get knowledge through our eyes (seeing), through our ears (hearing), and through our fingers (touching). These are three of our chief senses.

Another sense is taste.

This is a man's tongue.

These are his lips.

This is his chin.



The chief work of the tongue is tasting.



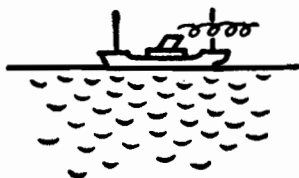
Here is some white powder on a plate. It may be salt or it may be sugar. Which is it—salt or sugar?

She is tasting the powder.

She has some of it on her finger.

She is putting some of the powder on her tongue. She is tasting it.



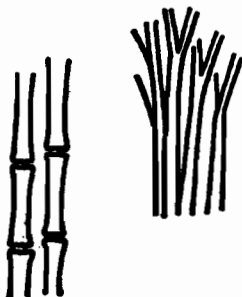


We get salt from the sea.
The water in the sea has salt in it.



We get salt from salt mines.
Some mines are deep. They go far down into the earth.

We get sugar from plants. We get it from the stems of some plants.



We get sugar from the roots of some plants.



The salt or sugar which we put in our food is a white powder.



The taste of sugar is sweet.



This is a cake.

**It has white sugar on the top.
Cakes with sugar on them are very sweet.**

This is an orange.



This is its skin.

Some oranges are sweet. But the taste of their skin is bitter.

**Salt has a salt taste.
Sugar has a sweet taste.
To the eye salt and sugar seem the same.**

But to the tongue they are very different.



Salt

Their taste is very different.



Sugar

What is the work of
the nose?
What do we do with
our noses?
She has a flower in
her hand.
She is smelling
the flower.



Some flowers have
a sweet smell.
Some flowers have no
smell.



This is grass.
These flowers are in
a garden.
They have a sweet
smell.



These are pigs.
Some pigs are dirty.
Some pigs are clean.
(See page 125.)
The smell of dirty pigs
is not sweet.
It is a bad smell.

This is smoke.

This is
a fire.



Some smoke has a good
smell. The smell may
not be sweet, but it
may be a good smell.
He is smoking a pipe.
Is the smell of the smoke
good?



We see things with our eyes and we see their colors.

Here are some names of colors:

green

blue

white

red

yellow

gray

What is the color of grass and leaves in spring?

Grass and leaves in spring are green.

What is the color of this girl's lips?

Her lips are red.



The sky is blue.



The sun is yellow.

Sometimes when it is going down



or coming up it is red.



It is blue when it is clear.

The color of some clouds is white.

Other clouds are gray.

This flame is yellow.



We see things with our eyes. We see the sizes and colors of things. Sometimes things seem to our eyes greater or smaller than they are. They are not what they seem.

This man is tall.



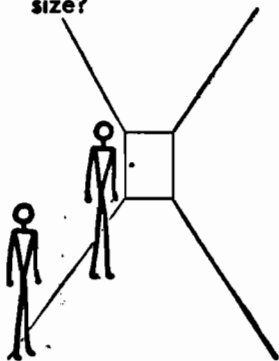
This man is short.

This is a tall woman.



This is a short woman.

**Here are two men.
Do they seem the same size?**



Which of them seems taller?

Does the man who is farther seem taller than the man who is nearer?

The pictures of them are the same size. The lines in the picture make the man who is nearer seem shorter.

Seeing, hearing, touch, taste, and smell are "the five senses." But we have more than five senses. Which are some of the other senses?

Our sense of how warm or how cold things are is another.

Here is some cold water with ice in it. It is very cold.



Here is some water in a kettle. The water is boiling. Steam is coming out of the kettle.



Here are three basins. The basin to the right has very warm water in it. The basin to the left has cold water in it. The basin in the middle has water which is not cold and not warm in it.



I put my hands in the basins at the sides.
One of my hands is in the cold water; the other is in the warm water.
I keep them there for a time.

Now I am putting them together into the middle basin where the water is not cold and not warm.



What is this?

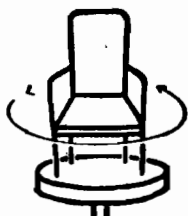
This water seems warm to one hand and it seems cold to the other!

It is the same water.
But it seems cold and warm at the same time!

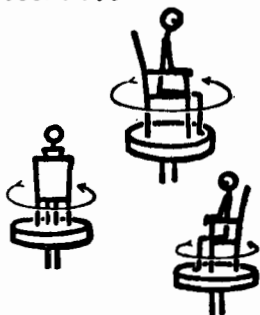
Why is this?

It is because one hand was in warm water and the other in cold water before I put them in this middle basin.

Another sense is our sense of motion. Here is a seat which goes round and round.



A man is in the seat. He is going round and round . . .



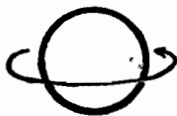
At first he has a feeling that he is in motion. He has the feeling that he is going round. The seat, with the man in it, keeps on turning round at the same rate. It does not go quicker. It does not go slower.

After a time the man has a feeling that he is not in motion. But there is no change in the rate at which the seat is turning. It is going round the same number of times a minute.



After a time, if the rate of turning is the same, the man seems to himself to be at rest (not in motion).

He is like all the men and women on the earth. We are all turning round all the time with the earth, but we seem to ourselves to be at rest.



We have no feeling that we are in motion. This is because the rate of turning is the same. The man is in motion. He seems to himself to be at rest.

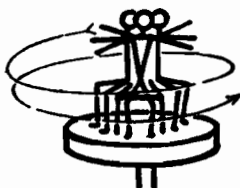


Here are three boys and a dog. Two of the boys are taking a rest. They are resting on their beds. The other boy and the dog are in motion.

Now, put a stop to the motion of the seat. When you do that the seat is at rest. The man is not in motion.



But he has a feeling that he is turning round and round. This is a picture of his feelings.

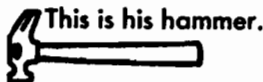


He is not turning round. But he seems to himself to be turning round. And everything round him seems to be turning round. Why is this?

It is because change in our motion is the cause of our feelings of motion. Through our sense of motion we get knowledge of changes in the rate and direction of our motion.



What is he doing?
He is hammering.



This is his hammer.



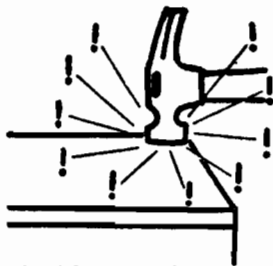
These are nails of
different sizes.



He is putting the cover
on a box.

He is nailing down the
cover of the box.

The cover is on the
top of the box.



The blows of the
hammer make a noise.
He is making a very
loud noise.

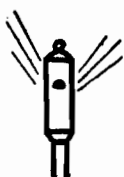


Mary has her hands
over her ears.

"What a noise!"

She is saying, "What a
noise you are making."

Some noises are loud.
These are guns.
Guns make loud noises.
Those guns make more
noise than this gun.

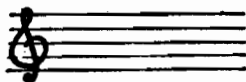


What is this?
It is a whistle.
It is a steam
whistle. It is
making a loud
noise.

This boy has a
pocket whistle.
He is making
some noise
with it but not
much noise.



This is music.



This is
a song.



These are
notes.



This is a
high note,



This is a
low note.



This is a very high
mountain.



These are high
mountains.

This is a high building.
It is a church,

This is a
low building.



Noises and songs
are sounds.
What are sounds?
They are the effects of
waves in the air.

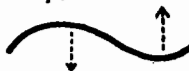


These are waves in a
cord. One end of the
cord is fixed to a tree
and the boy has the
other end. He is shaking
it up and down.



With every shake he
sends a wave down the
cord to the tree,

As the wave goes down
the cord this part,
which was up,



goes down. And
this part,
which was down,
goes up.





These are waves in the air. They come to our ears.

They have effects in our ears and brains. Those effects are sounds.



Here is a brain.

The part of the brain which does the most work in hearing has the word **HEARING** on it.

"The most"?

Some things have water in them.

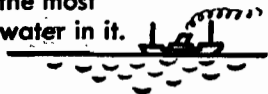
This cup has some water in it.



This bucket has more water in it.



The sea has the most water in it.



Some animals have brains: a horse has some brains; a monkey has more brains; and a man has the most brains of the three.



I have two dollars.
 You have twenty dollars.
 He has a thousand dollars.
 He has more money than we have.
 You have more than I have.
 He has the most money.

I have less money than he has.
 I have less than you have.
 I have the least money.

The most	\$1000	
More	\$20	Less
	\$2	The least

This is the highest note.

9

This is a lower note,

9

but it is higher than this note.

9

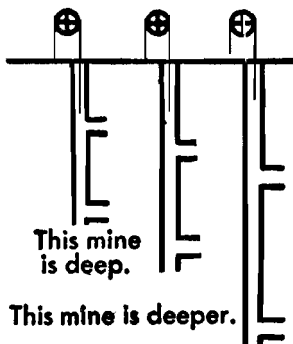
Which is the lowest note of the three?



Farming is an important sort of work.

Is it more important than banking?





This mine is the deepest of the three.

This plate has some salt on it.



This plate has more salt on it.



This plate has the most salt on it.



It has more salt on it than the other plates.

This is a good book.



These are two other good books.



One of them is better than the others.
It is the best book of the three.

This is a bad fire.



This is a worse fire.



This is the worst fire of the three.





She is looking at herself
in a looking glass.
Again and again, every
day, she takes a look at
herself in a glass.

Whenever she sees a
looking glass she goes to
it and takes a look at
herself.



Because looking at
herself in the glass gives
her pleasure.
She is beautiful. She sees
that she is beautiful.

Looking at himself in the
glass gives him no
pleasure.
It gives him pain. Why?
He sees himself. Is he
beautiful?

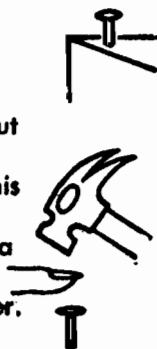


"Pleasure"? What is that? "Pain"? What is that?

**Put your finger in the flame.
No, I will not.
Why not?
Because of the pain.**

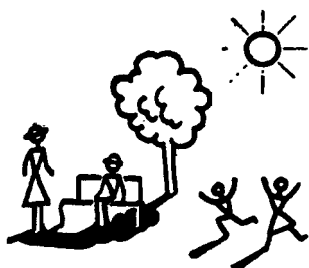


Here is a nail. You put your finger nail over this nail, and I will give it a blow with this hammer.

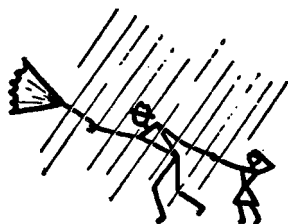


No, you will not. I see what pain is now. I see what the sense of the word "pain" is now. This is another use of the word "sense".

That is pain. Pleasure is the opposite of pain. "Opposite"? Good is the opposite of bad.



Good weather. The day is bright. The air is warm. The sky is blue. They are happy.



Bad weather. The wind is blowing. The rain is falling. It is cold. It is wet. They are unhappy.

Bright is the opposite of dark.



White is the opposite of black.



Warm is the opposite of cold.



What is the opposite of dry? (See page 128.)
What is the opposite of happy?

Which of these
is a high
building? What
is the other?



What is the opposite of
narrow?
Is this street narrow?

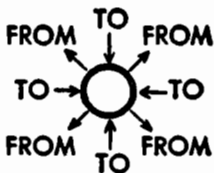
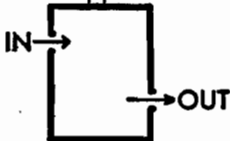


Up
is the



opposite of
down.

In is the opposite of out.



To is the opposite of from.

Pleasure is the opposite
of pain.

Beautiful things give us pleasure.



**When she sees herself in the glass, she sees that she is beautiful.
That gives her pleasure.**

When I say that she is beautiful, that gives her pleasure.



There is a smile on her face now.



Why is the smile there?

**It is there because she has a feeling of pleasure.
Her pleasure is the cause of her smile.
She is saying to herself, "I am beautiful."**

She is saying to herself that she is beautiful.



A smile does not make a sound. A laugh makes a sound.



A laugh is a smile with a sound.

This is a great painting
by Leonardo.



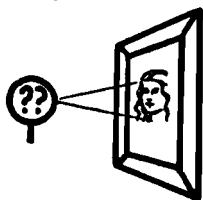
Its name is the
Mona Lisa.

The picture is beautiful.
That is certain.

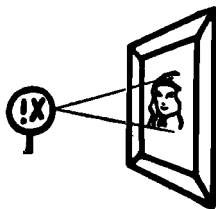


Was the woman
beautiful? Was Lisa
herself beautiful?
That is not certain.

I have my idea of that.



He has his idea.



She had her idea. We
may have different ideas
of how beautiful that
woman was.
There is no measure of
the beautiful.



She may or may not be beautiful.

But it is certain that she has a smile on her lips. That is certain.



It is not certain that she is beautiful.

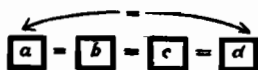
$$2 + 2 = 4$$

$2 + 2 = 4$. Two and two are equal to four. That is certain.

$$2 + 2 \neq 5$$

$2 + 2 = 5$. Two and two are not equal to five. That is certain.

It is certain that
 $2 + 2 = 4$.



a is equal to b , and b is equal to c , and c is equal to d .

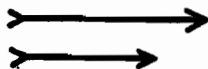
So a is equal to d .

Things which are equal to the same things are equal to one another.

Things which are like one another may be equal or they may not.



These two are like one another but they are not equal.





A smile is like a laugh.
But a laugh makes a
sound.



This girl is laughing. She
is happy.



She has a fall. She gives
a cry. Now she is crying.
She is not laughing now.
She is crying. Why?

Because she gave her
knee a blow in her fall.

This is
her knee.



She was on
her feet.



Then she was
on her face.
She had a
fall.



The fall was the cause of
the blow to her knee.

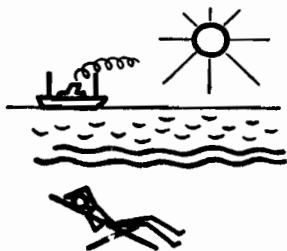


The blow was the cause
of the pain in her knee.

And the pain
in her knee
was the cause
of her crying.



Pleasure and pain are feelings.
We have feelings of pleasure and pain.
Here are some pleasures.



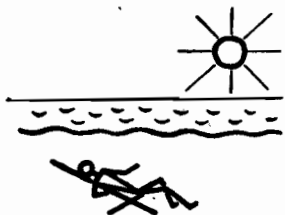
He is on the sand at the seaside, looking at and hearing the sound of the waves and warming himself in the sun.
These are pleasures.

Now he is taking a swim in the sea.



He is swimming through the waves. He is a good swimmer.
To a good swimmer, swimming is a pleasure.

Now he is resting in the sun again after his swim.



After the water the sun on his skin is a pleasure to him.

Pleasure and pain are feelings.



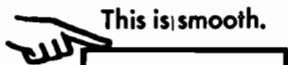
When we put our fingers on things we have feelings—feelings of touch or of heat and cold.

But this is another use of the word “feeling.”

The man is feeling the bit of wood with his fingers. Is it rough or is it smooth?

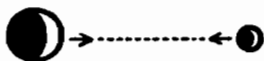


This is rough.



This is smooth.

Things which give us pleasure have an attraction for us. But it is not the same sort of attraction as the attraction between the earth and the moon. (See pages 202-203.)



Our feeling of this attraction is named “desire.”

When we have pleasure we have a desire for the pleasure to go on and go on . . .

Time goes on. The hands of the clock go on. Our feelings may or may not go on.



Some desires are stronger than others. This baby sees the cat and he sees his ball.



The cat has an attraction for him. He has a desire for the cat.

His ball has an attraction for him. He has a desire for the ball.



Which will he go to? If his desire for the cat is stronger than his desire for the ball, he will go to the cat.



He went to the cat. His desire for the cat was stronger.

All our desires are for things which seem good to us. They may not be good. Our ideas of them may be wrong.

We get knowledge by putting questions. That is one way of getting knowledge. The answers may give us knowledge or they may not.

When the answers are right, they give us knowledge.

When they are wrong they do not give us knowledge.

$2 + 2 = 4$ Right

$2 + 2 = 5$ Wrong

How far is the sun from the earth?
Which is the right answer:
"It is two miles away."
or "It is much more than two miles away"?
Which is the wrong answer to the question?

Which is his right hand?



Which is his left hand?
He is facing you.

Now he has his back to you.



Which is his left hand now, and which is his right?

Our senses—seeing, hearing, touching, tasting, and smelling—are ways through which we get knowledge. Our ideas come to us through our senses.

This is a doorway.



The way into the room is through the door.
The way out of the room is through the door.

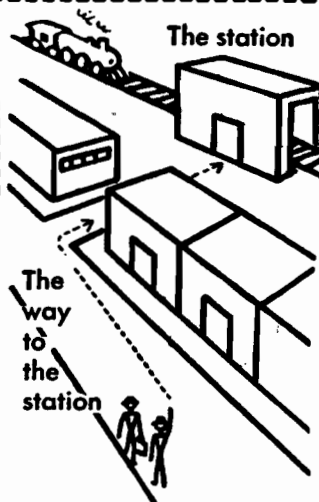
"Which is the way to the station?"

"Take the first street to the right."



This man had no knowledge of the way to the station.
Now he has the knowledge.

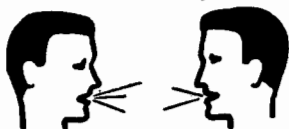
The station



We get knowledge in different ways—through our senses,



through talk with other men,



through the work we do with our hands and our heads, and through books.



These are all ways of getting knowledge.

Knowledge is very important. It is important in itself. And it is important as a way to other things. A man who has no knowledge is of no use to other men.

Is the word "use" part of your knowledge of English?

(See page 219.)

Knowledge gives us light. It makes things clearer to us.

This is a boy.



He will be a man.

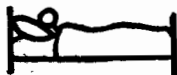
He was a baby.



He seems to be about twelve years old now.



Every night he has a long sleep in his bed.



He goes to bed at eight every night.



He gets up every morning at seven.



He puts his clothing on.



He gets out of bed and gives himself a good wash.



He says "Good morning" to his mother and father and takes his place at the table.



At school he sees his friends and does his work.

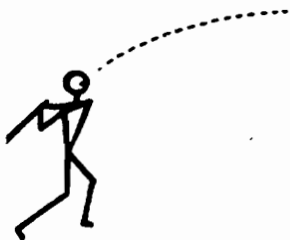


He keeps his thoughts on his work.

He does not let his thoughts go off to other things.



At play after school he sends the ball a long way.



He makes it go a long way.

Then he comes back from school.



Here he is with the family again.



Men are persons. They have their work.



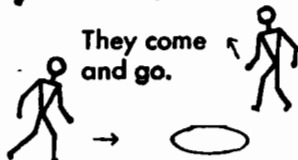
They put and take things.



and give



and get them.



They come and go.

They see and



say things,



keep things,



and let them (go),



make and



send them



Some seem happier than others.

All these sorts of things are done by men and women.

Things are put and taken by them.

Things are given and got by them.

Things are seen and said by them.

Things are kept and let go by them.

Things are made and sent by them.

Eve saw the apple.



She took it.



She gave it to Adam.
Eve did these things.



The apple was seen
by her.

It was taken by her.

It was given by her to
Adam.

These things were done
by Eve.

We may say this in two
ways.

She saw the apple and
took it and gave it to
Adam.

This may be said in two
ways.

The apple was seen by
Eve, and taken and
given by her to Adam.

I will do it.
I am doing it.
I did it.
They will see it.
They are taking it.
They gave it.
DO TAKE
SEE GIVE

It will be done by me.
It is being done by me.
It was done by me.
It will be seen by them.
It is being taken by them.
It was given by them.
DONE TAKEN
SEEN GIVEN

I will say it.
I said it.
I made it.
I kept it.
I let it go.
I put it there.
I got it.
I sent it.
SAY MAKE KEEP
LET PUT
GET SEND

It will be said by me.
It was said by me.
It was made by me.
It was kept by me.
It was let go by me.
It was put there by me.
It was got by me.
It was sent by me.
SAID MADE KEPT
LET PUT
GOT SENT

Every statement or question in this book has one or more of these sixteen words in it:

be	come	give	make
have	go	get	send
do	put	keep	see
seem	take	let	say

The first of these words, BE, comes into more statements than any other. Here it is. It goes like this:

	<i>Past</i>	<i>Present</i>	<i>Future</i>
I	was	am	will be
He } She } It }	was	is	will be
We } You } They }	were	are	will be

Here are the other fifteen words. They go like this:

	<i>Past</i>	<i>Present</i>	<i>Future</i>
I	had	have	will have
	did	do	will do
	seemed	seem	will seem
	came	come	will come
	went	go	will go
We	put	put	will put
	took	take	will take
	gave	give	will give
	got	get	will get
You	kept	keep	will keep
	let	let	will let
	made	make	will make
They	sent	send	will send
	saw	see	will see
	said	say	will say

	<i>Past</i>	<i>Present</i>	<i>Future</i>
He	had	has	will have
	did	does	will do
	seemed	seems	will seem
	came	comes	will come
	went	goes	will go
She	put	puts	will put
	took	takes	will take
	gave	gives	will give
	got	gets	will get
It	kept	keeps	will keep
	let	lets	will let
	made	makes	will make
	sent	sends	will send
	saw	sees	will see
	said	says	will say

In English we do not make statements like this:

She gave you money to I. That is wrong.

We make statements like this:

She gave your money to me. That is right.

I	my	me	we	our	us
you	your	you	you	your	you
he	his	him	they	their	them
she	her	her			
it	its	it			

In English we make COMPARISONS like this:

good	better	best
bad	worse	worst
much	more	most
little	less	least
beautiful	more beautiful	most beautiful
small	smaller	smallest
bright	brighter	brightest
short	shorter	shortest
thin	thinner	thinnest

In English we make changes in names like this:

1 cat (dog, boot, day, nose, face . . .)	2 or more cats (dogs, boots, days, noses, faces . . .)
1 glass (watch, brush . . .)	2 glasses (watches, brushes . . .)
1 body (cry, baby . . .)	2 bodies (cries, babies . . .)
1 knife (leaf, shelf . . .)	2 knives (leaves, shelves . . .)
1 tooth, foot	2 teeth, feet
1 man, woman	2 men, women

1 or more sheep, scissors, trousers

КНИГА 2
BOOK 2

PREFACE

This is a second book in a series English Through Pictures. It keeps in mind that its readers will have many different needs. Some will want more English to help them to find work, some as a step on the way to higher education, some for business, travel or better living — and some because English opens for them a window with a wider outlook on the world.

We have tried in designing English Through Pictures, Book 2 to serve all this needs. However, our first care has been the ordering of the teaching itself.

It is the purpose of this book to supply starting points from which people can go out in different directions as their different interests take them. We hope it will be a book of beginnings.

"I am here."



Where is "here"?

Where are you? Where do you live?

Who are you? What is your name?

live: the place where you are living or have your house is where you live.

FUTURE
will live

PRESENT
live(s)

PAST
lived

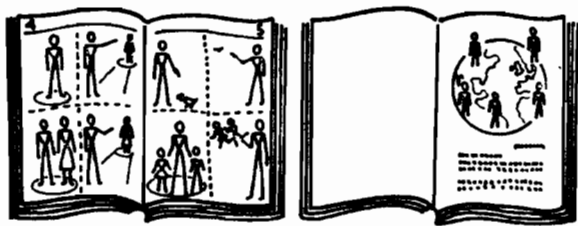
"I am here "



is the first statement in *English Through Pictures, Book 1 (EP 1)*.

That book uses about five hundred words of English in a great number of different ways.

Using those same words, together with about the same number of new words and more pictures, this book (*EP 2*) goes farther into the language.



This new book uses about a thousand words of English.

use: when you make use of something you use it.

language: all the words used by persons talking or writing to one another.

will use

use(s)

used

Are you a man or a woman or a girl or a boy? What is your country? Is the country where you live now the country of your birth?



Do you see on this page a map of the country where you live? Is it Germany, the Philippines, Brazil, Australia, Kenya, or some other country?

There are millions of readers of *EP 1*. The book is used in almost every country.

country: land under one government.

birth: coming into being

almost: the shorter line here is almost as long as the other.

"almost every country": most countries.

"What is your name?" the man on the right asks. The other man answers: "My name is Jean Schmidt."



"Where do you come from? What is the country of your birth? Where were you born?" (These are different ways of asking the same question.)

"Geneva, Switzerland," answers Jean Schmidt.

"Have you any relations in this country?"

"Yes, I have one. My uncle, my father's brother, lives in Boston, Massachusetts, U.S.A."

asks: puts a question.

answers: gives an answer.

born: given birth or given being.

any: one or more, some. In answering the question "Have you any money?" we say "Yes, I have some" (not "Yes, I have any"). If we have no money, we say "No, I haven't any."

relation: person of same family.

uncle: father's or mother's brother.

will ask
will answer

ask (s)
answer (s)

asked
answered

"When were you born? Give me the date of your birth. What is your age?"

JANUARY									
				1	2	3			
4	5	6	7	8	9	10			
11	12	13	14	15	16	17			
18	19	20	21	22	23	24			
25	26	27	28	29	30	31			

"I was born on January 10, 1920. I am thirty-seven (years old)."

"When were you at school? How long were you there? How many years were you at school?"



"I was at school eight years."

"What work do you do? What is your occupation?"



"I am a cook."

date: day of the month and year. If you give the day, month and year of your birth, that is a way of giving your age, saying how old you are.

age: your age is the number of years you have lived.

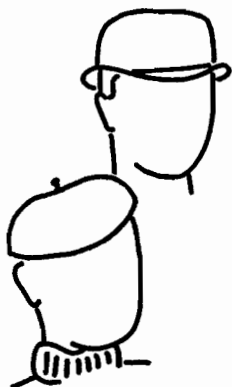
how many: what number of.

many: a great number of.

occupation: work.

cook: person who makes food ready by heating

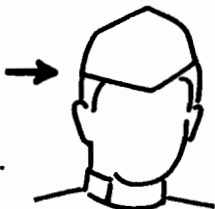
Here are some people of different countries.



This is a Japanese girl. She lives in Japan. Japan is her country. She is Japanese.



This is an Indian boy. He lives in India. India is his country.



Are you Japanese?...
Chinese?... German?...
French?... Polish?...
Swiss? What is your country?



people: men and women and boys and girls are people.

Here are some people who live in the United States of America, the U.S.A. The fathers and mothers of these people went to the U.S.A. from England, France, Italy, Switzerland, Poland, Russia and other countries. Some of them sailed there in sailing ships before the days of steamships.



Now the sons and daughters live in the U.S.A. and most of them are Americans. Some of them were born in the U.S.A. They got their start in America, but they have many relations in the old country.

sail: sailing ships have sails and sail by using the push of the wind.

start: if a person goes for a walk, the start of his walk is the very first step. Being born is the start or starting point of a person, and his age at a given date is the time he has been living from the start (from his birth).



will sail

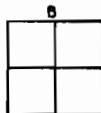
sail(s)

sailed

Japan and India and China are parts of Asia. Germany, Italy and France are in Europe. In all these countries there are many people. In some countries there is very little land for the size of the population. Europe has less land than Canada and not much more than the U.S.A., but it has a population more than thirty times as great as Canada's. And the numbers keep going up. Between 1850 and 1950, more than thirty million people went from Europe to live in the U.S.A., but the population of Europe in 1954 was greater than the populations of North and South America together.



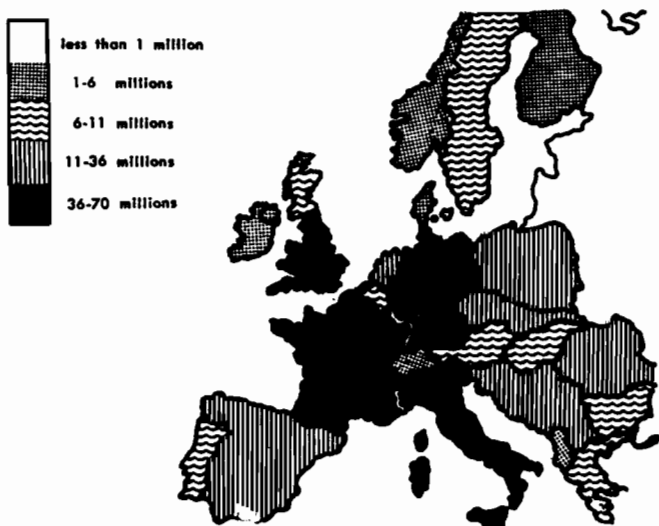
times as great: in this picture B is four times the size of A. It is four times as great as A.



population: the population of a place is the number of people living in it.

There are 50,000,000 more people in Europe today than there were twenty-five years ago. The increase in population in twenty-five years is 50,000,000. Europe has increased her population by 50,000,000 in the last twenty-five years.

This map gives a picture of the number of people in each country of Europe today.



ago: before now, before the present.

increase: amount by which something gets greater.

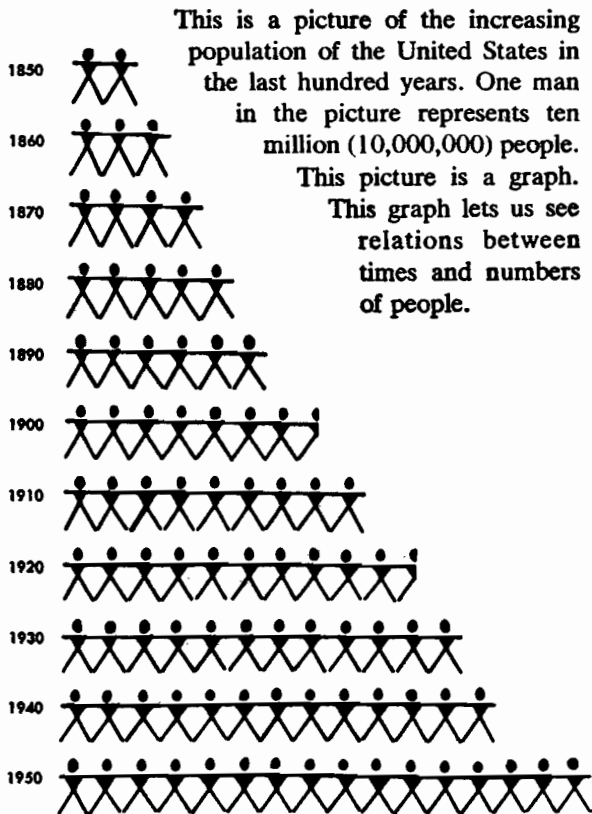
to increase: to get greater in size.

each: every; all, one by one.

will increase

increase (s)

increased



represents: takes the place of; puts before the mind.

graph: picture which represents changes in amounts in relation to other changes.

relation: there is the same relation between 2 and 4 as there is between 3 and 6.

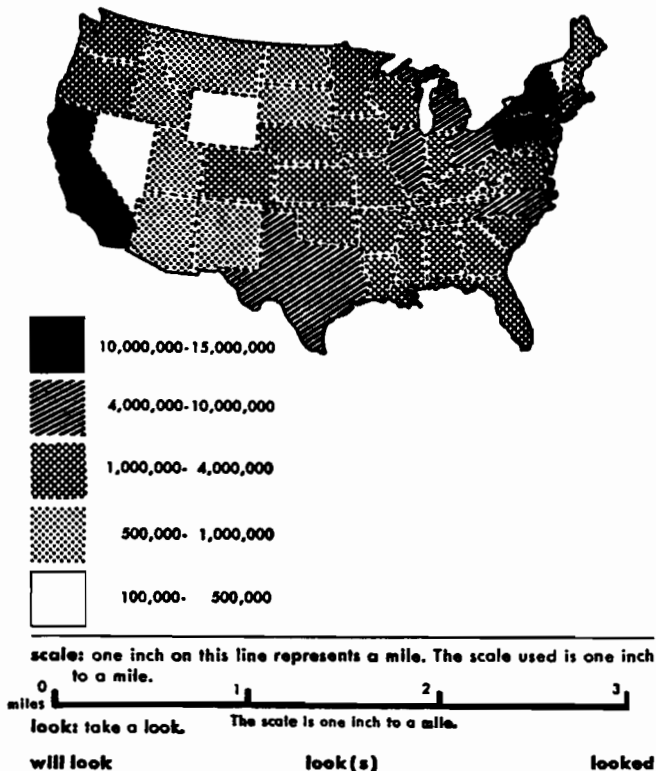
will represent

represent(s)

represented

This map gives a picture of the population in the different states of the United States of America today. The scale of the map is the same as that used for Europe on page 9.

If you look at the two you will see that the U.S.A. is not much smaller than all of Europe.



Which are the countries with the most people in them? China, India, the U.S.S.R. and the U.S.A. all have populations of over a hundred million. Some countries have less room in them than these four, but these have the greatest populations.



China has more than 600,000,000



India has more than 300,000,000



U.S.S.R. has more than 200,000,000



U.S.A. has more than 150,000,000



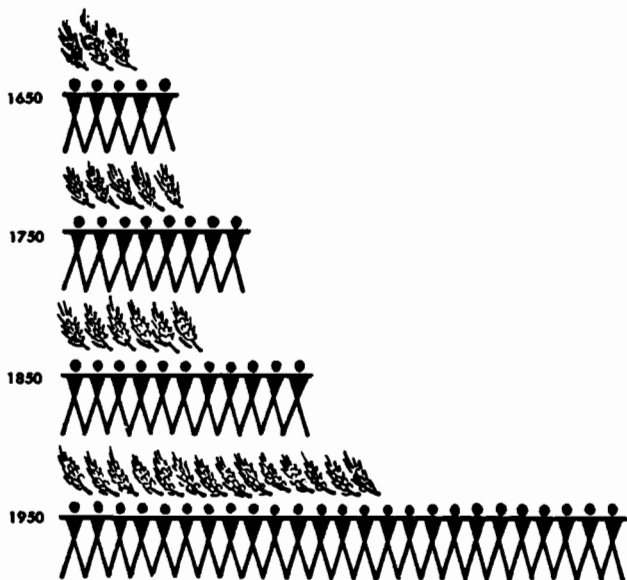
It is not good for a country if it does not have enough room for all its people. A person who does not have enough room to live in may not be able to keep well.

over: more than.

room: when there is no more room in a room, in a building, in a country, it is full.

well: a person is well if there is nothing wrong with his body or his mind.

The population of the earth has increased more than the amount of food. There is a great need for more food. More than a billion people on the earth today need more food than they can get. They cannot get enough food to keep them well and strong. The relation between amount of food and size of population has been changing.



a billion: in American numbers, a thousand million, 1,000,000,000.

need: something important which is not present.

can: are able to.

cannot: are not able to.

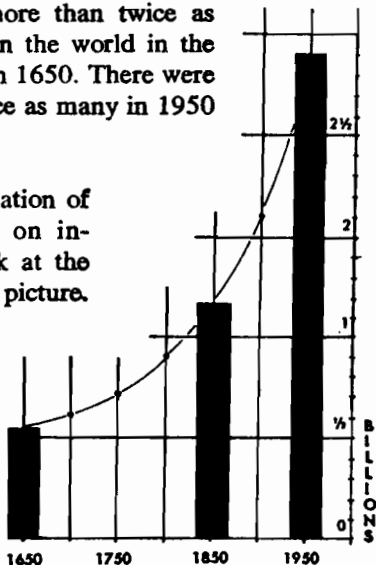
will need
(will be able to)

need(s)
can

needed
could

There were more than twice as many people in the world in the year 1850 as in 1650. There were more than twice as many in 1950 as in 1850.

Will the population of the world go on increasing? Look at the curve in this picture.

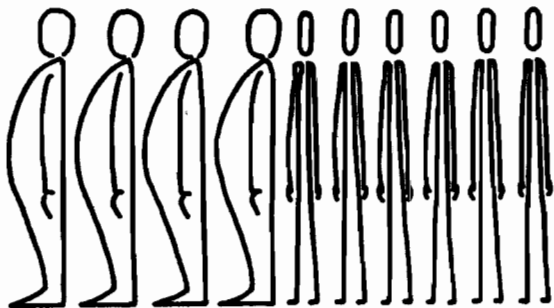


twice: twice a thing is two times it.

world: the earth and all that (which) is on it—people, other living things and the things that man has made.

curve: line that goes on changing its direction.

There were over two billion six hundred million (2,600,000,000) people in the world in 1954. Less than half of them could get as much food as they needed. Many of them because of this are not healthy.



There are some people everywhere who take more food than is good for them, but many more get less than they need.

People are asking one another what the world population will be in 2050 if it goes on increasing like this. It will be very great. It will be much greater in some parts of the world than in others.

Some people say it will be between five and ten billion and some that it may be as much as thirty billion.

healthy: well, right in body and mind.
everywhere: in every place.

More than a hundred million people on earth today live in cities. Some cities have more people in them than some countries have.

There are nineteen or more cities in the world which have over two million people in them.

Cities have been increasing in size in our time. Before the twentieth century it was hard for the people in a great city to get enough food.

On the next page you will see a map of the world on which are marked ten cities with more than three million people in each.



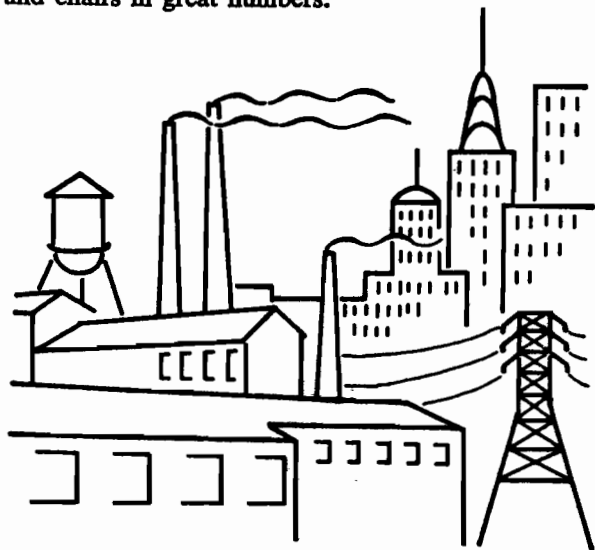
city: town of great size.

twentieth century: the hundred years numbered from 1900 through 1999.



MILLIONS	1	2	3	4	5	6	7	8
1. Berlin								
2. Calcutta								
3. Leningrad								
4. London								
5. Mexico City								
6. Moscow								
7. New York								
8. Paris								
9. Shanghai								
10. Tokyo								

This city has great buildings, some of which have machines in them for doing many sorts of work by steam or electric power. These are factories. One of them is a factory where furniture is made. In it men make tables and chairs in great numbers.



machine: instrument which does work for men.

power: a thing's power is the work it is able to do.

electric power: power which gives us electric light, heat, telephones.

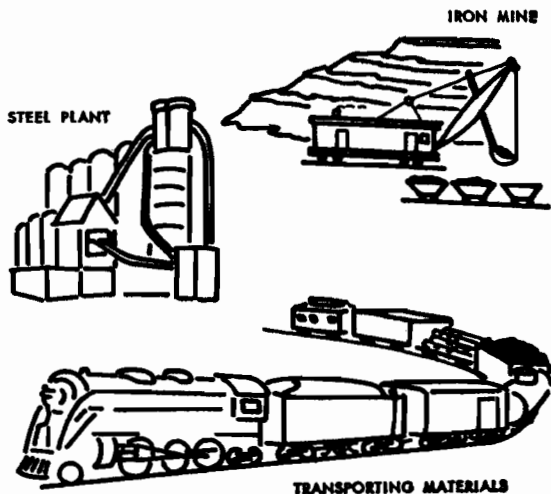
factory: building where men and machines make things.

furniture: beds, tables, chests of drawers,
bookshelves, etc.

chair: seat for one person.



We are living at a time when machines do work which men used to do. Now materials and things of all sorts can be transported long distances quickly. Its transport lines are very important to any great city.



Materials such as iron, which is mined from the earth in some places, and steel, which is made from iron, are used to make machines. Iron and steel are metals.

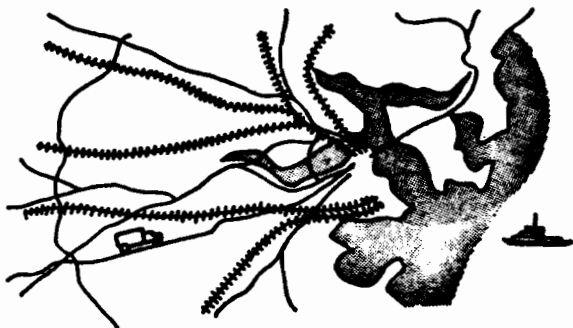
material: that from which things can be made. Wood is a material from which much of our furniture is made. Glass is the material used in windows. Much of our clothing is made of wool or cotton or silk materials. Machines are made of metal.

any: in this sense, every.

plant: in this sense, factory.

metal: any material of a certain sort, such as iron and steel. Metals are hard and are got from the earth.

It is only in the last century that great numbers of people have been able to live far from their food supply, with thousands of men in one place doing the same sort of work.



+++++ RAILROAD }
 _____ ROAD } TRANSPORT LINES (See p. 28)

High buildings like those pictured on the next page are being put up in more and more great cities today in greater and greater numbers. They are apartment houses, which sometimes have hundreds of different families living under one roof. There may be as many as twenty or thirty floors in one apartment house, with homes for fifteen or twenty families on a floor.

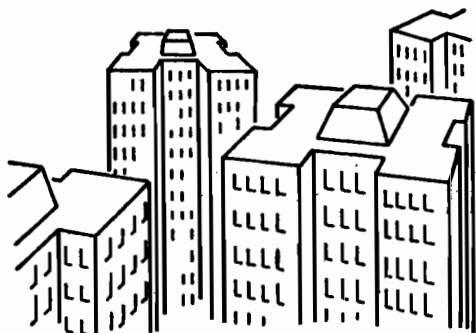
supply: amount of something for future use.

food supply: amount of food needed.

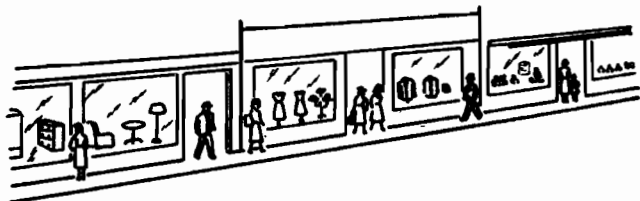
apartment house: building for a number of families to live in.

home: living place for a family.

Hundreds of families may make their homes in one apartment house.



In these stores people who live in the city can buy food, clothing and supplies of everything they need.



Some stores sell food, some sell clothing and some sell furniture. In most cities there are great stores which sell almost everything. They supply these families with what they need.

buy: get something by giving money for it.

sell: supply for money. If I buy something from you, you sell it to me.

supply: give a supply of.

will buy

will sell

will supply

buy (s)

sell (s)

supply (ies)

bought

sold

supplied

People in apartment houses have no place to keep a supply of food. They may have enough food in an icebox to take them through a day or two,



but on most days they buy meat and milk and fruit and other things they need from a store near their home.

Many families have supplies of milk and other foods sent to their houses every day. People with children in the family may buy four or five quarts of milk at a time.

Here is a family with five persons in it: a husband, a wife and their three children.

The man is the woman's husband and she is his wife. They have been married ten years.

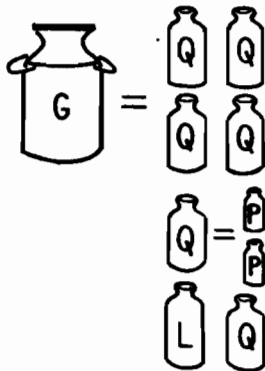
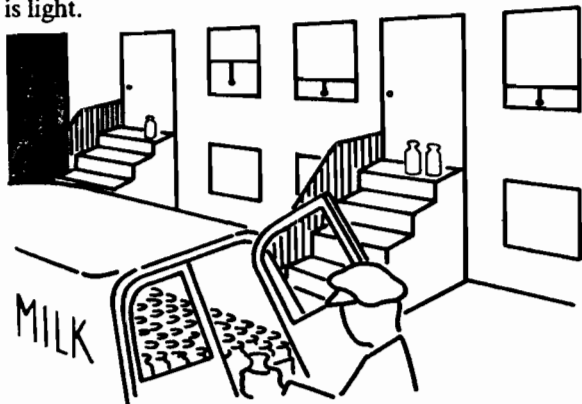


child: a baby or a young boy or young girl. Young boys and girls are children.

quart: see next page.

married: husbands and wives are men and women who are married.

A milkman puts the milk outside their door in the early morning. Milkmen start their work in a great city before it is light.



In some parts of the world milk is measured in gallons. Milk is put up in pint and quart bottles or in cartons. In other parts of the world milk is measured in liters. A liter is a little more than a quart.

pint: about two cupfuls.

gallon: four quarts make one gallon; two pints make one quart; there are two cups in a pint.

early: the first hours of the morning are the early morning.

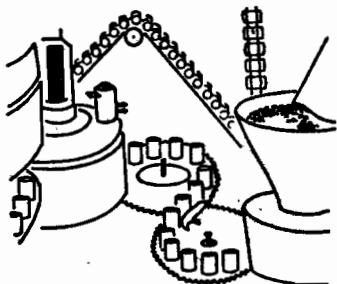
carton: bottle or box made of strong paper material.

will start

start (s)

started

In some factories food is put into cans. It is canned. These are machines in a canning factory.



Most foods today can be bought in cans. Food stores sell canned soups, meats, fruit and vegetables.

Food is canned to keep it from the air. When air can get at it, it quickly goes bad—if it is not kept very cold.

Canned food that has gone bad is a poison. Bad food is very bad for people; it poisons them. If they take much of it they may die. After a person dies, he is dead.

can: metal box. A can can keep food good for years. In Britain a can is a tin. Tin is a metal which is used as a coating for cans.

vegetables: plants used as food.

poison: anything which is very bad in its effect if taken by mouth.

die: come to the end of living.

dead: no longer living.

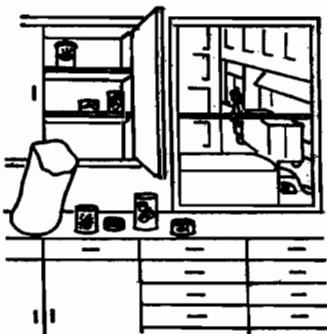


will poison
will die

poison (s)
die (s)

poisoned
died

People can have only a few cans of meat and fruit and other things "on hand," as we say, on their shelves. They may have a cupboard with two or three shelves of canned food, but most people have no room for more than that. If supplies do not come into the city day by day their supply of canned food is quickly used up.



can't: cannot.

few: a small number of, not many.

cupboard: walled-in shelves with doors in front of them.

Some people working in cities have no time or place to cook for themselves. Many of them go out to restaurants for all of their meals. There are many restaurants in a great city, all needing supplies of food every day and some of them cooking for great numbers of people.



A good restaurant keeps its food clean and does not let flies get at it. If flies get on food they may poison it.

cook: do cooking. A cook cooks.

themselves: himself and herself.

meal: food taken at one time, in the morning (breakfast), in the middle of the day (luncheon, lunch or dinner) or at night (dinner or supper).

restaurant: place where you can take meals at different prices.

fly: this is a housefly.



will cook

cook(s)

cooked

Here is a supply of meat, vegetables, milk, butter, cheese, bread, fruit and eggs, enough for a family of four persons for one day in the U.S.A. If a person does not get enough food of the right sorts, he will not keep well. He will not be able to work or play well.



Fresh food must be supplied to a city day by day. It will not keep good very long if it is open to the air. If uncovered, it may get flies on it. Flies get on dirty things. Their dirty feet make food dirty. Canned food will keep good for a long time. It can be stored.

fresh: new, not kept for a long time.

must: has to. A man must have air, water and food to live.

uncovered: not covered.

stored: kept for use when needed.

will store
will work
will play

store (s)
work (s)
play (s)

stored
worked
played

Grain and meat and milk and fruit and vegetables must be transported into the cities of the world day and night all through the year to feed its city populations. Much of this food comes great distances in ships, trains, or trucks, and must be kept cold and clean all the way.



This is a bag of grain.



grain: seeds of some grass plants used for making bread and some other cooked foods.

feed: when we give people food, we feed them.

truck: road transport for goods.

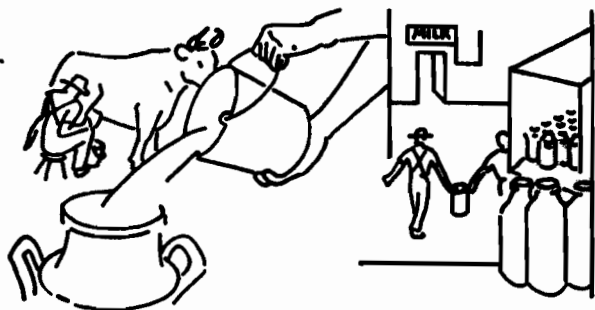


will feed

feed (s)

fed

The milk must be kept clean and cold and put into bottles and taken to the stores and houses in the city. City governments see that milk is kept clean and has enough butterfat in it.



Some city-born children have never seen a cow and have to be taught where milk comes from.

away: off, from that place

fat: the part of milk from which butter is made is butterfat. There are many sorts of fats.

never: not ever.

will teach

teach(es)

taught

Milk is the best food there is for babies. It is good for children and for older people too. It has in it fat, which gives energy, and it has the most important of the materials needed for building up our bodies. Milk makes strong bones and strong teeth too. It is good for a child to drink two or three glasses of it every day.



In addition, milk has in it most of the vitamins which are needed to keep us healthy. Vitamins are a discovery of this century. A hundred years ago no one knew anything about them.

toes in addition. After the addition of one thing to another we have the one and the other too.

energy: power.

builds: putting up a building is building it. We can build houses with wood and bodies with food.

drinks: take in by mouth, take a drink.

knows: have knowledge of.

will build
will drink
will know

build (s)
drink (s)
know (s)

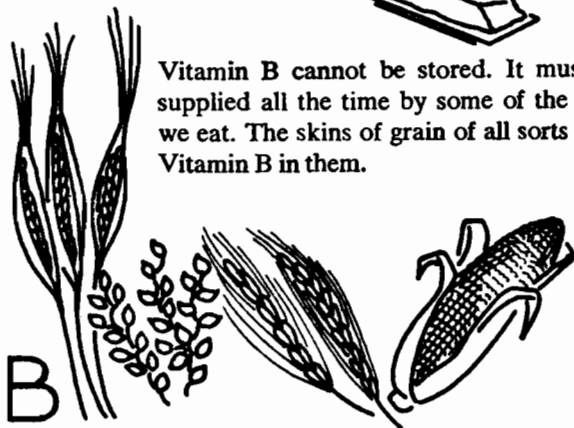
built
drank, drunk
know, known

A

The vitamins are named by letters of the alphabet. Vitamin A is needed by the eyes. There is Vitamin A in milk, butter and green vegetables. It can be stored by the body.



Vitamin B cannot be stored. It must be supplied all the time by some of the food we eat. The skins of grain of all sorts have Vitamin B in them.



B

alphabet: all the letters used in writing (see page 61).

eat: take food by the mouth.

will eat

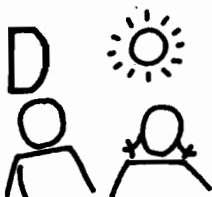
eat (s)

ate, eaten



Vitamin C is very important to the body. Without it men's teeth become loose and their arms and legs weak. Lemons, oranges and tomatoes have Vitamin C in them.

Vitamin D is the sun vitamin. We get it in milk and eggs and from sunlight on our skin. There are other vitamins, but these, A, B, C and D, are the most important.



without: not having.

become: come to be.

loose: not strongly rooted; not supported or kept in place.

weak: opposite of strong.

lemon: yellow fruit like an orange but not sweet.

tomato: a red or yellow fruit used as a vegetable.

become

become (s)

became

Every person must have air and water and food to keep him alive and he must have these vitamins to keep him well.

How do we know this? How do we know what food keeps a man well and healthy? We know from the effects on men and animals of going without one sort of food or another. That is how we see which foods give us energy, which make us fat and which make us able to keep healthy.



Men of science are putting together more and more knowledge about the sorts and amounts of food that our bodies need. Too little food or too much of the wrong food is bad for a person. The right amount of the right food (the food best for him) will keep him feeling well and strong.

Some people need a little more or a little less of one or another sort of food than others.

alive: living.

going without: not getting.

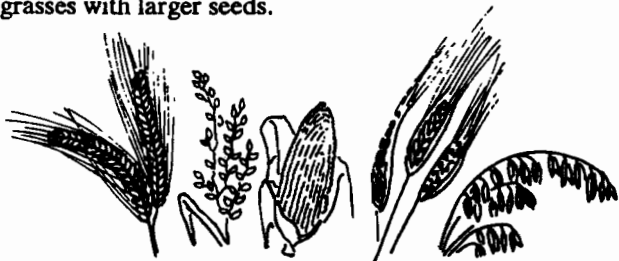
too little: less than enough, not enough.

too much: overmuch, more than enough.

Where do we get our food? We get much of it from the earth. We use some sorts of animals and birds to give us food.

Great parts of the earth are covered with grass, a plant which grows with narrow green leaves and puts down roots quickly. There are more than three thousand different sorts of grasses growing.

Grass has very small seeds which are used as food by birds and small animals. Man has discovered how to grow grasses with larger seeds.



Wheat, rice, corn, and other grains come from grass. The grain lands of the world have been planted by men. From grain man gets an important part of the food that gives him energy.

discover: make the discovery of, get to know.

large: great in size (large, larger, largest).

grow: come up from seeds in the earth, get larger.

will discover

will grow

discover (s)

grow (s)

discovered

grew, grown



The grasslands of the earth supply food to many different animals. From some of them we get meat and milk. From milk we make butter and cheese and other foods.

From birds living on grain we get eggs and meat.



Seeds planted in good earth supply grains and fruits and vegetables of many sorts,

The seas and rivers supply fish and some sea plants for food.



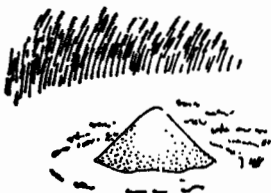
fish: water-breathing animal.

Man had to go from place to place for food until he discovered how to grow grain. Uncooked meat and parts of plants were all he had to eat until he made use of fire. And he had to get new supplies of food every day. He hadn't any way of keeping it good.

How could he get enough good food for himself, his wife and his children without having to go looking for it every day?



When he started growing grain, he had time to do other things than get the family food day by day. He could keep a supply of grain on hand through the winter until the next spring. He could make a home for himself and keep animals for his use.



until (till): up to the time that.

Bread, which is made from flour, supplies us with energy and is the chief food of many people.

A small amount of seed planted in the earth can grow great amounts of good grain.



In eastern countries more rice is eaten

than wheat.



flour: a soft powder made from crushing wheat or other grain.

pound: measure of weight. One pound (1 lb.) is a little less than half a kilogram. One kilogram (1000 grams) is a little more than two pounds (2.2046 lbs.).



public use: use by anyone. The public are the people.

eastern: in or of the east (ern may be put on the end of north, south or west in the same way).

If there were enough good food in every country every day for every person, would the world be a better place than it is?

We say, "If there *were* enough food," not, "If there *is* enough food," because there is not enough, and we know it.

We say, "If there were something in this hand you would see it," because we know that there is nothing in the hand.



But with this hand, which is shut, we say, "If there is something in this hand you will see it."



Now the hand is open. There is something in it and you do see it.



If we asked the question, "If there were enough good food for everybody, would the world be a better place?" some men would answer: "Yes, the world would be a better place." Others would say, "No, nobody would do any work! The world would be a worse place."

And some others would say something like this: "That is a strange question to ask when half the people of the world today do not get enough food. There will be time to answer your question when we have grown enough food for everybody."

What would your answer be?

everybody: all persons, everyone.

nobody: no person, no one, not anyone.

would: if this line from A to B were straight, then it would be the shortest distance between A and B.

But the line is not straight. That is why we say *were* and *would* in this example.

A  B

Why do men work?

Do they work only for their private needs — because of their need for homes and food and clothing for themselves and their families?



Why do some men work when they have enough of all these things? Do they work for pleasure, because making things, for example, gives them pleasure? Do some men work for the public good? Why are some men happier when they are working? Isn't work one of their needs?

Why do you work? Do you need to work to be happy?

Do we know one another's needs? Aren't we in the dark about some of them?

private needs: needs of one person or of a small number.

public goods: good of all.

isn't: is not.

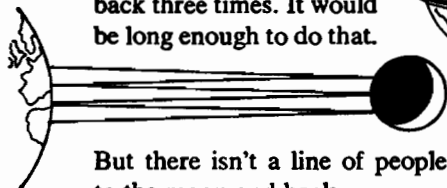
aren't: are not. When *isn't* or *aren't* starts a question in place of *is* or *are*, we are looking for the answer "Yes."

in the dark: people aren't able to see in the dark.

If all the people alive on the earth today were hand in hand like this, the line they would make would go more than fifty times round the earth.



The line of people would go out to the moon and back three times. It would be long enough to do that.



But there isn't a line of people which goes out to the moon and back.



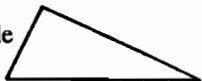
And the people of the earth aren't hand in hand; far from it!

That is why we said "*were*" (not "*are*") and "*They would go*" (not "*they go*").

We say: If the angles in this triangle are equal, then the sides will be equal.



But we say: If the angles in this triangle *were* equal, the sides *would be* equal.



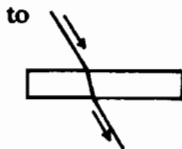
triangle: this is another triangle.



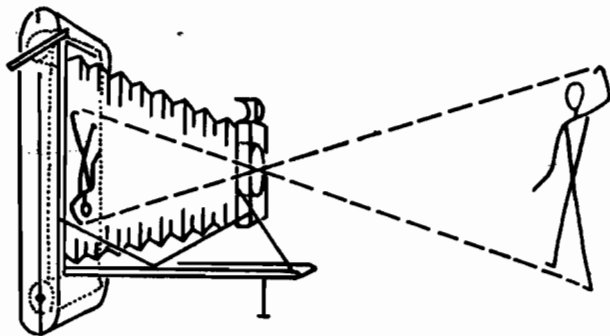
Men are not hand in hand, but their minds today are being put increasingly into touch with one another through reading and writing and in many other ways.

We are in touch with other people everywhere through pictures of them. Newspapers give us photographs of almost everything. The faces of important people can be seen by the public everywhere.

Before 1800 nobody could take photographs. Nobody had had the idea of using the knowledge of how light is bent by glass to make pictures.



Here is a camera which is taking a picture of a man.



You will see that the picture inside the camera is upside down.

Increasingly: more and more.

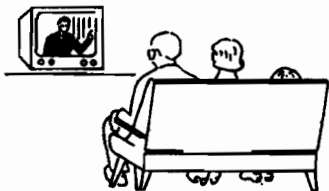
photograph: picture taken with a camera.

camera: instrument for taking photographs.

Another way in which people are getting to know more about one another is through the radio. Man's words were first sent from one place to another by telephone less than a hundred years ago. A word can now go by telephone from the Atlantic to the Pacific in one-twelfth ($1/12$) of a second. A telephone needs wires, but the radio, which came into use less than fifty years ago, can send sounds any distance without wires.



Television, which is one of the great new powers—for good or bad—of this century, lets a public man talk to millions while they sit in their private homes seeing him as if he were there in front of them.



wire: thread of metal.

talk: say things.

sit: be seated. When you take a seat on something, you sit on it.

telephone, radio, television: see pictures on this page.

will talk

will sit

talk (s)

sit (s)

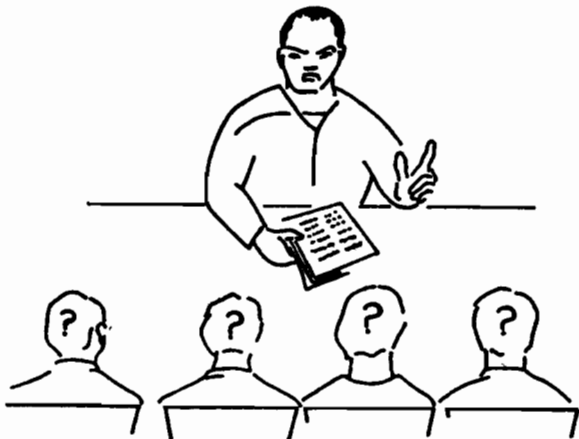
talked

sat

But people can't know what any man is saying if they don't know his language.

Up to a hundred years ago few people needed to learn foreign languages because not many people went into foreign countries.

Now, the need to learn other people's languages is becoming greater every day.



learn: get knowledge of, be learning.

foreign language: a language different from the language of your family.

foreign country: a country which is not yours.

will learn

learn (s)

learned, learnt

Today millions of people, young and old, go into foreign countries every year on business or for pleasure.



That is a quicker way to get about than on one's mother's back. Here is a woman who is carrying her baby on her back. She carries the child with her wherever she goes. In the last hundred years men have learnt to go over land and sea through the air as almost all birds and many insects can. Men are carried through the air in airplanes.



one: a person.

one's: a person's.

carrying: taking from place to place.

Insect: these are insects.



will carry

carries

carried

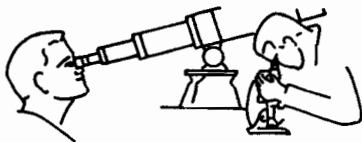
Some birds have eyes which can see great distances, and they have good hearing. Some of them can hear sounds which we cannot hear.



But man has made himself new ears and new eyes.



Today he can talk with a person at the other side of the earth by telephone. Through the radio he can hear sounds which come to him through space from thousands of miles away.



He can see through a telescope the mountains on the moon, and, through a microscope, thousands of living things in a drop of water.

hear: take in sounds, use the sense of hearing.

space: distance between things; that in which all things are.

will hear

hear (s)

heard

Hundreds of millions of people today can hear on the radio important statements by public men, statements which in earlier times could have been heard by few. It is a question whether at any time in history a man has been able to make his voice heard by as many as a hundred thousand people at the same time. Without the telephone and the radio a man can be heard only as far as his voice can carry.



New instruments are making men's homes less private and public men more public.

whether: if or not.

history: man's past as we know it; the account or story of it.

voice: sound made through the mouth; the power to make such sounds.

Birds and many insects have wings. It is their wings which take them up into the air. The wings of birds have long feathers on them. Their bones and the stems of their wing feathers are hollow. This keeps them light.

Here is a bee.



Here is a beetle.



Here is a fly.



And here is a butterfly.



Bees, beetles and flies are insects.



There are very many different sorts of insects.

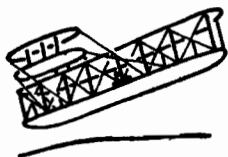
wings: a bird has wings where a man has arms and a dog or horse has front legs.

feathers: these are feathers:



hollow: with space inside as in a pipe or in a ball which is not solid.
light: of little weight.

Men have been attempting for thousands of years to make wings that will let them fly like the birds.



Here is the picture of the first flying machine to take men into the sky, made in 1903. It did not fly very fast or very far.

Now planes can fly farther and faster than the fastest bird and can carry heavy weights through the air. Man can go faster than sound in the newest planes.



heavy: of great weight; opposite of light.

fast (faster, fastest): quickly.

fly: go like a fly through the air.

will fly

fly (ies)

flew, flown

We can see why distances between people are not as important now as they were. They may be bridged in so many ways.

What is a bridge? Here is a wide river with a bridge over it. The bridge is more than a mile long and is made of steel. It can carry very heavy weights. It is so strong that not only automobiles but trains go across it. It is so high that great ships go under it.



Language is a bridge between minds, a bridge so strong that trains of thought can go across. Language can bridge distances.

so: in this sense very.

so strong that: strong enough to let.

so high that: high enough to let.

will bridge

bridge (s)

bridged

Language can bridge time as well as space. Ideas can go from mind to mind across the language bridge, and they can come from the past to the present. We can read what men before us wrote and keep their books for others to read in the future.

Here are some of the great books of all time.



Books are the most important records we have of men's thoughts and feelings, their ideas and desires.

read: do reading.

write: do writing.

past: what has been before now

present: here and now.

future: what will be.

records: store of knowledge. From records men can learn what was done in earlier times.

will read
will write

read(s)
write(s)

read
wrote, written

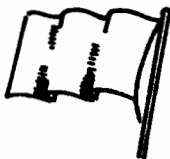
All men have more in common with all other men on earth than most of them know. What do the words "in common" mean? What is their meaning? What do the people in this family have in common? They have



their family name in common. They are the Smiths, or the Wangs. They have a house in common; it is their home. The husband and wife have their children in common. In some parts of the world a man may have a number of wives. In other parts a woman may have a number of husbands. In these countries the wives have their husband in common or the

husbands have their wife in common.

People of the same country have that country in common. It is their country. Every country has a flag. What is the flag of your country?



meaning: sense. What words say to us is their meaning, what they mean.
flag: see picture on this page. Your flag represents your country.

will mean

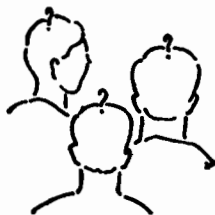
mean(s)

meant

People who talk the same language have that language in common. It is their language, the language of each and all of them. They have the ideas and feelings about things which that language carries.



People who do not talk a language do not know what those who use it are saying. They do not know what its words can mean. They have less in common with those who talk it than those people have with one another.



Sometimes, as in India, in one country under one flag people talk many languages. They have their country and their flag in common, but some of them have to learn the language of others if they are to have a language in common.

Talking with someone is saying things to him, hearing what he says and taking in his meaning. People can



talk together only when they have a language in common. When you were very young your parents talked to you and after a time you saw what they meant and learned to talk to them. A baby's first words are commonly names for its parents. Some children learn to talk earlier than others.



We go on learning our language all our lives.

Some people talk more than they think, and some people think more than they talk. Most of our thinking is done through language.

2.22

parent: father or mother.

commonly: most times. It is common for babies to say names for their parents first. Babies have this in common.

think: have thoughts, use the mind, have ideas.

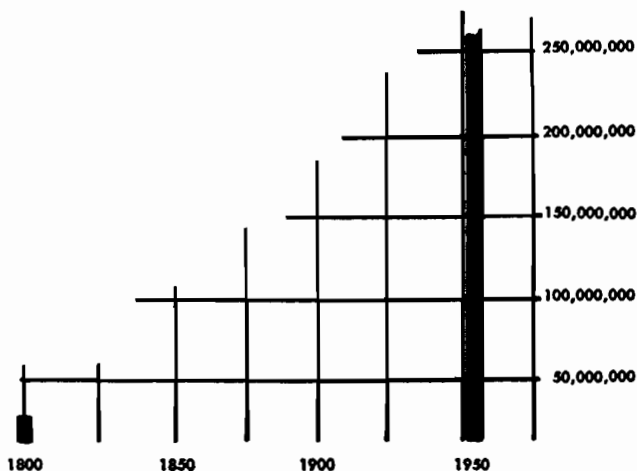
will think

think(s)

thought

There are more than 2600 million people on the earth and about 2500 languages. Of these languages only about twelve are used by more than 50 million people.

Here are the names of some languages which have very wide use: Chinese (Mandarin and Cantonese), English, French, German, Hindi, Japanese, Russian and Spanish. All these languages have more people talking them today than ever before. A hundred and fifty years ago there were only about twenty million people who talked English, for example. Now there are at least two hundred and fifty million, and there may be many, many more.



at least: that number or more.

More people will learn more languages as better ways of teaching them are worked out.

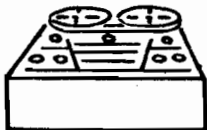


This book, *English Through Pictures 2*, is itself part of an attempt to teach English better.

We need better books to learn from and better records of good voices to teach us how to listen to the sentences of a language and say them.



Recordings of sounds are made on disks and on tapes.



listen: attempt to hear.

attempt: make an attempt.

record: records, when played on a machine, let us hear again the sounds recorded on them.

sentence: a thought put in words. A written sentence starts with a large (capital) letter and ends with a full stop (period) or sometimes a question mark.

disk: sound recording played with a needle.

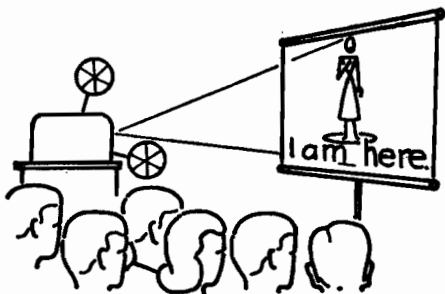
tape: long narrow roll of thin cloth, paper or other material.

will listen
will attempt

listen (s)
attempt(s)

listened
attempted

We need good pictures to teach us meanings in the new language and good motion pictures to help many more people to learn languages quickly and well. The learners will then be able to work in groups with the help of teachers or by themselves, using books, records, radio, sound motion pictures and television.



A teacher can help a learner to learn. Reading and writing can help us to think.

well: in a good way.

help: something which does part of our work for us. A stick may be a help to an old man; it may help him.



in groups: together with others.

groups: those doing something together or having something in common.

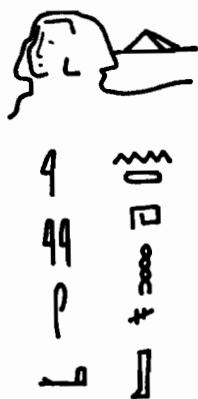
will help

help(s)

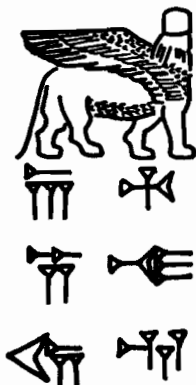
helped

Writing is a very much newer invention than talking. Nobody knows when men first began to talk, but they did not begin to write, so far as we know, until seven or eight thousand years ago.

IN EGYPT



IN MESOPOTAMIA



IN CHINA



In Egypt, Mesopotamia, and China, and later in Palestine and Greece, men began to make marks and pictures with sticks and sharp stones from which others, or they themselves, later, could see what they had thought.

invention: some new thing or a new way of doing something worked out by men.

began: started.

sharp: cutting.

stone: a hard material, or a bit of it. Much of the earth is made of stone.

Some stones are round and smooth from being rolled about by water.

Others are sharp and early men made them into knives.

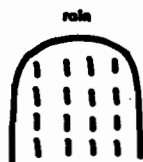
later (late, later, latest): opposite of earlier (early, earliest).

will begin

begin (s)

began, begun

These early records were the beginning of writing. The first writing was picture writing. Here are some early Chinese picture words. Can you see what they represent?



Later Chinese writing is less like pictures than the earlier writing was but we can see the pictures in some of its words. For example:



Here are some Egyptian words in picture writing.



beginning: starting point.

In picture writing, each picture represents a word; you need a different picture or mark for each word.

In present-day Chinese writing most of the marks are not pictures of anything, and a reader has to learn how the Chinese write about two thousand of these words before he can read a newspaper.

With some of these marks you may be able to see what the idea is. For example:

The sun and moon.



Two of its meanings are: "bright" and "open."

A man and two marks.



One of the meanings is "what men have in common."

Learning to read Chinese is much harder than learning to read English. But in word-writing like Chinese the same marks can be read as having the same meaning in different languages; for example, in Mandarin, in Cantonese and in Japanese.

has for must.

In time some men discovered how to represent the sounds in words by marks. In any language there are only a small number of different sounds. By writing down marks to represent sounds, not ideas, men can spell any of the words in a language with only a small number of marks. Every written language today has its spelling system. The hardest languages to spell are those in which—as with English—many of the letters may represent more than one sound.

Here is the complete Roman alphabet in which English and many other languages are written.

A B C D E F G H I
J K L M N O P Q R
S T U V W X Y Z

Something written in English has a meaning only if it is read as English, because the letters in English represent English sounds. What is written in Italian must be read as Italian.

spell: put letters together to make words.

system: way parts are put together. Here letters are put together to represent the sounds of a language.

complete: something is complete when all of it is there.

will spell

spell (s)

spelled

Here is the name of the book *English Through Pictures* written in a number of different languages. The names of the languages are given in English.

Arabic	الإنكليزية بواسطة الصور
Bengali	ইংরেজি ভাষার দ্বারা ছবি
Burmese	ပုံစံဖြင့် အင်္ဂလိပ် ဘာသာဖြင့်
Chinese	英語圖解
Greek	ΑΓΓΛΙΚΑ ΜΕ ΕΙΚΟΝΕΣ
Hebrew	השפה האנגלית באמצעות תמונות
Hindi	तस्वीरों द्वारा अंगरेज़ी
Japanese	英語圖解
Korean	그림을 통하여 영어 공부하는 방법
Persian	اموحتن زبان انگلیسی از روی عکس
Russian	АНГЛИЙСКИЙ ЯЗЫК В КАРТИНКАХ
Sinhalese	පින්තූර චිත්‍රය මගින් ඉංග්‍රීසි භාෂාව ඉගෙනගැනීම
Tamil	படங்களின் மூலமாக ஆங்கிலம் கற்றுக்கொள்ளல்
Telugu	పటములద్వారా ఇంగ్లీషు నేర్చుకొనుట
Thai	รูปภาพประกอบคำกริยา
Urdu	تصاویر کے ذریعہ انگریزی سیکھئے

Here are the twenty-six letters used in English with the English names for them spelled out after them.

a ay	j jay	s ess
b bee	k kay	t tee
c see	l ell	u you
d dee	m emm	v vee
e ee	n enn	w double-U
f eff	o oh	x eks
g jee	p pee	y wy
h aich	q kyou	z zee or
i eye	r are	zed (British)

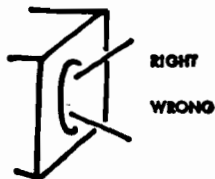
Some of these letters are used not for one sound only, but for any of two or three or more different sounds. The letter *a* may have the sound of *a* in *bag*, *part*, *again*, *say*, *was*, *any*, or *fall*.

The letter *e* may have the sound of *e* in *bell*, *week*, *older*, *earth*, or *hear*, or it may have no sound but only an effect upon other sounds which come before it. The *a* and the *g* in *bag* have different sounds from the *a* and the *g* in *age*, for example.

Reading English is not as hard as reading Chinese, but it is harder than reading a language in which each letter has only one sound. The book, *First Steps in Reading English*, can be a great help to a beginner.

Are some of the sounds used in one language very unlike any of those used in another?

Yes. You may have felt in learning English that some of the sounds it uses are strange. But if you do not have a well-trained ear, you will not hear English words as they are heard by an Englishman or an American. You will hear the nearest sounds in your mother language.



A good way of learning to make the sounds of a new language is to use recordings which have spaces after each sentence giving you time to say what you have heard before the next sentence comes.

may have felt: may have had the feeling.
trained: taught to do something well.

will feel
will train

feel(s)
train(s)

felt
trained

There are machines which will play back to you again and again, one after the other, the sounds you have made and the sounds you were attempting to make. When you hear what you are doing wrong you can try to do better next time.



RIGHT

WRONG

light

tong

right

wrong



For most children, new sounds are easy to make when they hear them, and children seem to hear new sounds better and more easily than grownups do. If a family goes to China, or France or Finland (to take three countries whose languages are very unlike one another) the children will learn to talk Chinese or French or Finnish much more quickly than their parents will.

try: make an attempt.

easy: something is easy for you when you can quickly learn to do it well.

It is hard when you cannot.

grownup: person who is no longer a child; who has grown up into a man or a woman.

will try

try(ies)

tried

Why is this? Why is it easy for young children to learn languages?

Part of the answer is that children have so many needs. They need to be helped by grownups at every turn. They have to make their needs known and they are always watching the effect of what they say and trying new ways of getting what they want.



Children are learning new things all the time.

watching: looking at. Our watches are things we watch (keep looking at) to see the time.

always: at all times, all the time.

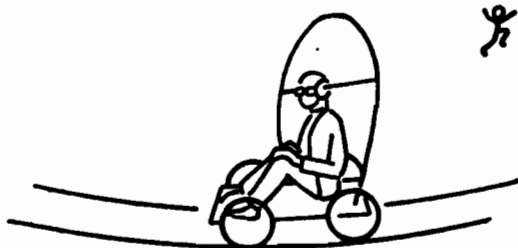
want: have a desire for.

will want
will watch

want (s)
watch (es)

wanted
watched

Another part of the answer is that children are not, as older people sometimes are, fixed in their ways of living. When they are taken about from one country to another they change easily from one language to another, from one bed to another, from one food to another. Older people are more fixed in their ways. They have been hearing and talking one language for a long time. Their ways of hearing and making sounds and of putting words together are like the rails a train goes on. They have been up and down their lines of talk and thought too many times to change them easily.



A child is freer in his ways. He is more like an airplane or, better, like a bird; he is free to go in any direction he wants. He is free to hear sounds as they are and make them as he hears them. He is free to put new words together in new ways in talking a new language.

free: opposite of fixed.

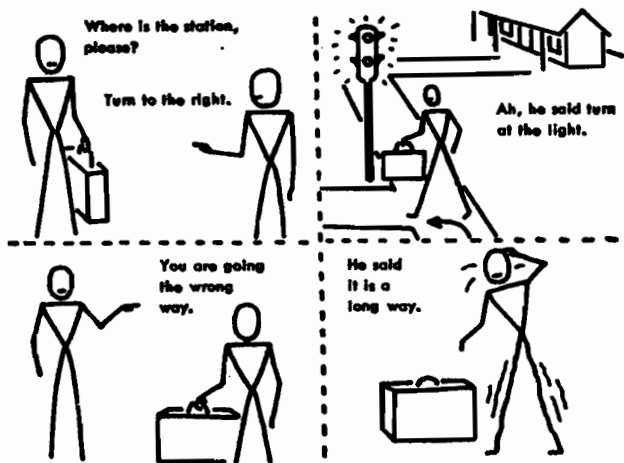
change: make a change, make changes in.

will change

change (s)

changed

The more languages you hear and get to know, the more you will see how any language is made up of a small number of sounds put together in different ways. For example, in English, *light* and *right* are different words with only one sound in them different. The same is true of *long* and *wrong*.



If a learner does not hear these different sounds as different, he may not get the meaning of what is said to him.

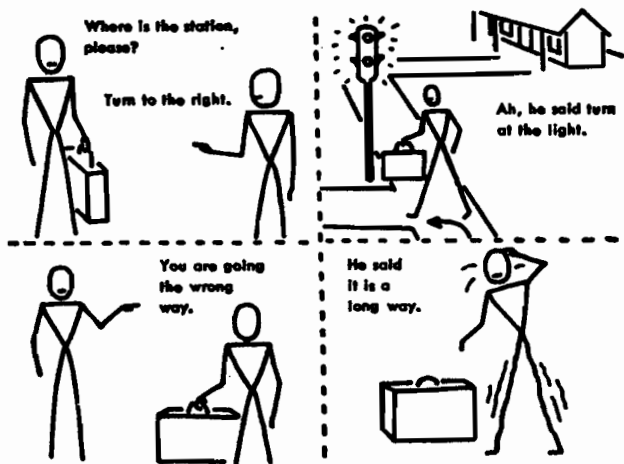
turns make a turn.
 asks a cry not a word.

will turn

turn(s) ~

turned

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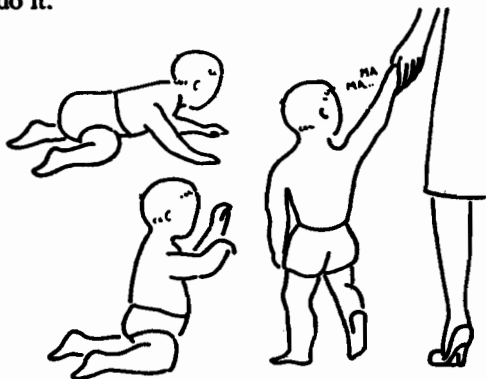
will turn

turn(s)

turned

There are many ways of helping a learner into a language, but not enough people know them.

Most people learn their mother language without being able to give any account at all of how it works. They learn to talk as they learn to walk, without any idea of how they do it.



People who learn to use a language well do so through talking with others who use it well, through reading good writers and through watching the effects on others of what they say and how they say it. The world needs more people who can use language well. Language is as necessary to men's minds as the air they breathe is to their bodies.

necessary for: needed by.

to breathe: take air in and give it out.

The sound of ea in breathe is like ea in meal.

The sound of ea in breath is like ea in head.

**will walk
will breathe**

**walk (s)
breathe (s)**

**walked
breathed**

All men need air; we breathe in air from outside our bodies in every breath.



When you put your face under water you cannot keep it there long.

A swimmer can't swim under water very long. He needs air.

A good swimmer may swim with his face in the water; if so, he keeps turning his head to take a breath through his mouth.



He does not take in air through his nose under the water because water would get in through his nose with the air and go to his lungs. With water in his lungs a man can't go on living.

swim: be swimming.

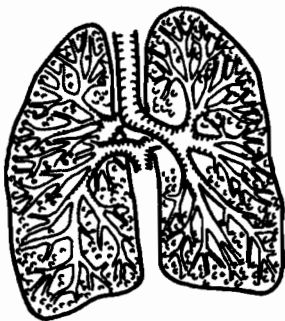
lung: see top of next page.

will swim

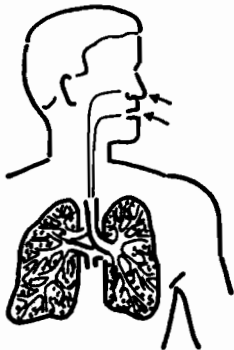
swim(s)

swam

Here is a picture of a man's lungs. They are soft like sponges with thousands of little pipes going through them. The pipes keep branching like the branches of a tree so that they go through every part of each lung.



Our lungs are in the upper part of our chest. We have two of them. The air we breathe goes right in to every part of the lungs through these branching pipes. They take it to the blood which is moving all the time through the lungs and round to every part of our bodies. The blood makes a journey round the body and back to the lungs in a very short time.



sponge: framework built up by one sort of water animal as its home; soft in water and used by men for washing.

upper: higher up than the middle.

right in: all the way in.

blood: red liquid in bodies of higher animals.

moving: in motion.



will move

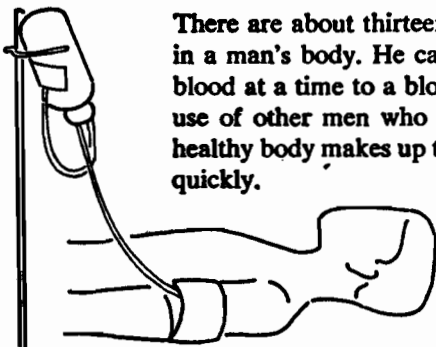
move(s)

moved

What is blood?



It is the red liquid which comes out of your finger when you cut it.



There are about thirteen pints of blood in a man's body. He can give a pint of blood at a time to a blood bank for the use of other men who may need it. A healthy body makes up the pint of blood quickly.

What does our blood do for us? It takes food to all parts of our bodies and takes waste away from them. All the parts of our bodies are made up of cells. These cells, which are very small, all need food all the time.

cut: make a cut in.

blood bank: place where blood is kept as money is kept in a bank.

waste: that which is of no more use; materials not needed.

cell: smallest living thing, or smallest living part of living thing.

will cut

cut(s)

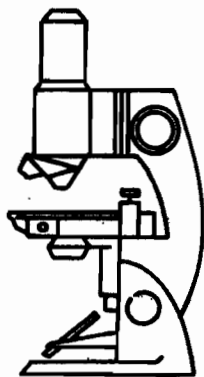
cut

Here are some cells, thousands of times the size they are in the body.



Each different sort of cell has its own work to do, different from the work other sorts of cells do.

No one had seen cells before the invention of the microscope and its development in the sixteenth and seventeenth centuries. Before then no one could make pictures of cells because no one could see them.



owns: a cell's own work is *its* work, not that of any other sort of cell.

Your own hat is yours, not any other person's hat.

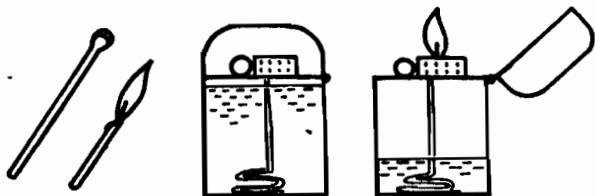
developments: change by which something (living thing, idea, invention) becomes better, or more able to do things. All the animals and plants we see about us have developed from earlier living things which were at first made up of only one cell.

will develop

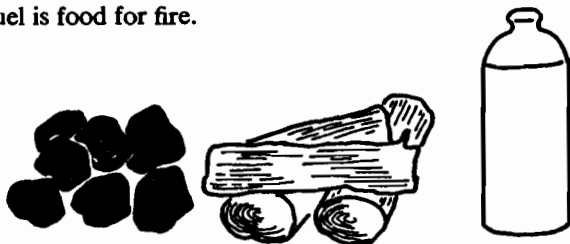
develop (s)

developed

Cells are like little flames. A flame needs food. We get a quick flame—for a fire or a cigarette—by lighting a match or using a lighter. The flame of the match burns the match and the flame of the lighter burns the liquid in the lighter, if there is air for them to burn in.



All fires burn something. What they burn is their fuel. Fuel is food for fire.



cigarette: thin roll of cut tobacco in paper for smoking.



cigarette lighter: box with liquid which will burn in it.

tobacco: dried leaves of the tobacco plant.



burn: be changed by fire.

match: small stick of wood or paper which gives flame.

fuel: material for fire. Fuel may be solid, liquid or gas.

will burn

burn(s)

burned, burnt

The blood is like a stream. The cells take what they need, their fuel, out of the blood stream, as plants and fishes take their food out of water.



The blood stream carries food and the oxygen which it has taken up in our lungs to all the cells in the body. Old cells die and give place to new cells in the body as plants and fish and other living things in the world about us die and give place to others. Three million of your red blood cells die every second and other cells take their place. The red cell population of your body changes completely in about three months.

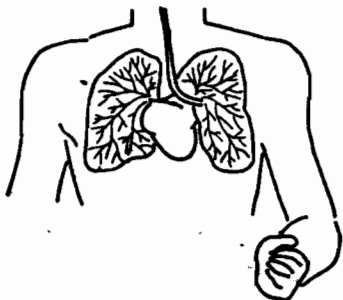
streams: river.

oxygen: one of the gases in air. Our lungs take it out of the air we breathe. Fire takes oxygen out of the air as it burns.

What makes the blood go on moving round the body in a stream?

The heart sends it round.

The heart is between the lungs. A man's heart is the size of his shut hand.



The heart is a pump. If you put your hand under water like this, and keep letting a little water into it



and sending it out again, you are pumping the water. The heart pumps blood in a way a little like this.

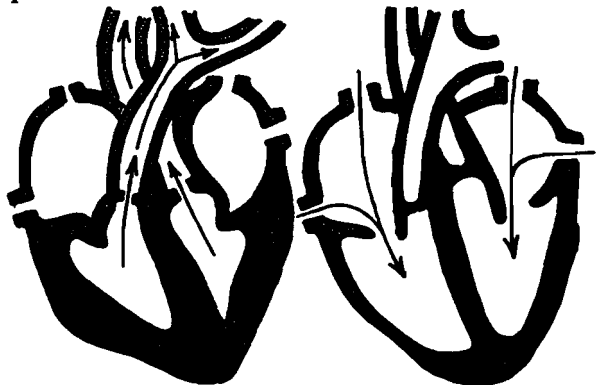
pump: machine for pushing liquid or air or gas in or out of something.

will pump

pump(s)

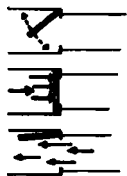
pumped

The heart has four rooms in it with doors (valves) between them. It pumps blood in and out through these doors by changing the size of the rooms so that the doors open and shut. It can do this because it is made of muscle.



The heart keeps a stream of blood going all round the body and back again to itself. The pipes which take blood from the heart are named *arteries*; the pipes through which it comes back to the heart are named *veins*.

valves: opening which lets liquid or gas go through one way but not the other way.



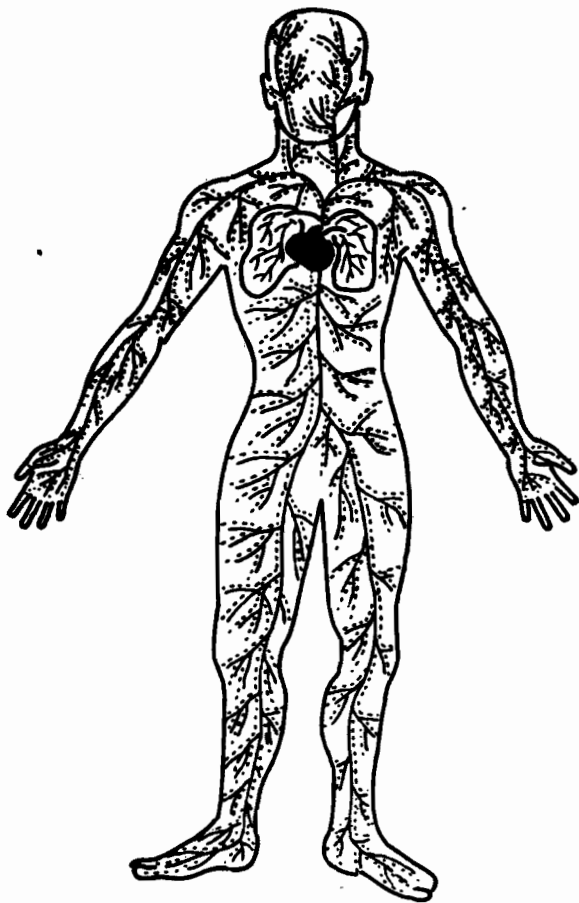
muscles: cords of threads which can become longer or shorter to move parts of the body.



will shut
will open

shut (s)
open (s)

shut
opened



A solid line represents an artery and a broken line a vein.

The first man to discover that the blood goes to all parts of the body, out through the valves of the heart through one system of pipes and back again through another, was the seventeenth-century doctor William Harvey.



The journey of our blood all round the body is the circulation of the blood. As you see in the picture opposite, the branches of the arteries are like the branches of a tree which get smaller and smaller the farther they are from the roots. The small branches go to all parts of the body. They go to the ends of your fingers and toes, to all the muscles—those parts by which you move your arms and legs and head and other parts of the body.

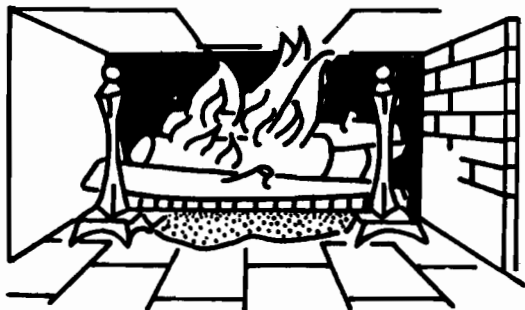
doctor: man with training which helps him to make and keep people healthy.

circulation: motion round and round.

picture opposite: picture which is on the opposite page; picture on the opposite page.

Everywhere the blood stream does two things: supplies the cells with food and oxygen and takes away waste. It is as if the blood kept the little fires in the cells burning and took away the ashes.

The fuel for the fires in the cells is given us by the food we eat. It cannot burn without oxygen. This gas is as necessary to all living things as it is necessary to the burning of fires made of wood or coal.



Burning is the change which takes place when oxygen and fuel unite. Coal, wood and other fuels (cooking gas, for example) burn by taking oxygen from the air.

everywhere: in all places, in all parts, at all points.

ash: powder you can see in the place where a wood fire has been burning.

unite: become one new thing, in this sense of unite.

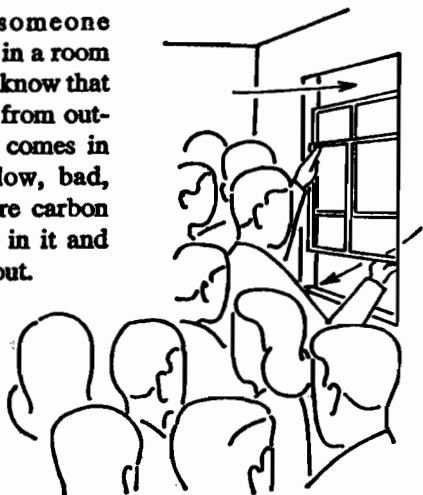
coal: coal is mined from the earth. Trees living millions of years ago have been slowly changed into the hard, black coal in use as fuel.

will unite

unite (s)

united

When you see someone opening a window in a room full of people, you know that he is letting in air from outside. As good air comes in through the window, bad, used air, with more carbon dioxide and water in it and less oxygen, goes out.

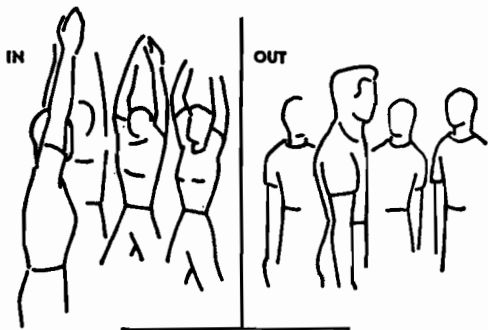


We say good air is fresh air. Fresh air is clean and good to breathe and has enough oxygen in it for our needs.

carbon dioxide: one of the gases present in the air. It is made up of carbon (present in coal) and oxygen united.

fresh: here are some other senses: Fresh water is water which is not salt like sea water. Fresh bread is new bread. Fresh paint is paint which has been newly put on.

These boys are outside in the fresh air, breathing deeply while their teacher is saying:



for every breath which they take. If you could watch them you would see their chests becoming first larger, then smaller in size, as their lungs breathed air in and out.

Breathing goes on when we are awake and when we are sleeping. Most of the time we are not conscious of our breathing.

The motion of our lungs as we breathe is automatic. It goes on by itself, the lungs taking fresh air in and letting used air out about eighteen times a minute. This is the common rate of breathing.

We become conscious of our breathing if anything shuts the air off from us, so that we do not get enough oxygen for our needs.

awake: not sleeping.

conscious of: taking note of; feeling; having in mind.

automatic: working by itself, without anyone having to do anything about it consciously.

Keeping your mouth shut, take your nose between your thumb and one finger, so that you shut the air out and shut your breath in. How long can you hold your breath? You will be wise if you do not try to hold it more than a minute. If oxygen is kept from a person for long he will become unconscious.



When a person becomes unconscious through getting water or smoke in his lungs it is very important to start him breathing again. This is done by turning him face down (putting something between his teeth to keep his mouth open) and then working his lungs to start his breathing.

hold: keep from changing, keep in one place, keep from moving.

wise: having knowledge and seeing what to do for the best.

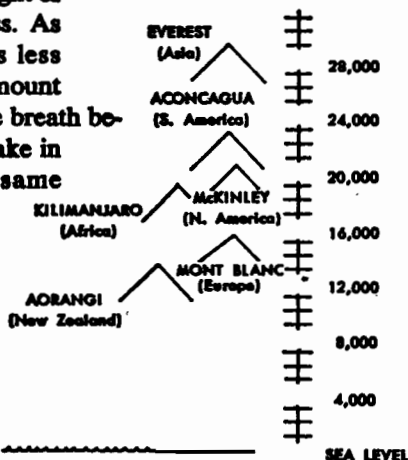
unconscious: not conscious, having no sense or feeling or knowledge.

will hold

^u
hold(s)

held

The higher up we go the less is the pressure of the air, because the weight of the air above us is less. As the pressure becomes less (air gets thinner) the amount of oxygen we get in one breath becomes less. We must take in more air to get the same amount of oxygen.



The instrument we use to measure the pressure of the air is the barometer.

the pressure on something: the push on it. The air is pushing on this ball, putting pressure on it, from all sides all the time.



above: over, higher up.
measures: take the measure of.

will measure

measure (s)

measured

Men have been able (1953) to get to the top of the highest mountain in the world, Mount Everest. They had to use oxygen when they got up high. They had to keep control over the amount of oxygen they used. They could get no more supplies from those below.



This man, who is going up a high mountain, is using a supply of oxygen which is stored in those cans he is carrying on his back. By opening and shutting a valve, he controls the amount of oxygen he breathes in. The gas has been pumped into the small space inside the cans. It is under pressure in there and comes out when the valve is opened.

control: power over.

below: lower down, opposite to above.

will control

control(s)

controlled

It was more than a century after Harvey had discovered the circulation of the blood that two other scientists, one English and the other French, discovered oxygen. These men saw that when a flame burns it takes something out of the air. That is why a candle goes out when it has been burning for a little time in a small amount of air. It has taken all the oxygen out of the air. You may see this by putting a lighted candle under a glass cover, so:



When the candle has used up the oxygen from the air it cannot go on burning. It cannot burn without oxygen. Its light goes out.

So with the burning that goes on inside the millions of cells of our bodies. If the blood stops carrying oxygen to the cells, they go out. They die.

scientist: man of science.

so: like this, it is like this.

candle: cotton cord with solid fuel round it. The heat of the flame turns the fuel to liquid and then to gas as it burns. The flame is the burning gas.

stop: do not go on, make a stop, put an end to.

will stop

stop (s)

stopped

When a man is running, his heart is working much harder than when he is sitting down. His blood is being pumped more quickly through his body. The blood must carry a greater supply of oxygen to the muscles all over the body. Our hearts work for us automatically. A man's heart can pump as much as three thousand gallons of blood a day.



The amount pumped at any time is controlled automatically. After running hard a man breathes very quickly because while running he couldn't take in enough air for his oxygen needs. He is "out of breath," as we say.

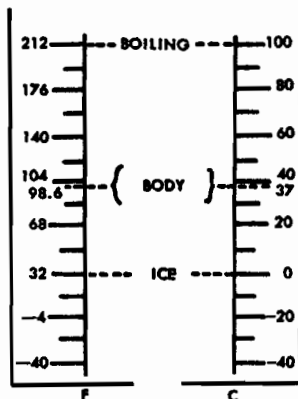
running: going faster on foot than walking.
automatically: in an automatic way.

will run

run (s)

ran, run

Our bodies control themselves in many other ways. For example, the temperature of our bodies (and those of all warm-blooded animals) is controlled; our blood temperature is kept at 98.6 degrees Fahrenheit, or near it.



When a person is very ill (sick) some of the automatic controls of his body stop working. His temperature, measured by a Fahrenheit thermometer, may go as high as 103°F or 104°F but if it goes much higher, or keeps as high as that for very long, he cannot go on living. He will die.

temperature: the measure of body heat on a scale.

warm: having a middle degree of temperature not very different from the temperature of our bodies.

degrees: temperatures are measured in degrees Fahrenheit (F) or degrees Centigrade (C). We change a temperature from Centigrade to Fahrenheit by the addition of 32 to nine fifths of the number. For example, 100°C is the boiling point of water. This is 100 times $9/5$ plus 32 = $180 + 32 = 212^\circ\text{F}$.

ill: not well, unwell; in some parts of the world the word *sick* is used.

thermometer: instrument for measuring temperature—another of Galileo's inventions.

The body has many different ways of keeping itself warm enough and not too warm. It uses up more food, more fuel for the cells, in cold weather. It shivers—that is, its muscles go on making quick little motions to keep it warm. We cannot stop ourselves from shivering. The body's heating system is not under a man's conscious control; it is automatic. To stop shivering he has to warm himself some other way: he may run or walk quickly, or take hot drinks, or cover himself up warmly, or use a hot water bottle to warm his bed.



shivering: shaking all over as an effect of cold.

warm: make warm.

hot: very warm, at a high temperature.

heat: make hotter. We warm our hands at a fire, but we heat water on R.

will shiver
will warm
will heat

shiver(s)
warm(s)
heat(s)

shivered
warmed
heated

Our bodies give off some of their heat all the time by sending a little liquid out through the skin. Sometimes the amount gets greater and our skin becomes wet. This cools the body quickly.



Here the man on the left is shivering because he has been waiting in line for a long time in the cold wind. The man on the right is wet all over because he got too hot in the sun. He is drinking water because he feels the need of it. He is thirsty.

cool: make less warm.

too: more than enough.

thirsty: feeling the need to drink.

will cool

cool(s)

cooled

This man is in training. He is going to run a distance of one mile in the shortest possible time. The fastest runners before him have taken a little under four minutes and he wants to make a new record.

When a man runs a mile in four minutes he is going at a rate of fifteen miles an hour, but it is not possible to keep running at this rate very long.



The runner is standing now in front of his doctor who has an instrument in his hand. Through this the doctor can hear the sounds made by the runner's heart.

possible: able to be done.

under: in this sense, less than.

record: this is another sense of "record." When a person does something better than it has been done before we say he has made a record.

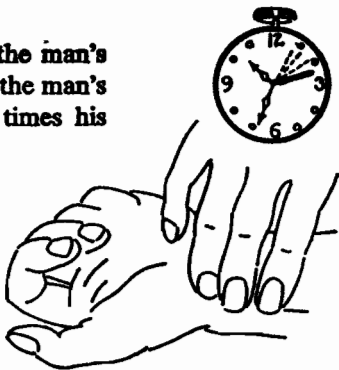
standing: on his feet, not moving.

will stand

stand (s)

stood

Now the doctor is taking the man's pulse. He has his finger on the man's wrist and is counting the times his heart pumps the blood in one minute. The doctor can feel the motion or pulsing of the blood every time the man's heart pumps.



In most men the pulse rate is between seventy and eighty times a minute. In children it is higher.

The runner's pulse rate is 72. It will be higher when he is running.

pulse: motion of the blood through the arteries as it may be felt at points in the body, for example, the wrist.

pulse rate: number of pulses in a minute.

wrist: end of the arm nearest the hand.



counting: using numbers to discover how many.

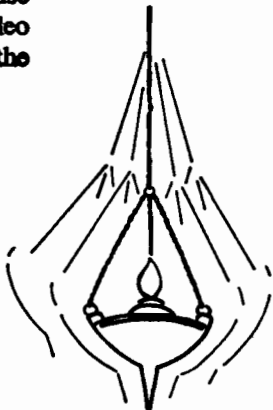
will count

count (s)

counted

There is a good story about the use
the great Italian scientist Galileo
once made of his knowledge of the
pulse rate.

Galileo lived three hundred
years ago before men had
watches for measuring time.
In the sixteenth century
there were very few clocks in
the world and no watches.



One day when Galileo
was a young man of eight-
teen, he was in the great
church of the city of Pisa
where he lived. Watching



the motion of a light hanging down on a long chain from
the roof high above his head, he saw that as the light
moved forward and back on its chain, it seemed to take
the same time between turns, however far it went.

once: at one time in the past.
forward: to the front.

chain: support made of metal rings going through one another.



however far: when it went only a short distance and when it went a
longer distance.
however: in whatever way.

To see if he was right about the motion of the light, Galileo put his fingers on his wrist. He timed the motion of the light as it went forward and back on its chain, measuring it by his pulse rate.



He was right. He had the proof. He could prove that the time was the same, however short or long the journey of the light through the air was. Galileo had made a great discovery about the motion of a pendulum. Among other things this discovery made possible a better instrument for measuring time—the pendulum clock.



proof: that which makes clear that something is so.

timed: measured the time taken by.

prove: give proof.

pendulum: hanging weight free to move from side to side.

will prove
will time

prove (s)
time (s)

proved
timed

Measuring how fast something is moving gives us the rate of motion.

This plane has gone 300 miles in half an hour. Its rate was 600 m.p.h.



This man has walked two miles in half an hour. He was walking at a rate of four miles an hour. Now he is standing. He is not moving.



This man is working slowly. His pay will be small if he is paid by the amount of work he does in a day.



This other man is working quickly. His pay will be high if he is paid by the amount of work done in a day.

The two commonest ways of paying a worker are by the hour and by the amount of work done. Piecework is work paid by the amount done. For different sorts of work rates of pay may be different. Sometimes rates for the same sort of work are different in different places.

pieces: bit, amount, part of something solid.

m.p.h.: miles per hour, miles in an hour, measure of rate of motion

pay: amount of money given for work.

will pay

pay(s)

paid

When we move about from one country to another we sometimes have to change our money, we sometimes have to change our watches and sometimes we change both. When we change our watches we move the hands forward or back: forward if we are going east and back if we are going west.

Here is a map giving time lines across the Pacific Ocean.



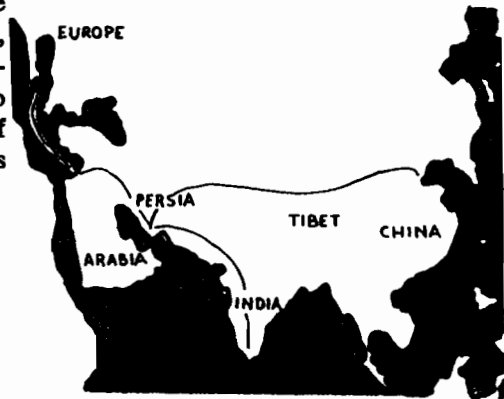
In the days when Galileo used his pulse as a timekeeper, most men did not even know that the earth was round. They knew no more about the journey of the earth around the sun than they did about the journey of their blood stream through their bodies.

both: the two, one and the other of two.
even: so much as. Even gives the idea that something is much more than
we would think—or much less.

But for another two thousand years most men went on thinking that the earth was flat like a large plate with the sun and stars journeying round it.

How was the idea that the earth is not flat but round like a ball proved true in the end?

Sailing men went out in their ships to find a way by water from Europe to India and China. Though some ships from the north of Europe had sailed west to parts of America in the tenth century, most of Europe had no knowledge of the land across the Atlantic.



Men like Marco Polo had gone east to India and China, much of the way by land, long before Columbus, in 1492, went sailing west with the idea that he could get round to the Far East by water.

to find: to look for and discover or come upon.
though: even if.

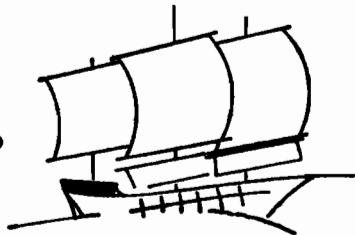
will find

find(s)

found

Christopher Columbus has gone down in history as the man who discovered America. He was looking for a way of getting to the East by sailing west. It was hard for him to get help for this journey. He was laughed at by most people when he said he could go this way to India because the earth was round.

This is the sort of ship Columbus sailed in.



He made use of a half-hour sand glass for measuring time at sea. Through all the long months the glasses on Columbus's three ships had to be turned every half-hour as the sand ran out.



**gone down: been given a place. When a person's name goes down in history something he has done is recorded in history books.
could: in this sense, would be able to—as used on the opposite page.**

Men living in America were named Indians by Columbus because he thought he had got to India when he discovered America. He went back to Spain without knowing that he had found a new continent. He knew nothing of the life that had been going on in North



and South America for thousands of years or of the two great peoples, the Aztecs and the Incas, who had been living there—the one in Mexico, the other in Peru—for centuries. It is now thought that in 1500 the population of the Americas was about 30 million, and that the first of these “Indians” had come from Asia themselves. There may have been a land bridge between Asia and Alaska across which they could have come.

continents: Europe, Asia, Africa, North America, South America, Australia and Antarctica are the continents of the world.
It is now thought: scientists now think.

Thirty years after Columbus discovered America, the ship of Magellan, a sailor of Portugal, was the first to make its way south of South America and on round the world through the Indian Ocean and past the Cape of Good Hope back to Europe.



Magellan himself died on one of the Philippine Islands on April 27 (in) 1521.

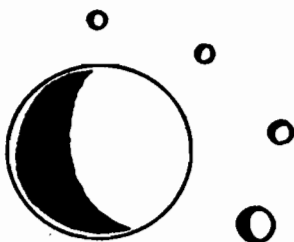
When a ship sailed out to the west and came back home from the east three years later men could see that the earth must be round. This proved that the earth was round. It was proof enough for most men.

sailor: man who works on ships at sea.

cape: piece of land pointing out into the water.

But it was harder to take in the idea that the earth might be moving round the sun, as Copernicus of Poland, 1473-1543, said it was. Very few men had made any sense of the writings of Copernicus by the time he died in 1543, twenty-one years before Galileo and Shakespeare were born. Few people could read or write in those days.

It was Galileo who made the first telescope, through which he could watch the stars and look into the ideas that Copernicus and others had been working upon. Through his telescope the stars seemed more than thirty times as near, and he could see not only the mountains of the moon but spots on the face of the sun, and the motion of the moons moving round the planet Jupiter.

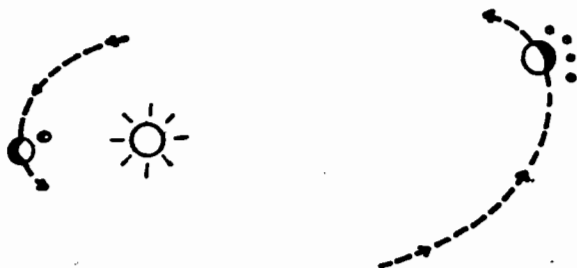


very few: opposite of very many.

spot: small mark.

Jupiter: Jupiter is the name of one of the planets—great bodies which are moving round the sun as the earth is.

Galileo could let men look through his telescope but he could not make most of them see the picture of the universe that was becoming clear in his mind.



He could not do that any more than Copernicus had been able to do it. Men's ideas were changing, but not as quickly as his.

Galileo was put in prison for saying that the ideas written down by Ptolemy fifteen hundred years before did not make sense to him.

universe: everything there is.

prison: place where wrongdoers or those said to have done wrong are locked up.

Newton, who was born the year that Galileo died (1642), took the new line of thought much farther.

Like Galileo he became a great watcher and recorder, asking the question "how," more than "why," and answering by measuring and recording and comparing and proving.



Even more than Galileo, he saw the universe as part of a great machine, and he was able to put into words great natural laws—accounts of its workings.

comparing: finding where and how things are the same or different.

law: laws which are made by man are statements, backed by government power, controlling what men may or may not do. When some laws are broken, the person who breaks them, if it is proved that he did so, may be put in prison.

natural: not made by man.

natural law: statement of causes and effects at work everywhere.

will compare
will break

compare (s)
break (s)

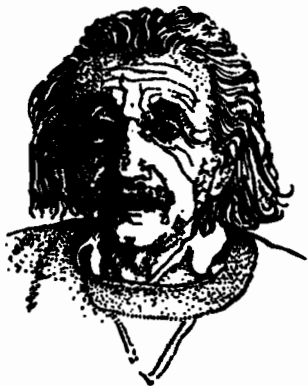
compared
broke, broken

He was able to do this only because he was carried forward on the shoulders of such men as Galileo, Kepler and Copernicus. With their work before him he could think out new ideas about the weights of things and their motions. His Law of Gravitation says that all things in the universe have an attraction for one another.

It was only by standing on Newton's and other men's shoulders that Einstein (1879-1955) was able to get his picture of the universe and work out new ideas about time and space and energy.



Their work made it possible for him to see farther into the laws of the universe than they could. Younger men in their turn are developing new ideas made possible by Einstein.



about: in this sense, of.

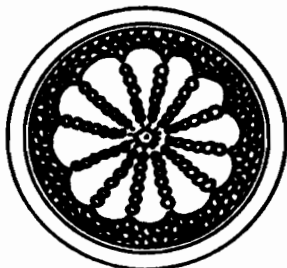
shoulder: part of body between arm, neck and chest.

The thinking of scientists has become clearer and truer as their instruments have become better. Galileo made one of the first microscopes as well as the first telescope, and by the middle of the seventeenth century this new instrument had opened up to man another world, a world of things too small for our eyes by themselves to see.

The microscope made possible the discovery of the cell structure of all living things.



Plant stem
cut across



The same seen through
a microscope

Even the body of man himself could be pictured now as a great machine with millions upon millions of working parts, each part a cell.

structure: how a thing is made up; the way its parts are put together.
The structure of the plant stem in the picture above, right, is made clearer by the microscope.

Together with all this new knowledge of the cell structure of plants and animals, the microscope opened up a world of living beings so small that men had had no idea such things were possible.

It was a surprise to the scientist to see that in a drop of water there might be thousands of living things of many different sorts moving about and taking in food.



With the invention of such instruments as the microscope and telescope man found himself walking between two strange new worlds: one too far off and great, the other too near and small for anyone but the scientist to know much about or do much about. As science developed, thinking men came to feel less and less at home in the universe. They had enough knowledge to become conscious of the need for more.

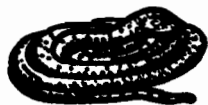
such: like these.

such things: things like these.

surprise: a feeling we have when we see something strange.

Our bodies can be looked upon as machines which are kept going by fuel. As food is burned up in the body cells it gives us heat and other sorts of energy. All through a man's life—from birth to death—he must be supplied with energy.

Even when we are sleeping we are using up some food to keep our bodies warm. Our lungs and heart keep on working. Some animals sleep through the cold winter weather: snakes, for example. When they are asleep their rate of breathing and pulse rate and temperature go down, and less food is needed.



Only animals that can store enough fat in their bodies to keep them alive through the winter can sleep through the months when food is hard to get.

lives time of living.
death end of living.

snakes a long narrow-bodied animal with no legs. Some sorts of snakes have poison in their long, needle-sharp front teeth. If this poison gets into your blood stream it can cause death in a few minutes.



asleep sleeping; opposite of awake.

will sleep

sleep (s)

slept

While our bodies are at rest the large muscles are not in use. It is these large muscles which pull on our bones and let us move as we want to.

Hard work with our large muscles uses up energy quickly so that we come to feel hungry and want to eat.

The more we know about the parts of our bodies and their work, the more new questions come to our minds, questions such as:



How is it possible for all the different parts of us to grow from one cell?

How is it possible for all the millions of cells in our growing bodies to go on doing what they do without our being conscious of their workings?

while: through the time that; in the time when.
hungry: feeling need and desire for food.

will pull

pull (s)

pelled

Through about two billion (2,000,000,000) years, scientists say, the development of plants and animals on our earth has been going on. At first both were very small, much less than a pin point in size. We might say that the first plants or animals were bodies living in one-roomed houses, too small for man's eye to see. All the house-keeping went on in one room. Such cells take food in and let waste out. They do not give birth to new cells but divide to become two daughter cells.



These three pictures show the division of a cell into two separate cells each of which may in turn divide into two more.

much less: a great amount less.

show: make clear, let be seen.

division: becoming two (or more) in place of one.

separate: not together.

divide: make a division, become two or more.

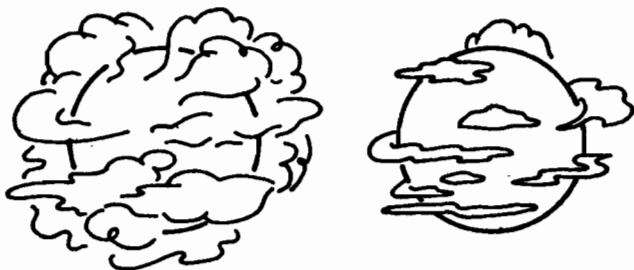
will divide
will show

divide (s)
shows (s)

divided
showed, shown

The earth itself is thought to be more than twice as old as life on it. Our picture of what it was like two billion (2,000,000,000) years ago is of a great ball about as hot on its surface as boiling water.

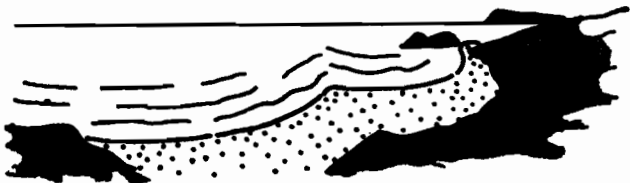
In time, as the earth's surface became less hot, the thick clouds round it, from which water went on raining down, got thinner. Then more sunlight could get through to the surface of the earth. Sunlight is necessary for life on earth, as air and water are.



life: in this sense, that which only living things have.

surfaces: outside part. This page has two large opposite surfaces: one this side and the other (page 114) which you will see when you turn over.

Life began, men think, in the salt sea. Near the land, where the waters were not deep, very small one-celled organisms came into being.



The cells in our bodies are of many different sorts but they all have water in them. Our bodies are seventy per cent water.

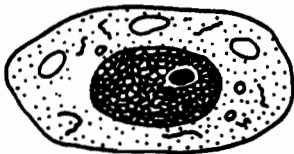
This water has in it about the same amount of salt, common table salt, as there was in the water of the sea in which the earliest organisms swam. That water was a little less salt than sea water is today. In billions of years the rivers have washed down more and more salt from the land into the sea. The sea has become more salt. The water in our bodies does not become more salt. Even if we eat a great amount of salt in our food the body automatically controls how much it will keep in the blood stream. And the same is true if we let very much salt out through the skin when we get overheated. (See page 91.) Then we have to eat something that will give us new supplies of salt.

organisms: living body.

per cents in a hundred. Seventy per cent (70%), seventy parts in a hundred. (Latin, *per centum*.)

The first living things, though they were too small to be seen, were eating, growing organisms which divided to become others like them.

Under a microscope, a cell looks like a bit of clear jelly with a thin wall round it. Very small openings in the walls of the cell let food in and waste out.



In every cell there is a part like a little ball. This is the nucleus, which organizes the work of the cell. Though cells were discovered two and a half centuries ago, it is only in the last hundred years that knowledge of the work of the nucleus has developed. It is this nucleus which keeps the cell working at what has to be done. It is to the cell what London is to Britain, New Delhi to India, Peking to China. It is the seat of government.

jelly: a soft material, not solid and not liquid.

nucleus: see above on this page.

organize: give every part its work to do and control it.

will organize

organize(s)

organized

All living things are developments from these one-celled organisms. They have developed step by step through change upon change from these first, simple, living things. Our bodies and the bodies of the plants and animals we see about us are highly complex in their structure. They have in them millions of millions of cells, some doing one sort of work, some another. Every different cell has its own sort of work to do.



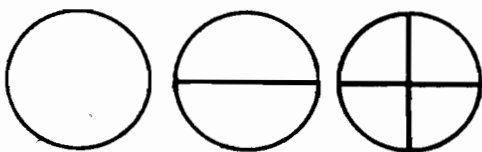
What do the words *simple* and *complex* mean?

simple: not complex.

complex: not simple (see next page).

The greater the number of parts a thing has, the more complex it is.

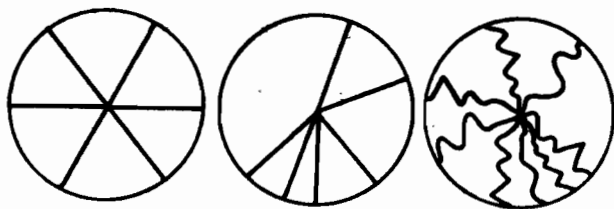
The smaller the number of parts a thing has, the simpler it is.



Which of these is the more complex?

The more different the parts of a thing are from one another, the more complex it is.

The less different the parts of a thing are from one another, the less complex it is.



Which of these is more complex?

The more the parts of a thing need one another, the more complex it is.

Take one little wheel out of a watch, for example, and see if the other parts can do their work without it.

Which is more complex—a stone or a plant?

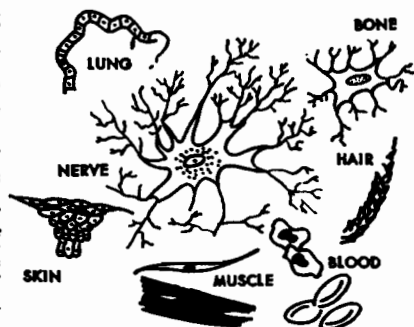


The leaves, the flower, stem and roots of the plant work together to keep it alive. But each does a different sort of work and each is dependent upon all the others. The work of each part is different.

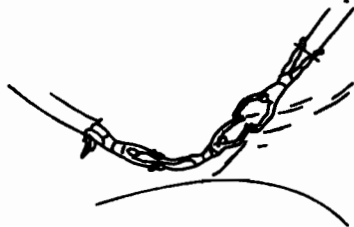
The parts of a stone do not work in this way for one another. A stone is a much simpler thing than a plant.

Any living thing, however small or simple it may seem, is far more complex than anything which has no life.

People are the most complex of all organisms, far more complex than any plant. A man would not go on living, he would die, if the millions of millions of cells in his body did not work together in their different ways, each doing its own sort of work. The cells are dependent upon one another and the man is dependent upon his cells.



The picture below shows what the word *dependent* can mean.



The girl in the middle is dependent on both men to keep her from falling. The man who has been holding her feet is letting go as the other man takes hold of her hands. She has been dependent on the first man. She will be dependent on the second. Their act depends on timing.

their act: what they do. A man's acts are what he does.
depends: is dependent on.
letting go: letting them go.

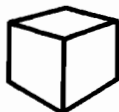
will depend

depend (s)

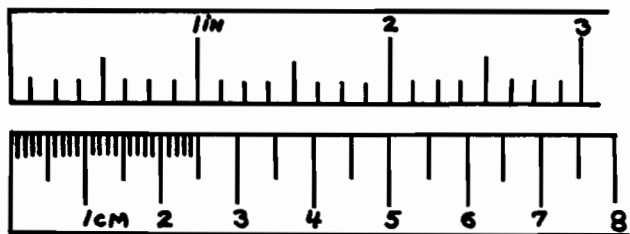
depended

There are about five million red cells in one cubic millimeter of our blood. One millimeter is a thousandth part of a meter and a tenth of a centimeter.

One cubic centimeter—how much space does that take up?



Here is a picture of a cube which is one centimeter long, one centimeter wide and one centimeter high. It takes up one cubic centimeter of space. A centimeter is a little less than half an inch.



millimeter: mm. = .001 of a meter.

centimeter: cm. = .01 of a meter, or .3937 of an inch.

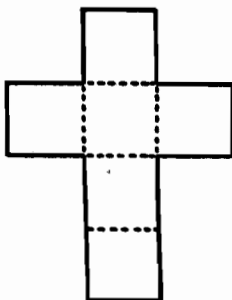
cube: a solid the six sides of which are equal squares.

square: a square has four sides which are equal and four angles which are right angles

You can put a paper cube this size together for yourself, or cut one out of soap or cheese.

To make a paper cube, take a pencil and make six one-centimeter squares like this:

Now take your scissors and cut round the outer lines. Do not cut the broken lines but make folds there. Put the edges together to make a hollow paper cube, as in the picture. Your cube will be a cubic centimeter in size.



A cube has six sides; its sides are equal squares. The surface of a one-centimeter cube is six square centimeters. In one cubic centimeter of our blood there are about five billion red cells.



fold: this is a page folded down.

edge: this is the edge of the page.



Living things are made up of cells, and cells do not grow to be more than twice the size they were at first.



But trees can grow to be many thousands of times the size they were as seeds. The tallest tree known is 364 feet high. One great tree in California is as much as 115 feet round its trunk at the thickest point.

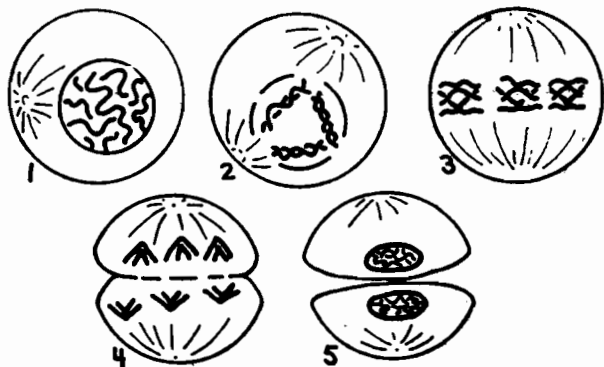
How does such growth take place if cells do not grow to be more than twice as large as they were at first?

It all takes place through division. The cells which make up the organism are able to divide into two and this division goes on and on. When you were born you had as many as 200 billion cells in your body all coming, in nine months, from the division of one cell $1/175$ th of an inch across.

trunk: stem of a tree.

growth: growing, becoming greater in number or size, the outcome of growing.

All organisms which you see in the world about you have grown by cell division.



You and I have become what we are through billions of divisions in the cells whose outcome is our cell structure at this minute.

In cell division the two halves of the cell (as you see in picture four) become ready to separate. In picture five you see that they have separated. The cell in picture one, by division, has become two separate cells. The daughter cells do in every way the same as their mother cell did. One of the greatest questions scientists are working on is: What keeps the daughter cells doing what they have to do?

separate: become or make separate.

will separate

separate (s)

separated

Even the simplest living organism is far more complex than any machines that men have made. Organisms are built up of parts which are themselves more complex than any machine. And these parts in turn are the most complex things the science of chemistry knows. It is because they are so complex that they can work together in an organism in so many different ways.

Chemistry is about the different ways in which different materials are built up. For example:

Water is made up of oxygen and hydrogen united in a way which may be represented like this.



Carbon dioxide is made up of carbon and oxygen in a way which may be represented like this.



Chemists make use of the formula H_2O for water in their writing. They use formulas to represent the structure of all material things.

formulas: chemists' way of representing structures.

The most important of the materials in our bodies are the proteins (from Greek *proteios*, meaning "having first place"). Among them are materials with the most complex structures known to the chemist. We can get some idea of how complex proteins are by comparing the formula for one of them with the formula for water (H_2O) or for carbon dioxide (CO_2).

Compare this formula for a protein from milk:



with the simple formulas for water:



or carbon dioxide:



The letter N in this formula represents nitrogen and the letter S represents sulphur.

among: in, in the sense of being part of a group.

nitrogen: a gas which makes up about four fifths of air. Nitrogen is breathed in and out unchanged. Our bodies have to get the nitrogen they need in other ways.

sulphur: a light-yellow material found in some parts of the earth in great amounts.

There may be as many as 100,000 different sorts of proteins in a man's body, at work in as many different ways.

It is a protein in our blood which takes up oxygen from the air we breathe into our lungs and carries it to the cells which need it. It is another protein which makes our bones strong, and another which makes our muscles able to pull on and move our bones. It is other proteins in our hair and skin and nails which make them what they are.



Others again do very important work in the digestion of food, in controlling other changes in the body, in keeping it healthy and in making children become so surprisingly like their parents.



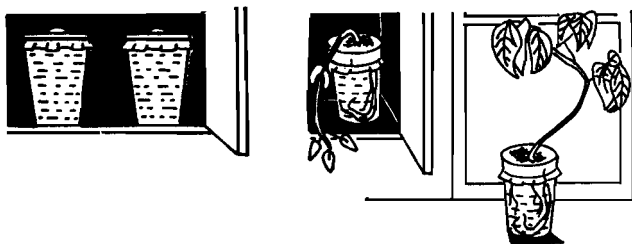
nail: finger nail, toe nail. Our nails are living parts of us.

digestion: the changing of food in the mouth and stomach so that materials in the food may be used by the body.

How do these very complex materials come into being?
The answer is, through the work of plants.

Plants need sunlight. This is common knowledge within the experience of most of us, but you can show how true it is if you make this little experiment.

Grow two bean seeds over glasses of water, starting them in a dark cupboard. After a few days take one glass out into the daylight and keep the other in the dark. Compare the two from time to time. You will find that it is the plant in the light which grows a strong stem and green leaves.



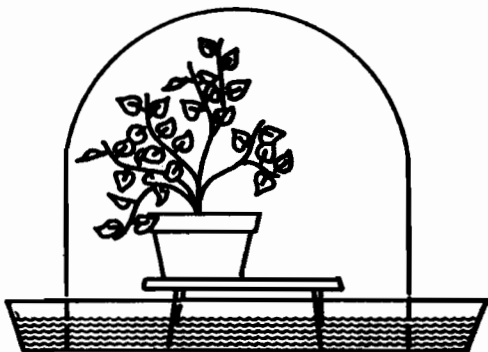
within: in; inside. Not on opposite of *without* as commonly used (see page 32).

experience: knowledge we get as we go on living, seeing what goes on, and thinking about it.

experiment: getting knowledge by doing something so that you are able to watch what takes place and find what in the outcome is dependent upon what.

bean: common plant whose seeds, and sometimes seed coverings, are used for food.

In 1772 the Englishman Joseph Priestley, the discoverer of oxygen, made a most important experiment. He knew from experience that air is necessary to plants and animals. He knew that if you put a live mouse, for example, under a glass so that no fresh air can come to it, the mouse in a short time will die. It will have taken all the oxygen out of the air and without oxygen it cannot go on living.



Priestley put a green plant under a large glass cover standing in water so that no fresh air could get in. He thought that in a little while he would find the plant dead like the mouse.

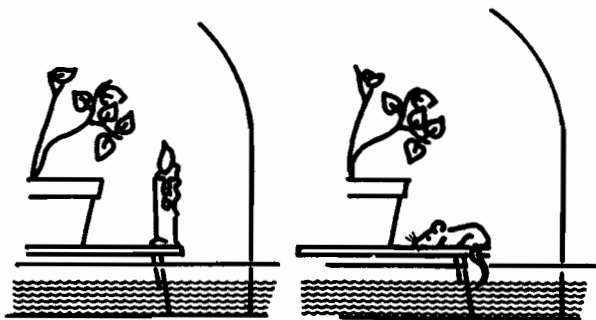
live: alive, living.

mouse: small dark-brown or gray animal with a long tail.

while: in this sense, a space of time.

But no. Here is what he said:

"When it had gone on growing there for some months, I found that the air would neither put out a candle nor was it bad for a mouse which I put into it."

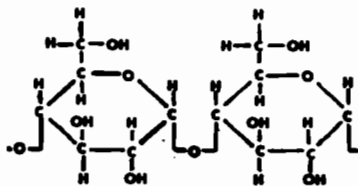


In other words, the green plant had not used up all the oxygen in the air.

The next step was taken when a Dutch scientist found that Priestley's experiment would not work without light. In the light a plant gives out oxygen and builds up sugars and other complex materials in itself. In the dark (without light) it gives out carbon dioxide and water.

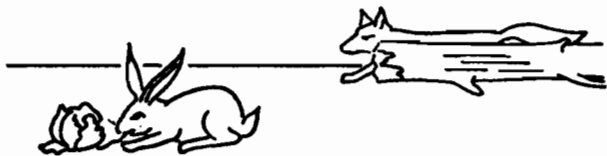
had gone on growing; had been growing; had grown. We go on growing until we have grown up and are grownups. either, or, one or the other of two. neither, nor, not one and not the other of two.

The material which makes plants green (chlorophyll) is necessary if they are to use energy from light for healthy growth. Unlike animals, plants can take what they need straight from the air and earth and water in which they live. Through their green leaves and stems they separate H from H_2O and unite it with CO_2 to make carbohydrates.



Structure of part of a carbohydrate, a sugar.

This power of plants is named photosynthesis (from the Greek words for *light* and *putting together*). Men and animals depend upon photosynthesis in plants to supply their food and energy. We and the animals either eat plants or eat plant-eating animals or both.



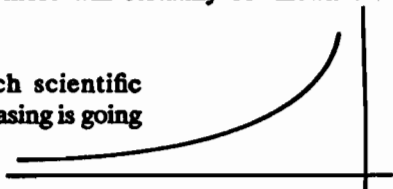
carbohydrate: any of a number of materials made by green plants from carbon, hydrogen and oxygen and used for growth or stored for future use.

When we think it out we can see that most of the energy man uses comes from the sun by way of the materials which plants build up in photosynthesis.



Scientists know only a little, so far, about photosynthesis. It is only a little more than a hundred years since the first account of it was given by the German scientist von Mayer. But with more experimenting being done every year, much more will certainly be known before very long.

The rate at which scientific knowledge is increasing is going up all the time.



In time (but we may have to wait a long time before this) it may even be possible to use the energy of light itself in industry to do in our factories something like what plants do in their green cells.

since: from the time when.
 industry: making things on a large scale: the automobile industry, ship-building industry, clothing industry, for example.
 scientific: of, to do with, used in science.
 wait: be waiting.

will wait

wait (s)

waited

Before long, we may learn from working on photosynthesis how to make or grow more food. As we have seen (page 13 above) more than half the population of the planet is short of food. As more and more people are born, the need for new food supplies will increase. It may be that we can find what we want in the sea. It is thought that as much as 90 per cent of the photosynthesis which takes place in the world goes on in microscopic water plants in the sea. Maybe much of the food people are going to need in the future will come out of the oceans.

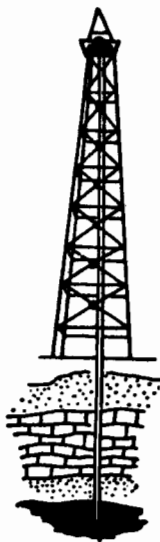
Or making food straight from complexes of carbon, hydrogen and oxygen may become a great new industry.

At present we have to get most of the energy used in industry by burning coal and oil and other fuels.

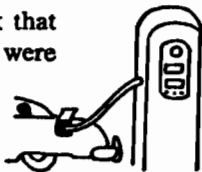
microscopic: so small that we have to use a microscope to see them.
maybe: it may be that ... possibly.

oil: the oils are a large group of liquids of many sorts. Some we get from plants (the olive tree, for example), some from animals (fish oils), some from deep down in the earth. Oils are lighter than water, burn easily and have many uses. One of their chief uses is as fuel for gasoline engines. Gasoline (or petroleum) is "gas" in the U.S.A. but "petrol" in Britain.

This energy is the sun's energy stored up long ago by plants. Coal comes from the dead bodies of plants stored, away from the air and under pressure, through millions of years in great beds in the earth. The amount of coal and oil in the earth is, it is true, very great, but the amount we are using today is great too. A time may come before long when men will have used up all the coal and oil that is easy to get at.



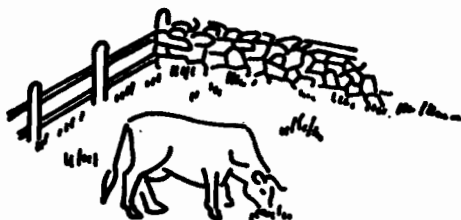
Men have been taking oil out of the earth only since about 1860. Without oil there would be no cars and no airplanes. It is strange to think that planes depend on what plants were doing millions of years ago.



Plants and animals all need air. Only about one fifth ($1/5$) of the air is oxygen. The other four fifths is another gas, without taste, smell or color, named nitrogen. Both plants and animals need nitrogen as well as oxygen but they cannot take it from the air themselves. How do they get their supply of nitrogen?

O
N
N
N
N

There are very small organisms in soil and water which can take nitrogen out of the air and fix it in complex materials which plants and animals can use. These materials are taken up by plants through their roots in water from the soil. Animals get their nitrogen by eating plants. Some of this nitrogen comes away in animal waste and men have for many thousands of years known enough to put animal waste back into the soil to help plants grow.



soil: earth in which plants can grow.

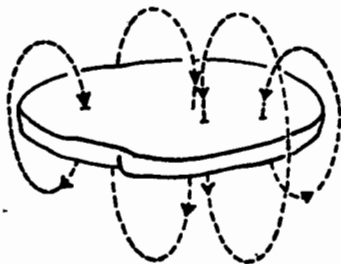
fix: make fixed; keep something from changing.

will fix

fix (es)

fixed

Nitrogen, like carbon, oxygen and hydrogen, is used over and over again in support of life. Plants build nitrogen up into complex structures. Animals eat the plants. Then animal waste and dead plants and fallen leaves are broken down into simpler forms again.



So the great round goes on without end, all made possible only by energy coming from the sun.

Scientists say that all the oxygen and all the carbon dioxide now in the air have been put there after use by plants through photosynthesis.

fallen: fallen leaves are leaves which fell from trees

The fall of the leaves takes place in the fall of the year when they fall from the branches.

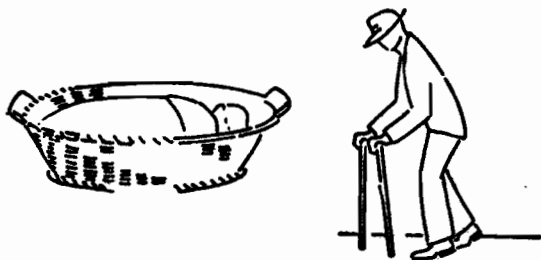
will fall

fall(s)

fell, fallen

All organisms, it is clear, have a number of needs in common, of which air, water, food and the sun's light and heat are the chief.

But men have many other needs, though we may not think of them as needs. One of them, our need for other people, is very important. First of all, we need other people to do things for us when we are very young or very old, or when we are ill.



We need others to take care of us. We need their help. We need them to do things for us which we cannot do for ourselves. We need their love.

care: when people look after us, do things for us which we need to have done, they take care of us, they help us.

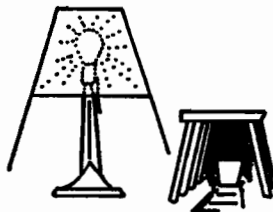
love: warm feeling for. Desire to take care of a person is one sort of love. There are many sorts of love

Every hour of our lives we do things that are possible only because of work which is done for us by other people.



Who grew the cotton? Who made the sheets? Who watched the sheep? Who washed the wool? Who made the blankets for the bed you sleep in?

Whose work are you using when you turn on the light?



Who mined the coal which gives the power to heat and light your room?



But equally men need to do things for other people. Most men are not happy if they are not in some way helping others—doing things for others. They need someone to love.

sheet: cotton cover used on bed for sleeping on or under.
blanket: warm wool bed cover.

will wash
will mine
will light
will love

wash(es)
mine(s)
light(s)
love(s)

washed
mined
lighted
loved

All our lives we need other people.

In many parts of the world families do everything for themselves.

Until the nineteenth century this was true almost everywhere outside the cities. Families were self-supporting.

They grew the food they needed,

built their own houses, and

made their own clothing and furniture,

the candles for lighting the rooms at night,

and the plows and carts for work on the farm by day...

In every way they took care of themselves. Living like this, a family is very like a simple organism.



But a man living in a city today is more like a cell in a complex organism. Other people whom he does not know do almost everything for him. Workers in factories make the things he needs and send them to the stores, which sell them to him.

Other people teach his children in schools and take care of them in hospitals when they are ill. Police and fire stations keep watch over his city. Lighting and water supplies, the clearing away of waste, the upkeep of streets and roads are all public services.



In exchange for all this, each of us does his own sort of work, his daily round, whatever it is. This is true for most of us, if not all.

police: men whose work it is to see that laws are kept.

upkeep: keeping so that they may be used.

public: done for the good of all.

service: work done for others.

daily: day after day; every day.

People need play as well as work, though, if your interest is deep enough, work and play can be the same thing. To some people all their best work is a sort of play. They get so much pleasure from it and are so interested in it that they work when they don't need to. They are doing what they want most to do.



It was the philosopher Plato who said, "All learning is best done as play. Nothing learned under pressure takes root rightly in the mind. So let children's work be a sort of play."

interest: attraction of the mind to something, pleasure in knowledge of something or in doing something.

philosopher: thinker, lover of knowledge (from two Greek words: *philos*, loving; *sophos*, wise). One who is interested in all things.

People need work and play for the body and for the mind.

They need music . . .



and dancing. . . .



. . . rest and change.

They need books and talk with other men:
with old friends as well as with new people.
They need new knowledge to keep their old
knowledge clear and living.



A friend is someone you know and love and with whom
you have much in common. People you know only a little
are not your friends in this sense though they may become
your friends if you get to know them better.

dancing: moving in time to music.

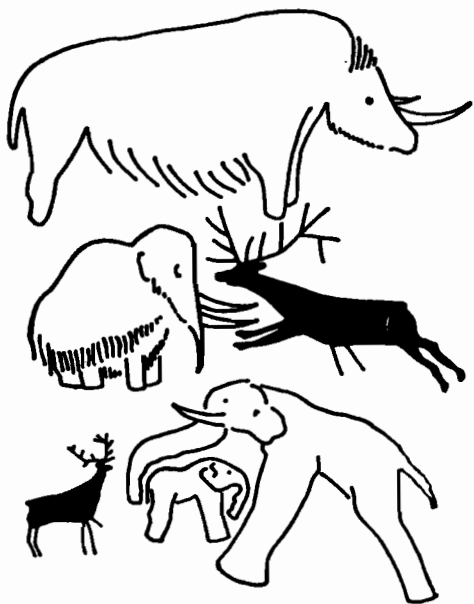
will dance

dance (s)

danced

Men need to see beautiful things and to have beautiful things about them.

Drawing goes back very far in man's past. The drawings of animals copied on this page may have been made as early as 25,000 B.C.



drawing: making pictures with lines.

copied: a copy of something is another thing made as much like it as possible.

will draw
will copy

draw(s)
copy(ies)

drew, drawn
copied

Drawing can help to make ideas easier—the pictures drawn in this book, for example.

But the greatest drawing and painting and sculpture can make our highest powers come into play. The drawings below are of two pieces of sculpture, one from India and the other from Africa.



sculpture: making beautiful things from stone, wood, metal or other materials; the works so made.

For great drawings, see *The Pocket Book of Great Drawings* by Paul J. Sachs.

Men need to hear beautiful things.

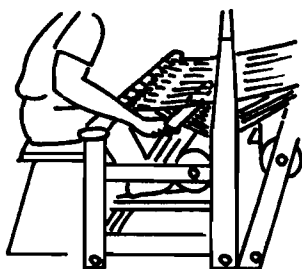
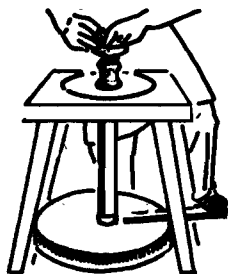
Music may go back still farther in time than the other arts, but unhappily we have no records of music before the discovery of writing. As with language the writing of music may have started with pictures.



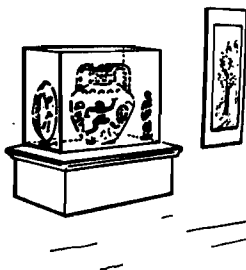
Today not only do we have ways of writing down music, but we can make copies of the sound of music as it is played.

arts: work done to feed the mind and heart through the senses and feelings: painting, sculpture, music, etc.

Men need to make beautiful things.



Today the great cities of the world have public art galleries and museums where anyone may see the paintings and drawings and sculpture of artists through the centuries.

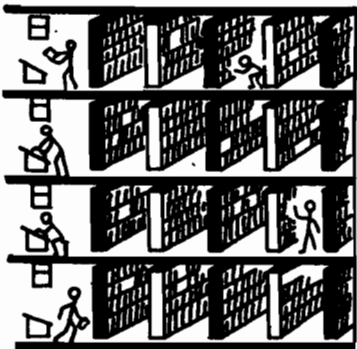


artist: worker at one of the arts.

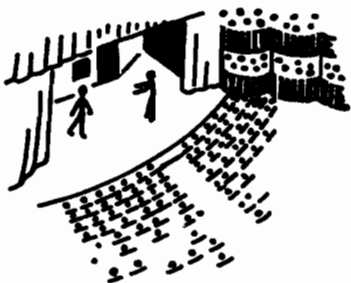
art gallery: building where works of art are kept for people to look at.

museum: building where important works of art, science, history, etc., are housed.

Great cities have theaters where plays of the past and the present are acted. They have music buildings where great works of music are played. They have libraries where the best that has been thought and written can be found.



Art and music and poetry come out of man's greatest hours with himself, and give other men some of their greatest hours.



theater: building where plays are given.

acted: when a play is given, it is acted by actors (players).

library: building or room for keeping books; the books kept there.

poetry: words put together in the best way so that others can see and feel what they mean.

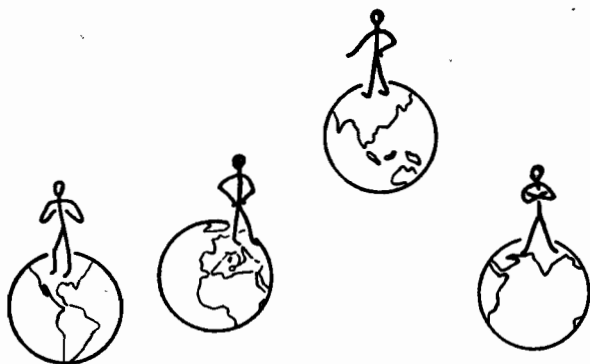
will act

act(s)

acted

We need to be alone sometimes to get to know ourselves better, though we need to be with other people too, to get to know them better and ourselves through them.

The more men know one another, the better able they will be to live together in the world. The nations on the earth—the Chinese, the Indians, the British, the Russians, the Germans, the Americans, the French and the others—know very little about one another. They look in different directions and have different ideas of themselves and of the world. They live in different worlds.



This is good only if they have bridges between their separate worlds and get to know enough about each other.

alone: by one's self (oneself); not with others.

nations: countries and peoples under independent government.

independent: not dependent.

A little knowledge about
other nations—too little
knowledge—can make
them seem bad.



But we can't turn the clock back to yesterday when nations could keep to themselves and live without any knowledge of or help from other countries.

The thing to do now is to get more knowledge about other peoples. And knowledge of other languages is necessary for this. We need many more people with a deep knowledge of other languages than their own.

We have to know a language well if we are to know what people who use it mean and think.

have to: must.

are to: are to become able to.

In English—as in any other language—we do not always say what we mean or mean what we say. This is true of some of the things we say every day. For example: “How do you do?” “How are you?” This is what people say on meeting. Sometimes they stop and shake hands. “How are you?” looks like a question. It is written with a question mark after it. And sometimes “How are you?” is a question. One person may want to know if another is well or ill—how his health is—and so on.



meeting: coming together.

shake hands: when two people shake hands each takes the right hand of the other in his for a second.

health: a man who has good health is healthy. A man in bad health is ill or sick much of the time. Taking care of the health of the public is an important part of the work of good government. Care of the health of everyone in the world is becoming increasingly necessary to all nations. The World Health Organization (WHO) was started in 1947.

will shake

shake (s)

shook, shaken

When these are questions they are almost always said as if the person who says them means them as questions and wants an answer.



But most of the time they are said in a way which does not ask for any answer. When these words are said so, we do not answer: "I am tired," or "I have a bad cold," or "I am not well." We say the same thing back to the other person: "How are you?" or "Hullo!" Such words are like a smile or a wave of the hand.



In the same way, when we meet someone in the morning, we may say "Good morning!" The weather may be very bad but we say "Good morning!" and the other person will say "Good morning!" back to us. We are not talking about the weather or about how good or bad the morning is.



tired: in need of a rest.

meet: come together with.

will meet

meet(s)

met

Again, when people are parting, they may say: "Good morning!" or "Good afternoon!" or "Good evening!" or "Good night!" to one another in place of "Good-by!" They are not talking about the weather but saying "May all be well with you at this time!"

You will find few people today who know that "Good-by!" is a short way of saying "God be with you!" But in times past, when religion had more place than it now has in education, a child could be taught this very young as part of his knowledge of English.

parting: separating, going away from one another.

afternoon: part of the day which comes after noon (12:00) and before night.

evening: late afternoon and early night.

noon: (12:00) point of time between morning and afternoon.

Gods: in Christian teaching, that Being on Whom all other beings depend.

religion: thought, feeling, desire for, interest in man's deepest needs.

There was a teacher who tried to teach all this. Her students seemed to take in what she taught them. They said back to her all together: "When you say 'Good morning!' to us, we say 'Good morning!' to you."

Next morning on her way to school, she saw one of them coming. She said to herself, "Now I will see if he has learned that point about 'Good morning!' "

So she said to the young man:



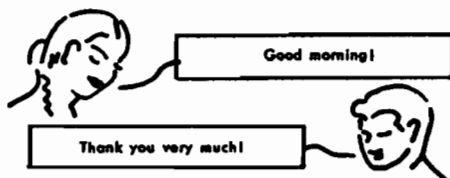
She had said "Good morning" to him with a question in her mind: "Will he say 'Good morning!'?" She had asked a question and he had answered it.

The teacher said to herself: "I must have seemed to be asking a question, so he gave me an answer. Next time I will do better."

At that minute she saw another student coming. She said to herself, "Let me try again."

student: learner.

So she gave the young man a friendly smile and said,



"What was wrong then?" the teacher asked herself. "I must have said it as if I were giving him something. That was why he thanked me. Next time I must keep that out of my voice."

She saw a third student coming. This time she wanted the answer "Good morning!" so much that her voice became hard and sharp.



You see how little one person may know what is in another's mind even when the other is trying to show him.

thank: say it was good of a person to have done what he did; give him thanks; say "Thank you."

please!: may it be your pleasure; may it please you.

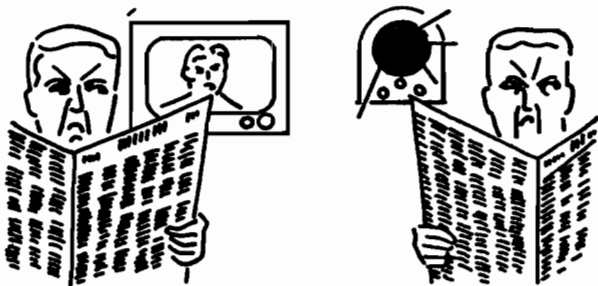
will thank
will please

thank (s)
please (s)

thanked
pleased

When people are from very different countries with very different ways, it can be hard for them to understand one another. Not very long ago the number of people who knew anything about people in other countries was very small. Few people went far from home or took much interest in other countries.

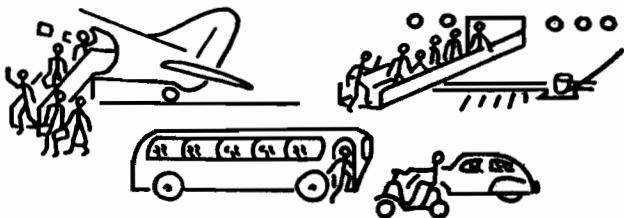
Today all this is changed. Every day, men hear more and more about other countries and about how bad their governments are. They hear about the strange and wrong ideas other countries have of them.



If we knew them better, we would see that people everywhere are very much like ourselves: not very good or very bad, but in between and able to become better or worse than they are. Men's minds are as like one another as their bodies are.

to understand a person: to see what his ideas and feelings may be.
will understand **understand(s)** **understood**

We say: "The earth is getting smaller." It is the same size as it was, but we can go about it more and more easily. Many more people travel outside their own countries every year.



We can get news today from any part of the world in a few seconds, though we may not always understand it.

Many more ideas, right or wrong, about other countries are in people's minds.

Most of this interest in other nations and places is good if it goes deep enough. We need to know more. If we can keep our heads on our shoulders, the wider knowledge and experience which are coming will help the world to better days.

understand something: have a clear, true idea of it.

travel: make a journey, go.

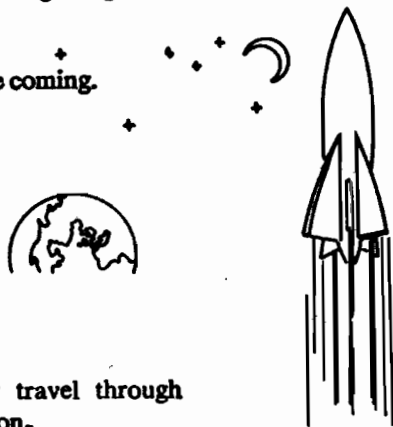
will travel

travel(s)

traveled

The earth seems to be getting smaller because men's experience is getting wider. All sorts of new ways of living and new ways of doing things have come to us in the last fifty years.

Stranger things are coming.



Men can today travel through space to the moon.

What is Space? That is hard to say. It is equally hard to say what Time is. We and the sun and the moon and the stars are all in Space and Time. But no one understands what Space and Time are. Not even the best philosophers are clear about them.



These two men know that they have a space between them without being able to say what Space is.



There is not enough space in this car for all these travelers. They know that this is so, though they cannot say what Space is.



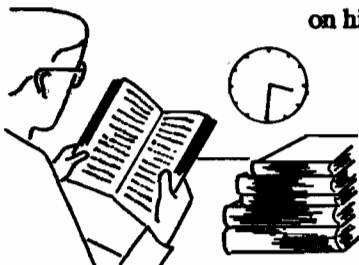
There is more space free on this page than on some other pages of the book which take longer to read.

traveler: person who travels.

It is equally hard to say what Time is.



This man has time on his hands.



This other man has not enough time for his reading.

The same amount of time may seem very short to one person and very long to another. A man's sense of time changes as his feelings change. Some days go by much more quickly than others. Some hours seem as if they would never end. Some are past before they seem to have begun.

Most people find that time goes by more quickly the older they get.

never: not ever.

end: come to an end; opposite of *begin*.

will end

end(s)

ended

Our ideas about Space and Time are changing. Today we can fly round the world in twenty-four hours.



The earth turns round on itself in twenty-four hours.

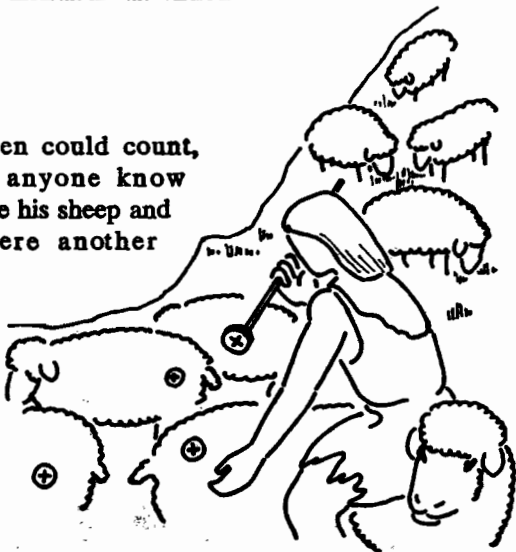
A man in a plane flying west at 1000 miles an hour (m.p.h.) would see the earth turning. The sun would seem to be in the same place in the sky for him. The earth would turn under him.



A hundred years ago men of learning thought that the world was only about 6000 years old. Now scientists say that it is nearer six billion years old and that Man himself is at least five hundred thousand.

Air travel would have seemed very strange two or three thousand years ago, to men keeping their sheep on the mountainsides. All these changes are the outcome of the great step taken in the invention of numbers.

Before men could count, how did anyone know which were his sheep and which were another man's?



He put his mark on his sheep. He was their owner. They were his own sheep. He owned them.

Sometimes he gave his sheep names, and then he would go through all the names—with his sheep—to see if they were all there.

will own

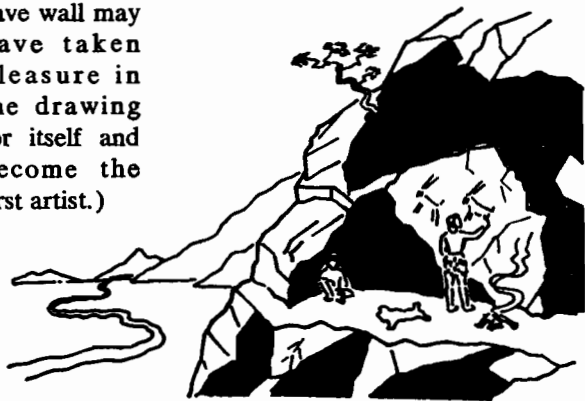
owns

owned

Before the invention of writing how did men keep records? They made pictures on soft earth or sand. But rain and wind and waves quickly washed away such records. Smooth stone or wood was better, and best of all, the smooth stone walls of caves whose roofs kept the rain and wind away.

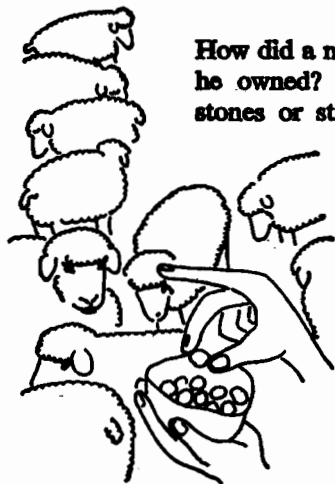
It may be that the drawings copied on page 142, or others like them, were records made by early men.

(Some man recording animals on his cave wall may have taken pleasure in the drawing for itself and become the first artist.)



cave: deep hole or hollow in side of mountain. Men lived in caves long before they knew how to build themselves houses.

wash away: take away by the motion of water over something.



How did a man know how many sheep he owned? Sometimes he used small stones or sticks, putting one of them into a bag or pocket for each sheep he had.

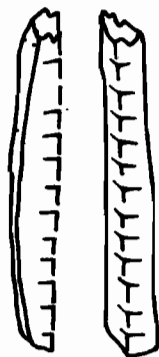
When he came to the end of his sheep, the number of stones in the bag was the same as the number of his sheep. The stones and the sheep were equal in number. The stones gave him a record of how many sheep he owned. When a sheep died he could take a stone out of the bag. And when lambs were born he could put in another stone for each lamb.

lamb: baby sheep, young sheep. In the U.S.A. meat from sheep is lamb. In Britain, the word mutton (from French for sheep) is used for the meat of full-grown sheep.

Sometimes a record was made by taking a sharp, hard stone and making cuts on a stick. The number of cuts in the stick equaled the number of things to be recorded.



Then the stick was cut in half down the middle so that each half had half of every cut on it. The two half sticks were tallies. If they were put side by side, the halves of the cuts came together. They tallied. One man took one tally and another the other, and both then had the record.



tally: one sort of record.

will equal
will tally

equal (s)
tally (ies)

equaled
tallied

Tallies are some of the earliest and simplest records of the numbers of things. They tell how many things have been counted.

Even today in a bank a man who takes money in and gives it out is sometimes named a teller.



The shelf or table at which he works is a counter. On it he does his counting of the money coming in and going out. He keeps a record of all this in his account book.

A man who makes a statement tells something. Most banks make a statement every month to each person banking with them to tell him what his account is. The statement tells him how much money he has in the bank at that date. Then both he and the bank have the record straight.

To get this statement ready, the banker has to take the amount of money given out (for any one person) from the amount of money put in.

tell: give an account of, give a story to someone.
straight: in this sense, right.

will tell

tell (s)

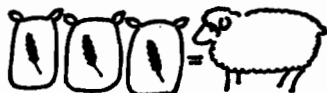
told

A bank teller must keep a complete record of the money he takes in and gives out. This is his way of making certain that his accounts are in order. Banking is a very important sort of business. A bank must keep all its accounts in good order and the statements which the bank makes must be true statements.



STATEMENT OF ACCOUNT—TOWN BANK				
Mr. John Smith, 11 First Street				
OUT	IN	DATE	NO.	BALANCE
		5/ 3/54		860.83
10.00		5/ 5/54	1	850.83
	62.55	5/ 7/54		913.38
	80.00	5/14/54		963.38
80.00		5/15/54	2	883.38
42.94		5/15/54	3	840.44
15.00		5/18/54	4	825.44
	30.00	5/21/54		855.44
20.00		5/24/54	5	835.44
41.95		5/26/54	6	793.49

In order: with nothing wrong. Things are in order when in their right places. When a man is in good health, his body is "in order." When he is ill, it is "out of order." The work of the police in a country is to help to keep law and order.
making certain: proving to himself and to others.



How do we know whether a man is telling the truth? If a man tells another that he will give him three bags of grain for one sheep, the other will know whether he told the truth when he gets the grain or doesn't.

The man may, or may not, have meant to give the grain when he said he would. He may not have meant to say anything but the truth. But if he did not give the grain later, he was not true to his word.

We sometimes know whether a man is telling the truth (and will be true to his word) by the look in his eye, or the sound of his voice.

truth: things which are true. A man tells the truth when what he says is true.

In early times, before men invented money, they did all their business by exchange of goods. Men traded with other men by exchanging goods they were willing to give up for goods they wanted more. Exchange of things still goes on in some parts of the world today.



After the invention of money, trade increased. It is man's experience that money can be a great help in making trade easier and in keeping business in better order. If you want something and have the money for it, you can buy it. You do not have to keep asking yourself whether you have something which the other man will be willing to take in exchange for what you want.

exchange: giving one thing for another.

willing: if you are willing to do something you will do it if you have to.

still: up to the present time.

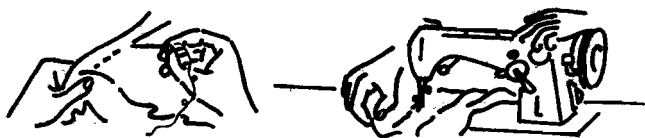
trade: exchange of things for other things or money.

will trade
will invent

trade (s)
invent (s)

traded
invented

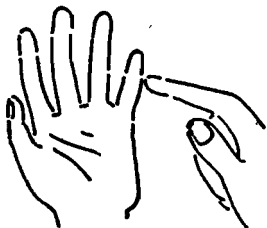
Early man did things with his hands which we do with instruments or by machine.



Fingers were made before forks.



Among their early uses, fingers made good counters. We still use the number ten as the key to our number system because we have ten fingers.



The most important number in the number system used commonly today is zero (0). Zero is so easy to use that it is hard to understand why it was not invented long ago. It is thought to be not much more than a thousand years old and no one knows who invented it.

We use zeroes to change numbers to others. Zero to the right of a number makes it ten times its size. Two zeroes make it a hundred times its size. Six zeroes after one make it mean one million.

Schools today teach a child to add, subtract, multiply and divide numbers. Here are examples.

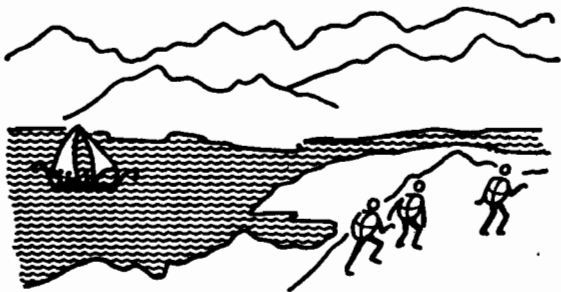
addition:	$5 + 5 = 10$;	$6 + 3 = 9$
subtraction:	$5 - 5 = 0$;	$6 - 3 = 3$
multiplication:	$5 \times 5 = 25$;	$6 \times 3 = 18$
division:	$5 \div 5 = 1$;	$6 \div 3 = 2$

will add
will subtract
will multiply

add(s)
subtract(s)
multiply(ies)

added
subtracted
multiplied

Men made their way about on the earth, over mountains, down rivers and across seas long before they had a number system or could make or use a compass. Nobody knows who invented the compass. The Chinese, Arabs, Greeks and Italians, among others, say they did.



When men became able to work out the relations of lines and spaces to one another, and could measure distances and angles, the science of geometry, earth measuring, began.

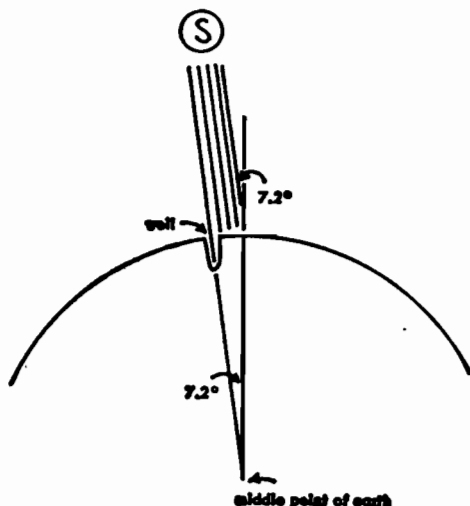
Men went on then from measuring fields and bits of land, to measure the size of the earth itself.

compass: instrument showing the direction of something in relation to the north.

geometry: science which looks into the relations of lines and spaces to one another, from two Greek words, *ge*—earth, and *metron*—a measure.

The Greek scientist Eratosthenes (276-194 B.C.) was the first man to work out the size of the earth.

He heard that there was a deep well into which on one day of the year the sun's light went all the way down to the bottom. He took the angle of the sun at the same hour from another place 500 miles from the well and worked out by geometry that the earth was about 29,000 miles round.



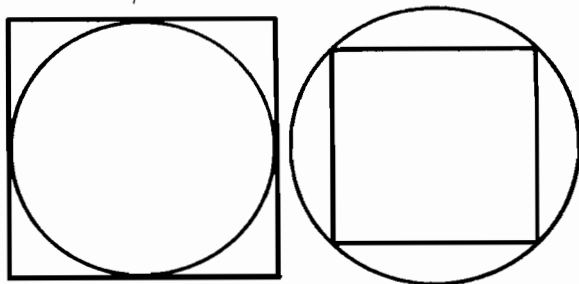
The size of the earth, scientists now tell us, is about 25,000 miles round.

well: here, a deep hole in the earth from which water is got.

bottom: lowest part, opposite of "top." This is the bottom of the glass.



Geometry starts with ideas about lines and spaces.



Here are two circles and two squares.

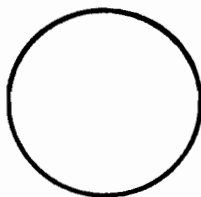
The circle on the left is inside a square. That is the relation of that circle to that square.

The square on the right is inside a circle. That is its relation to the circle.

These are facts about the circles and squares on this page.

Statements which tally with facts are true. Statements which don't tally with facts are not true. It is untrue that the square on the right is outside the circle. To say it is would be to make a false statement.

fact: it is a fact that the word **fact** has four letters in it.
untrue: not true, false.

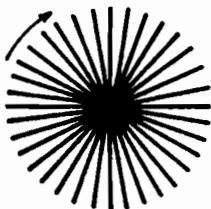


What is a circle?

It is easy to see what it is, but not equally easy to say what it is. Here is a straight line half an inch long. If you could turn the line right round like the hand of a watch, it would have covered a circle. One end of the line would have to keep in the same place while the rest of the line was turning.



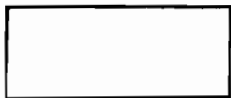
Here is another line the same length; it is half an inch long. If you could pull it down like a map on a roller a distance equal to its own length ($\frac{1}{2}$ inch) then it would make a square with sides half an inch long.



This is not a square though its sides are equal. Why not? Because its angles are not right angles.



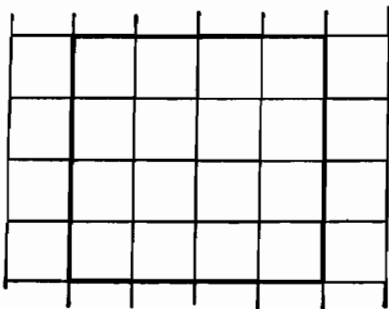
This is not a square though its angles are right angles. Why not? Because its sides are not all equal.



rests in this sense, the other parts.
lengths distance long.

Six thousand years ago in Egypt there were men who saw how to measure their land through their knowledge about squares and triangles.

How large is this square? What is its size?



Because the square is on squared paper, it is easy to see what its size is. We count the number of small squares in the large square. This number is the area of the square.

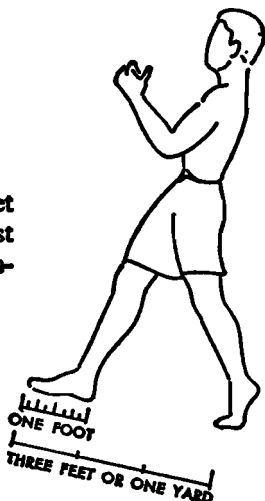
If the small squares were an inch square, the area of the large square would be sixteen square inches. If they were one foot square, the area of the large square would be sixteen square feet. If they were one yard square, the area of the large square would be sixteen square yards. Whatever the unit of measure used the relation of side to area is the same.

areas see above on this page.
units: division of a measure used as one.

Men took the first units of long measure from their bodies. The end of a man's thumb is about one inch long. A tall man's foot is about twelve inches or one foot long.



A long step is about three feet or one yard long. The simplest way of measuring a short distance is to step it.



These units of long measure have been a great help to man. They have made it possible for him to measure and compare lengths and areas and volumes. Measuring lets us build a room the size and shape we want it, for example, twenty feet long, sixteen feet wide and twelve feet high.

volume: cubic space. The volume of the cube on page 121 is one cubic centimeter.

shape: outline. All squares are the same shape but they can be different sizes. All circles are the same shape but not all triangles.

will step

step(s)

stepped

Sometimes a man's fields were not square. Some of them were like this:



or like this.



Men walked across their fields; they planted them and took in the grain. They knew how much land they had from working them before they could measure them.

They saw that a field like this



was the same size, though not the same shape, as a field like this



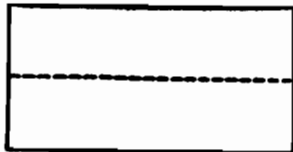
before they knew that they could measure how long and how wide a field was, and then get the area by taking one measure times the other.

will plant

plant (s)

planted

They saw that they could get half a field in this way...

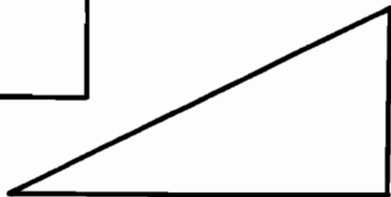
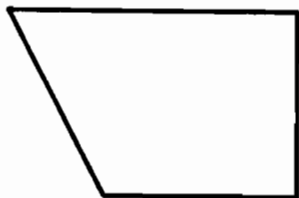


or in this way,



before they knew how to measure rectangles or triangles.

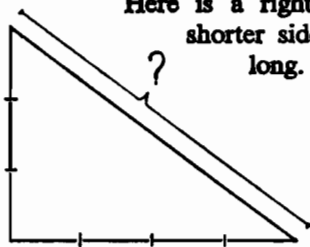
Can you see whether these two fields have the same area?



Put in lines to prove that they are or are not equal in area. The answer is at the bottom of page 178.

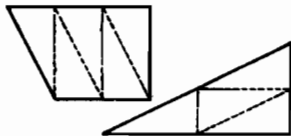
rectangle: a rectangle has four straight sides and four right angles.

Here is a right angled triangle. The two shorter sides are three and four units long. How many units long is the longest side?

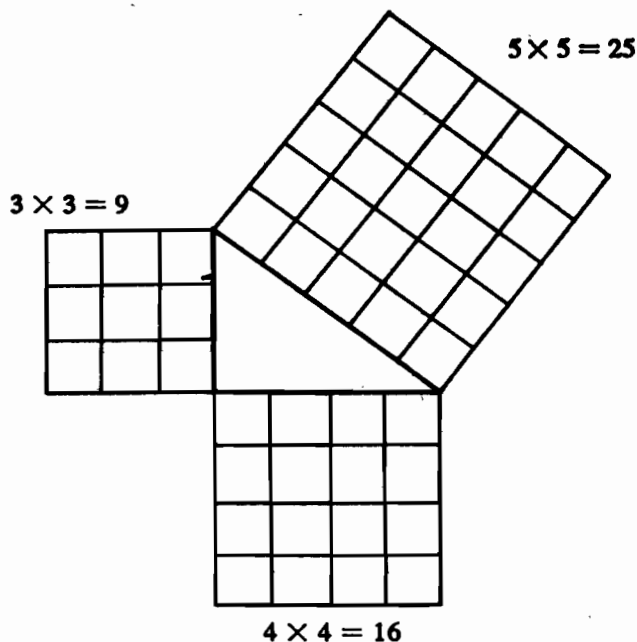


Can you tell without measuring? How?

About 2500 years ago (500 B.C.) a great Greek, Pythagoras, proved that the square on the longest side of any right angled triangle is equal to the squares on the other two sides added together. We can use his discovery to get our answer. We multiply the length of each of the two shorter sides by itself. We add the answers together. Then we find a number which, multiplied by itself, gives us this number.



Here is the answer:



$$9 + 16 = 25 = 5 \times 5$$

When we multiply a number by itself we “square” it.
Any number is the square root of its square.
5 is the square root of 25.

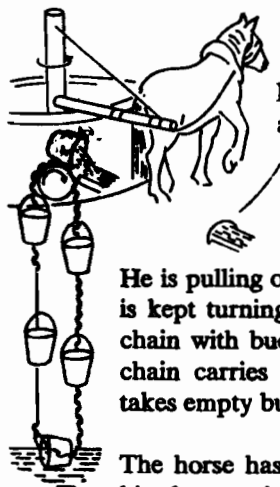
to square: to multiply a number by itself.

will square

square (s)

squared

It was not until many centuries later that men put this knowledge of geometry to wide use. The development of science had to wait until the days of Galileo and Newton. In the last three centuries men's ways of living have been and are being deeply changed by science. These changes can be compared only with three or four great earlier steps in the history of man's development. These are the birth of language, the use of fire and farming, and the invention of writing.



Here is a horse walking round and round the mouth of a well.

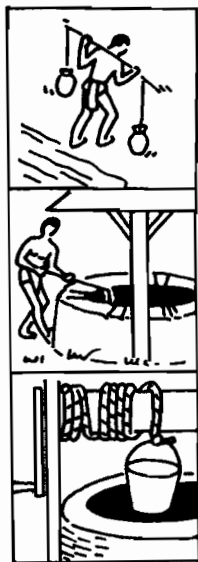
He is pulling on a strong stick of wood which is kept turning by his motion. This moves a chain with buckets on it. The motion of the chain carries buckets full of water up and takes empty buckets down.

The horse has a cloth over his eyes to keep him from seeing that he is walking all the time in a circle. Would he stop if he knew he was going round in circles?

empty: with nothing inside.

Today machines are the work horses. They are doing what men gave all their days to doing in the past. Men's muscles get less tired in the machine age, but they often get more tired in other ways. We are finding that we need more and more time to work out the direction that our lives may best take. We need a new design for living.

Men carried water from springs and rivers, and pulled it up by hand from wells, long before they learned even how to turn a chain round a wheel. They put a cord round a wheel and turned the wheel round because that was less hard work than pulling full buckets up the well by hand. The steps have come slowly because each has to be taken before the next. A next step was to put another bucket on the other end of the cord so that an empty bucket went down as the full one came up.



often: time after time.

design: picture of what can be done. Before a house or a complex machine is built, the builders must have a design (a "blueprint") before them.

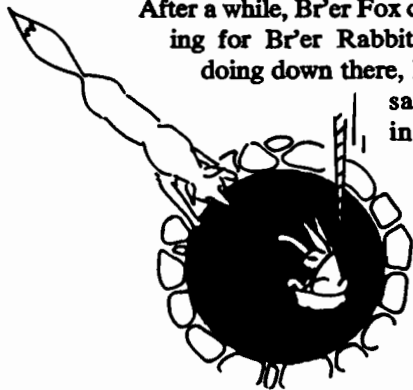
In one of the well-known Uncle Remus stories, Br'er Rabbit, a little animal who always gets the better of the other animals living near him, gets into a well-bucket . . .



and down he goes to the bottom of the well. As his bucket goes down, the other bucket comes up empty.

"How am I ever going to get back up?" he says to himself.

After a while, Br'er Fox comes along, looking for Br'er Rabbit. "What are you doing down there, Br'er Rabbit?" he says, looking down into the well-hole.



Br'er's Brother.

"I'm doing a little fishing. There are hundreds of fish down here."

"How can I get down there?" says Br'er Fox.

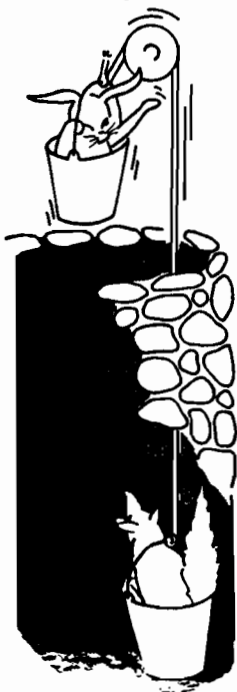
"Just get in the bucket, Br'er Fox. It'll bring you down in no time," says Br'er Rabbit.

And as the
fox goes
down . . .

up comes Br'er Rabbit to the top
in his bucket, as he wanted to do.

The two buckets go by one another
on the way. "Good day, Br'er Fox,
some go up and some go down. A
happy landing to you," says Br'er
Rabbit with a smile and a wave of
the hand.

Such stories about animals are as
old as any of man's inventions.



just: in this sense, *only*.

bring: make . . . come; come with.

landing: coming to land, to earth, to harbor.

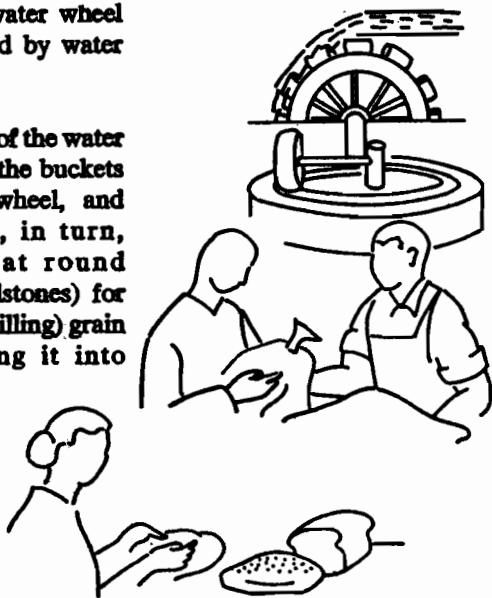
will bring

bring (s)

brought

Here is a water wheel being turned by water power.

The weight of the water falling into the buckets turns the wheel, and the wheel, in turn, turns great round stones (millstones) for crushing (milling) grain and making it into flour.



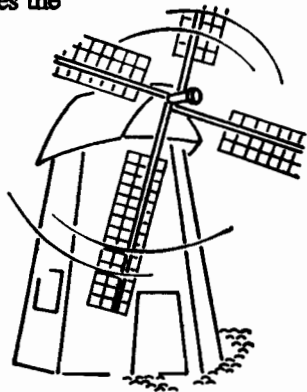
Men took their grain to the miller to be made into flour. Then they took the flour away and their wives made it into bread.

Men did all this everywhere in the old days before the invention of steam engines and electric power.

mill: factory for making flour.
miller: man who works in a mill.

Here is a windmill which does the same sort of work.

The wind pushes the sails of the windmill round. The work of the windmill is dependent upon wind. When there is no wind the miller cannot make his flour because there is no power to turn the millstones round.



There is an old song about a miller who lived by himself and could be heard singing a song all day long.

"I care for nobody, no not I
And nobody cares for me."

sang the miller.

What he meant was that he did not love anyone and that nobody loved him. He had no hopes or fears. He did not hope for anything or fear anyone.

push: give a push to.

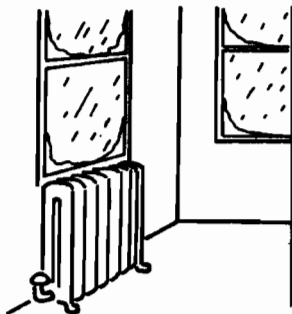
hope: our feeling when we look forward to and desire something.

fear: opposite of hope; feeling about things which we think may take place, the thought of which makes us turn white and shake all over.

will push
will hope
will fear

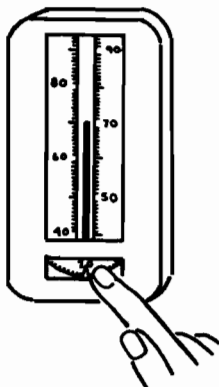
push (es)
hope (s)
fear (s)

pushed
hoped
feared



In many parts of the earth the climate is either too hot or too cold for man most of the year. But it is now possible to put automatic controls over temperature into houses, offices, and work plants.

Here is a thermostat which keeps the temperature of the air as high or low as we want. We put the pointer at 70°F; then the thermostat will keep the temperature of the room near 70° F, the point on the scale to which the pointer points.



climate: weather through the year; temperature, amount of rainfall, amount of water in the air and so on.

thermostat: instrument for keeping automatic control over temperature.

pointer: person or thing pointing.

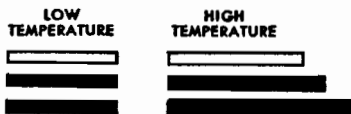
will point

point (s)

pointed

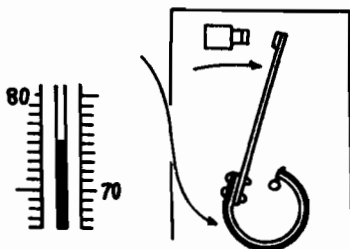
A thermostat is designed for this purpose. Its design makes use of our knowledge of what metals do when heated.

This is the way it works.



Different metals get larger by different amounts as they are heated.

Two long thin pieces of such different metals are bent together like this inside the thermostat.

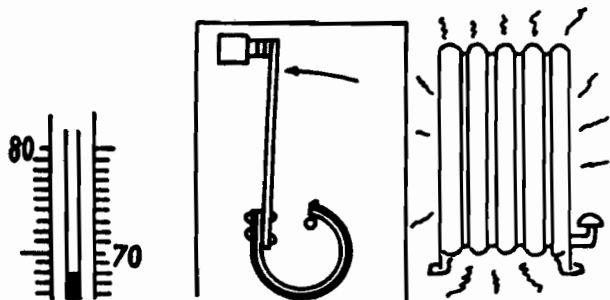


When the temperature in a room goes above 70°F the metal on the outside gets longer than the metal on the inside. This moves the arm to the right and shuts off the fuel in the heating system of the house.

for this purpose: to do this work.

purpose: a thing's purpose is what it is designed to do.

When the room gets too cold, the piece of metal on the outside gets shorter and moves the arm to the left. This turns on the heating system and more fuel is burned to warm the house. The purpose of putting a thermostat into a heating system is to control temperature.



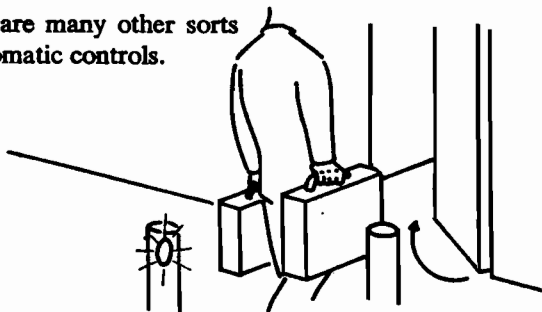
In hot climates what is important is to cool houses by sending fresh cold air through them. We can control the temperature of the rooms and in addition dry the air and have a climate of our own making indoors. Every ice chest has a climate of its own inside it. It is strange and surprising, but true, that ice chests are kept cold by using heat. The heat is supplied by electric power or by burning gas. Scientists tell us that before long men will be using the sun's heat to cool buildings. This will make life in hot climates much easier.

will dry

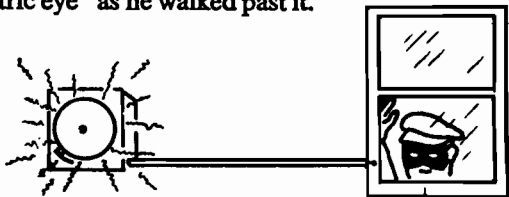
dry (ies)

dried

There are many other sorts of automatic controls.



In this hotel a door is automatically opening to let a man go through. His body has shut off the light from an "electric eye" as he walked past it.



In this bank a bell is ringing loudly because someone has touched a window. The man was hoping to break into the safe.

Many offices, banks, stores and work plants are kept safe at all times by such automatic watchers.

ringing: sound made by a bell. We say that a bell rings.

safe: steel box where money and important papers are kept. They are safe when locked in it, if no one breaks it open.

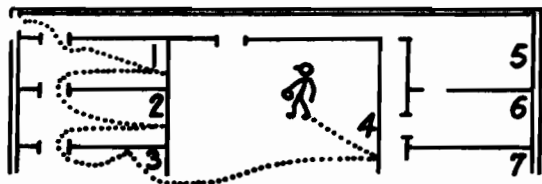
hotel: building where people can get rooms for money.

will ring
will touch
will break

ring (s)
touch (es)
break (s)

rang, rung
touched
broke, broken

Here is a night watchman in a motion picture studio (plant) keeping it safe from danger of fire at night.



He has his time clock with him. He walks all night long through the plant from one station to another. At each station he pushes his time clock against a key which is fixed in the wall.

This key prints a number on a long narrow roll of paper which is moving all the time through the lock of the time clock.



In this way the time clock makes a full record of whether and when the watchman went to each station in the studio in turn. The time at which he was at each one of them is recorded. If a number is not recorded, that is proof that the watchman did not go to that station.



		1:11
3		1:12
		1:13
		1:14
		1:15
		1:16
4		1:17

This record is necessary before the insurance company will pay for damage done to the plant by fire. The insurance company needs to know where the watchman was all through the night.

The motion picture company pays insurance money every year to the insurance company. In exchange the insurance company will pay for any damage to the building done by fire. But the motion picture company is responsible for keeping the studio as safe as possible from fire. The night watchman with his time clock is part of the system of keeping the studio safe from fire.

responsible: if you are responsible for doing something, you have to do it. If you give your word that you will do something, you become responsible for doing it.

insurance: making safe from danger; making good when something goes wrong.

company: business group.

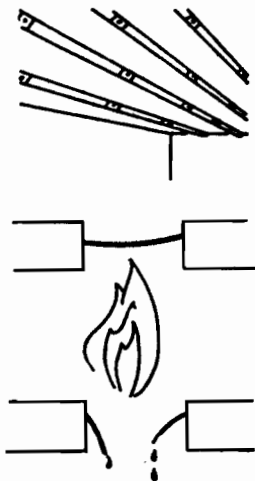
damage: if a thing is burned, broken, or put out of working order it is damaged. Damage is done to it.

will damage

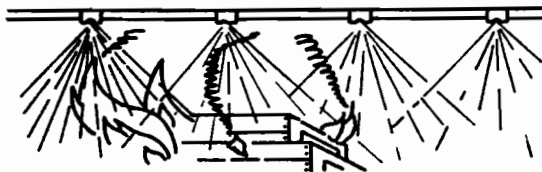
damage(s)

damaged

Here is a more fully automatic part of a system of controls against fire. Some metals melt at low temperatures for metals. Thin lengths of such metal are placed at many points in the plant. A fire starting near one of these points will quickly melt the metal.



This starts an electric system working. It opens outlets through which water comes down from the ceiling to put out the fire.



The price of such a system may be high, but it is much lower than the price of a new building. Such insurance is cheap at the price.

melt: become liquid, as ice becomes water.

ceiling: inside of the roof of a room.

cheap: low in price for what you get.

will melt

melt (s)

melted

Much of the work in present-day factories has to be automatically controlled. The much-talked-of Assembly Line was a first step in this direction. It let men make automobiles and many other things much more cheaply than they could be made before.



An Assembly Line is a moving line of parts of whatever is being made. Each worker (man or machine) does one thing (adds or changes some part) to each automobile (or whatever is being put together) as it goes by. The work of each is dependent on what has been done before. They are parts in an over-all design with an over-all purpose.

If you make men into machines for short working hours you can free the rest of their time. What for? To what purpose? What is man designed to do? This new free time has been given man by the workers and thinkers of the past. He has to think about what he will do with it, and about the best possible use of it.

free: make free.

will free

free(s)

freed

It seems sometimes as if men want very much to put an end to waiting on one another. There are many ways, for example, of making the serving of food in restaurants more or less automatic. One of the causes of the high price of food in restaurants is the use of waiters and waitresses. One waitress can serve only a small number of people, if she has to go to and



from the tables with trays. And fewer people than before are interested in doing this sort of work even when the hours are short, the pay is good and the work not too hard.

In present-day living more people than ever before eat at restaurants. Many housewives who used to have servants now do all their own housework.

serve: give out, put before, do things for.

waiter: man who serves at table or in a restaurant.

waitress: woman who does the same.

servant: one who serves others, for example, a person who is paid to do housework.

will serve

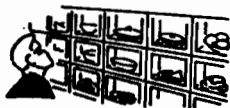
serve (s)

served

There are ways of making restaurants self-serving, that is, of getting the public to do more of the work so that fewer waitresses are needed and less time is wasted in waiting to be served.

The nearest thing to complete self-serving is the **AUTO-MAT**. Food and drink are put into boxes with glass doors in front.

You look at the food.



If you want what you see, you put in the right amount of money and the door is unlocked so that you can open it.



You take the food out and shut the door again.



Fresh supplies of food are put in the boxes as they are emptied.

will empty

empty (ies)

emptied

More and more use is being made, in public places, of automatic machines which sell food, cigarettes, drinks, stamps, or even books.



To make buying and selling simpler and more automatic is important. Too many housewives have to give up too much of their time to shopping for their families. Some of them use up a large part of their lives going from shop to shop to get what they want and waiting in line for people to serve them. Serving themselves frees them from this.



shops store. In the United Kingdom shop is used and in the United States store, but you go shopping in both countries—that is, you go to stores to see what you can buy.

will shop

shop(s)

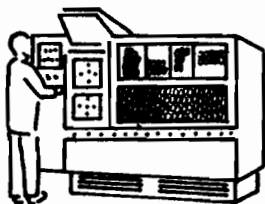
shopped

There are great food stores today where every sort of food: meat, bread, butter, milk, vegetables, flour, sugar, salt, fruit—whatever it may be—is put out, each in its place, on shelves for everyone to help himself. You take what you want, put it in a little cart if there is much of it, and take it to a control counter where you pay for it. An automatic adding machine is used to give the amount you will have to pay and to make a record of the things you have bought.



The adding machine prints the price of each thing on a roll of paper. You see how much you are paying for each thing you are buying and how much what you have bought adds up to. Then you get a list of the amounts recorded and the store keeps a copy. These records of everything sold help to keep the business of the store in order.

In many businesses accounts are kept by machines and the records are photographed. When there are millions of different facts to be taken into account, and records of them to be made, machines can work far more quickly than men.



The newest and greatest accounting machines can do far more work in a minute than the quickest man could do in a year. But the machines and the questions put to them come out of men's minds and are controlled by men.

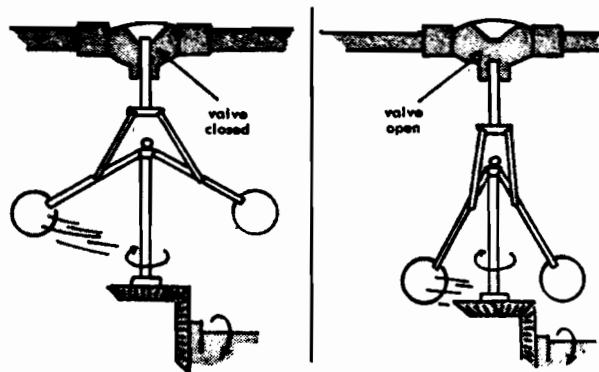


will photograph

photograph (s)

photographed

It was James Watt who in 1788 invented the Flyball Governor for steam engines as a way of making the engine able to keep control over its own rate of motion. This was the invention which made the steam engine a safe machine.



The two balls are kept flying round and round by the motion of the engine. As it goes more quickly they fly farther out and this shuts down the supply of steam coming to the engine from the boiler. When the engine goes more slowly the balls fly lower and this opens up the shut-off (valve) and lets more steam through the pipe to the engine.

The governor of a steam engine took its name from the fact that it governs the engine as a government governs a country. A government in a free country is a group of men to whom the people give the power to govern them. In free



countries there is government of the people, by the people, for the good of the people. The government is the instrument by which the country controls itself. In a free country the people can change the government: they can take the power away from one group of men and give it to another. And there is a limit to the powers that any government is given or can take.

govern: be in control of.

limit: the point, line or edge where something comes to an end. To limit is to put a limit to.

will govern
will limit

govern (s)
limit (s)

governed
limited

In a free country the men in the government are dependent upon the people and responsible to them for the use made of the power which has been given them. In any good system of government, there must be ways of controlling and limiting the amount of power anyone has, as the flyball governor controls and limits the output of the steam engine.



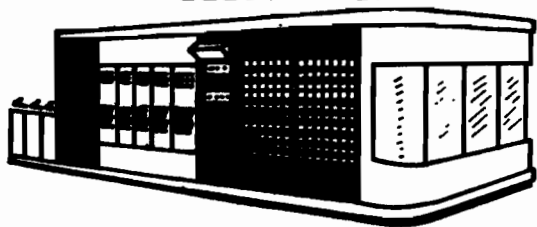
One of the chief controls over the power of a government is the law of a country. The law is a body of statements about what may be done to or by any person. In free countries all men are equal under the law which they are responsible for keeping. To help them to keep it there are police and judges.

judges: men trained in the law who are responsible for saying what the law is and what is to be done to men who break it.

Our bodies govern themselves in many ways (pp. 87-91, 115) but we have to control them consciously too. We have to be their judges and police, when necessary. But in a well governed country there is little work for police and judges. A good education develops the power of a person to govern himself in more and more complex ways.

As population increases and as men become more responsible for meeting people's needs on a larger and larger scale, machines become more important. As the facts become more complex, machines are being used more and more to do all sorts of measuring, counting and controlling.

ELECTRIC BRAIN



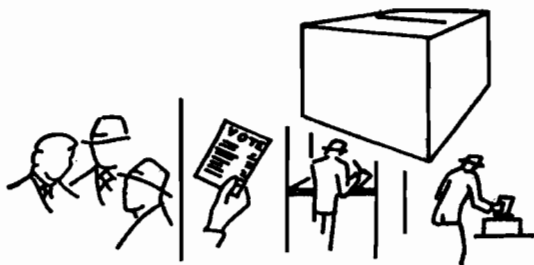
Can machines think? In a sense, yes. In another sense, no. They can answer a question if we have built into them the power to answer that sort of question.

education:

in a wider sense, ways in which we
learn to become more able and responsible.

We can make machines work for us, but machines cannot tell us what that work should be. It is men who are responsible for the direction of the work.

Men have to know not only how to do things but whether to do them and when. A machine has only to do what it is made to do.



Free men have to make up their own minds about all important questions.

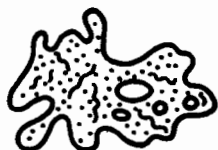
How does a man learn to do this? By being with, talking to and watching others who are able to think for themselves he may see how to think for himself. He gets better at it by trying. Education in this cannot start too early.

should: would best be, the work should be what would be best for man.
direction: seeing what should be done, giving the orders (directions) and being responsible for the outcome.



How do men come by their ideas about what is better and what is worse, about what things are important in life, what unimportant? How do they judge between things?

Man has grown to what he is out of the past. He has come a very long way through change and growth from the first living cells.



All living things, however simple, control themselves to some degree. Many cannot be said to have ideas but they have direction. Within limits they have self-control.

come by: get, in the sense of develop.

judge: come to a clear idea of what is best.

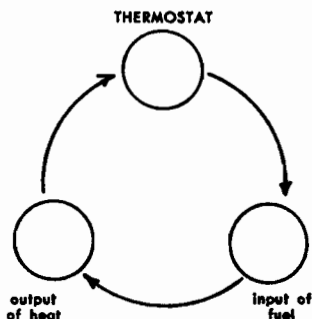
will judge

judge (s)

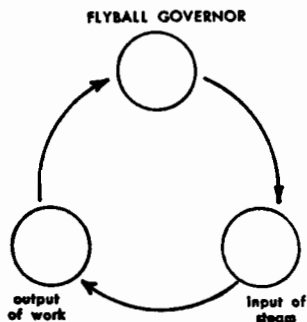
judged

Thinking is the most complex sort of self-control; and our brains, with which we think, are the most complex systems of feed-back. The thermostat and the flyball governor are about the simplest of them. In feed-back systems, effects control their causes.

In the thermostat feed-back circle the effect of increased input of fuel is increased output of heat. This effect feeds back, through the thermostat, and cuts down the input of fuel when the increase becomes too great.



In the flyball governor circle the effect of more steam is more output of work from the engine. This effect feeds back, through the governor, and cuts down the steam when the engine goes too fast.



In the brain millions of feed-back circles are always controlling one another.

Man's past is a very small part of all time, but it is a very important part.

How old are the stars? How old are the Sun and the Earth and the Moon? Nobody knows for certain. It is not possible at present to be certain about such great questions as these, but two things seem probable.

The universe is about five billion (5,000,000,000) years old.

It has been becoming more and more complex from the start.

certain: two different meanings of "certain":

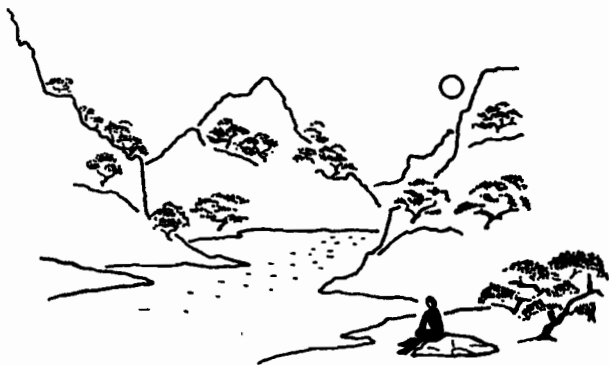
1. You are certain about something when there is no question in your mind that it is so.
2. Something is certain (is a fact) if it is well-supported by all the rest of knowledge. We are sometimes certain (in sense 1) about things which are not certain (in sense 2).

probable: more than possible, less than certain.
If there are seven black balls and three white balls in a bag and you take one of them out without looking, it is probable that you will get a black one.



However we try to think of time, it seems certain that the earth is older than our minds can take in.

Things have been going on for a longer time than we can think of and they will go on and on through a longer time in the future than we can think of.



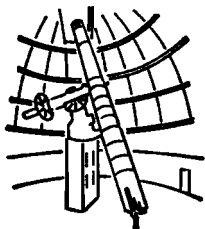
Seventy years seems a long life-time if compared with the present minute. But if compared with the age of a stone it seems no time at all.

There is a Chinese poem which says:

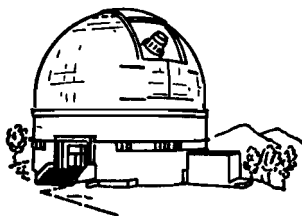
Quickly the years fly past forever,
Here forever is this spring morning.

poem: something said for the complete man (his thoughts, feelings, desires, hopes, fears...) in the best possible way.

We have to think of Time and Space together: here and now, there and then. We cannot see with our eyes how far off in Time and Space the stars are, but astronomers can measure their distances. Their unit of measure is the light-year—the distance light travels through Space in a year.

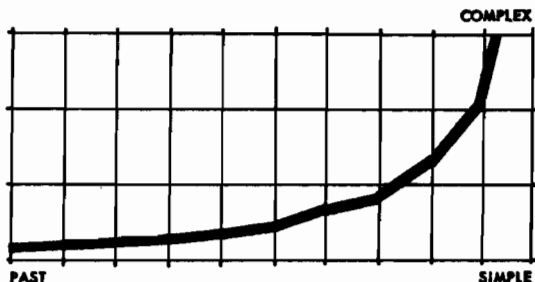


The greatest telescopes of today let us look two billion light-years out into Space. The stars we see there are two billion light-years away. We see them as they were two billion years ago. We are looking into the past.



astronomer: scientist working in astronomy.
astronomy: science of the stars.

Let this curving line represent growth from simple to complex in the world.



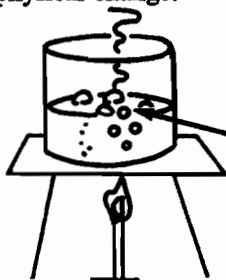
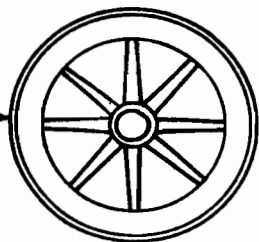
In this picture the past is to the left and we men of today are at the top of the curve.

Long, long ago, the only sorts of changes that took place were—so men of science say—very simple in comparison with the changes which are taking place in you now as you read this.

The curve represents the change from simple to complex. The higher it goes the more complex are the sorts of changes which are taking place.

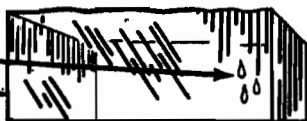
In the beginning—as long ago, as far back in the past, as we can talk about—the only sorts of changes which took place, scientists say, were physical changes. They were the sorts of changes which the science of physics is about.

Here is a wheel turning round. Its motion is a physical change.

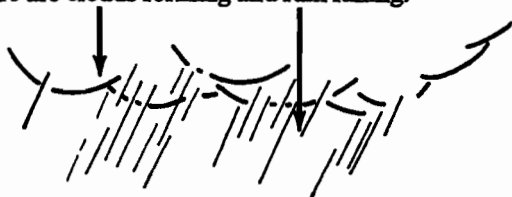


Here is water boiling.

And here is water turning into ice.



Here are clouds forming and rain falling.



These are physical changes.

physical: in the narrow sense used here, within the field of the science of physics. In a wide sense, material having to do with bodies not minds.

Much later, other sorts of changes, more complex than these, began to take place.

Here is a lighted candle. As it burns the heat melts the candle and the liquid goes up into the flame where it is turned into gas.

So far all is physical.

But in the flame chemical changes take place.

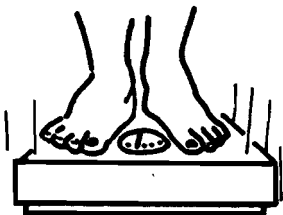
Carbon from the candle and oxygen from the air come together to make carbon dioxide. At the same time water is given off, as you may see if you hold a glass cover over the flame. The cover quickly becomes clouded with little drops of water. This water was not in the wax and the candle flame gives it off however dry the air is. The water and carbon dioxide come into being through the chemical exchanges, between the lighted candle and the air, which make the flame.

At the same time there are physical changes taking place. The top of the candle is melting and the liquid fuel is moving up into the flame and being turned into gas, air is coming into the flame, carbon dioxide and water are moving up from it and heat and light are being given out.

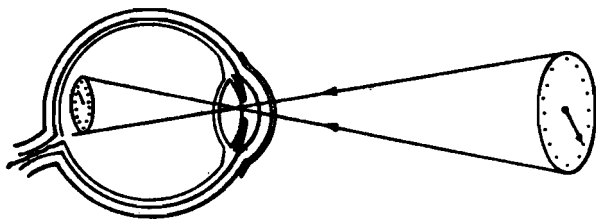
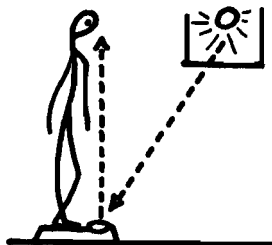
chemical changes: changes that take place in the structure of different sorts of material, turning them into other materials.



When you step on a scale, the scale goes down and the springs inside it are pulled out, and the pointer moves to a mark. These changes are physical.



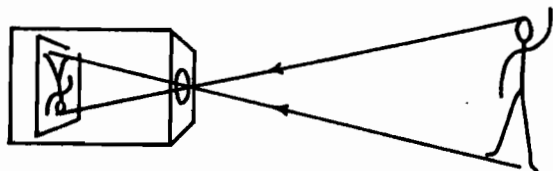
When you look at the pointer to see what your weight is, rays of light come from it to your eye and go through the lens in your eye to a point on the retina.



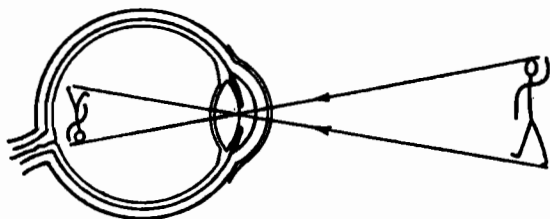
lens: lenses in cameras are made of glass. The lens in an eye is built of clear living cells.

retina: coat of cells at the back of the eyeball.

In a camera, rays of light from whatever you are photographing make an upside down picture on the film.



So it is inside your eye. The pictures made on the retina are upside down.



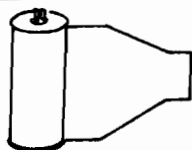
Everything going on so far has been physical. But in your retina more complex sorts of changes now take place. Some of these are chemical. Complex materials in the retina go through chemical changes not very unlike those that make photographs on films and these changes cause other much more complex sorts of changes in the living cells of the retina.

film: here is a roll of film ready to be put into a camera.

cause: be the cause of.

will cause

cause(s)



caused

These nerves, which make us able to see, are an out-growth from the brain to the retina. From the eye impulses travel to the brain through the living cells of the nerves. There are as many as a million separate telephone lines in these nerves alone.

A train of changes goes up these nerves to the back part of the brain. The cells there let us see the things that our eyes are looking at. No one, at present, has any idea of how they do this.



The distance from the eye to the back of the brain is not great, but some distances from some parts of the body to the brain are long. The rate at which impulses travel through the nerves is about the same for all of them.

impulse: wave of change which goes through a nerve.

nerves: chain of cells through which impulses travel from one part of the body to another; the impulses themselves. (See page 181, line 3. It is men's nerves that get tired today.)

The distance from a man's toe to his brain and back may be as much as twelve feet. When you are feeling with your toe for a step to put your weight on, the impulses have to go up your nerves from your toe to your brain and back down again to the muscles which move your foot.



When you are walking, almost all the muscles in your body are at work keeping you from falling down. Your muscles and nerves work together to keep you on your feet.



These changes in the nerve and muscle cells are dependent on what is going on in other cells in the body in many different ways.

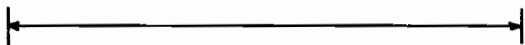
Life on earth began, it is thought, about two billion years ago. No one knows for certain whether there are living things on other planets—on the red planet, Mars, for example, or on any of the ten million, million planets like the earth which are now thought to be traveling round other stars which are like our sun. It seems possible—even probable—that there are living beings (not unlike men maybe) on many of them.

Changes of color on Mars are seen at different times of the Martian year. These changes may be caused by the growth of plants.

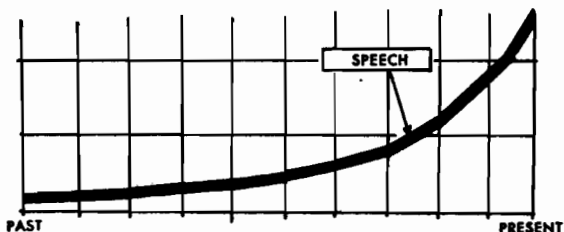


The newest and highest development of living things on earth is Man. About a million years ago, early men were beginning something new in the long story of the earth.

Let us change our time scale and make this line:



represent one million years, the time since Man began.



Then this curve may represent the next great steps forward into more complex ways of living.

No one knows when speech began. Probably speech developed slowly and in different ways and at different times with different sorts of men. But certainly it was through being able to speak to one another that men became human. With the growth of language a great development of the parts of the brain which are used in talking took place. Speech gave Man greater and greater control over the world, over other men and over himself. Without language, Man would not have become what we mean by the word *human*.

speech: talking, word language of the voice.

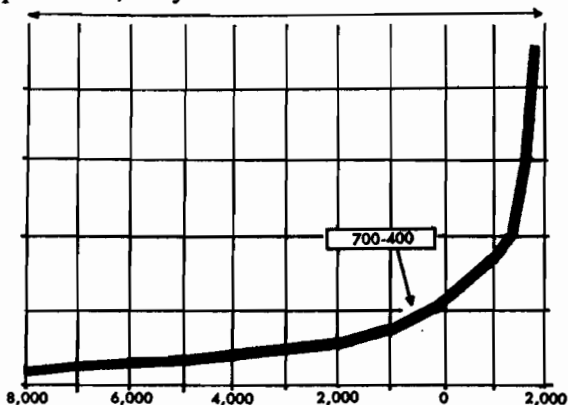
human: like a man, different from animals, as man should be.

will speak

speak (s)

spoke, spoken

Let us change our time scale again and make our line represent 10,000 years.



The next great upward turn of our curve came some twenty-five hundred years ago. In many different parts of the earth, Man was discovering then his first full and clear ideas of himself and of his world.

In Greece, the great poem, the *Iliad*, and Socrates and Plato.



In Palestine, Amos, Hosea and Isaiah.

**YOU MAY NOT
MAKE for yourselves
an IMAGE of any
THING in the SKY
or ON EARTH
or in the WATERS
under the EARTH.**

"You may not make for yourselves an image of anything in the sky or on earth or in the waters under the earth."

(Deuteronomy, 5:8.)

image: picture or sculpture representing something.



**In India, Gautama Buddha
and the Bhagavad-Gita.**

**In China, Confucius and
Mencius.**



At first through the spoken word and then in writing, men began to make for themselves pictures of Man and of what Man should become. More than some know, men have been living by these pictures ever since.

If you have read this book up to this point, you can easily read for yourself *The Wrath of Achilles* (Homer's *Iliad*) in simple English, *The Republic of Plato* in simple English (both W. W. Norton, New York) and the Books of Amos, Hosea and Isaiah in *The Bible in Basic English* (E. P. Dutton, New York).

Here are some of the greatest sayings of all time which, in one language or another, go on living in men's minds. For many centuries school children in China began to learn to read with this sentence:



"Men's nature is good."
Mencius
(4th century B.C.)

From the *Chung Yung* (a later work of the school of Confucius):

"What makes us is named our nature. What directs our nature is named the Way. What makes the Way possible is education."

our nature: what we most deeply and truly ARE.
directs: gives directions to.

will direct

direct (s)

directed

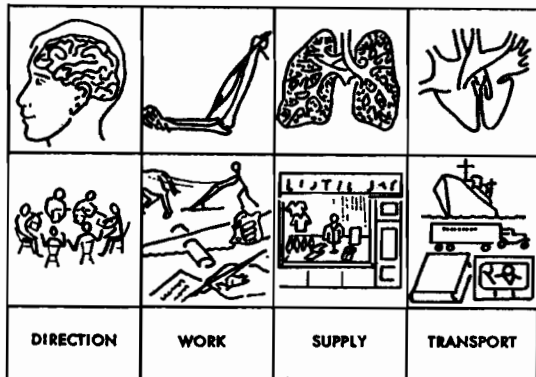
At first, writing seems to have been chiefly a way of keeping records. The first great poems, the *Iliad*, for example, were in the minds and mouths of poet after poet before they were written down.

The teachings of Buddha and of Mencius, Confucius and the earlier Hebrews were given first by the spoken word and written down later by some who heard them. Socrates, though he used books, thought that teaching should be by word of mouth and by example. And Jesus taught only by what he said and did and was.



Later, the written word was to become the chief instrument through which Man could try to understand himself and his world.

It is chiefly through reading, and through thought about what we read, that we come to see how our ideas depend upon one another—very much as men are dependent upon other men, or as organs in our bodies are interdependent.



Through reading and reflection we can learn to know ourselves. Reflect for a while on these words of Shakespeare. Thinking, he says,

“... turns not to itself
Till it has traveled and is mirror'd there
Where it may see itself.”

Troilus and Cressida, Act III, Scene iii, lines 109-111.

Some very good students of Shakespeare think that he wrote *married*, not *mirror'd* in line 110.

organ: heart, lungs, stomach, brain, etc.

interdependent: dependent on one another.

reflection: If you look in a mirror

you will see a reflection of yourself. The mirror reflects light from you back to your eye. The eye is the sense organ most clearly servant to the brain. When we understand we say we see.

will reflect

reflect(s)

reflected

Every idea with which we reflect is what it is and can do what it can do only because our other organs of thought are what they are and do their own work.



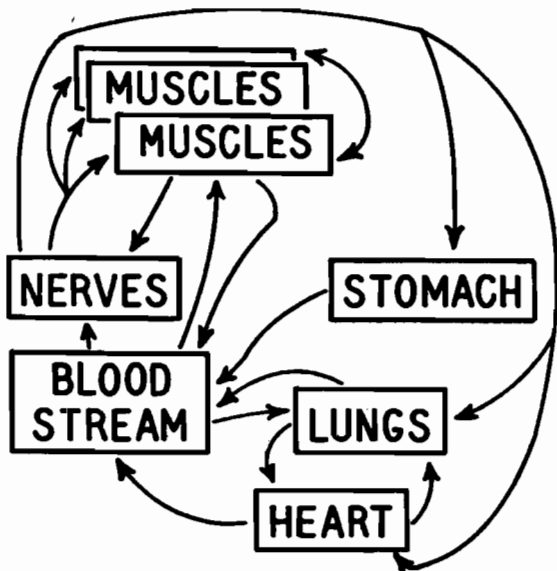
The parts of this bridge do what they do only because the other parts of it are there and are doing their work.

And this is equally true of the words in a language. Every word is able to work as it does only because other words work with it.

In every step we take, what any of our muscles can do depends on what our other muscles are doing, and all this is possible only because our nerve cells are in control. And nerve cells can work together well only if the blood is serving them well.



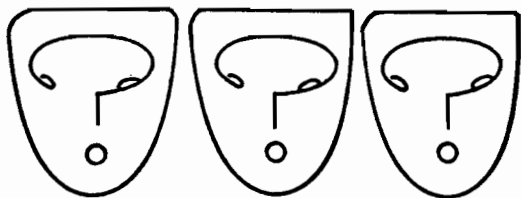
And the blood can serve them well only if the heart is in good order and if the lungs are taking in enough oxygen; and the heart and lungs in turn are dependent on the food the stomach can give the blood stream and on the control the nervous system can keep up over all the organs of the body.



nervous system: system of nerves.

But in fact, the organization of our bodies is far more complex than this short and simple account can say. In everything we do, every breath we take, every motion we make, from the directing of our eyes as we look to the wording of a sentence as we write, billions of cells of every sort in our bodies are working together serving one another.

It is the same with Man and his world. Any great question coming up in any part of the world today has its effect on almost everyone anywhere. As with the body, damage in any part is damaging to all the rest. The more men reflect upon this the more they will understand why world organization is important. We are far more dependent upon one another than we know.



"What to do? What to do?" said Confucius. "In truth, I do not know what to do with a man who does not ask himself this!"

A wise man goes on asking himself what to do all his life. It is two questions:

1. What should Man want to be or to become? What is Man's end or purpose? We have seen (page 204) how far he has come. Where is he going?
2. How can he best work to this end?

organization: way of being organized (see page 115).

Everything, said Aristotle, has its own true work—or purpose—the work it can do best, the work which is right for it.



A good wheel turns well, a good knife cuts well, a good clock keeps time well. A good apple tree gives good fruit, a good cow gives good milk.



In the body, eye, hand, foot, each has its own work to do.

What can Man do best? What is his own work as Man?

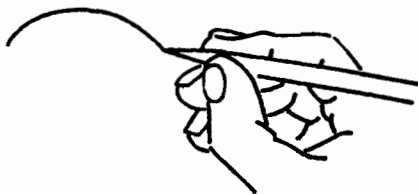
Is it to learn? To learn what?

Is it to learn what to do?

How does he learn?

Is it by the feed-back from the effects of what he does?
Is it by seeing from the outcome whether he is doing the right thing?

If you are trying to draw a circle, the curved line you have made (together with your knowledge of what a circle is) keeps telling you how to go on. You can learn to draw better by trying.



If you are making a speech, what you will go on to say depends upon what you have said up to that point and upon the people listening to you. A bad speaker is one of whom this is not true. A good speaker has learned by experience how to design a speech and how to change the design if necessary.

In speaking, as in everything we do, the way we begin depends upon what our purpose is, upon what we are trying to do. But we are not always, nor need we be, fully conscious of what that purpose is. Sometimes, in reflection, we see more purpose than we knew in what we did.

design: see what should be done and how to do it.

will design

design (s)

designed

How you start your circle depends on how large it is to be.



So there is feed-forward as well as feed-back. Feed-forward is as widely supported a fact as feed-back. Any number of examples can be found. There can be no feed-back without feed-forward. Knowledge of what you have done and are doing will not help you unless there is direction in what you are trying to do.

You may not fully know what this direction is; you may be trying to find out what it is.

As the development of the microscope has increased man's power to see, so the development of his instruments of thought is increasing his power to design and direct and see what he is doing.

unless there is: if there is no.

In every sentence you write, the feed-back from the letters of any word you are writing, together with your knowledge of the spelling of the word, tells you which letter to write next. But feed-back can do this only because you fed forward that word and no other as the word you would write. And in writing any sentence, feed-back from the words you have written can tell you what to write next only because you fed forward that sentence. And you fed forward that sentence only because of a more general feed-forward, the purpose of the paragraph in which the sentence is to take part. And the paragraph too depends upon the chapter and the chapter on the book.

“General”? What does this word mean? Each of these circles as they go out from YOU represents a more general idea than all that is within.



paragraph: a part of a longer piece of writing which develops an idea in it.

chapter: a part of a book made up of a number of paragraphs under a separate heading (or number).

John Amos Comenius (1592-1670) was, so far as we know, the first man to use pictures in books written for beginning readers and for beginners in a second language. (It was Latin.) He was to have been the first head of Harvard College, where this book is being written, but could not come.

Comenius began his reader, *Orbis Pictus* (Nürnberg, 1657), with this picture.



The teacher is saying: "Come, Boy, learn to be wise." And the boy asks: "What does this mean, *to be wise*?" The teacher answers: "To understand rightly, to do rightly and to speak out rightly all that is necessary."

The teacher gives the boy an answer though he knows that no one can become wise all in a minute. All our lives through, we go on learning how to understand rightly, to do what is right, and to speak out at the right time. See the size of the question the boy is asking.

In this book we have not tried to give any answers, but only to bring together some of the more important ideas and facts needed if we are to ask ourselves what we should know and think and feel and desire and do. To have been wise is to have known, thought, felt, desired and done as was best. But there are many different ways of knowing, thinking, feeling, desiring and doing. Which are the best? That is the question. Our lives are our attempts to find an answer, and language is the most important of all our instruments for this purpose.

desire: have a desire for.

will desire

desire(s)

desired

