

WONDERY  
KIDS

# KIDS' MICROSCOPE & BIOLOGY KIT

WOW-TO  
GUIDE



EXPLORE!

WOW  
IN THE  
WORLD

THAMES & KOSMOS



# SAFETY INFORMATION

**WARNING!** Not suitable for children under 3 years. Choking hazard — small parts may be swallowed or inhaled.

Keep the packaging and instructions as they contain important information.

**WARNING!** Never leave the magnifying eyepiece unattended in the sun. Fire danger! Never look directly into the sun, either with your naked eye or through the magnifying eyepiece. You could blind yourself!

## Safety for experiments with batteries

- To operate the microscope, you will need two AA batteries (1.5-volt, type LR6), which could not be included in the kit due to their limited shelf life.
- An adult should insert and change the batteries. See page 4 for instructions.
- Avoid a short circuit of the batteries. A short circuit can cause the wires to overheat and the batteries to explode.
- Different types of batteries or new and used batteries are not to be mixed.
- Do not mix old and new batteries.
- Do not mix alkaline, standard (carbon-zinc), or rechargeable (nickel-cadmium) batteries
- Batteries are to be inserted with the correct polarity (+ and -). Press them gently into the battery compartment. Always close the battery compartment with the cover after changing the batteries.
- Non-rechargeable batteries are not to be recharged. They could explode!

Always wash your hands carefully after handling any specimens and always dispose of any specimens in a safe manner. When working with specimens, keep your hands away from your mouth and eyes. Clean all equipment thoroughly after use. Read all instructions before use, follow them and keep them for future reference. Keep small children and animals away from any experiments or projects. Store your microscope set out of reach of small children. Eye protection is not included.

- Rechargeable batteries are only to be charged under adult supervision.
- Rechargeable batteries are to be removed from the toy before being charged.
- Exhausted batteries are to be removed from the toy.
- The supply terminals are not to be short-circuited.
- Dispose of used batteries in accordance with environmental provisions, not in the household trash.
- Avoid deforming the batteries.

## Notes on disposal of electrical and electronic components

The electronic components of this product are recyclable. For the sake of the environment, do not throw them into the household trash at the end of their lifespan. They must be delivered to a collection location for electronic waste, as indicated by the following symbol:

Please contact your local authorities for the appropriate disposal location.



**Have any questions? Missing any parts? Want to tell us a joke? Our tech support team will be glad to help you!**

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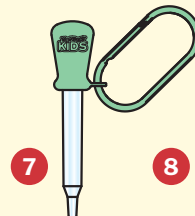
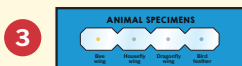
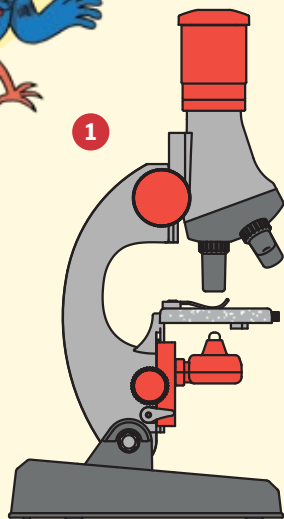
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# KIT CONTENTS



Part No.	Description	Quantity
1	Microscope	1
2	Prepared slide with 4 plant specimens	1
3	Prepared slide with 4 animal specimens	1
4	Blank slide	1
	Storage box containing:	
5	Cover slips	12
6	Slide labels	12

Part No.	Description	Quantity
7	Dropper with clip	1
8	Specimen vial	1
9	Stirring rod	1
10	Tweezers	1

YOU WILL ALSO NEED: 2 AA BATTERIES (1.5-VOLT, TYPE LR6), SMALL PHILLIPS-HEAD SCREWDRIVER

# INTRODUCTION

WELCOME TO YOUR KIDS' MICROSCOPE WOW-TO GUIDE!



GUY RAZ  
(WOW IN THE WORLD HOST)



MINDY THOMAS  
(WOW IN THE WORLD HOST)

THIS GUIDE HAS ALL THE INFO YOU NEED TO LEARN HOW TO USE YOUR MICROSCOPE AND DISCOVER HOW IT WORKS!

WE'VE ALSO SPRINKLED WOW-WORTHY FACTS THROUGHOUT, SO USE THE QR CODE BELOW TO LISTEN!



WE'VE INCLUDED PREPARED SLIDES WITH EIGHT TEENY TINY WOWS TO EXPLORE, PLUS TOOLS AND TIPS FOR MAKING YOUR OWN SLIDES.

NOW ZOOM IN ON SOME SMALL THINGS TO MAKE SOME BIG DISCOVERIES!



Wow in the World is the #1 kids' science podcast, hosted by Guy Raz and Mindy Thomas!



Start here!



- 1 Grown-ups! Scan this QR code to start your **audio journey**.
- 2 Listen to **Track 1**, a *Wow in the World* Bonus Episode!
- 3 Unlock exclusive **Wow Facts** from Guy & Mindy when you see this symbol in the guide!



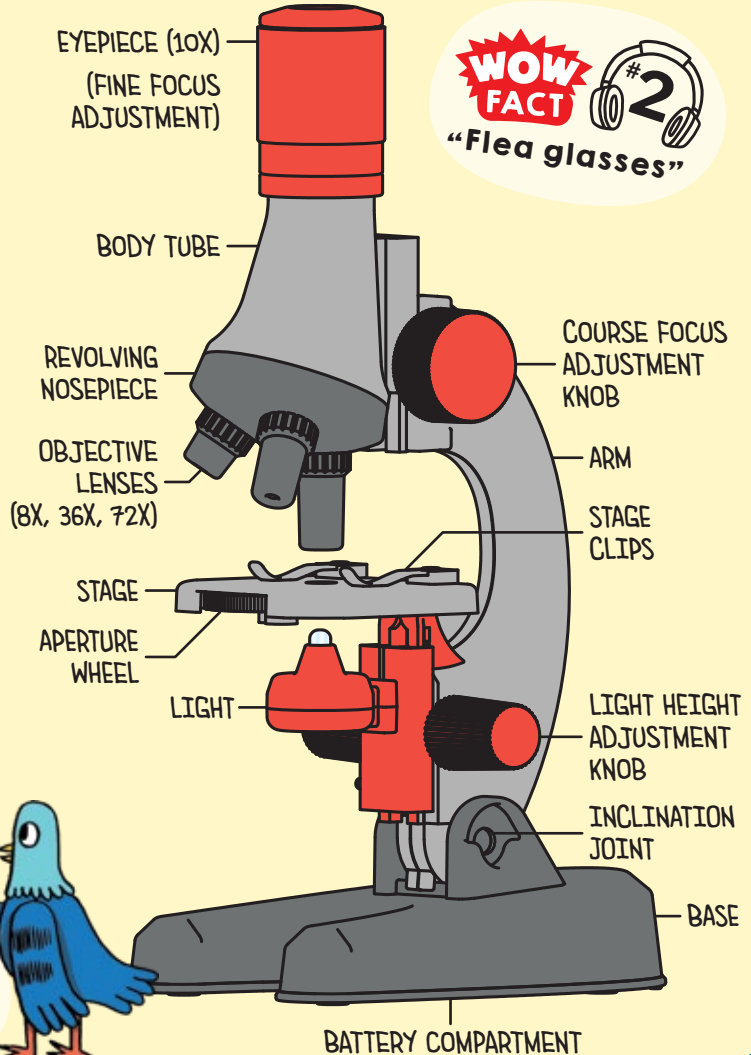
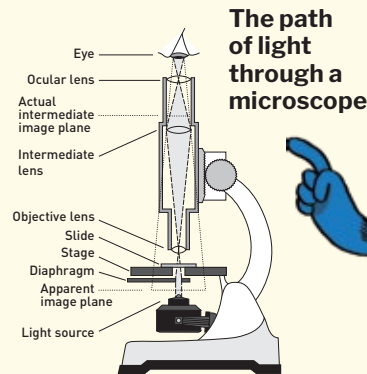
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(Terms and conditions apply. See back of front cover for more details.)

# GETTING TO KNOW YOUR MICROSCOPE

Inside your microscope, there are curved, clear plastic disks called **optical lenses**, which are located in the **eyepiece (ocular lens)** and lower down in the **nosepiece (objective lenses)**. These lenses bend light waves to make objects viewed through them appear larger, like a magnifying glass or a pair of glasses.

The different lenses enlarge objects on the stage to different degrees. The lens in the eyepiece enlarges the object 10 times. The objective lenses enlarge the object 8 times (short tube), 36 times (medium tube), or 72 times (long tube). To calculate the **total magnification**, you have to multiply these two numbers together, yielding 80x, 360x, and 720x.



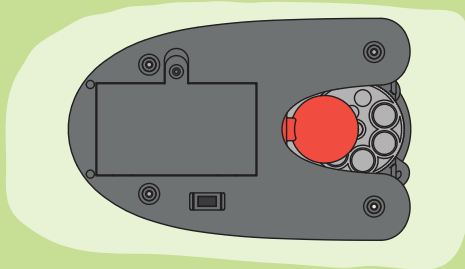
**WOW FACT** #2  
"Flea glasses"

# USING YOUR MICROSCOPE

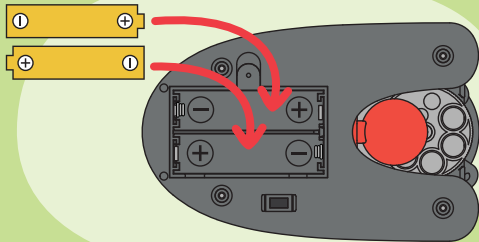
**WOW  
FACT**



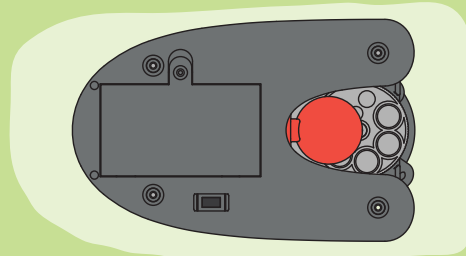
“Lights  
for micro-  
scopes”



- 1 Have an adult insert the batteries into your microscope. Turn the microscope upside down. The **battery compartment** is on the bottom of the **base**. Unscrew the screw that secures the battery compartment with the help of a small Phillips-head screwdriver.



- 2 Lift up the lid and insert two new AA batteries. Pay attention to the correct polarity (+ and -), as shown above. Then close the battery compartment and tighten the screw. Do not over-tighten.



- 3 Turn on the **light** with the **power switch** on the bottom of the microscope. The light shines through the hole in the **stage**.



- 4 Choose one of the **prepared slides** and place it under the two clips on top of the stage to hold the slides. Position the specimen as precisely as possible over the center of the opening in the stage (the aperture) so it is well illuminated by the light source.



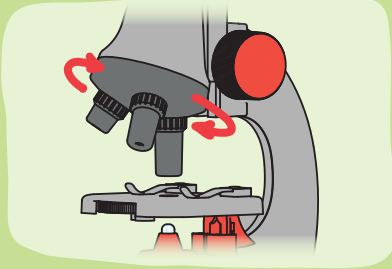


# USING YOUR MICROSCOPE

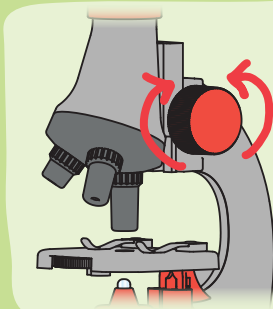
**WOW  
FACT**



“Microscope  
detectives”



- 5** Select your desired magnification by twisting the **revolving nosepiece**. It's best to start with the lowest magnification (80x) before moving up to the higher ones (360x and 720x). If necessary, move the height of the light upwards or downwards.



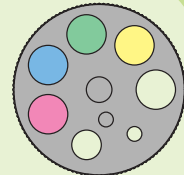
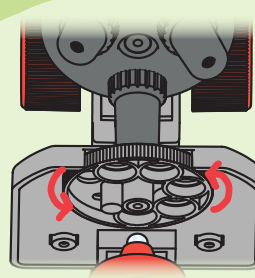
**WARNING!**  
AT THE HIGHEST  
MAGNIFICATION  
(720X), THE  
OBJECTIVE LENS  
IS SO LONG THAT  
YOU HAVE TO BE  
CAREFUL NOT TO  
LET IT HIT THE  
SLIDE!

- 6** Looking through the eyepiece, use the **course focus adjustment knob** to lower the objective lens all the way down (without hitting the slide) and then gradually up again until the image viewed through the eyepiece appears sharp and clear (in others words, in focus).



- 7** For **fine focus adjustment** of the magnification, rotate the eyepiece.

- 8** Try rotating the nosepiece to the two other magnification levels, using the course and fine focus adjustments to sharpen the image each time.



VIEW FROM  
THE BOTTOM

- 9** Under the stage, you will find a round wheel with openings of different sizes and colors. This is the **aperture wheel**. You can turn it to control how much light passes through the specimen on your slide, as well as the color of the light. Always choose the largest aperture at the beginning.

## PEEP THE WOW: PLANT SPECIMENS

**WOW FACT** #5  
“Plant cell superheroes”

**ONION SKIN**



The cells in the skin of an onion look like bricks packed tightly together.

**SILVERBERRY SCALY HAIR**



These tiny hairs on the leaves of the silverberry plant give them a silvery metallic appearance.

**PINE TREE STEM**



The cells in a slice of a pine stem form a circular pattern; the large holes are resin ducts.

**COTTON FIBERS**



Cotton fibers appear as long, twisted, ribbon-like strands all tangled up with each other.

## PEEP THE WOW: ANIMAL SPECIMENS

**WOW FACT** #6  
“Flying style”

**BEE WING**



The thin, translucent membrane of a bee wing has intricate vein patterns forming a structure that is both light and strong.

**HOUSEFLY WING**



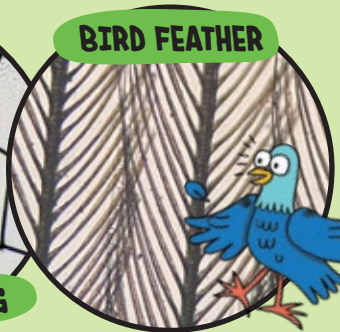
The housefly wing has a membrane and structure similar to the bee wing, but with a different pattern and more prominent hairs.



**DRAGONFLY WING**

The dragonfly wing has a membrane and structure similar to the bee and housefly wings, but with a very different geometric pattern and iridescent sheen.

**BIRD FEATHER**



A feather has barbs branching out from the main shaft, each with many hook-like barbules that interlock to create a smooth surface.

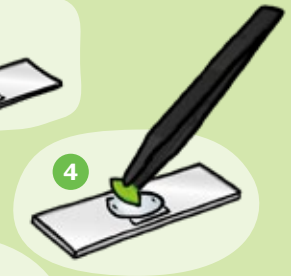
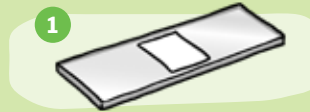


# PREPARING YOUR OWN SLIDES



Follow these instructions for preparing your own slides. Samples for viewing under the microscope should be very thin so that light can pass through them. If the sample is too thick, it will appear dark under the microscope. Cloth fibers, thin plant pieces, pollen, dust, and salt crystals will be easy to see and make good samples for beginners to observe. See the next page for suggestions for things to look at!

- 1 Start with a clean **blank slide**.
- 2 Prepare a thin sample. You may have to slice it with a scalpel or a razor blade (not included). Be very careful. You must always have adult help with this.
- 3 Add one drop of water to the center of the slide with the **dropper**.
- 4 Pick up your sample with the **tweezers** and put it in the water in the center of the slide.
- 5 Peel a **cover slip** off of its paper backing and gently place it over the sample, being careful not to allow any air bubbles in. The cover slip will crush the drop of water and set the preparation.
- 6 Remove any excess water with a piece of paper towel by pressing it down gently at the edge of the cover slip.
- 7 You can put a **label** on the side of your slide with a description of the specimen and the date.
- 8 Now you can observe your slide under the microscope!



**WOW  
FACT**



“Sticky  
water  
magic”

# PEEP THE WOW: SUGGESTED VIEWING



**WOW  
FACT**



“Tiny water  
bears”

Here are some suggestions for specimens to find and view on your own. How many can you find?

- Pond water:** Collect a sample from a pond and observe the microorganisms like algae, protozoa, and tiny aquatic insects — you might even find a **tardigrade!**
- Plant cells:** Thin slices of onion or leaf epidermis can be stained and observed for plant cell structures.
- Insect wings:** Wings from already-dead butterflies, moths, or other insects can be very interesting to examine under the microscope.
- Human hair:** Pluck a strand of hair and observe it to understand its structure and texture.
- Feathers:** Collect feathers dropped by different birds to compare their structures.
- Salt crystals:** Evaporate a drop of salt water on a slide to observe the formation of salt crystals.
- Cheek cells:** Swab the inside of your cheek with a clean cotton swab, transfer it to a slide, and observe your own cheek cells.
- Dust particles:** Dust from various surfaces, such as a bookshelf or window sill, can reveal tiny particles under the microscope.
- Spider silk:** If you can find a spider web, carefully collect a strand of spider silk for observation.
- Microbe-rich soil:** Collect a small amount of soil from a garden or a park and observe the microorganisms present.
- Moss spores:** Moss is abundant in damp areas, and its spores can be interesting to study.
- Fruit skin:** A thin slice of the skin of fruits like apple or banana can show the arrangement of cells.
- Fabric fibers:** Cut small pieces from different types of fabric and observe the individual fibers under the microscope.
- Paper fibers:** Examine the fibers in different types of paper, such as newspaper, tissue paper, and cardboard.
- Yogurt culture:** A drop of yogurt on a slide can reveal bacteria and other microorganisms in a microbial culture.
- Mold spores:** Leave a piece of bread in a damp place for a few days and observe the mold spores that develop.
- Pollen grains:** Collect pollen from flowers and observe the different shapes and sizes of pollen grains.



# TROUBLESHOOTING



## Why can't I see anything through my microscope?

• If you just see a **blurry image**, it is because the two lenses (in the eyepiece and the nosepiece) are not yet at the optimum distance from each other. To get a clear enlarged image, the distance between the lenses will have to be adjusted. To do this, slowly (!) turn the fine adjustment knob while looking through the eyepiece, and you will get a clear image. Don't get frustrated if you don't immediately see something. Try again!

- If you **don't see anything at all**, it's probably because the specimen is not positioned precisely beneath the objective lens. Carefully and slowly move the slide around on the stage in order to bring the specimen into the correct position until you can see it through the eyepiece.
- Remember to make sure the light is turned on, a slide is in place on the stage, one of the objective lenses on the rotating nosepiece is clicked into place, the aperture wheel is letting light through, and the eyepiece lens cap is off.



# CARE AND CLEANING

Here are some tips for properly caring for your microscope.

- The lenses are the most important parts of your microscope. Treat them with care. Dirty or scratched lenses will no longer give you sharp images!
- Never touch the lenses with your fingers, and be careful not to let the lenses in the eyepiece or nosepiece bump against other objects. Do not wipe the lenses with paper tissues.
- If dust has collected on one of the lenses, gently wipe it away with a soft, dry cloth. Do not use a cleaning solution to clean your microscope, since it might damage some of the components.

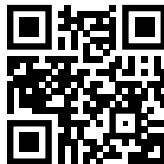
- Ideally, hold onto the microscope by the arm or the base only.
- If you are not going to use your microscope for a week or more, remove the batteries that power the illuminator.
- Protect your microscope from dust and moisture by always storing it in the box or another storage case.



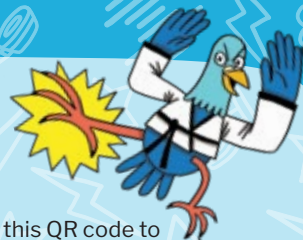
# NEXT-LEVEL CHALLENGES

Try these experiments on your own!

1. Make a science journal and draw pictures of the things you see through the microscope in it.
2. Try holding a smartphone camera over the eyepiece lens and take photos of the images.
3. Ask a teacher or parent for more prepared slides and dive deep into the microscopic world!



Scan this QR code to **KEEP THE WOW ROLLING** with additional **educational resources** related to this item.



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