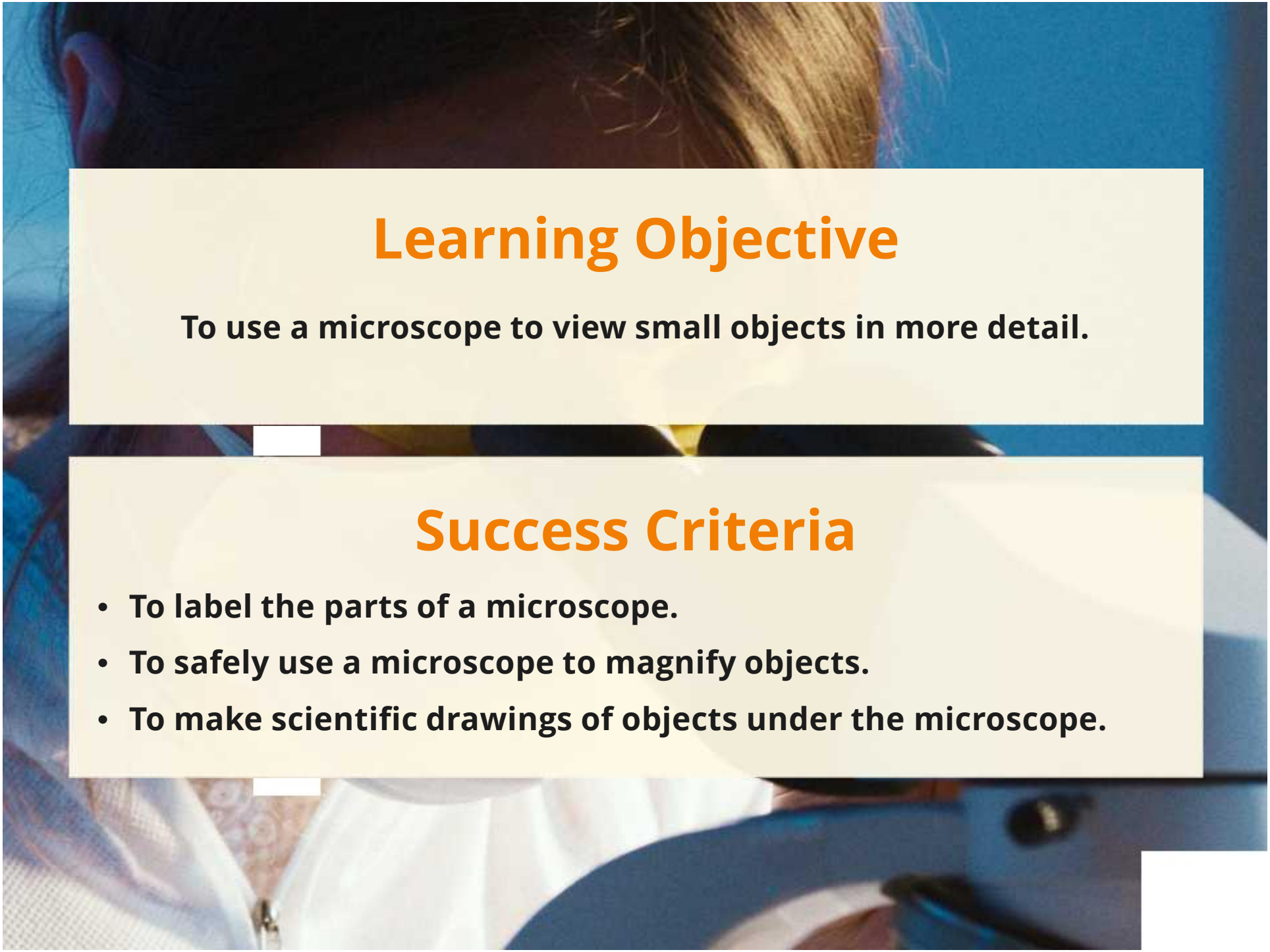
How to Use a Microscope



Learning Objective

To use a microscope to view small objects in more detail.

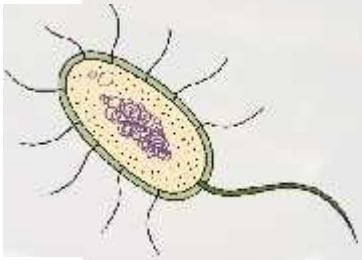
Success Criteria

- **To label the parts of a microscope.**
- **To safely use a microscope to magnify objects.**
- **To make scientific drawings of objects under the microscope.**

Organising Objects

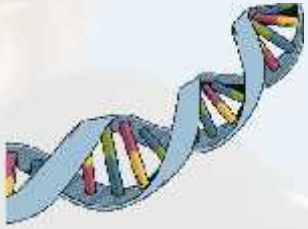
Put the following objects in order of size.

grain of salt



bacteria

paperclip



DNA

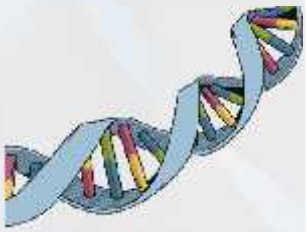
red blood cell

Extension:
Which of these objects can only be seen using a microscope?

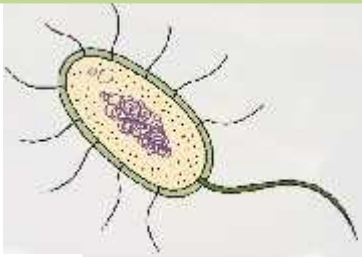
Organising Objects

Put the following objects in order of size.

increasing size



DNA



bacteria

red blood cell

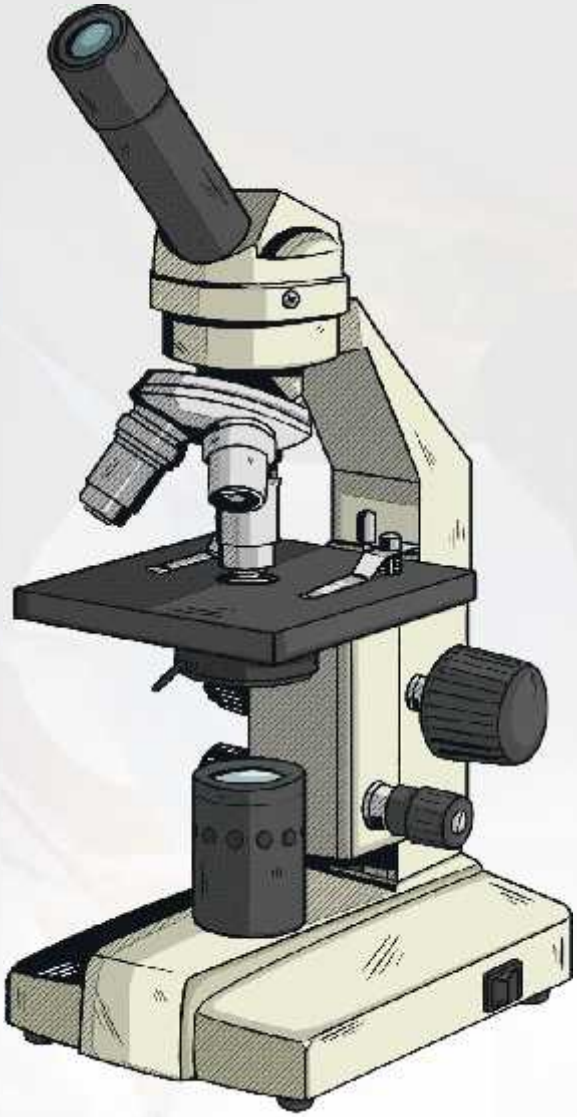
grain of salt

paperclip

Extension:
Which of these objects can only be seen using a microscope?

bacteria, red blood cell and DNA

Microscopes



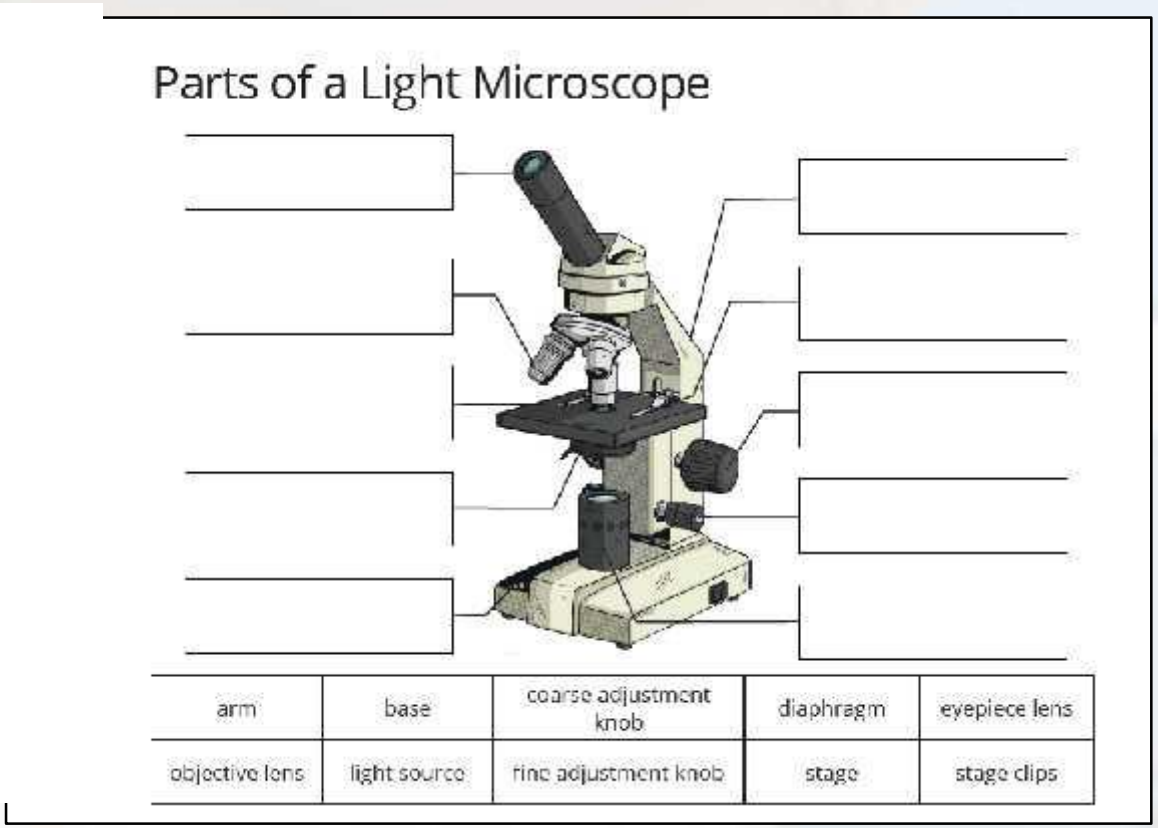
Microscopes have been used for many years to observe objects that are too small to see with the naked eye. The first microscope was invented in the 1500s.

Over time, the magnification and resolution of microscopes has significantly improved due to developments in technology. We now have microscopes that can examine specimens at an atomic level.

Many important scientific discoveries have been made using microscopes.

Parts of a Microscope

Can you label any parts of the light microscope?



Parts of a Microscope

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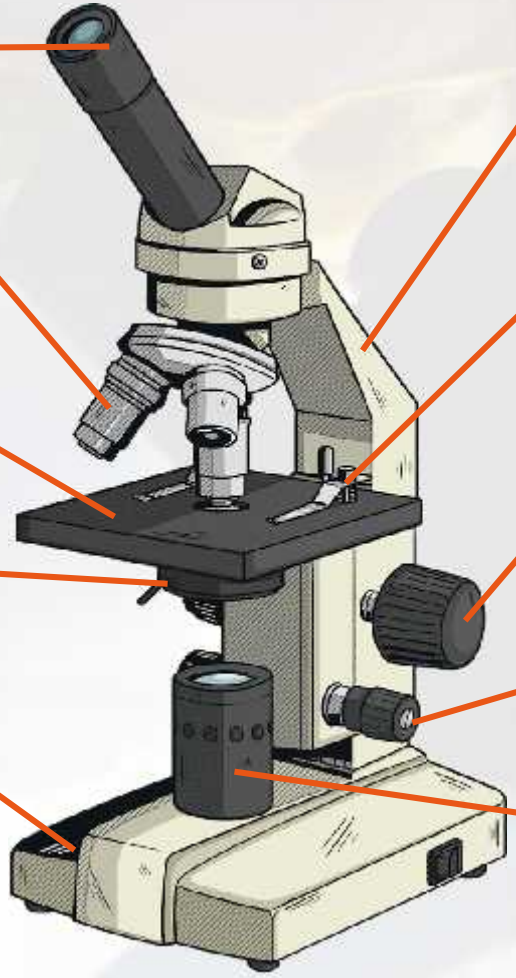


- eyepiece lens
- objective lens
- stage
- diaphragm
- base
- arm
- stage clips
- coarse adjustment knob
- fine adjustment knob
- light source

Using a Light Microscope

1. Plug in the microscope and turn on the light. If your microscope has a mirror, you may need to adjust it so light is directed through the diaphragm.
2. Place your specimen (the object you want to observe) on the stage and secure it with the stage clips.
3. Turn the objective lens to the lowest magnification (usually ×4).
4. Turn the coarse adjustment knob until the objective lens is almost touching the microscope slide. Look from the side of the microscope as you do this, not through the eyepiece, so you do not damage the slide.
5. Looking through the eyepiece, turn the coarse adjustment knob to move the stage away from the objective lens until the image comes into focus.
6. Use the fine adjustment knob to make the image clearer.
7. Turn to a higher power objective lens (×10 or ×40) and refocus the image using the fine adjustment knob.
8. Make a scientific drawing of the specimen or write down any observations.

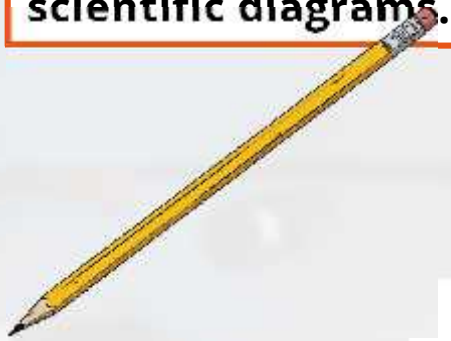
Using a Light Microscope

Have a go at looking at some objects under the microscope. These could be prepared slides provided by your teacher, but you could also try looking at a strand of your hair, the tip of a pencil or any other objects you can find in the classroom.

Object	Diagram/Observation

Remember to start on the lowest magnification!

Use a sharp pencil for drawing scientific diagrams.



Home Learning

Task 1

Research the history of the microscope and how it has developed over time. Add pictures and diagrams.

Task 2

Describe the differences between a light microscope and an electron microscope.

Quick Quiz

1. Which part of the microscope do you look through?

- diaphragm
- eyepiece lens
- objective lens

Quick Quiz

2. Which part of the microscope is used to move the stage up and down?

- coarse adjustment knob
- fine adjustment knob
- stage clips

Quick Quiz

3. What is the name of the object that you observe with a microscope?

sample

species

specimen

Quick Quiz

4. Which part of the microscope can be adjusted to control the amount of light reaching the specimen.

arm

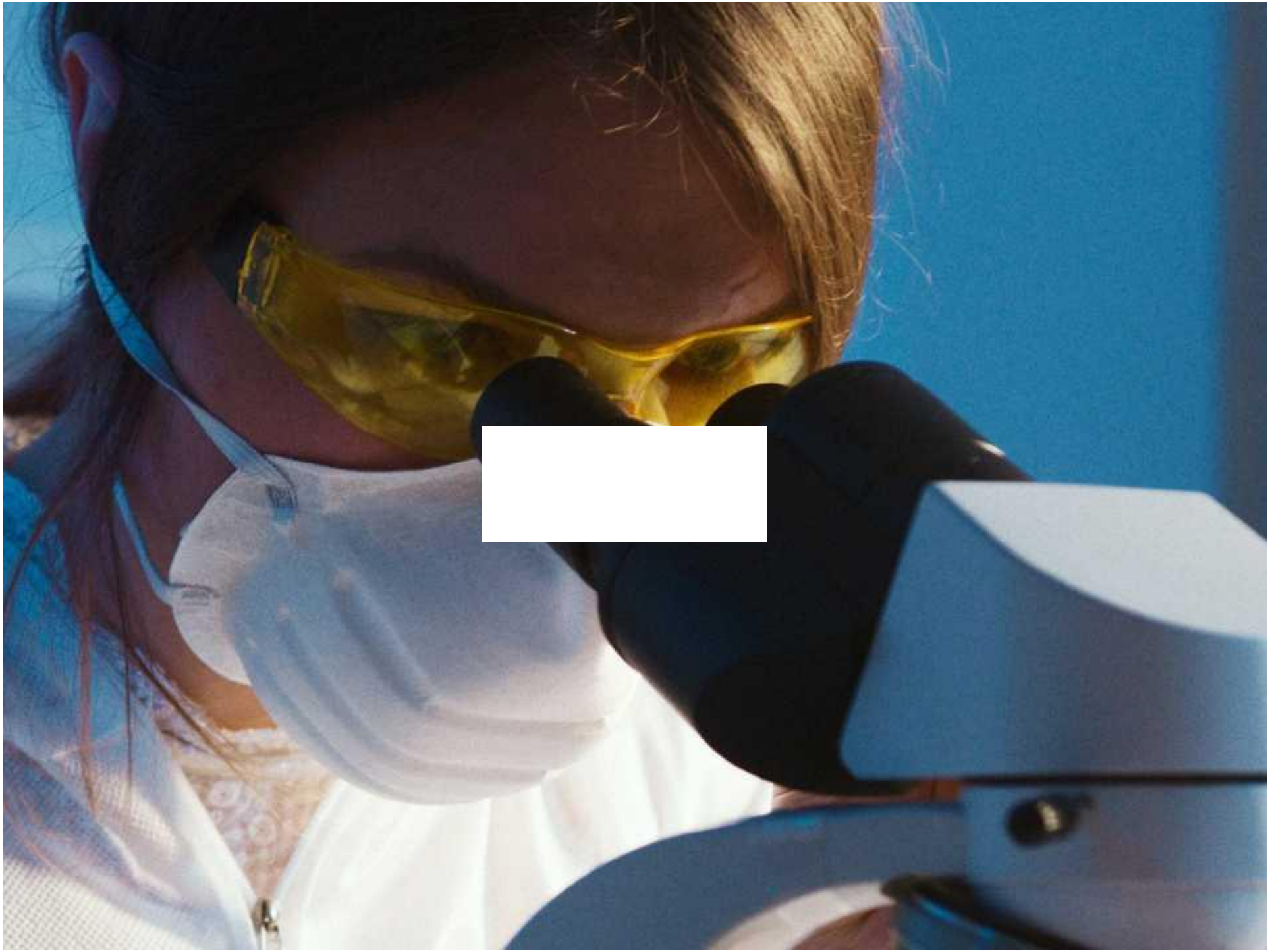
diaphragm

objective lens

Quick Quiz

5. A light microscope has three objective lenses: ×4, ×10 and ×40. Which objective lens should be used first when viewing an object?

- ×4
- ×10
- ×40



How to Use a Microscope

Teaching Ideas

Learning Objective:
To use a microscope to view small objects in more detail.

Success Criteria:

- To label the parts of a microscope.
- To safely use a microscope to magnify objects.
- To make scientific drawings of objects under the microscope.

Context
This lesson is part of the Introduction to Science unit of work. Students learn the parts of a light microscope and use a light microscope to view some objects in more detail.

Resources
light microscopes

prepared slides and other objects to view through the microscope

mini whiteboards and pens

Starter

Organising Objects

Students are asked to put some objects in order of size. Included on the slide are five objects that students should be familiar with, although they may not have learnt about them all in detail. Highlight to students that the illustrations are simply a visual representation of the objects and are not shown to scale. An extension question asks students to link the sizes of the objects to their understanding of what a microscope is used for. The answers appear on the following slide.

Main Activities

Microscopes

The slide gives a brief introduction to microscopes. You could use these points to encourage a discussion between students about what discoveries they think have been made using microscopes. What is the smallest object they can think of?

Parts of a Microscope

The slide shows an illustration of a light microscope and asks students if they can label any of the parts. You may wish to hold up an actual light microscope so students can see what it looks like, or have microscopes out on the desks in front of students for them to look at. If you are having students collect the microscopes themselves, demonstrate the correct way to safely handle it before they do so. On the slide, each label appears one at a time on a click. You could take this opportunity to describe to students what each part of the microscope is used for. Students can then complete the **Parts of a Light Microscope Worksheet**.

Using a Light Microscope

The slide gives instructions for using a light microscope. These are also included on the **Using a Light Microscope Student Instruction Sheet**, which can be given to students as a handout. You may wish to demonstrate these steps to students to ensure that the instructions are clear, before allowing them to use the microscopes themselves. Students can then work in pairs or small groups to observe prepared slides or other objects using their light microscope. They should record their observations on the **Microscope Observations Worksheet**. Following this, bring the class together to discuss anything they found interesting and any difficulties they had when viewing their specimens.

Plenary

Quick Quiz

Five multiple choice questions appear on the slides. Students could write their answers on mini whiteboards or in the back of their books.

Home Learning

Research Task

Students select one of the tasks to complete at home. Task 1 asks them to research the history of the microscope and how it has developed over time. Task 2 asks them to describe the differences between a light microscope and an electron microscope.

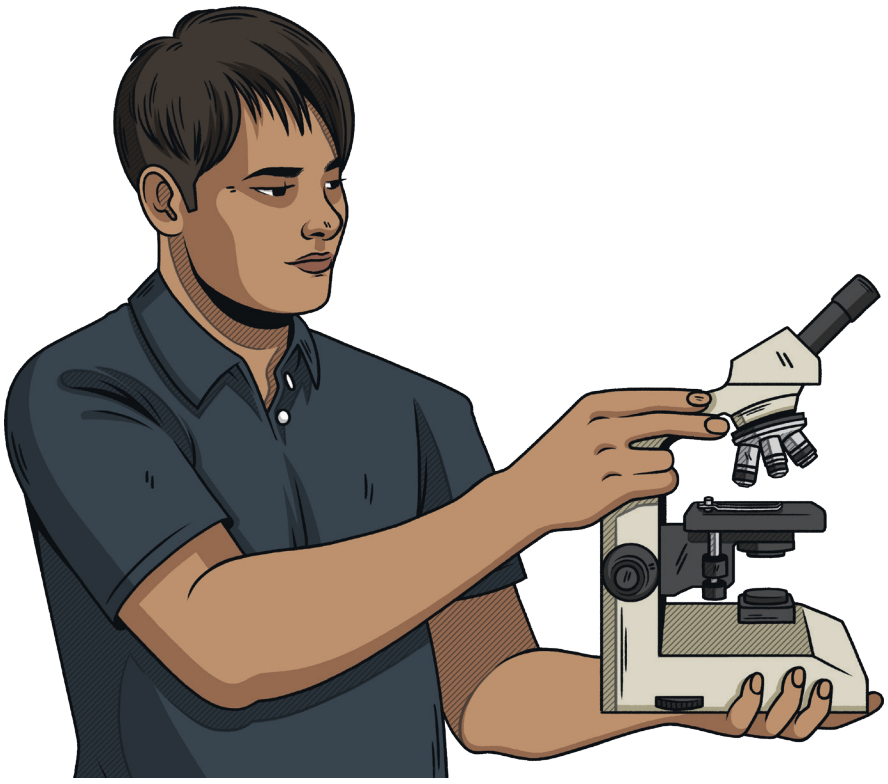
Microscope Observations

Look at some objects under the microscope and draw a diagram or write down what you observe.

Object	Diagram/Observation

Taking Care of a Microscope

When using a microscope, it must be cared for in the correct way.



Collecting Your Microscope

Always carry the microscope with **two** hands. Hold the arm of the microscope with one hand and the base of the microscope with the other. **Do not** touch the light as it may be hot.

Using Your Microscope

Place your prepared slide on the stage carefully and put the clips over the ends to hold the slide in place.

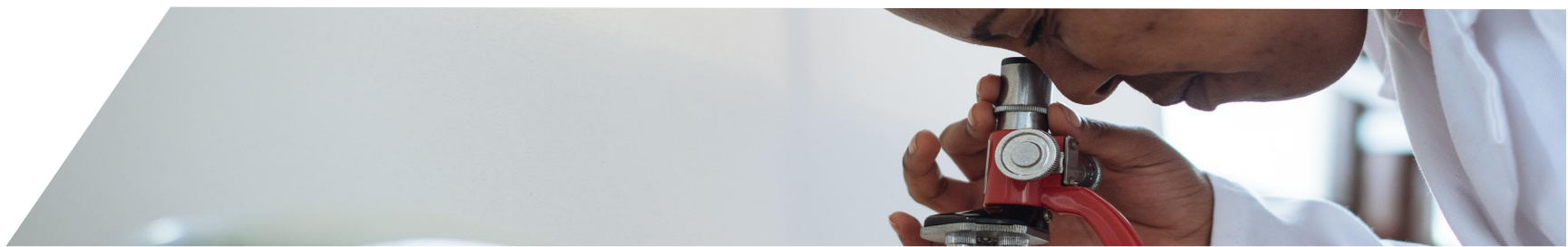
Turn the objective lens to the **lowest** magnification. Turn the coarse adjustment knob until the objective lens is **almost** touching the microscope slide. Look from the side of the microscope as you do this, **not** through the eyepiece.

Looking through the eyepiece, turn the coarse adjustment knob to move the stage **away** from the objective lens until the image comes into focus. This is to make sure that the objective lens and slide **do not** come into contact, or it may cause the lens or slide to crack.

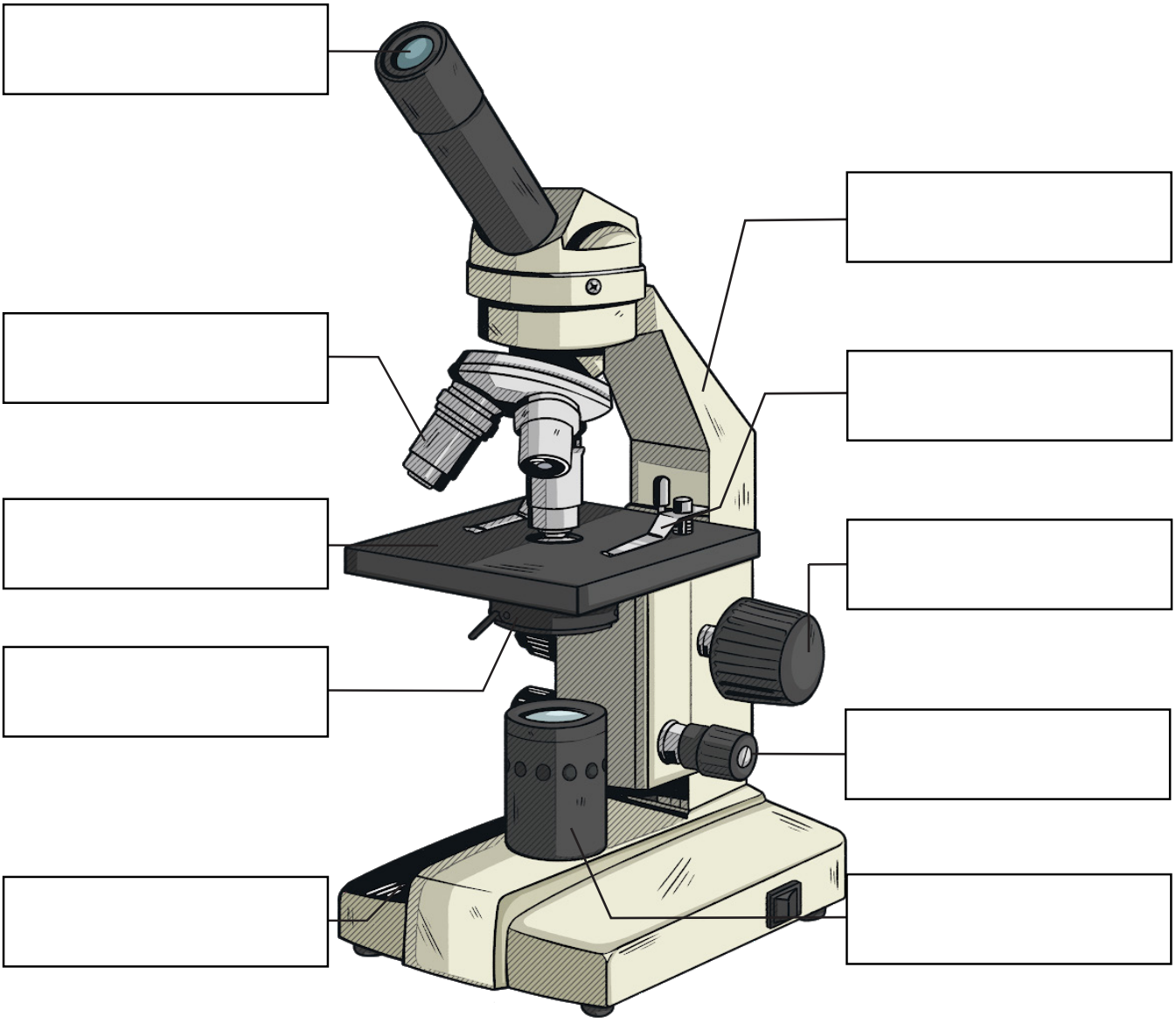
Turn to a higher power objective lens and refocus the image using the fine adjustment knob. Repeat until you are using the highest magnification.

Putting Your Microscope Away

When you have finished with your microscope **remove the slide** with the specimen on. Wrap the cord carefully around the arm, and if the microscope has a cover, put it on.

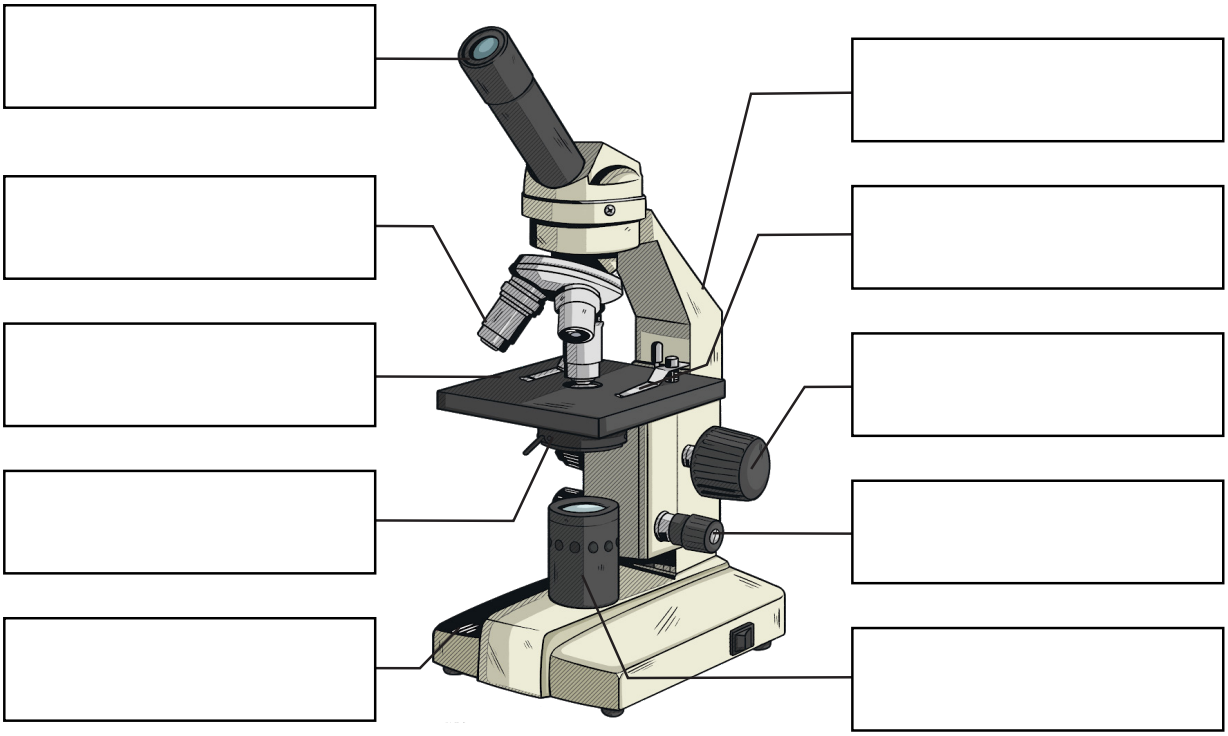


Parts of a Light Microscope



arm	base	coarse adjustment knob	diaphragm	eyepiece lens
objective lens	light source	fine adjustment knob	stage	stage clips

Parts of a Light Microscope



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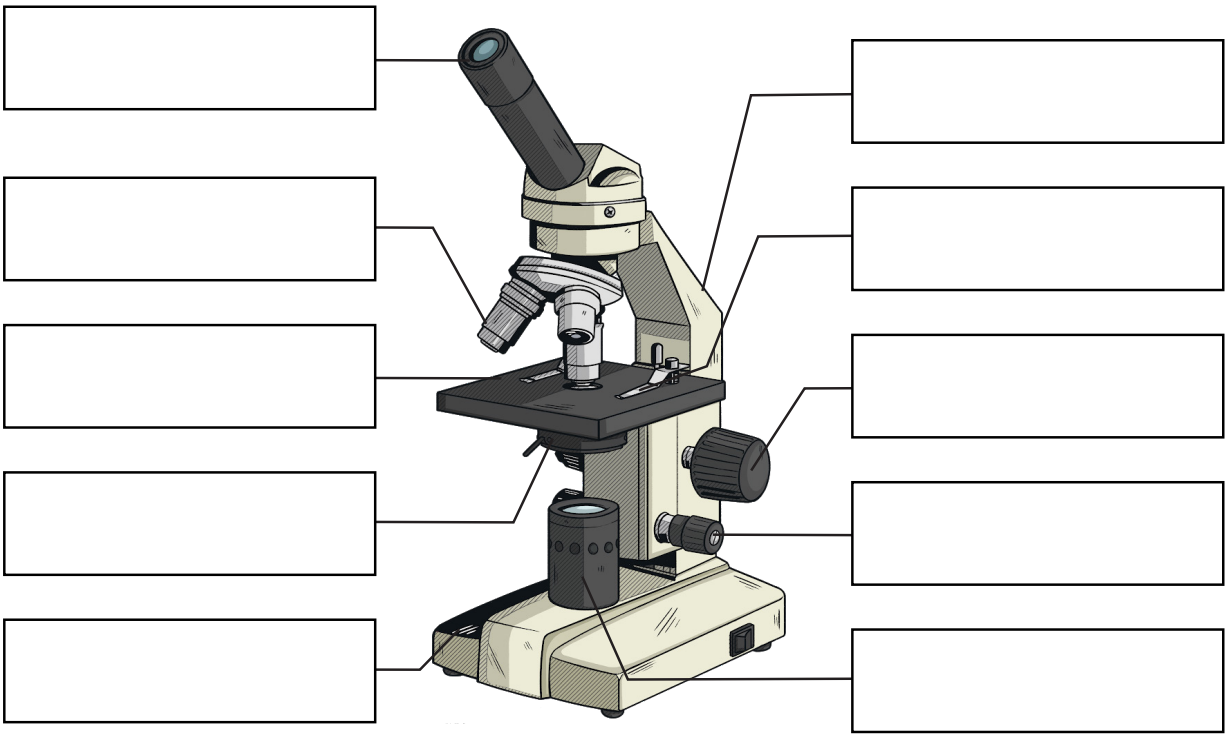
Parts of a Light Microscope



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8. Make a scientific drawing of the specimen or write down any observations.

Remember:

- Always carry a microscope with **two** hands. Hold the arm of the microscope with one hand and the base of the microscope with the other.
- Do **not** let the objective lens touch the slide – it could damage it.
- Take care not to touch the light – it can get very hot.
- Look through the eyepiece lens with one eye.
- The image you see is flipped vertically and horizontally, so bear this in mind when trying to reposition the slide while looking through the eyepiece lens.