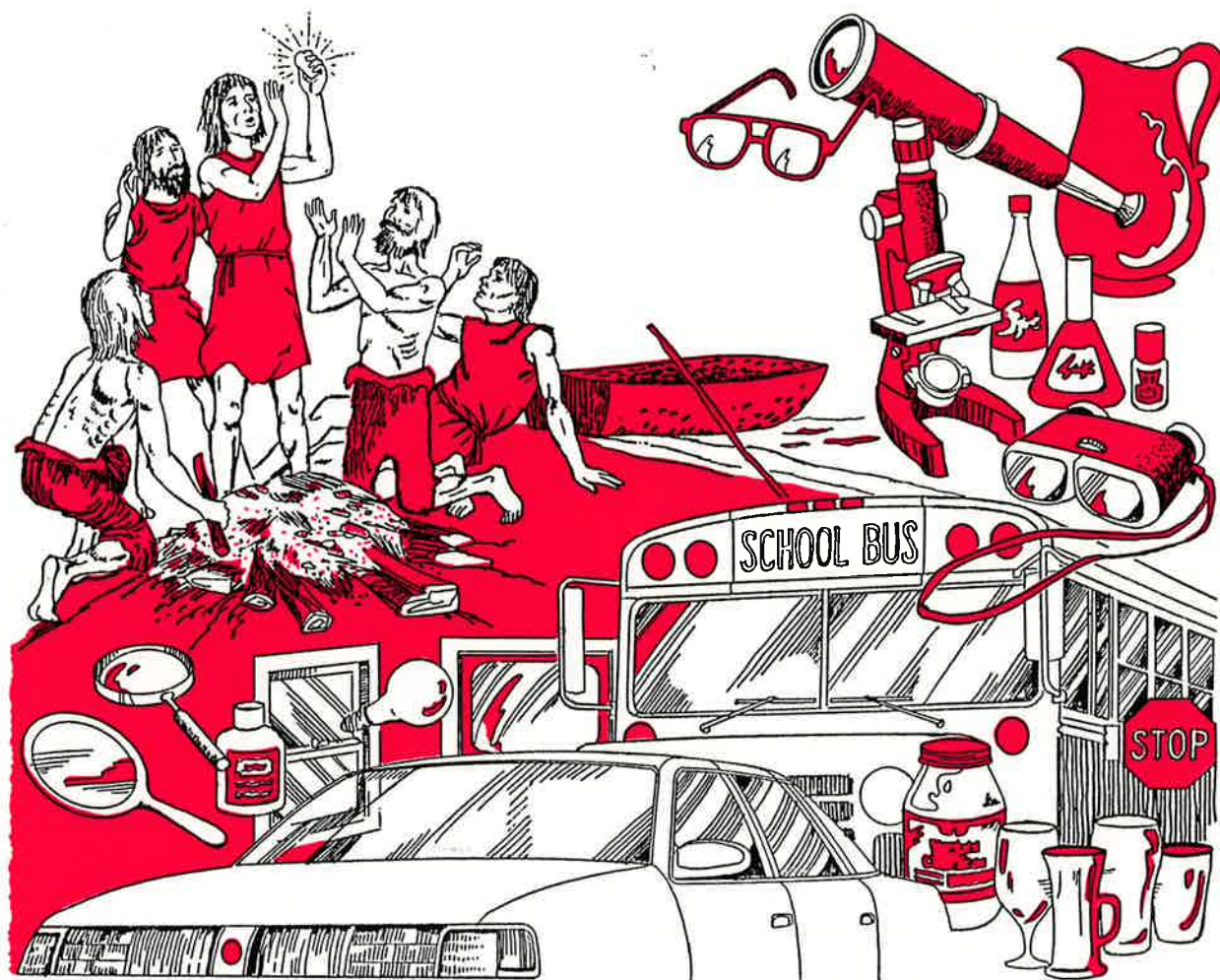


ALL ABOUT GLASS

by Madelyn Carlisle



- 1 One day, thousands of years ago, some fishermen camped for the night on a sandy beach. After they went to sleep, the hot coals from their campfire glowed far into the night.
- 2 In the morning one of the men noticed a strange lump in the ashes. He had never

seen a stone like it before. Puzzled, he picked it up and cleaned it off. As he turned it over in his hands, he saw that the morning sunlight shone right through it. He was sure that it had not been on the beach the night before. Could the fire somehow have made this odd substance?

- 3 Legends say that this may be the way that people first discovered glass. Glass is formed when sand is mixed with certain chemicals in a very hot fire. Perhaps by accident all of these materials were mixed with the sand on that beach.
- 4 As time went on, people found many uses for this new substance. Hundreds of years ago castles had only high, narrow openings in their cold stone walls. Because the wind and weather blew in through them, they were called "wind's eyes." This is where the English word *window* comes from. Wealthy people like kings began to use glass to cover these holes in the walls.
- 5 But glass was hard to make and very expensive. Even kings could not afford glass for every window in their homes. Most people had to use animal skins, pieces of cloth, or oiled paper. But these coverings did not let in much light, and no one could see out through them.
- 6 Over the years glassmaking improved a great deal. Today glass is so clear that you can hardly tell it is there. Homes can have many large windows. Some city skyscrapers look as though they were built almost entirely of glass.
- 7 Glass windows are used in vehicles as well as buildings. Automobiles, buses, trains, and planes have windows made of safety glass. When this glass is hit hard, it cracks. But it does not shatter into pieces that could injure passengers. This is because safety glass is made like a sandwich. A layer of clear plastic is cemented between two sheets of glass. When safety glass is broken, the shattered pieces of glass stick to the plastic.
- 8 Glass is helpful, too, in building submarines and spaceships. The glass used is very tough. It will not break under the great pressure of water, the cold of outer space, or the extreme heat when coming back into the earth's atmosphere. Even astronauts' spacesuits are made partly of glass.
- 9 Of all the objects made of glass, lenses are probably the most important. A lens is a specially curved piece of glass that bends light rays. Lenses make things look either bigger or smaller than they really are.
- 10 The first lenses were used in glasses to help people see better. Then in 1609 an Italian scientist named Galileo put two glass lenses inside a tube. With one lens at each end, he looked at the sky through this first telescope. He could see things in the solar system that no one had ever seen before. He discovered the rings around Saturn and the moons around Jupiter.
- 11 In 1675 a Dutchman, Anton van Leeuwenhoek, found another way to use lenses. He made an instrument called a microscope. Through it, he could see tiny creatures swimming about in a drop of water. For the first time he learned of forms of life that could not be seen by the eye alone. His discovery led people to find out about germs that cause disease.
- 12 More than two thousand years ago people had learned how to blow hot melted glass into the shape of bottles. For a long time these glass containers were scarce and expensive. They had to be blown one at a time. Today there are millions of glass bottles, jars, and drinking glasses. In a modern factory, machines can make hundreds of them in a minute.
- 13 Until recently millions of bottles and jars were thrown away every year. Now people have discovered ways to *recycle* glass in order to use it over again. When old glass is melted down, it can be made into new bottles or into building materials, like bricks. These glass bricks are solid and do not let light shine through. They look a lot like ordinary clay bricks.
- 14 Old glass is also used to pave roads. Glass can be ground up and mixed with asphalt, a road-surfacing material. The ground-up glass has no sharp edges. It makes a tough surface that engineers think may last longer than other materials.
- 15 In the future we may all be driving on glass roads and living in houses made of glass. And who knows what other uses will be found for this interesting material!

How Well Did You Read?

Write *T* if the statement is true according to the story. Write *F* if the statement is false.

- 1 Glass was invented by rich people who were looking for a way to keep the wind out of their homes.
- 2 In the days before glass was invented, homes were likely to be darker inside than they are today.
- 3 Suppose you take a piece of glass from a train window and a piece of glass from a picture frame and you strike both with a hammer. Both will shatter into bits.
- 4 If glass lenses had not been invented, the history of medicine might have been different.
- 5 The English word *window* has its origin in the phrase "wind's eye."
- 6 Safety glass resists shattering better than ordinary glass because it contains a layer of plastic.
- 7 A lens can make a small thing appear larger.
- 8 Glass bricks have all the qualities of ordinary glass.

Learn about Words

Vocabulary

A You can often tell the meaning of a word by reading the words around it.

Look at each number in parentheses. Find the paragraph in the story with the same number. Then find the word that fits the given meaning. Write the word.

- 1 confused; not understanding (2)
- 2 matter; material (2)
- 3 have the money to pay for (5)
- 4 glued; firmly bonded (7)
- 5 pushing force (8)
- 6 great; much more than normal (8)
- 7 rare; in short supply (12)

B A word may have more than one meaning. Its meaning depends on the way it is used. The word *string* is an example.

We tied the box with *string*.

Our team had a *string* of victories.

Look at each number in parentheses. Find the paragraph in the story with the same number. See how the word in **heavy type** below is used in the paragraph. Decide whether it has meaning **a** or **b**. Write *a* or *b*.

- 8 **lump** (2)
 - a dull or stupid person
 - b solid object of no particular shape
- 9 **narrow** (4)
 - a not wide
 - b small-minded; bigoted
- 10 **forms** (11)
 - a types; varieties
 - b printed documents with spaces to be filled in

Word Study

C Summer held the land in her warm embrace.

Sometimes a writer personifies a thing, a quality, or an idea. That is, the writer makes it sound like a person. In the example above, the warm summer weather is made to sound like a warm, loving person. Write the word that is personified in each sentence below.

- 11 The wind whimpered like a frightened child.
- 12 The sea roared angrily as the wind blew harder.
- 13 Her blond hair danced merrily around her face.
- 14 The sand caressed Jan's feet as she walked down the beach.
- 15 The trees cried out of their need for water.
- 16 The hen chuckled and talked to herself as she looked for seeds.
- 17 The cat smiled and laughed at me.
- 18 The mountain frowned down at me.

D Writers sometimes use words in special ways known as figures of speech. Similes and metaphors are figures of speech that make comparisons. A simile always uses the word *as* or *like* in saying that one thing is like another:

My brother is **as fierce as a tiger**.
My brother is **like a tiger**.

A metaphor states a likeness without the use of *as* or *like*:

My brother is a tiger.

But all three sentences mean the same thing. They all mean "My brother is very fierce." Read the figures of speech below. If the comparison is a simile, write *S*. If it is a metaphor, write *M*.

- 19 She was like a lion.
- 20 My brother is a big teddy bear.
- 21 Esther is a bad apple.

- 22 Jake is as happy as a moth in a sweater factory.
- 23 This classroom is an igloo.
- 24 Jason is a slippery eel.
- 25 Ruth is as industrious as an ant.
- 26 Joe is as hungry as a bear.

E A dictionary's pronunciation key uses symbols to show you how the sounds in a word are spoken. Not all pronunciation keys are alike, but you are likely to find these symbols used in many dictionaries:

i = trip	u = cup
ī = life	yoo = cute
ə = animal	û = pull

There are many other symbols as well. This is just a small part of a pronunciation key. Complete each statement below by writing a word from the key above.

- 27 The *i* in *gizmo* (giz'mō) is like the *i* in ____.
- 28 The *u* in *grudge* (gruj) is like the *u* in ____.
- 29 The *i* in *binary* (bī'nərē) is like the *i* in ____.
- 30 The *u* in *mutiny* (myoo'tənē) is like the *u* in ____.
- 31 The *u* in *putty* (put'ē) is like the *u* in ____.
- 32 The *i* in *estimate* (es'təmət) is like the *i* in ____.
- 33 The *u* in *rural* (rūr'əl) is like the *u* in ____.