


Premium

# MICROSCOPE & CAMERA KIT

EXPLORE... LEARN... GROW!



## M40-K-MDM35 USER GUIDE

Download Our Kids Software  
an  IQCREW<sup>®</sup> Exclusive!



SCIENCE • TECHNOLOGY • ENGINEERING • MATH

**WARNING - CHOKING HAZARD**  
Small parts. Not for children under  
three (3) years. Adult Supervision  
required.



# IQCrew M40 User Guide

## 1. Introduction

IQCrew's Early Explorer Series is designed to inspire kids to learn more about science. Microscopes are important tools which help children understand science and nature by allowing them to peek into the microscopic world. This is why microscopes are a standard component of STEM curricula. Biology, chemistry, geology, and many more fields rely on microscopes to understand how things work.



SCIENCE | TECHNOLOGY | ENGINEERING | MATH

The IQCrew brand offers a range of microscopes and accessories to drive the curiosity of the budding scientist:

- **Compound Microscopes:** view specimens under high magnification where light is transmitted through the specimen.
- **Stereo Microscopes:** view specimens under low magnification where light is reflected from the surface of the specimen.
- **Inverted Microscopes:** view specimens in petri dishes as light is directed from the top of specimen while objective is at the bottom.
- **Experiments and Accessories** supplementing the microscopes to continue learning.



See our full line of products at [www.amscope.com/iqcrew](http://www.amscope.com/iqcrew)

## Safety Information



This microscope kit has tools with sharp points or edges, including a microtome and a pick. Please use this product very carefully, children must be under adult supervision. This microscope set contains chemicals that may be harmful if misused. Please read all the warnings and cautions in the instruction manual and on individual containers carefully. Do not allow the chemicals to come into contact with any part of the body, especially the mouth and eyes. Keep small children and animals away from experiments. As the microscope kit also has instruments with sharp edges and points, eye protection is strongly recommended.

### WARNING- BATTERY SAFETY INFORMATION

- ▶ Battery installation and removal should be performed by an adult.
- ▶ Use only batteries recommended in this instruction manual.
- ▶ Be careful to install the batteries with correct polarity as indicated.
- ▶ Do not mix old and new batteries.
- ▶ Remove all batteries when replacing.
- ▶ Do not mix alkaline, standard, rechargeable, or different types of batteries.
- ▶ Rechargeable batteries are to be removed from the microscope before being charged.

### CAUTION:

The following chemicals in this package could be harmful if misused:

- Eosin Biological Dye
- Gum Media

Avoid eye and skin contact. Do not swallow. Do not inhale. May cause irritation. In case of accident, call a doctor. Keep away from young children.

### SAFETY INFORMATION

- Glass slides and slide covers are very delicate. Please handle with care.
- The incorrect use of chemicals can cause injury and damage to one's health. Use only the slide preparations listed in the instructions.
- Because children's abilities vary, even within age groups, supervising adults should exercise discretion regarding which slide preparations are suitable and safe for children. The instructions should aid adults in assessing slide preparations to discern their suitability for each child.
- Supervising adults should discuss the warnings and safety information with the child before commencing the preparation of slides. Pay particular attention to the safe handling of chemicals (if used).
- Your slide and brine shrimp preparation space should be kept clean, clear and away from any food storage areas. Place brine shrimp hatching station in a location where brine shrimp will not be consumed by humans or animals.

## Let's Begin!

To get things started, this complete kit includes some prepared slides for viewing right out of the box. It also includes materials to prepare your own samples, like a Petri dish and blank slides. A graduated cylinder for measuring, tweezers, a probe, and a stirring rod are also included for preparing and positioning specimens.

Carefully lift the microscope from the box using two hands. Place one hand around the microscope arm and the other under the base. For best results, use the microscope on flat, sturdy surfaces. Install 2 AA batteries (included) as shown on page 7 in this guide. Always be aware of the orientation of your mirror and light source. The more light that is reflected or transmitted through the hole in the stage, the brighter and sharper the images will appear in the microscope eyepiece.

Then attach your digital camera eyepiece (included) to the microscope (see page 9 for instructions). Place a prepared slide on the microscope stage. Make sure you download the camera software from [amscope.com/download](http://amscope.com/download). Now connect the camera with the provided USB cable and begin viewing the amazing microscopic world. You can have fun with creating your own samples using the easy-to-use kid's software created just for you and share it with your family and friends.



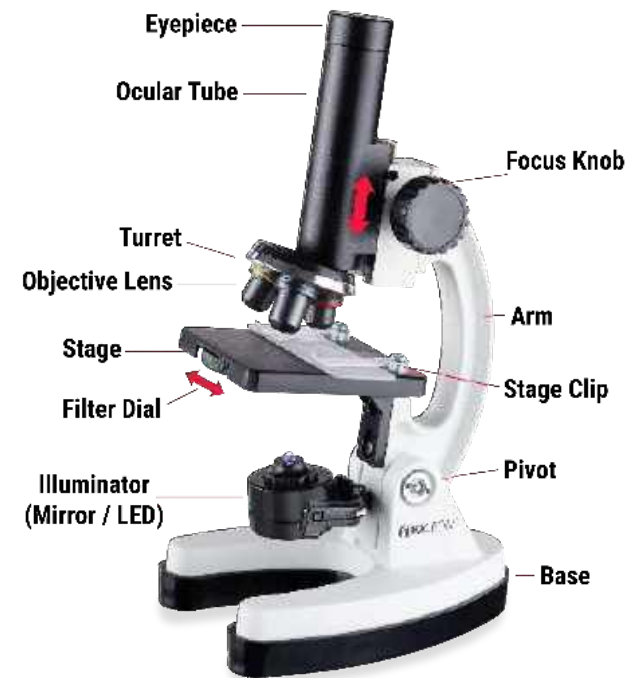
## 85+ Piece Microscope Set

## Here's what you will find in the box!



- |   |                          |
|---|--------------------------|
| 1. Microscope                               | 13. Eosin Dye            |
| 2. Digital Eyepiece Camera                  | 14. Gum Media            |
| 3. USB Cable                                | 15. Sea Salt             |
| 4. Shrimp Hatchery                          | 16. (2) AA Batteries     |
| 5. Micro-Slicer                             | 17. Tweezers             |
| 6. (10) Prepared Slides & (13) Blank Slides | 18. Plastic Scalpel      |
| 7. Petri Dish                               | 19. Probe                |
| 8. Replacement Light Bulb                   | 20. Stirring Rod         |
| 9. (13) Slide Labels & (13) Slide Covers    | 21. Graduated Cylinder   |
| 10. (13) Cover Slips                        | 22. Dropper              |
| 11. Magnifier                               | 23. (2) Collecting Vials |
| 12. Brine Shrimp Eggs                       | 24. Eyepiece             |

## M40 - Parts Names and Applications



NAME	USAGE
Ocular Tube	The main body of the microscope, connecting the lenses.
Eyepiece	The lens you look through to further magnify specimens
Stage	Where specimens are placed for viewing
Stage Clips	Used to prevent slide from moving
Illuminator	A source of light which illuminates the specimen
Filter Dial	Holds filters which can be used to change the color or quality of light
Lamp Housing	Contains the light-source, including the LED bulb
Arm	Connects the ocular tube and focusing mechanism to the rest of the microscope
Objective turret (nose piece)	Holds the objective lenses and rotates to switch between lenses
Focusing knob	Adjusts the height of the objective turret to focus on the specimen
Battery compartment cover	Remove the battery cover to change the two AA batteries which are used to power the LED light
Battery compartment screw	Secures the battery compartment lid

## Microscope Features

- **Eyepiece:** The eyepiece is the part of the microscope that you look through. It is a lens that adds magnification.
- **Objective Lenses:** There are 3 lenses attached to the turret. These lenses are called objective lenses because they are close to the object that is being observed. Each lens has a different magnification (low, medium and high). The low magnification lens is the easiest one to use and should be used when you start looking at a new slide. The medium lens has more magnification, and lets you see more details. The high magnification lens shows the most details.
- **Focus Knobs:** There is a focus knob on each side of the microscope. Slowly turning the knob will move the lenses up or down. This is how you focus the microscope.
- **Stage:** This is a flat surface under the objective lenses. This is where slides can be placed for viewing through the microscope.
- **Stage Clips:** The 2 clips on the stage are used to hold a slide so it does not move around.
- **Filter Wheel:** A filter wheel attached to the bottom of the stage. The wheel has several holes called apertures. Some apertures contain color filters which change the color of the light. Some apertures are empty and have different sizes. These apertures affect the brightness of the light.
- **LED/Mirror:** Light is needed to look at a specimen through the microscope. This microscope has a 2-sided light. One side has a mirror, which can be used to reflect light from a lamp or light from a window towards the specimen. By rotating the mirror down an LED light on the other side will now be on top. When the LED is pointed up the light will automatically turn on. When it is pointed down it will turn off.
- **Magnification:** A microscope's total magnification is a combination of the eyepieces and the objective lens. The total magnification on this microscope is 120x - 1200x.

### Digital Camera Eyepiece

30FPS @640x480 USB 20mm Digital Camera	microUSB 2.0 connectivity	Downloadable easy-to-use kid's software for PC & Mac Download at: <b>amscope.com/download</b>
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## How To Use Your Microscope



### 1. Installing Batteries in the Microscope

Remove the battery cover on the bottom of the microscope and install 2 AA batteries. Make sure to follow the diagram on the inside of the battery compartment to ensure that batteries are installed in the correct direction. Once installed replace the battery cover.



### 2. Adjust the focus

1. Rotate the focus knob and raise the body tube as far as it will go. Turn the turret to the shortest objective.
2. Put one of the prepared slides under the stage clips and position the prepared specimen over the hole in the stage.
3. Rotate the focus knob to lower the body tube as far as it will go.

4. Look through the eyepiece and slowly turn the focus knob until the specimen can be seen in focus.

5. Observe what happens when you slowly move the light source or the mirror. Adjust the mirror or light source to provide the amount of light that gives you the best image.



6. Observe what happens to the image when you move the slide to the left and then to the right.

7. To increase magnification, rotate the objective turret to a higher power and refocus. Practice rotating the turret to change magnification.

### 3. Using filters



**Tip:** The color filter will be most useful when looking at clear or dim specimens.



**CAUTION:** To prevent the wires attached to the light from breaking, never rotate the light source a full 360°. Be careful as you turn the focus knob so that the objective lens does not make contact with a slide or the stage. This may cause damage to the slide and also to the objective lens.



This microscope includes a filter wheel built into the stage. The edge of the wheel can be seen under the front of the stage, and it can be easily rotated using your finger. There are several settings you can use. Some have colored filters which are used to change the color of light shining through them. Others are empty but are different sizes. They are used to reduce the amount of light.

Four colored filters are included: grey, yellow, blue, and green. The grey filter is a neutral color, which means it does not change the color of the light. Instead, it makes the image slightly darker. The other colors can have interesting effects, especially when using stains. An easy experiment to try is to put a small amount of salt or sugar crystals on a blank slide. Rotate the wheel to change colors while you look at the crystals through the microscope.

#### 4. Eyepieces

A microscope's eyepiece magnifies the images created by the objective lenses. This is called compound magnification. This microscope uses interchangeable eyepieces, which means that different eyepieces can be used to change the microscope's magnification. You can easily slide the eyepiece in or out of the microscope's tube.



Be careful not to hold the microscope upside-down. The eyepiece can fall out.

#### 5. Using Slides

The microscope's stage has 2 clips on top which can be used to hold a slide in place. They are very easy to use. Make sure the clips are facing the front of the stage. Angle the slide slightly down so the top edge is under both clips. As you gently push the slide under the clips and towards the back of the stage the slide should be flat against the top of the stage. If you are using a prepared slide move the slide around until the specimen is directly under the objective lens.



### Installing the Digital Eyepiece Camera



1. Insert the included mini USB connector into the camera.



2. Remove the eyepiece from the microscope and keep it safe for future use.



3. Put a slide you want to view on the microscope stage.



4. Now insert your new digital camera into the eyepiece tube.



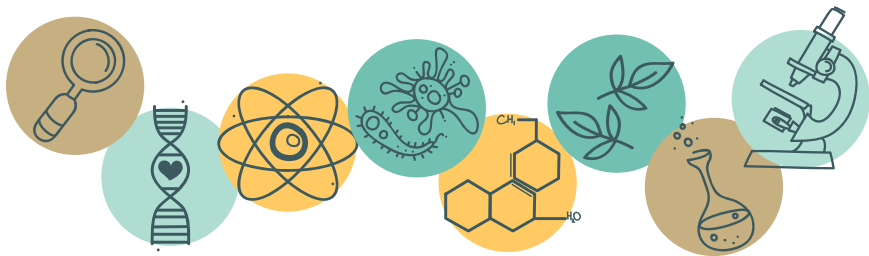
5. Plug the other end of the USB cable into your computer.



6. Now download and open the software. You are ready to begin.



Download Software at [www.amscope.com/download](http://www.amscope.com/download)



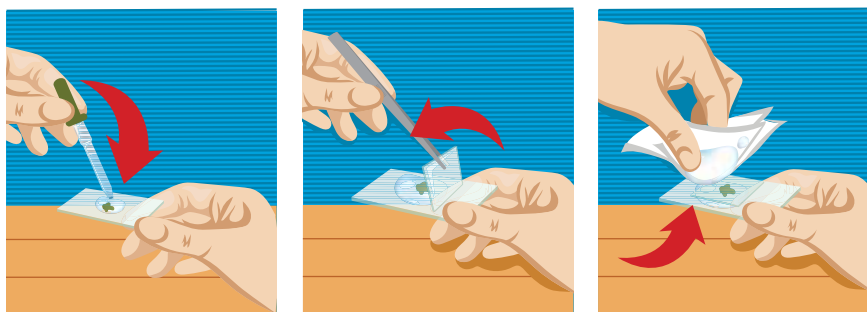
## Let's Begin by Preparing Your Own Slides!

Now that you've studied the features of your microscope, it's time to try it out for a test drive and try out a simple observing exercise.

**NOTE:** When preparing slides you want to use the thinnest possible sample. Have an adult use a razor blade or sharp knife to cut slices for you to try. **DO NOT CUT SPECIMENS WITHOUT ADULT SUPERVISION.**

### Wet Mount Slides

The most common way to prepare a specimen is with a wet mount. Here's how you do it:



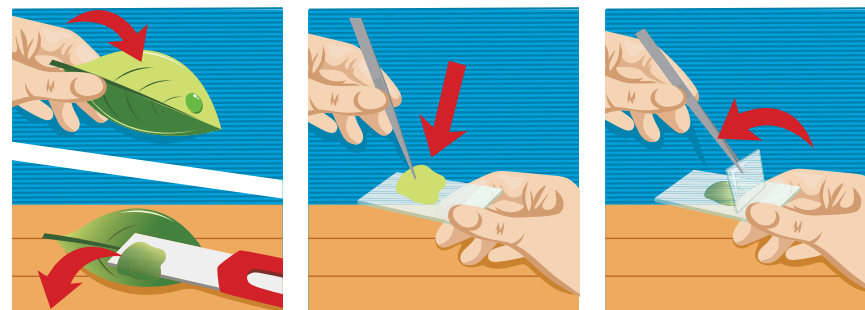
1. Place a drop of water on a clean slide using a pipette or dropper.
2. Using a tweezer or toothpick, carefully place the specimen onto the drop of water.
3. Pick up a cover slip and place one edge on the slide. This method will help prevent air bubbles from being trapped under the cover slip.
4. Slowly lower the cover slip until it lays flat on the water. Soak up any excess water with a paper towel. It is now ready to view under a microscope.

*Recommended Specimens to look at with wet mount slides*

- Plant material, like leaves, onion skin, flower petals
- Mold spores from bread, cheese or fruit
- Fibers like thread or yarn

### Dry Mount Slides

Here is how to prepare a dry mount slide:



1. Select a clean slide. Make sure it is free of dirt and smudges
2. Inspect the specimen to determine if it needs to be sliced. Try to use a translucent to transparent specimen for light to pass through it
3. Place the sample specimen on the slide using tweezers or a toothpick
4. Carefully place a cover slip over your specimen to flatten it out. There is no need to worry about air bubbles so you can just drop the cover slip onto the specimen.

*Recommended Specimens to look at with dry mount slides:*

- Hair, fur or feathers
- Small insects or insect body parts
- Butterfly or moth wings
- Cloth
- Printed Material



**TIP:**



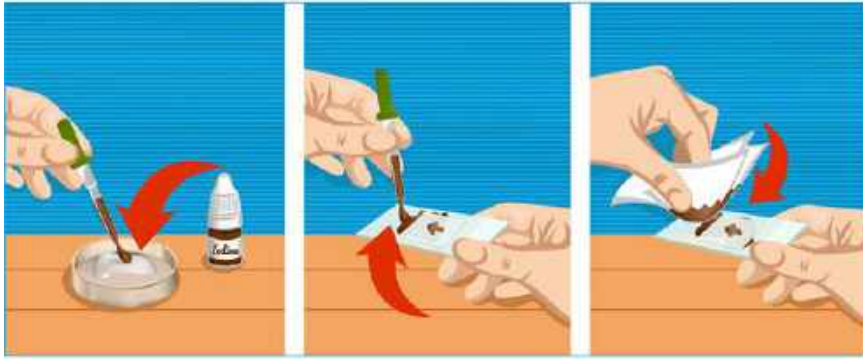
The highest magnification is not always the best for every specimen!

It is recommended that you begin viewing at the lowest magnification or power and focus the object. Once the image is focused, increase magnification by turning the objective turret and refocus



## Staining a Specimen

Many things you look at under your microscope are quite difficult to see because they do not have much color in them. If you use stains, they will be much more visible and you will be able to distinguish between many of the details inside them.



1. Place a drop of stain in a petri dish and dilute with a dropper full of water. You can use the eosin dye provided in the kit.
2. Add a drop of the diluted stain to the outer edge of the coverslip on the top of your slide.
3. Wait until the staining agent is drawn under the slide cover. Wipe up excess staining with a paper towel.
4. Put the slide under your microscope stage. Cell nuclei should appear as the darkest portion under the microscope.

## Make Your Own Slides

It's so easy to make slides that the variety of slides you can create will be limited only by your own imagination.

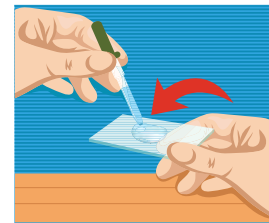
A section of almost any material can be placed on a slide and observed with a microscope. All you need is the proper equipment and a little patience, and you'll be making slides in no time. Everything you need for the following experiments can be found in this kit or around your home (make sure to ask a parent first before you borrow any items, such as the measuring cup).

### NOTE:

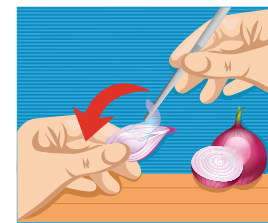
In order to stain a slide, you will need to prepare the Eosin Dye: Without opening the container, look closely at the container marked "Eosin Dye". You'll notice a few grains of 'dust' at the bottom of the container. These are the grains of Eosin. Remove the container's lid and fill the container with water. Gently stir the mixture, you have now prepared Eosin Dye for use.

### Onion Skin Cell Experiment:

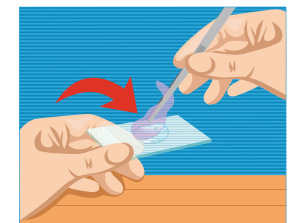
Tissue from an onion is a good first exercise in using the microscope and viewing plant cells. The cells are easily visible under a microscope and the preparation of a thin section is straight forward. An onion is made of layers, each separated by a thin skin or membrane.



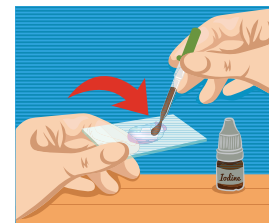
1. First, place a small drop of water on a microscope slide. This is to hold the onion skin and to keep it from drying out.



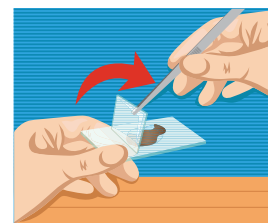
2. With adult supervision, take a small piece of onion and using tweezers, peel off the membrane from the underside (the rough side).



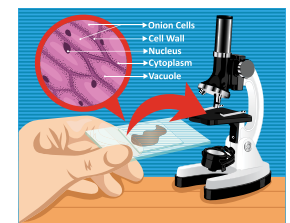
3. Using tweezers, place the onion skin membrane flat onto the drop of water on the slide.



4. Using your dropper, add a drop of Eosin dye provided with this kit on top of the onion on the slide. This will help you see the cell structure better.



5. Place one edge of the cover slip over the onion and dye. Carefully lower it into place using a toothpick or tweezers. This helps prevent air bubbles from getting trapped under the cover slip.



6. Observe the slide under your microscope. What do you see? Can you spot the four parts?



## Crystal Growth Experiment:

Grow your own crystals with salt and water. Magnesium Sulfate (MgSo<sub>4</sub>) is more commonly known as Epsom Salt. It is one of many types of salt that can be used to grow crystals. It can be easily found at drug stores and markets. It is used to relieve pain or to help with digestive problems. When added in water, it creates a solution.

Ingredient Ratio - 2½ tbsp epsom salt : ¼ cup water

What you'll need:

- 2½ tbsp epsom salt
- ¼ cup water (distilled preferred, but tap water also works)
- 1 drop of liquid dish soap
- 1 Petri dish (a blank slide can be used, but the growing area will be smaller)
- 1 container for heating the water such as a pot for use on a stove or a Pyrex glass container for use in a microwave
- 1 stirring spoon and 1 dropper or pipette



1. Heat water on a stove or in a microwave until it begins to boil. Adult supervision is required. Always be careful when handling hot water.



2. Slowly pour the salt into the water, stirring as you do so. Continue to stir until the salt has completely dissolved. You may continue adding salt until it no longer dissolves. Any salt that does not dissolve should be removed using a spoon.



3. While the solution is cooling place one drop of dish soap in the petri dish. Spread it evenly with a finger to create a thin layer.



4. Use a dropper or pipette to transfer the salt solution into the petri dish. Only a thin layer of solution is required. Place the dish in a dry place where it will not be disturbed.



5. Within one hour you should see thin crystals forming on the bottom of the dish. Place the petri dish on the stage and observe the crystal formation using the bottom light.



6. Make a note of the different observations and carry out research like a real scientist!

## Brine Shrimp Hatchery

Brine shrimp are tiny crustaceans that are ideal for study with a microscope. Brine shrimp are the major part of the diet of many sea creatures. The word brine means water containing noticeable amounts of salt. Brine shrimp are salt water creatures.

If you have a Biology microscope kit, it comes with brine shrimp eggs and a hatchery. You can also buy it online or from a store. Here's how to grow and observe your own shrimp.

### Growing Brine Shrimp:



1. Prepare the saltwater for them to live in by adding 1-1½ teaspoons of non-iodized table salt to a cup of water. Stir until all the salt has dissolved.



2. Pour a small amount of saltwater into each compartment of your hatching station.



3. Sprinkle a tiny amount of eggs into each compartment, just enough to cover about ¼ to ½ of the surface of the water.



4. Move your hatching station into a sunny window. **DO NOT COVER IT WITH THE LID.** The shrimp need oxygen to survive.



5. Your shrimp should start hatching in 24-48 hours. They are really tiny, so look for little brown specks that are moving below the surface of the saltwater.



6. Observe the life cycle of the shrimp as they grow: the dried eggs, the hatching larvae, the developing larvae, and finally, the mature shrimp.

## Observing Brine Shrimp:

Once your shrimp have hatched, cover the hatching station with the lid and observe the shrimp through the magnifying lens.

For even higher magnification, suck up some shrimp into the pipette and place a few drops of that water onto a blank microscope slide. Cover the droplets gently with another slide, and then remove the covering slide. This will flatten out the water without crushing the shrimp.

Place the slide on your microscope stage and examine the shrimp with both the medium and high lenses. The shrimp will be swimming rapidly. Move the slide around to keep them in view.

Your brine shrimp will live for 1-3 days. If you want to observe them for a longer period, feed them by adding a few grains of yeast to the hatching compartments. Also, skim off unhatched eggs from the water surface so the growing shrimp can get more oxygen.

## Exciting Things to Look For

- When brine Shrimp first hatch they only have one eye, called a naupliar eye and an extra set of antennae with fine hairs to help them swim. Do you see the eye?
- After about 12 hours, the shrimp molt - shed their exoskeletons - and move into a new stage of development. They will continue to molt until they reach the adult stage about 8 days after hatching. If you are lucky, you might see one as it molts!
- The adult brine shrimp have two eyes in addition to the naupliar eye. They also have 11 pairs of what look like legs. These appendages are called phyllopods and they are not all the same. Some are adapted for swimming while others are used to scrape and filter algae, which is what shrimp mostly eat. Can you see any differences in the phyllopods?

## Experiments to Try

See what kind of water your shrimp like best. Place unsalted water into one compartment, and fill the other three compartments with water that has salt at the ratios of ½ teaspoon, 1 teaspoon and 2 teaspoons of salt per cup of water. Which solution did they hatch best in? Were there any differences between the results after 24 hours, 48 hours, and 72 hours?

See how pollutants in the water affect the shrimp. Once you have grown some shrimp, use the pipette to transfer an equal amount to each half of your petri dish. Then add a different pollutant to each sample. What happens when you add vinegar, dish soap, sugar, soy sauce, or anything else to the water?

## Troubleshooting

If you are experiencing difficulty with your microscope, try these troubleshooting techniques:

S/N	PROBLEM	CAUSE	SOLUTIONS
1	Light source of microscope is dim	No battery installed or batteries are dead.	Install two AA batteries in the battery compartment
2	Light source is bright but the image is not, or the light is not uniform	The objective lens is not properly aligned	Rotate objective turret until it clicks in place.
		The filter wheel's aperture is not correctly aligned	Rotate the filter wheel to a suitable position
3	The image is blurry	The focus is not correctly set.	Follow the instructions to properly focus.

## Microscope Best Practices

The microscope should be used in a dry environment. Do not use the microscope outside in wet conditions as water can damage the light-source or contaminate the optical system. Always turn off the illuminator when the microscope is not being used.

When storing the microscope, remove the batteries to prevent corrosion. Always remove slides from the stage before putting the microscope away. Do not use anything except lens cleaning tissue to clean the lenses. Always carry the microscope with two hands - one around its arm and one under the base. Keep the microscope in a cool, dry, dust-free place. Use a dust-cover to prevent dust and humidity from entering the microscope.



## Make a Record of Your Experiments



Begin to start thinking like a scientist as you perform your experiments. Observe carefully and make records of your experiments (make sure you date them). Record the types of specimens you observe; their colors, shapes and patterns; how they look through each objective; how you prepare your slides; what tools you use; how different specimens compare with each other; and so forth.

## NOTES

Date of slide: \_\_\_\_\_

Name of sample: \_\_\_\_\_

Collected from: \_\_\_\_\_

Stain: \_\_\_\_\_

Mount: \_\_\_\_\_

Lighting: \_\_\_\_\_

### Observations

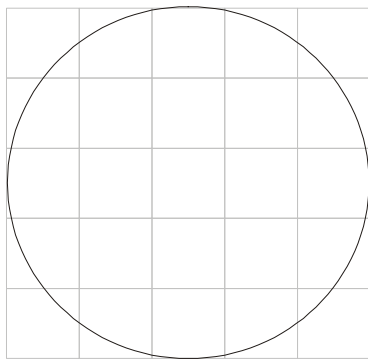
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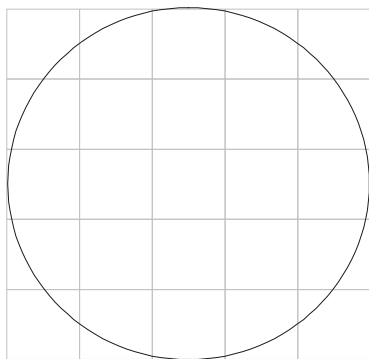
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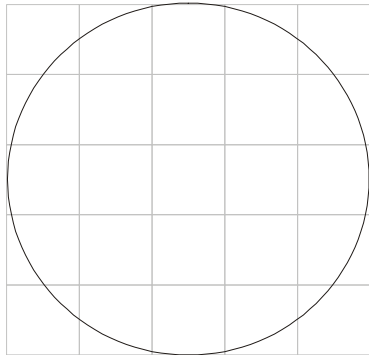
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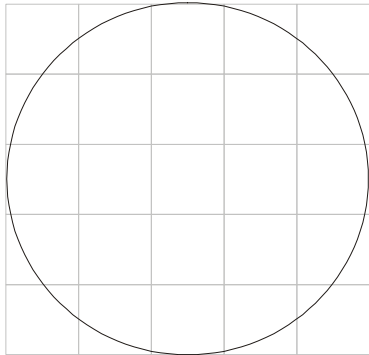
Low magnification



Medium magnification



High magnification



Other: \_\_\_\_\_

## NOTES

Date of slide: \_\_\_\_\_

Name of sample: \_\_\_\_\_

Collected from: \_\_\_\_\_

Stain: \_\_\_\_\_

Mount: \_\_\_\_\_

Lighting: \_\_\_\_\_

### Observations

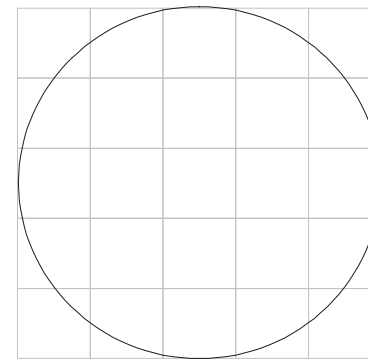
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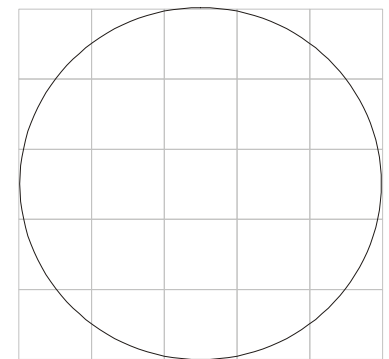
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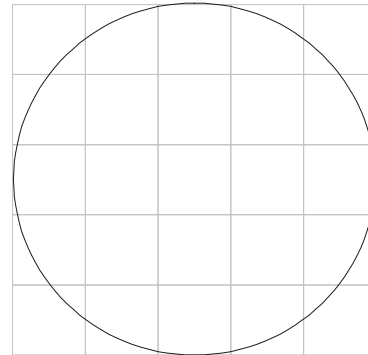
### Sketches



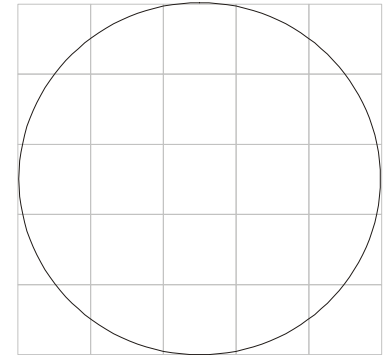
Low magnification



Medium magnification



High magnification



Other: \_\_\_\_\_

## NOTES

Date of slide: \_\_\_\_\_

Name of sample: \_\_\_\_\_

Collected from: \_\_\_\_\_

Stain: \_\_\_\_\_

Mount: \_\_\_\_\_

Lighting: \_\_\_\_\_

### Observations

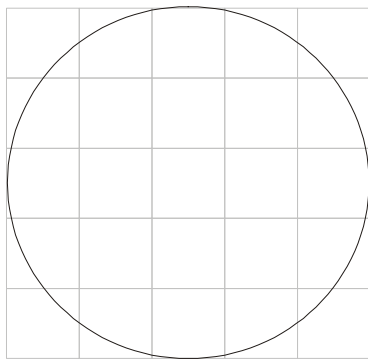
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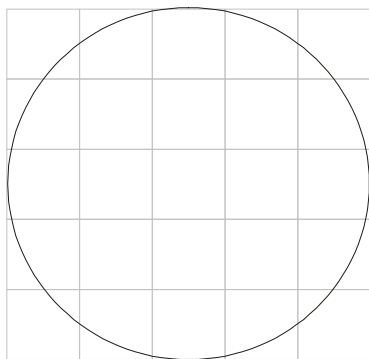
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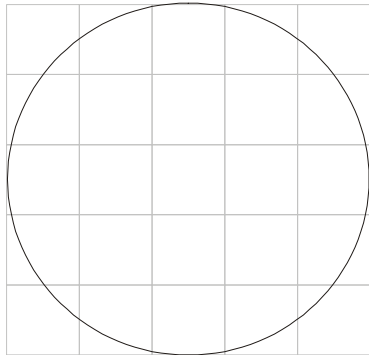
### Sketches



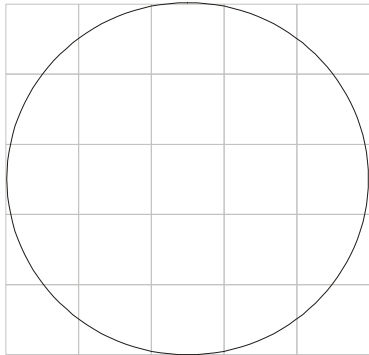
Low magnification



Medium magnification



High magnification



Other: \_\_\_\_\_

## NOTES

Date of slide: \_\_\_\_\_

Name of sample: \_\_\_\_\_

Collected from: \_\_\_\_\_

Stain: \_\_\_\_\_

Mount: \_\_\_\_\_

Lighting: \_\_\_\_\_

### Observations

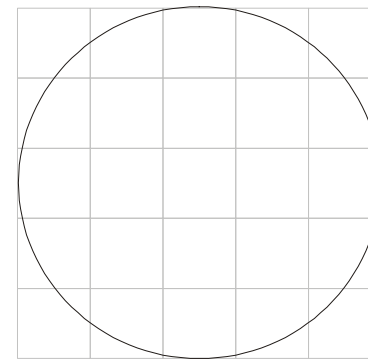
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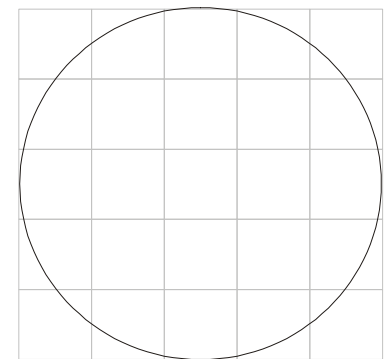
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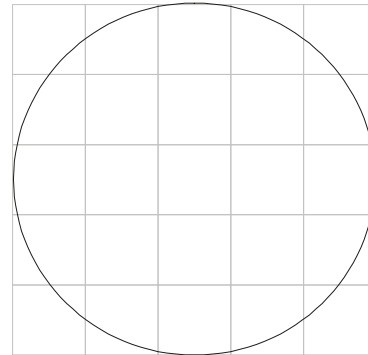
### Sketches



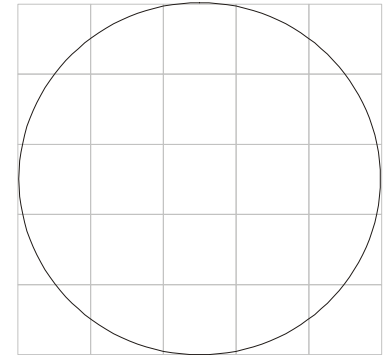
Low magnification



Medium magnification



High magnification



Other: \_\_\_\_\_

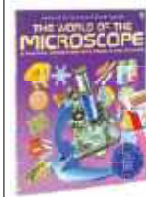
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