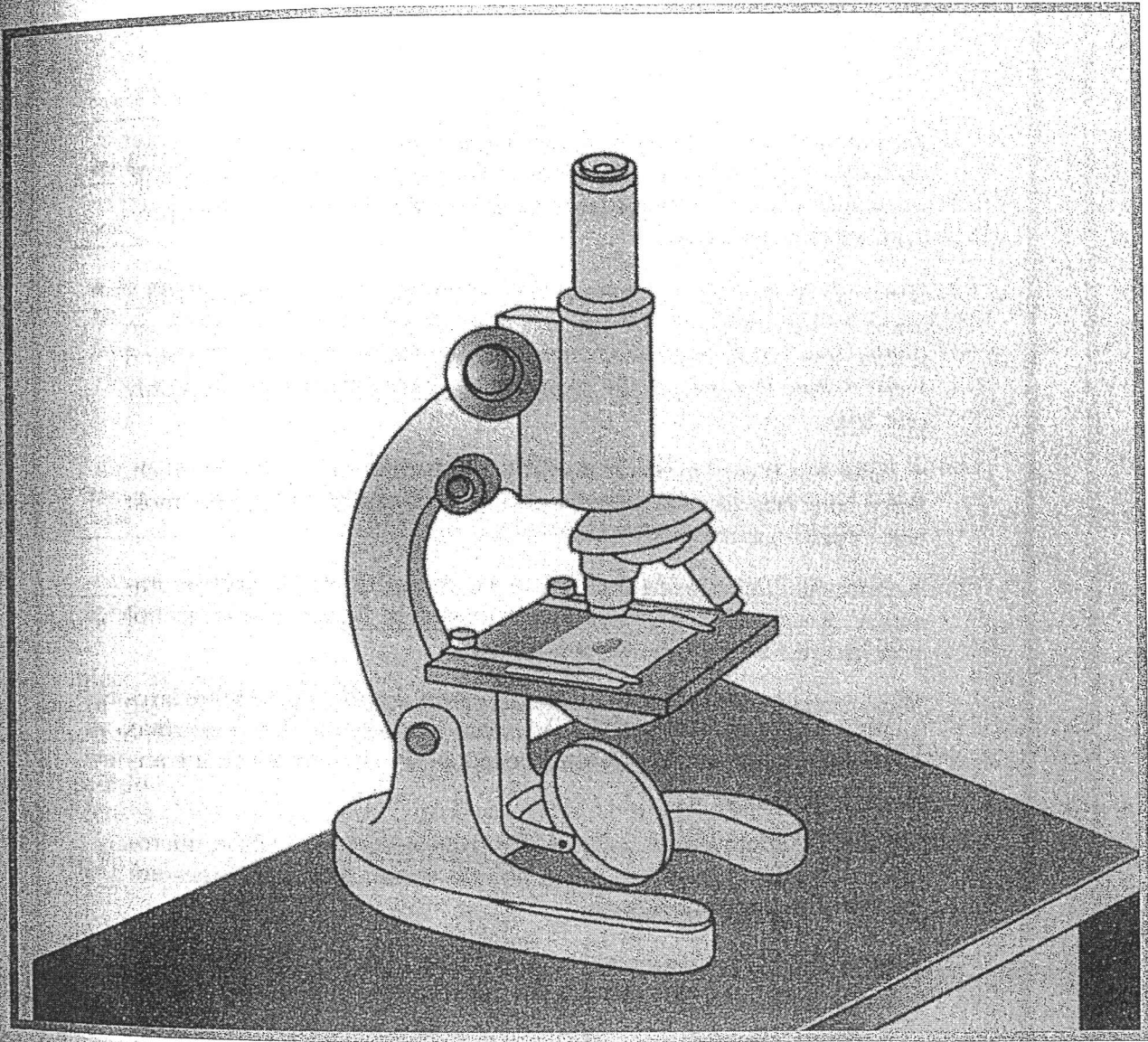


How can a microscope help us study living things?



KEY TERM

microscope: instrument that makes things appear larger than they really are

LESSON 9 | How can a microscope help us study living things?

All living things are made up of cells. Some organisms, such as bacteria, are made up of only one cell. They are much too small to be seen with the naked eye alone. These organisms are called microorganisms [my-kroh-OWR-guh-nizums].

How can we see and study such tiny organisms or the single cells of a many-celled organism? We can use a **microscope**. A microscope is an instrument that makes objects appear larger. Have you ever used a hand lens? A hand lens is a simple microscope. A simple microscope has only one lens.

A hand lens is easy to use. It is small, and it does not weigh very much. But a hand lens does not magnify objects very much. We cannot see most one-celled organisms with a hand lens.

A compound microscope is much more powerful than a simple microscope. A compound microscope has two sets of lenses. Most school microscopes are compound microscopes.

Most compound microscopes can make objects appear 100 to 400 times larger than they really are. Some microscopes can magnify objects as much as 1000 times. When we talk about a microscope, we usually mean a compound microscope.

Another kind of microscope is the electron microscope. Electron microscopes can magnify objects up to 300,000 times. These microscopes are found in scientific laboratories.

Microscopes have many uses, especially in biology. Doctors often use microscopes. Have you ever seen a microscope in your doctor's office?

WHAT ARE THE PARTS OF A MICROSCOPE?

A compound microscope is shown in Figure A. The parts of the microscope have been labeled. Read the description of each part below the microscope. Then find the part in Figure A.

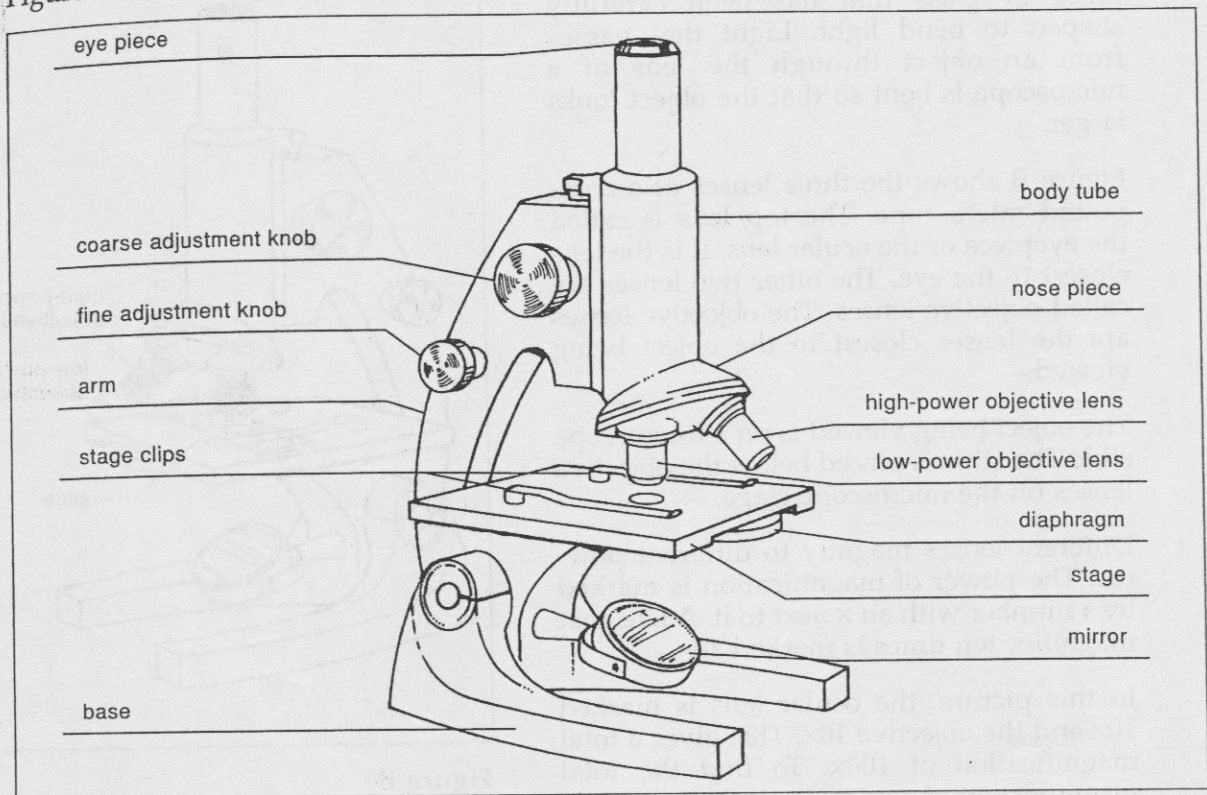


Figure A

Eyepiece or Ocular lens Located at the top of the microscope. Holds the lens closest to the eye.

High-Power Objective Longer of the two lenses close to the slide.

Low-Power Objective Shorter of the two lenses close to the slide.

Body Tube Gives the distance needed between the eyepiece and objective.

Coarse Adjustment Knob Moves the tube up and down.

Fine Adjustment Knob Moves the tube up and down, but only slightly.

Base Holds up the entire microscope.

Arm Supports the body tube.

Nosepiece Holds objective lenses.

Mirror Reflects light into the tube.

Diaphragm Circular disk that adjusts the amount of light entering the stage area.

Stage Platform that supports the slide; allows light to pass through.

Stage Clips Hold the slide in place on the stage.

1. What does the diaphragm do?

2. What part of a compound microscope supports the body tube? _____

3. Which objective is longer? _____

HOW DOES A MICROSCOPE MAGNIFY?

A microscope makes things look bigger. It does this because light coming from the object passes through lenses. A lens is a piece of glass that has been carefully shaped to bend light. Light that passes from an object through the lens of a microscope is bent so that the object looks larger.

Figure B shows the three lenses of a compound microscope. The top lens is called the eyepiece or the ocular lens. It is the lens closest to the eye. The other two lenses are called objective lenses. The objective lenses are the lenses closest to the object being viewed.

The object being viewed is on a microscope slide. The slide is placed below the objective lenses on the microscope stage.

Different lenses magnify to different powers. The power of magnification is marked by a number with an \times next to it. A lens that magnifies ten times is marked $10\times$.

In this picture, the ocular lens is marked $10\times$ and the objective $10\times$. This gives a total magnification of $100\times$. To find the total magnification of a microscope, just multiply the two magnifications.

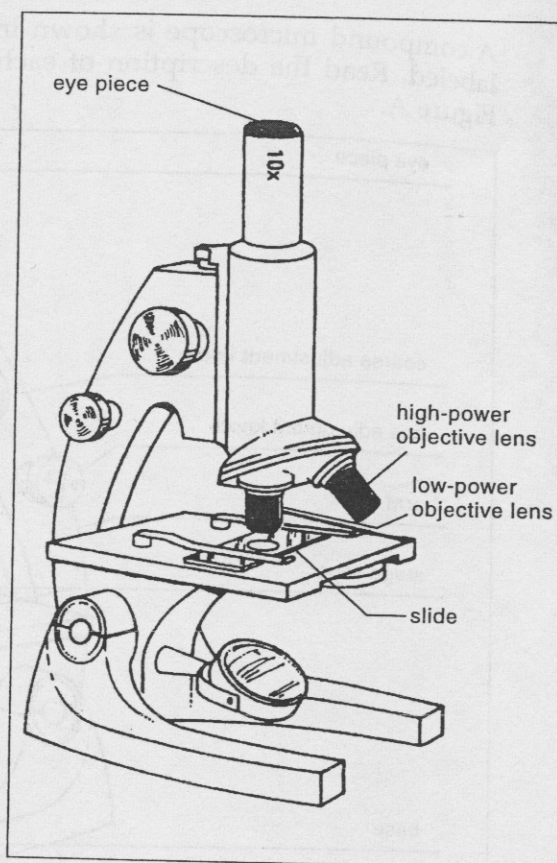


Figure B

Complete the table below by finding the total magnification for each pair of lenses. For example, the first pair has a total magnification of $100\times$ ($10 \times 10 = 100$).

Eyepiece	Objective lens	Magnification
$10\times$	$10\times$	$100\times$
$10\times$	$40\times$	
$10\times$	$44\times$	
$5\times$	$10\times$	
$5\times$	$40\times$	
$20\times$	$10\times$	
$20\times$	$40\times$	

DISCOVERING MICROSCOPE FEATURES

Look at each picture. Then answer the questions next to the pictures.

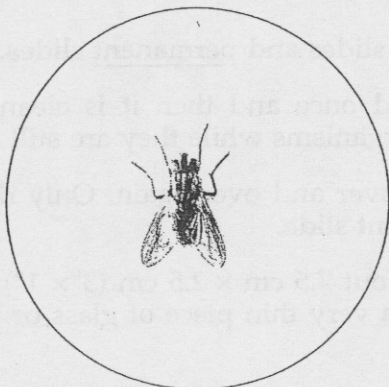


Figure C

This is a picture of a common house fly. It has been magnified about two times.

1. Can you see much of the fly's detail?

_____ yes, no

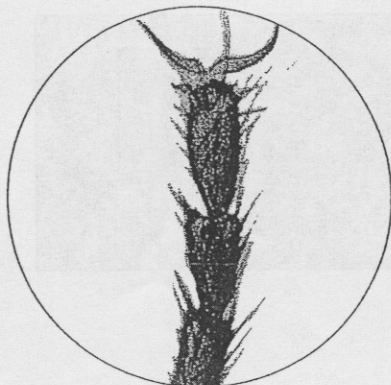


Figure D

This is what a part of a fly looks like through a microscope. It is magnified 100 times.

2. You now see _____ of the fly,
more, less

but you see _____ detail.
more, less

3. What part of the fly do you think this picture shows? _____

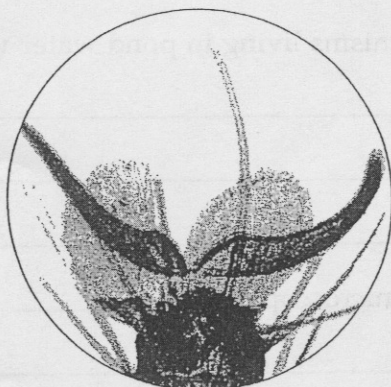


Figure E

This is the same part of the fly. This time it is magnified 400 times.

4. Compared to 100 \times , you now see

_____ of the fly. However,
more, less

you see _____ detail.
more, less

CONCLUSIONS

1. The higher the magnification of a microscope, the _____ of a specimen you see.
more, less
2. The higher the magnification of a microscope, the _____ detail you see.
more, less

MICROSCOPE SLIDES

Objects that are viewed with a microscope are placed on a small piece of glass called a microscope slide. A microscope slide is placed on the stage of a microscope below the objectives.

There are two kinds of microscope slides: temporary slides and permanent slides.

- A temporary slide cannot be stored. It is used once and then it is cleaned off. Temporary slides are useful for studying tiny organisms while they are still living.
- A permanent slide can be stored and studied over and over again. Only dead or nonliving things can be studied with a permanent slide.

Most microscope slides are made of glass and are about 7.5 cm \times 2.5 cm (3" \times 1"). Many times a cover slip is used on a slide. A cover slip is a very thin piece of glass or plastic, which rests on the glass slide.

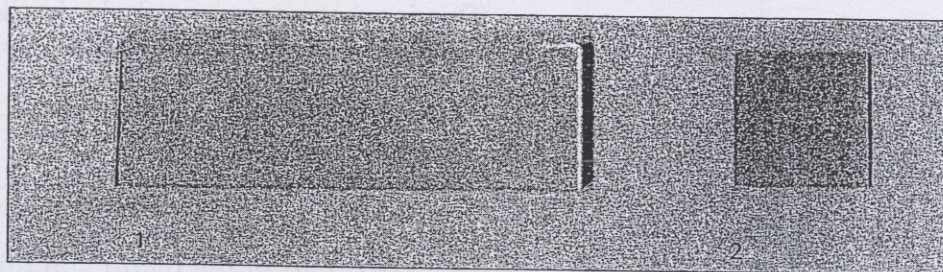


Figure F *Microscope slide and cover slip*

1. What type of slide would you use to study organisms living in pond water while they are still alive? _____
2. Why? _____

3. Where does a microscope slide get placed on a microscope? _____
4. What are the advantages of temporary slides? _____

5. What are the advantages of permanent slides? _____

6. What is happening to this boy's microscope? _____

7. What should you do to prevent this from happening? _____

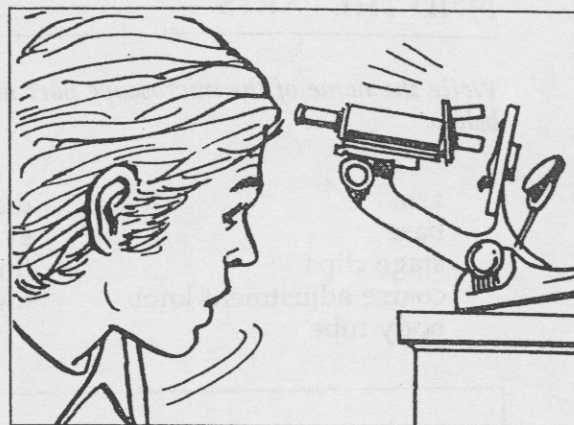


Figure S

TRUE OR FALSE

In the space provided, write "true" if the sentence is true. Write "false" if the sentence is false.

- _____ 1. A microscope can have one lens.
- _____ 2. A transparent object blocks light.
- _____ 3. A compound microscope magnifies more than a simple microscope does.
- _____ 4. Light enters the eyepiece first.
- _____ 5. A microscope stage must have an opening.
- _____ 6. When you carry a microscope, you should hold it by the tube.
- _____ 7. A temporary slide cannot be stored.
- _____ 8. You should only use lens tissue to clean a microscope lens.

MATCHING

Match each term in Column A with its description in Column B. Write the correct letter in the space provided.

Column A

- _____ 1. simple microscope
- _____ 2. base
- _____ 3. compound microscope
- _____ 4. eyepiece
- _____ 5. transparent

Column B

- a) supports entire microscope
- b) has only one lens
- c) allows light to pass through
- d) has more than one lens
- e) lens closest to the eye

FIND THE PARTS

Write the name of the microscope part next to the correct line in the picture. The parts are listed below.

arm
base
stage clips
coarse adjustment knob
body tube

diaphragm
eyepiece
fine adjustment knob
high-power objective

low-power objective
mirror
nosepiece
stage

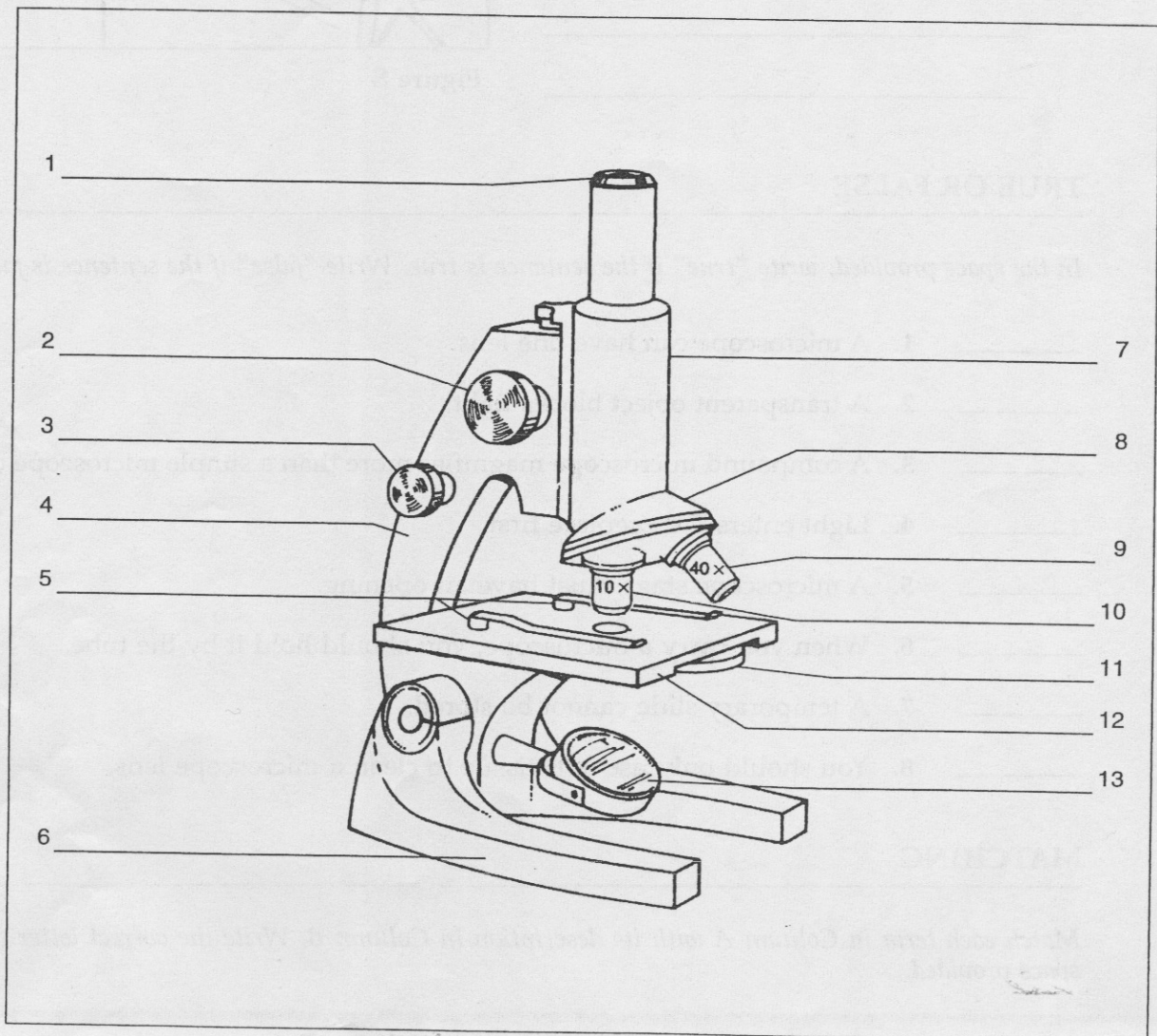


Figure T