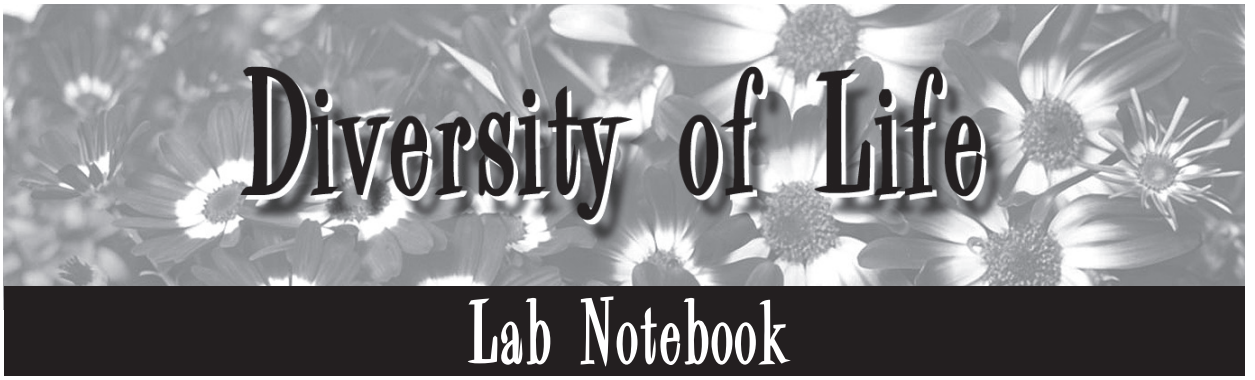

Contents

Contents (continued)

WARNING — This set contains chemicals that may be harmful if misused. Read cautions on individual containers carefully. Not to be used by children except under adult supervision.

Name _____

Period _____ Date _____

WHAT IS LIFE?

Part 1: Overhead-projector observations

Observe the activities in the petri dish. Record what you see.

Part 2: Sorting living/nonliving pictures

After you sort the picture cards, record the objects you put in each category.

Living	Nonliving	Undecided

Part 3: Characteristics of all organisms

List the characteristics shared by all organisms that the class agreed on.

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Name _____

Period _____ Date _____

FIVE MATERIALS OBSERVATION

	Evidence for living or nonliving Include drawings with a scale to show size.	**Changes observed after 10 minutes** Include drawings showing changes.	**Changes observed after 24 hours** Include drawings showing changes.	**Changes observed after _____** Include drawings showing changes.	**Evidence for living or nonliving?**
A					
B					
C					
D					
E					

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Name _____

Period _____ Date _____

IS ANYTHING ALIVE IN HERE?

Materials for each group

5 Plastic vials with caps
1 Vial holder
6 Labels
1 Cotton ball
5 Bags of unknown materials, labeled A–E

Part 1: Prepare the vials

1. The equipment manager collects all the materials listed above.
2. Label the vials "A" through "E." Put your group number on each label.
3. Label the vial holder with the date, your group number, the period, and the number of the liquid you have been assigned.
4. Pull the cotton ball apart and place the halves into vials A and D.

Part 2: Provide the liquid environment

Add the liquid *assigned to your group* to the bottles as follows:

Vial A: 3 *full droppers* of liquid (*not* 3 drops)
Vial B: 30 ml of liquid
Vial C: 30 ml of liquid
Vial D: 3 *full droppers* of liquid (*not* 3 drops)
Vial E: 30 ml of liquid

Part 3: Add the unknown materials

Caution! Be careful not to mix the samples or touch them with your fingers. This may affect their survival if they are living organisms.

1. Carefully measure 1 minispoon of materials B and E, and 8–10 grains of C into their appropriate vials. Cap and gently swirl the vials; do not shake them.
2. Sprinkle 1 minispoon of material A and 8–10 grains of material D onto the damp cotton and cap the vials.
3. Place the vials in the vial holder and return all other materials to the materials station.
4. After approximately 10 minutes record any changes you observe on the *Five Materials Observation* sheet. Also make drawings to show these changes.

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Name _____

Period _____ Date _____

LIFE IN DIFFERENT ENVIRONMENTS

Liquid 1 _____

Material	Is it alive?		Evidence of life
A	yes	no	
B	yes	no	
C	yes	no	
D	yes	no	
E	yes	no	

Liquid 2 _____

Material	Is it alive?		Evidence of life
A	yes	no	
B	yes	no	
C	yes	no	
D	yes	no	
E	yes	no	

Liquid 3 _____

Material	Is it alive?		Evidence of life
A	yes	no	
B	yes	no	
C	yes	no	
D	yes	no	
E	yes	no	

Name _____

Period _____ Date _____

LIVING OR NONLIVING?

1. Copy in the spaces below your class list of characteristics that define life.
2. Use this definition to decide whether the objects below are living or nonliving.
3. *If it is living,* explain how you know.
4. *If it is nonliving,* explain why someone might think it is living.

Characteristics of life

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Object	Living or nonliving?	Evidence or explanation
Mushroom		
Cheese		
Ear of corn		
Rain		
Sun		
Eggs		
Waterfall		
Fire		
Robot		

Name _____

Period _____ Date _____

MICROSCOPE CARE AND USE

Always use *two hands* to carry a microscope—one hand holding the neck and one supporting the microscope from below. If the microscope has a built-in light, *gather up the power cord* to keep it from getting underfoot.

Water and *dust* are the two main enemies of a microscope. Be sure to *wipe up any water* that falls on the scope, and always *cover microscopes with a dust cover* when they are not in use.

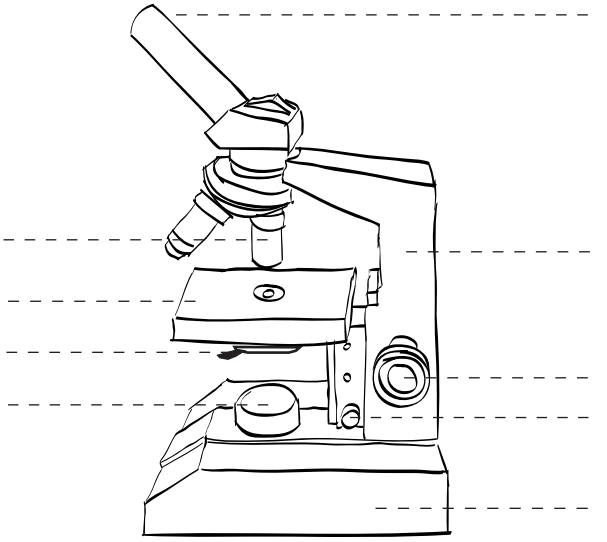
Never use tissue or a paper towel to clean a microscope lens. Even though they feel soft, they can scratch the lenses. Use *lens paper only* to clean the lenses.

When first examining an object, **start with the lowest power objective lens** (the lens with the smallest number on it). Use the **coarse adjustment knob** to bring the objective lens close to the slide. *Do not look through the lens at this time.* Check the distance between the objective lens and the slide carefully while bringing the objective lens close to the slide. *The lens should never touch the slide.*

Look through the **eyepiece.** Use the coarse adjustment to bring the object into focus. *Always* turn the coarse focus knob so the objective lens moves **away from the stage,** so that you will not break the slide or damage the lens. *Never* use the coarse adjustment *to focus closer to the object* while looking through the eyepiece. Adjust the amount of light coming to the object with the **diaphragm located under the stage.**

Once you have the object in focus, to increase the magnification **rotate the objective lens to a higher power** and use the **fine adjustment to focus** the object.

Label the parts of the microscope.



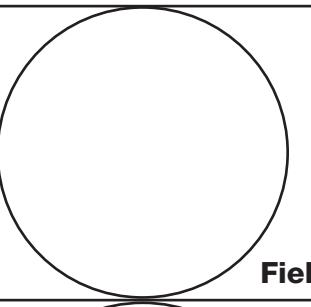
Name _____

Period _____ Date _____

MICROSCOPE IMAGES

1. Draw the letter e.

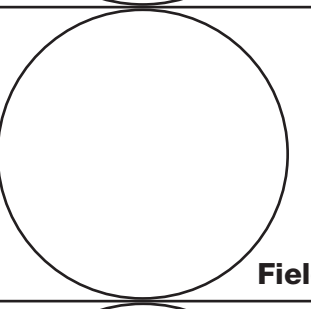
- Set the objective lens to 4x.
- Place the dry-mount slide of the letter e on the stage of the microscope.
- Center the image and draw *exactly* what you see.



Field of view

2. Move the slide away from you.

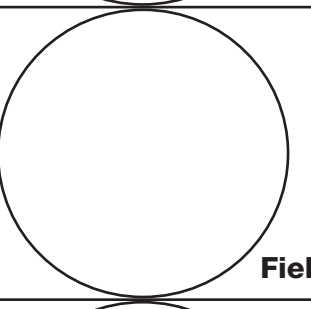
- Move the slide away from you.
- What direction did the image move? _____
- Draw an arrow in the circle to indicate the direction the image moved.



Field of view

3. Move the slide to the right.

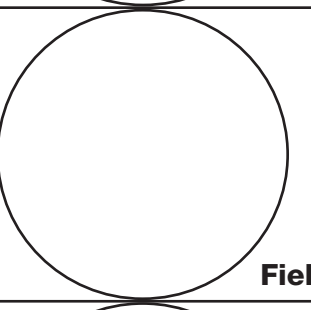
- Move the slide to your right.
- What direction did the image move? _____
- Draw an arrow in the circle to indicate the direction the image moved.



Field of view

4. Observe the color photograph.

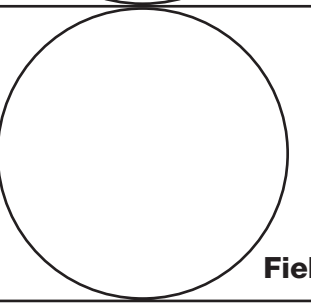
- Make a dry mount of a piece of colored photo.
- Draw and color what you see.
- Compare the colors you see with and without the microscope.



Field of view

5. Observe the feather.

- Prepare a dry mount of the feather. Use a second slide as a coverslip.
- View the feather tip using the 10x objective.
- Draw what you observe.



Field of view

6. Answer these questions on page 8 or on a blank sheet of paper.

- Is the image seen through the microscope oriented the same way as the object on the stage of the microscope? Explain.
- If you want to move the image to the right, which way should you move the slide?
- If you want to move the image up, which way should you move the slide?

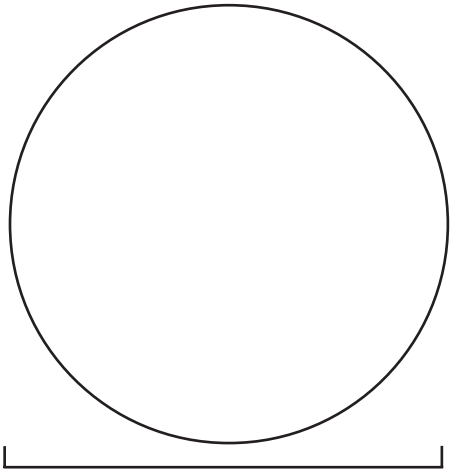
Name _____

Period _____ Date _____

FIELD OF VIEW AND MAGNIFICATION

The width of one square in the nylon netting material (measured with the millimeter ruler) is _____.

Field of view

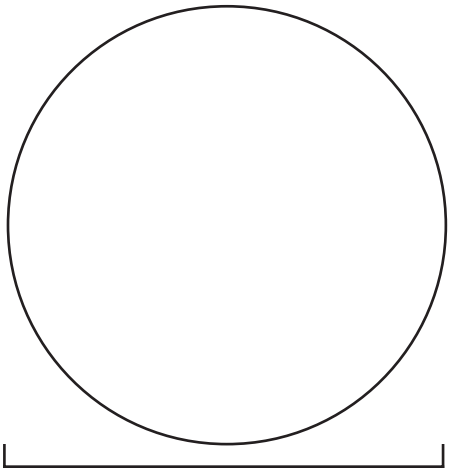


Part 1: The 4x objective

1. Place the netting and ruler slide on the stage of the microscope. Select the 4x objective.
2. Draw exactly what you see in the field of view.

- What is the width of the field of view?_____
- What is the width of one mesh square? _____
- What is the total magnification with this objective lens? _____
- Mark 1 mm on the scale below the field of view.

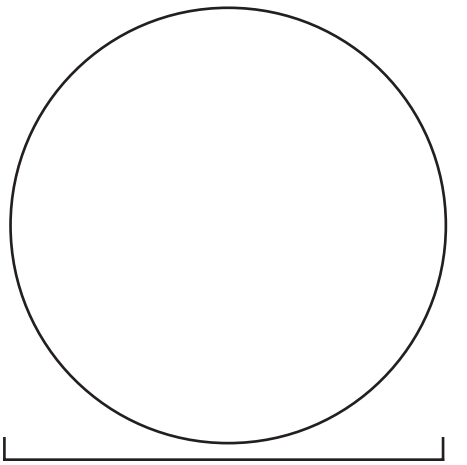
Part 2: The 10x objective



1. Select the 10x objective.
2. Draw exactly what you see in the field of view.

- What is the width of the field of view?_____
- Estimate the width of one mesh square to the nearest 0.1 mm._____
- What is the total magnification with this objective lens? _____
- Mark 1 mm on the scale below the field of view.

Part 3: The 40x objective



1. Select the 40x objective.
2. Draw exactly what you see in the field of view.

- What is the width of the field of view?_____
- Estimate the width of one mesh square to the nearest 0.1 mm._____
- What is the total magnification with this objective lens? _____
- Mark 1 mm on the scale below the field of view.

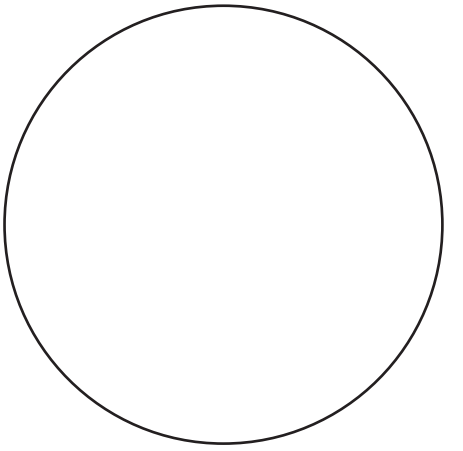
Name _____

Period _____ Date _____

FOCAL PLANE

Part 1: Focus on layers of ribbon

Field of view



1. Make a wet mount of three layers of ribbon.
2. Set the objective lens for 100x magnification.
3. Focus on the top layer of ribbon. Then use the fine focus to focus down through the layers.

- How many layers can you get into focus at one time? _____
- Which direction do you turn the right-hand fine focus to focus *down* through the layers? _____
- Use colored pencils to draw *exactly* what you see when the *middle* layer is in focus.

Part 2: Mystery ribbons

Our slide

Top
2
3

1. Make a wet mount of *three* layers of ribbon. Keep the order a secret. Record the order of ribbons, top to bottom, on the lines to the left under the heading "Our slide."
2. Trade mystery-ribbon slides with another team.
3. Use your microscope to determine the order of the colored ribbons used to make the mystery-ribbon slide. Record the colors and the order to the right under the heading "Mystery slide."

Mystery slide

Top
2
3

Questions

1. How did you figure out which ribbon was on the bottom?

_____

_____

2. Why can't you get all three layers of ribbon in focus at the same time?

_____

_____

3. What is "focal plane"?

_____

_____

_____

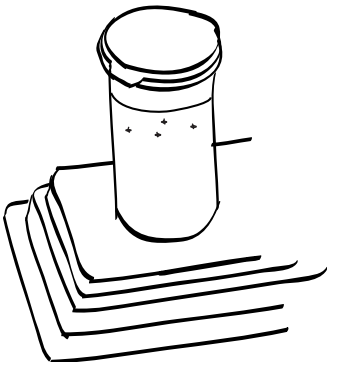
WARNING — This set contains chemicals that may be harmful if misused. Read cautions on individual containers carefully. Not to be used by children except under adult supervision.

Name _____

Period _____ Date _____

BRINE SHRIMP ALIVE!

Part 1: Brine shrimp in the vial



1. Place the vial containing brine shrimp in one of the vial holders. Shine a flashlight through the vial at the water's surface. Where do the brine shrimp go? Why do you think they do that?
2. Compare the size of the brine shrimp now to the size of the shrimp when they first hatched. How are they different?

Part 2: Brine shrimp under the microscope

1. Use a dropper to take up a few shrimp. Put one drop on the surface of a slide. If no shrimp are on the slide, wipe the slide dry and put on another drop.
2. Use a piece of blotter paper to soak up part of the water.
3. Do *not* put a coverslip on the slide.
4. Observe and draw a picture of the brine shrimp.
5. How big are the brine shrimp?_____ mm

Field of view at 100x

Part 3: Adding yeast to brine shrimp

1. Carefully add *one drop* of Congo red–dyed yeast to the slide.
2. Observe the tiny red yeast and the brine shrimp. Describe what you observe.

_____

_____

_____

_____

Questions

1. What evidence did you collect to support the idea that brine shrimp are living organisms?

_____

_____

_____

_____

2. What characteristics of life were not confirmed by your observations of brine shrimp?

_____

_____

_____

_____

Name _____

Period _____ Date _____

LOOKING AT *ELODEA*

Part 1: *Elodea* at 100x

1. Tear an *Elodea* leaf in half. Place it on a slide, top side up, bottom side against the slide.
2. Prepare a wet mount, using pond water and a coverslip.
3. Observe the *Elodea* at 100 power.
4. Focus up and down through the leaf.
5. Describe what you see.

_____

_____

_____

Part 2: *Elodea* at 400x

1. Increase the magnification to 400 power.
2. Look carefully for movement inside the leaf.
3. Describe what you see.

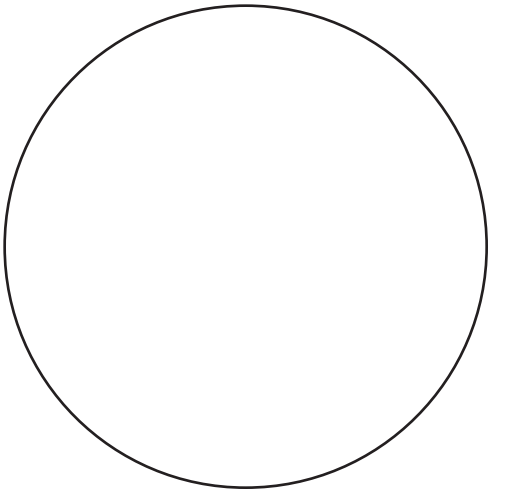
_____

_____

_____

4. Draw what you see in the space provided.
5. Estimate the size of the green "bricks" seen in the *Elodea* leaf.

Field of view at 400x



Part 3: Other observations

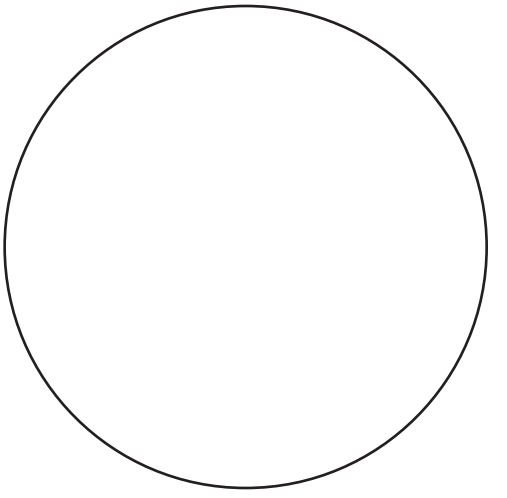
1. Do you see anything else on your slide besides the *Elodea?* _____
2. Describe what you see in the space below, and draw it in the space provided.

_____

_____

_____

_____



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Name _____

Period _____ Date _____

PARAMECIA

Part 1: Paramecium at 100x

1. Set the microscope to 100x.
2. Observe one paramecium.
3. Draw it as it looks in the field of view at 100x.
4. Estimate the length of the paramecium.

   _____

5. Describe the paramecium's behavior.

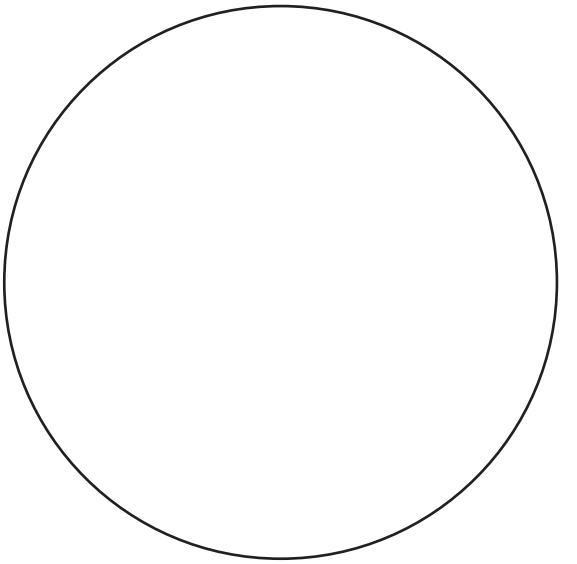
   _____

   _____

   _____

   _____

Field of view at 100x



Part 2: Paramecium at 400x

1. Find a trapped paramecium and position it in the center of the field of view.
2. Increase to 400x and observe the paramecium. Draw the paramecium as it looks in the 400x field of view and describe what you see.

   _____

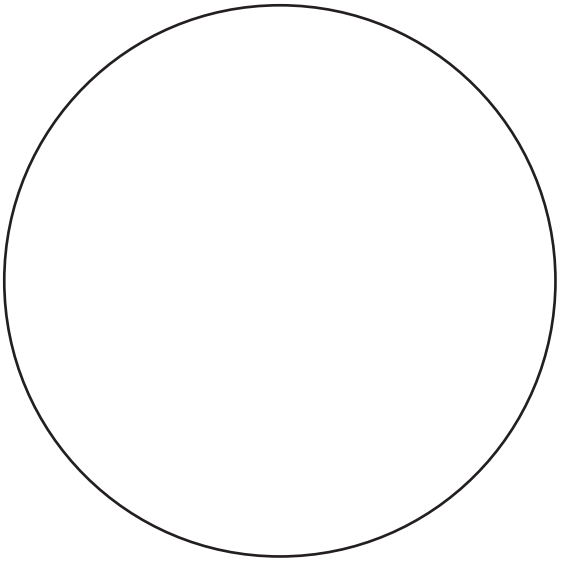
   _____

   _____

   _____

   _____

Field of view at 400x



3. Reestimate the length of the paramecium.

   _____

4. Are the paramecia alive? _____
   What is your evidence?

   _____

   _____

   _____

   _____

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Name _____

Period _____ Date _____

FEEDING TIME

Part 1: Wet mount with food

1. Prepare a wet mount of the paramecia with cotton strands. Add one drop of the Congo red–dyed yeast and then add the coverslip.
2. Find a paramecium that is trapped in cotton strands. Make sure it is a paramecium and not some other organism. Observe it at 100x.
3. Describe the paramecium's behavior when it encounters the yeast.

_____

_____

_____

_____

Part 2: Record feeding

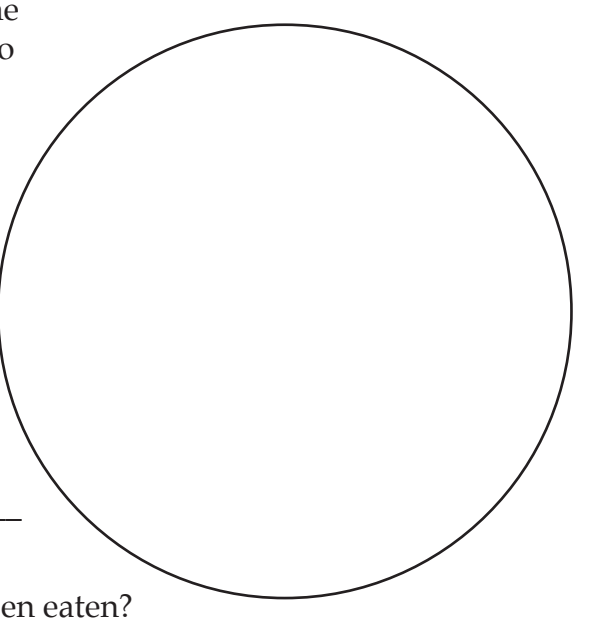
1. Position your trapped paramecium as close to the center of the field of view as possible. Increase to 400x.
2. What evidence do you see that the paramecium has eaten?_____
3. Describe and draw what it looks like.

_____

_____

_____

Field of view at 400x



4. Do you see any changes in the yeast that have been eaten? Describe them. _____

_____

5. What else did you see inside your paramecium? Describe and draw what you observed.

_____

_____

_____

Name _____

Period _____ Date _____

RESPONSE SHEET—MICROSCOPIC LIFE

Two students were having a discussion. One said,

All cells are living things. Every cell in an *Elodea* plant is an organism, just like the one-celled paramecium we looked at.

The second student said,

Well, you're partly right. I agree that all cells are living things, but an *Elodea* cell cannot be called an organism. The *Elodea* cells can't live on their own like the paramecia can.

What do you think about what these two students said? Who is correct?

Explain your thinking.

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Name _____

Period _____ Date _____

AMOEBAE

Amoeba—A single-celled organism

1. Prepare a wet mount of amoebae *without* cotton strands.
2. Add one drop of dyed yeast suspension to the slide and add a coverslip.
3. Set the microscope at 100x. Find an amoeba. Make sure it is an amoeba and not one of the other organisms or trash on the slide.
4. Describe the behavior of the amoeba, including how it moves.

_____

_____

_____

_____

5. Increase the magnification to 400x. Do you see any evidence that the amoeba has eaten? If so, what did it eat?

_____

6. What do you see inside your amoeba? Describe and draw them.

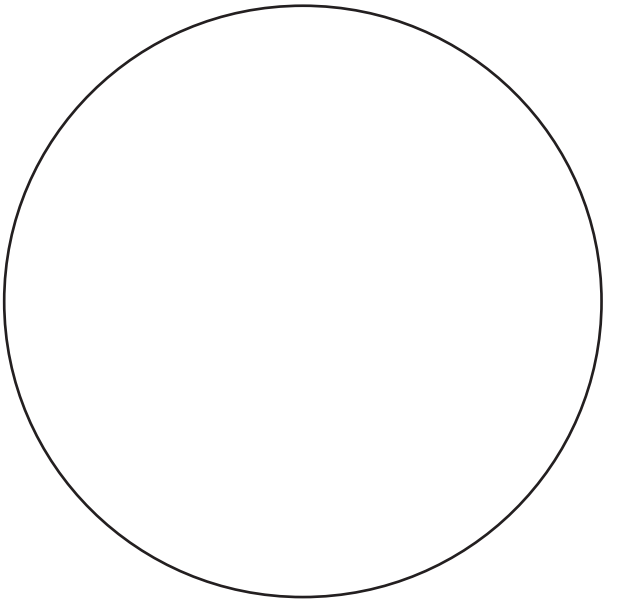
_____

_____

_____

_____

Field of view at 400x



7. Compare the amoeba to the paramecium.

_____

_____

_____

_____

_____

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Name _____

Period _____ Date _____

EUGLENAS

Euglena—A single-celled organism

1. Prepare a wet mount of euglenas *with* cotton strands.
2. Add one drop of dyed yeast suspension to the slide and add a coverslip.
3. Set the microscope at 100x. Find a euglena.
4. Describe the behavior of the euglena, including how it moves.

_____

_____

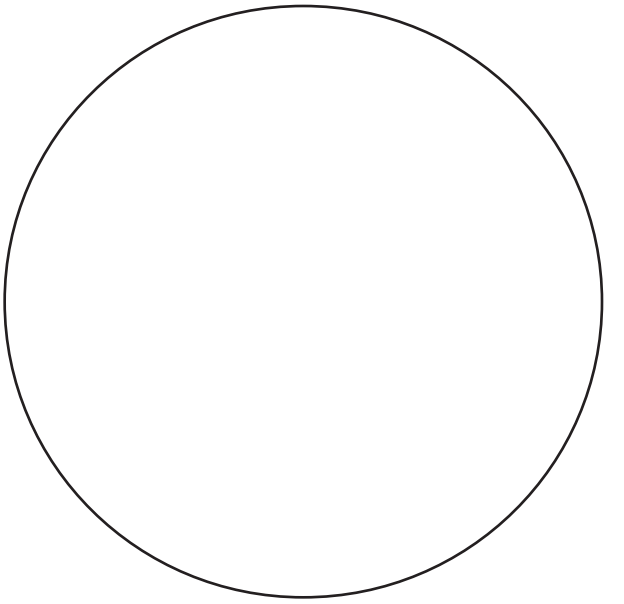
_____

_____

5. Increase the magnification to 400x. Do you see any evidence that the euglena has eaten? If so, what did it eat?

_____

Field of view at 400x



6. What do you see inside your euglena? Describe and draw them.

_____

_____

_____

_____

7. Compare the euglena to the paramecium.

_____

_____

_____

_____

_____

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Name _____

Period _____ Date _____

FLAGELLATES

Flagellate—A single-celled organism

1. Prepare a wet mount of flagellates *with* cotton strands.
2. Add one drop of dyed yeast suspension to the slide and add a coverslip.
3. Set the microscope at 100x. Find a flagellate.
4. Describe the behavior of the flagellate, including how it moves.

_____

_____

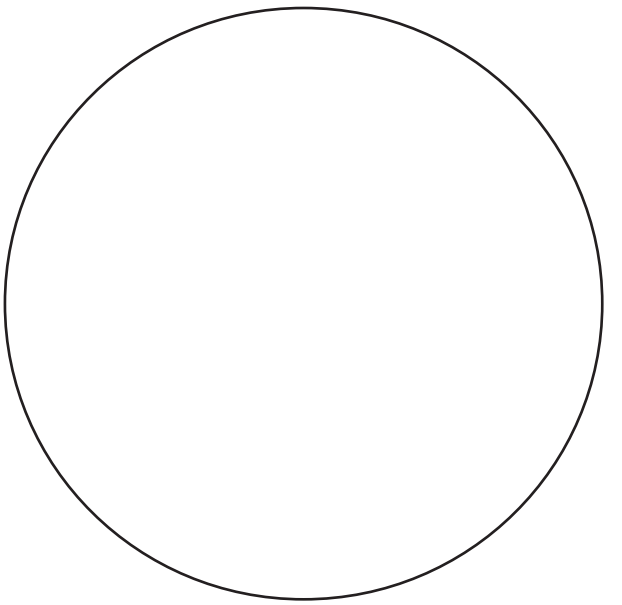
_____

_____

5. Increase the magnification to 400x. Do you see any evidence that the flagellate has eaten? If so, what did it eat?

_____

Field of view at 400x



6. What do you see inside your flagellate? Describe and draw them.

_____

_____

_____

_____

7. Compare the flagellate to the paramecium.

_____

_____

_____

_____

_____

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Name _____

Period _____ Date _____

MINIPOND SAFARI

What lives in the minipond?

1. Prepare a wet mount from the material in your minipond.
2. Observe the organisms at 100x and 400x.
3. Draw the organisms to scale and describe their behaviors in the spaces below.
4. Use the key to identify the organisms.

1.	**2.**	**3.**	**4.**
_____ _____ _____	_____ _____ _____	_____ _____ _____	_____ _____ _____
5.	**6.**	**7.**	**8.**
_____ _____ _____	_____ _____ _____	_____ _____ _____	_____ _____ _____

- How many different organisms did you find? _____
- What was the most common organism you found? _____
- Which organisms are single-celled? _____
- Which organisms are multicellular? _____
- How could you tell the difference? _____

Name _____

Period _____ Date _____

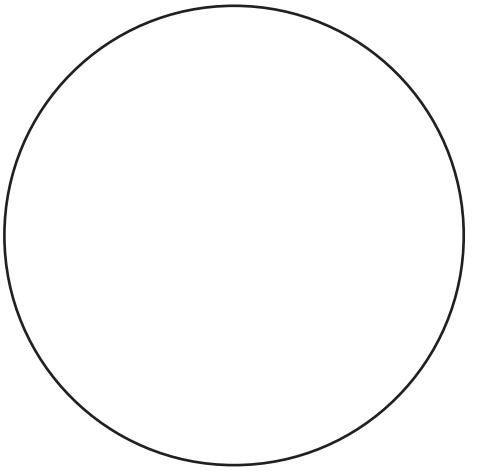
CHEEK INVESTIGATION

Prepare a cheek scraping

1. Put a drop of methylene blue dye in the center of a slide.
2. Use the broader end of a clean flat toothpick to scrape the inside of your cheek. Make five or six gentle scrapes.
3. Use the scraping end of the toothpick to stir the drop of methylene blue for 1 minute.
4. Dilute the drop of methylene blue with 4 drops of water. Stir again.
5. Place a coverslip on the slide. Use blotter paper to absorb the liquid from the edge of the coverslip.
6. View the slide at different powers. Adjust intensity of the light.

Record observations

Draw and describe what you see at 400x.



Questions

1. What is the inside of your cheek made of?

2. What do you think other parts of your body are made of?

Clean Up

Wash off your own slide and coverslip and properly dispose of your toothpick.

Name _____

Period _____ Date _____

RIBBON OF LIFE

1. Everything is made of atoms, including organisms. Write the sequence of increasing organization of atoms in living organisms.

   a. _____ d. _____ g. _____

   b. _____ e. _____ h. _____

   c. _____ f. _____ i. _____

2. Some kinds of organisms are simple; others are complex. Put the major groupings of organisms in order from simplest to most complex.

   a. _____ b. _____ c. _____

3. Cells are alive, but not all living cells are organisms. Explain.

   _____

   _____

   _____

4. What is the basic unit of life? Why do you think so?

   _____

   _____

   _____

5. What organelles are found in all cells?

   _____

   _____

6. What is the difference between a prokaryotic cell and a eukaryotic cell?

   _____

   _____

   _____

   _____

Name _____

Period _____ Date _____

7. How many kinds of organisms have prokaryotic cells? How many have eukaryotic cells?

8. How are paramecia cells and sheep cells the same and how are they different?

9. Plants and animals have tissues. What is a tissue?

10. How do cells in animals such as mammals and other vertebrates get the resources they need to survive?

11. Some say all life is aquatic. Explain what they mean.

Name _____

Period _____ Date _____

SEED DISSECTION

Dissection of dry seed—draw and label what you observe

Outside of seed	Inside of seed

Dissection of soaked seed—draw and label what you observe

Outside of seed	Inside of seed

1. What is the function of each of the three main parts of a seed? How do they work together to produce a new plant?

2. Are lima bean seeds living or nonliving, and what is your evidence?

3. How are seeds and brine shrimp eggs similar and how are they different?

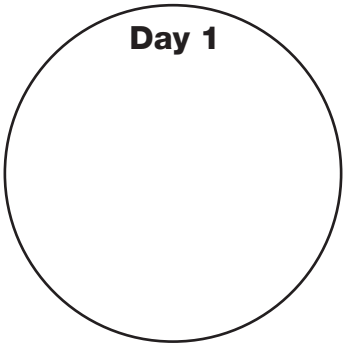
Name _____

Period _____ Date _____

ROOTS AND SHOOTS

Day 1

Draw your seeds in the petri-dish minisprouter.



Day 1—Draw the seed as seen in a hand lens.

Day 2

1. What changes do you see?

   _____

   _____

2. What part, if any, is coming out of the seed?

   _____

   _____

Day 2—Draw the seed as seen in a hand lens.

Day 3

1. What changes do you see?

   _____

   _____

2. How many sprouts grew upside down?

   _____

   _____

Day 3—Draw the seed as seen in a hand lens.

Questions

1. What structure grew first? _____ Why do you think that's what it is? _____

   _____

2. What is the function of that structure? _____

   _____

   _____

Name _____

Period _____ Date _____

SECRET GARDEN

Think about questions 7–11 while you watch the video.

1. What is unusual about snail reproduction?

2. Why is it important for the cabbage white butterfly to lay its eggs on cabbage or nasturtium leaves?

3. What is the function of flowers on plants?

4. What was the problem with spraying the garden for aphids?

5. If insects lay so many eggs, why don't they overrun the garden?

6. Give at least two examples of how one organism depends on another organism for something besides food.

7. List at least five adaptations you noticed during the video.

8. Give several examples of how animals change their behavior to live in gardens created and occupied by humans.

9. How is this helpful to the animals?

10. How is it harmful to the animals?

11. Why do you think the video is titled *Secret Garden?*

Name _____

Period _____ Date _____

RESPONSE SHEET—SEEDS OF LIFE

A student made the following entries in his lab notebook.

Day 1. Soaked seeds for 15 minutes. Placed wet paper towel in a clear plastic cup and placed seeds between towel and cup so we can watch them grow.

Day 2. Seed coat is breaking open.

Day 3. A little part of the plant is starting to stick out of the top part of the seed. I think it is the beginning of the stem because it is growing upward. I think the stem begins to grow first so that the plant can get light as soon as possible.

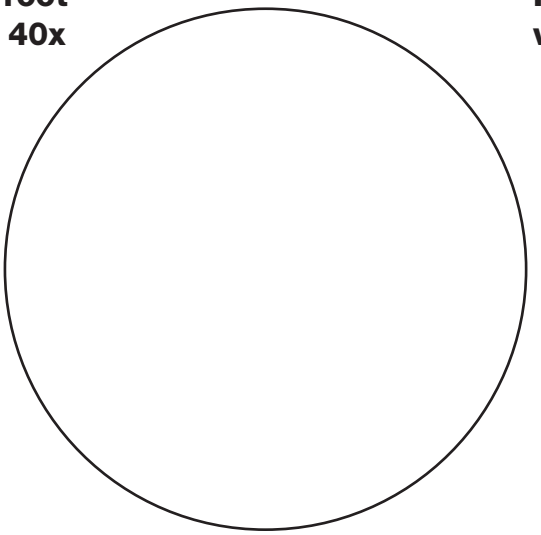
Do you agree with this student's thinking on day 3? Why or why not?

Name _____

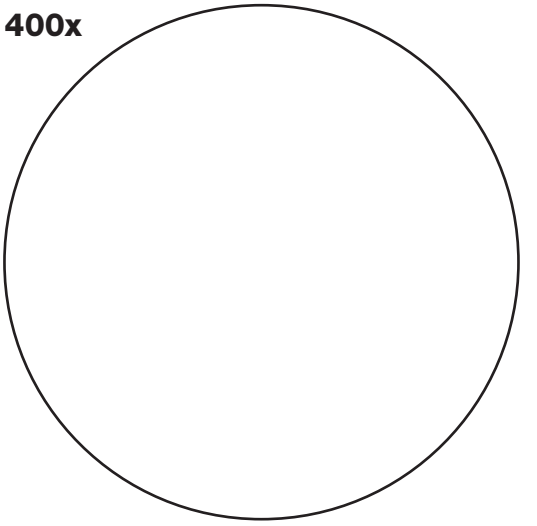
Period _____ Date _____

MICROSCOPE VIEWS OF ROOTS

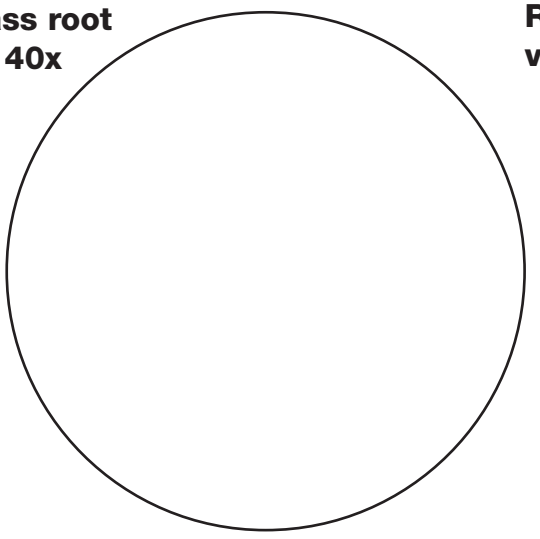
Radish root view at 40x



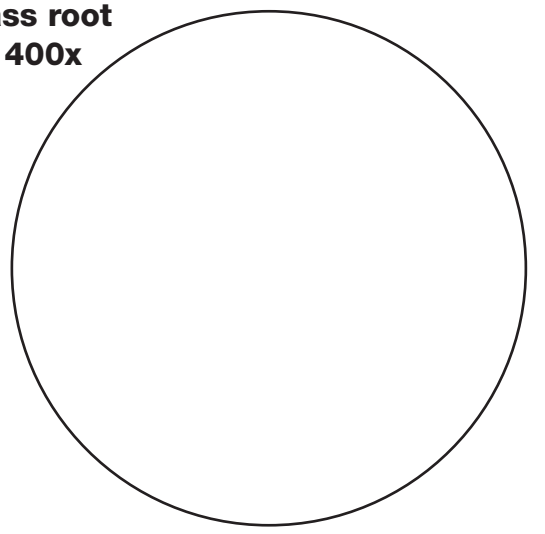
Radish root view at 400x



Rye grass root view at 40x



Rye grass root view at 400x



1. How are cells in the zone of elongation different from those in the zone of maturation?

   _____

2. What do you think is the function of each zone?

   Zone of elongation _____

   Zone of maturation _____

3. What do you think the channels are there for?

   _____

   _____

Name _____

Period _____ Date _____

CELERY-INVESTIGATION PLAN

1. What question are you investigating?

_____

_____

2. Restate the question as an "if-then" statement.

_____

_____

3. What will be measured?

_____

_____

_____

4. How will you collect the data?

_____

_____

_____

5. What materials will you use?

_____

_____

_____

6. Outline the procedure.

_____

_____

_____

_____

Review your plan

Can the question be clearly answered by an experiment?

Are all of the essential measurements being made?

Will the data answer the original question?

Are materials clearly described in terms of size and quantity? Are all materials available?

Is the procedure clear and thorough?

Is there a control or standard to compare to?

Could someone else easily follow these directions?

Name _____

Period _____ Date _____

CELERY-INVESTIGATION RESULTS

Part 1: Data table and illustrations

Part 2: Results

_____

_____

_____

_____

_____

_____

_____

Part 3: Conclusions and further investigations

_____

_____

_____

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_____

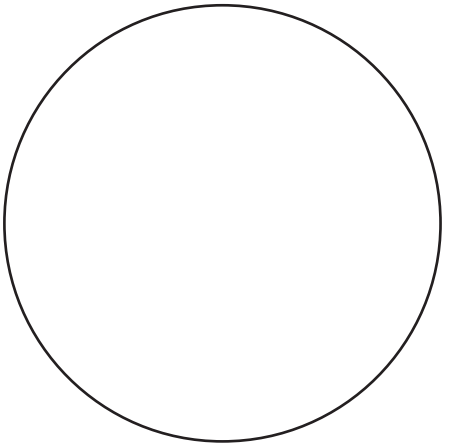
_____

Review your results
Are the data recorded clearly, and are they easy to read? Are the illustrations labeled?
Are the data calculations displayed clearly?
Did I describe the results completely and clearly?
Did I explain my conclusion? Does the conclusion provide an answer to the original question?
Did new questions come up? Are further investigations needed? Have I described them?

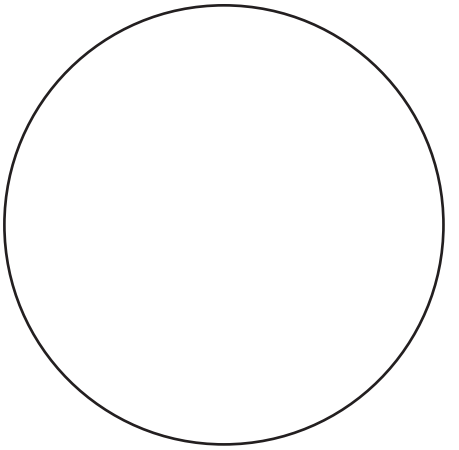
Name _____

Period _____ Date _____

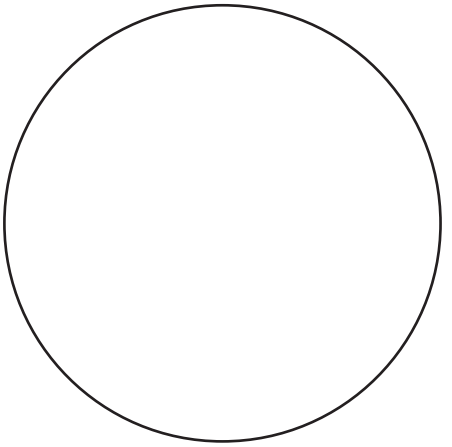
LEAF AND STEM OBSERVATIONS



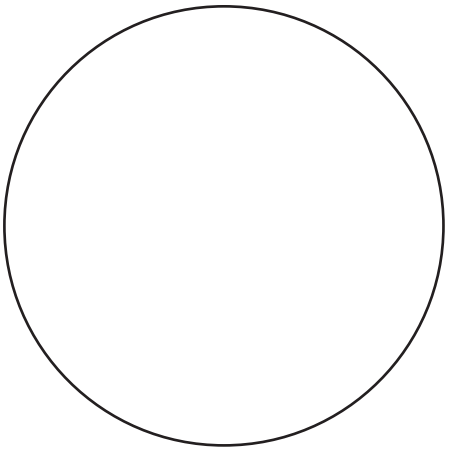
Cross section of celery stalk 100x



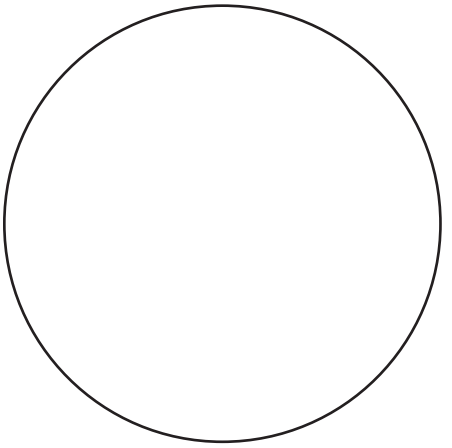
Wandering Jew leaf 400x



Crisp celery leaf 400x



Wilted celery leaf 400x



***Elodea* leaf 400x**

Use another sheet to

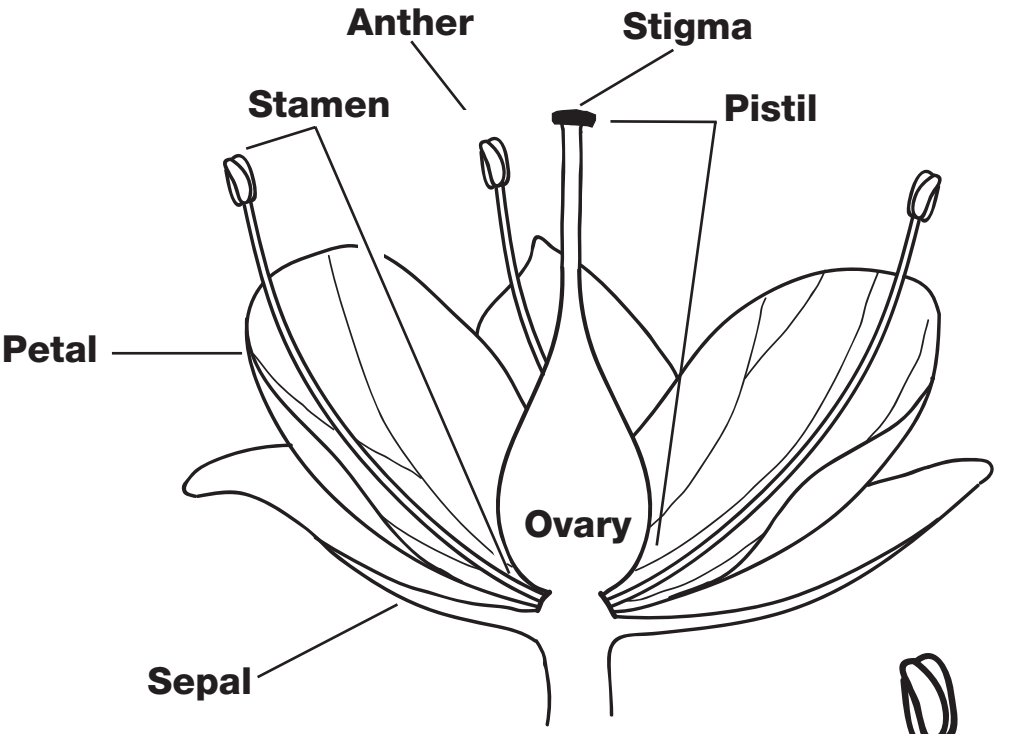
1. Describe stomate structure.

2. Explain the function that stomates perform for the plant.

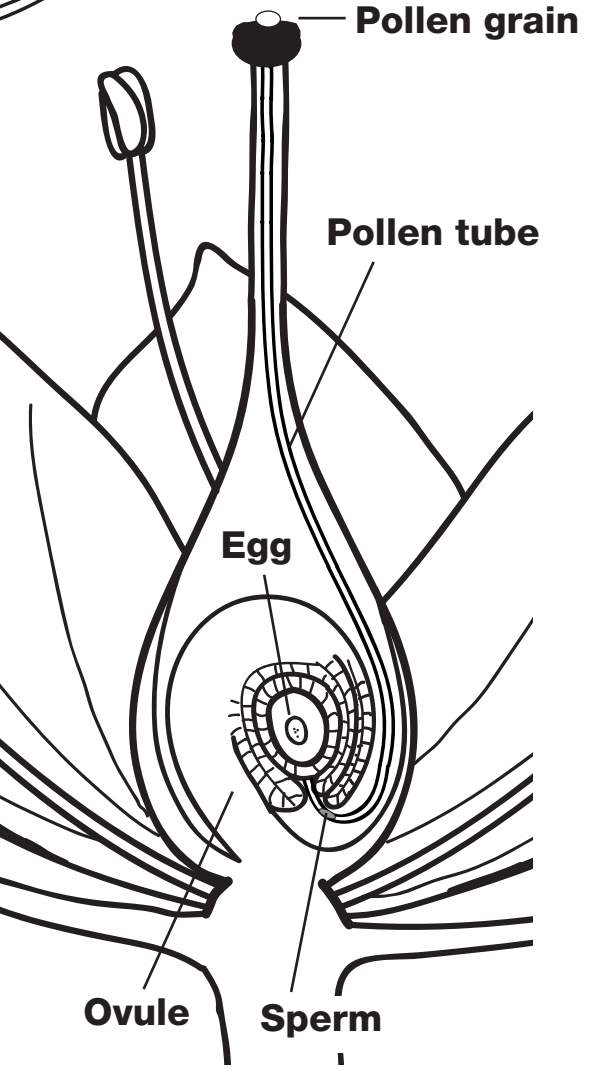
Name _____

Period _____ Date _____

PARTS OF A FLOWER



Simple flower

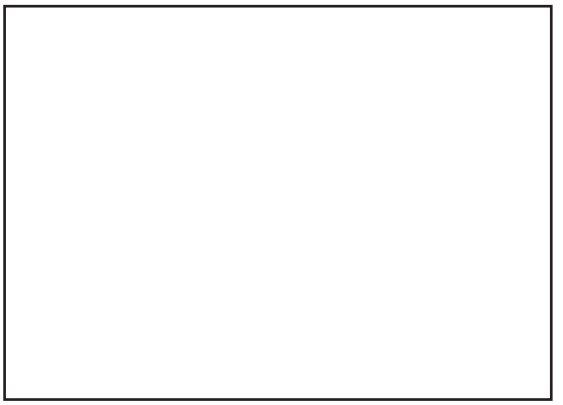


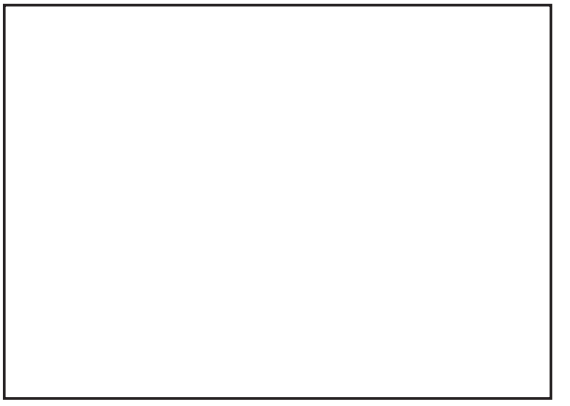
Name _____

Period _____ Date _____

FLOWER DISSECTION

Dissection of a _____ flower.





1. Look into the center of the flower. Draw a picture showing how the stamen and the pistil are arranged. Smell the flower.

2. Observe the end of the stamen closely. Make a close-up drawing showing the structure at the end of the stamen.

3. Gently push your finger down into the center of the flower. If the flower is too small for your finger, twist a small piece of paper towel into a stick and insert that into the flower. Look closely at your finger or the paper with a hand lens. What do you see?

   _____

   _____

4. If a microscope is handy, put some of the material on a slide and observe it at 100x and 400x. Draw what you see.

100x	400x

5. Remove the sepals. Count them. Stick one sepal on the tape near the *right* end.

6. Remove the petals. Count them. Put one petal on the tape next to the sepal.

7. Remove the stamens. Count them. Put all of them on the tape.

Name _____

Period _____ Date _____

8. The remaining part is the pistil, which includes the ovary. Use a hand lens or microscope to observe the tip of the pistil. Draw what you see.

Tip of pistil

9. Get your teacher to cut open the ovary. Examine the inside of the ovary with your hand lens or a microscope. Draw what you see.

Ovary

Place the pistil with the ovary *cut side down* on the tape.

10. Slide the card out from under the tape. Place the card on top of the mounted flower parts. Press down firmly to stick the card to the tape. Carefully lift up the ends of the tape and fold them to the back of the card to complete the flower mount.

11. Label the parts of the flower on your card and indicate how many of each there were.

12. Fill in the table below with your flower information. Then swap mounts with one or more other teams that dissected other kinds of flowers and fill in their information.

Flower	Color	Smell	Sepals	Petals	Stamens	Pistils

Name _____

Period _____ Date _____

RESPONSE SHEET—PLANT REPRODUCTION

One of your good friends was absent the day plant reproduction was discussed in class. She is trying to write a paragraph describing plant reproduction.

All I know is that baby plants come from seeds—I don't really know where seeds come from.

What would you tell your friend that would help her understand plant reproduction?

Name _____

Period _____ Date _____

SEED-HUNT CARD

1. Look closely at the plants in your environment. Collect one or two of as many different kinds of seeds as you can find.
2. Sort the seeds into the squares below. Tape them in place if you like.
3. Look at some seeds with a hand lens or microscope.
4. Think about the features of your seeds that help them disperse. How many different seed-dispersal features did you observe on seeds in your area? What dispersal mechanism is used the most by plants in your area?

		Type of plant				
		Grass	Tree	Bush	Weed	Garden plant
Seed-dispersal mechanism	Wind					
	Water					
	Ejection					
	Animal					
	Human					

Name _____

Period _____ Date _____

SNAILS

What I know about snails	What I'd like to find out about snails

Name _____

Period _____ Date _____

SNAIL-INVESTIGATION PLAN

1. What question are you investigating?

_____

_____

2. Restate the question as an "if-then" statement.

_____

_____

3. What will be measured?

_____

_____

_____

4. How will you collect the data?

_____

_____

_____

5. What materials will you use?

_____

_____

_____

6. Outline the procedure.

_____

_____

_____

_____

Review your plan

Can the question be clearly answered by an experiment?
Are all of the essential measurements being made?
Will the data answer the original question?
Are materials clearly described in terms of size and quantity? Are all materials available?
Is the procedure clear and thorough?
Is there a control or standard to compare to?
Could someone else easily follow these directions?

Name _____

Period _____ Date _____

SNAIL-INVESTIGATION RESULTS

Part 1: Data table and illustrations

Review your results
Are the data recorded clearly, and are they easy to read? Are the illustrations labeled?
Are the data calculations displayed clearly?
Did I describe the results completely and clearly?
Did I explain my conclusion? Does the conclusion provide an answer to the original question?
Did new questions come up? Are further investigations needed? Have I described them?

Part 2: Results

_____

_____

_____

_____

_____

_____

_____

Part 3: Conclusions and further investigations

_____

_____

_____

_____

_____

_____

_____

Name _____

Period _____ Date _____

GLIDING THROUGH LIFE

1. Why are snails and slugs called gastropods?

_____

_____

2. How many senses do snails have? What are they?

_____

_____

3. What do snails do when it gets cold?

_____

_____

4. What do snails do when their habitat gets dry?

_____

_____

5. Based on your experiments and what you have read, what should you provide for the snail to eat in your terrarium? Give a reason for each food you list.

_____

_____

_____

_____

6. Discuss the reproductive behavior of snails. _____

_____

_____

_____

_____

_____

_____

Name _____

Period _____ Date _____

Think Questions

7. Describe an experiment you could design to determine if snails can smell.

_____

_____

_____

_____

_____

8. Susan said, "Our snails usually went to the dry oatmeal flakes in the experiments we did, so we are just going to feed them dry oatmeal."

   What do you think about this decision? Explain your opinion.

_____

_____

_____

_____

9. What additional structures and behaviors would you look for the next time you work with the snails, now that you have read a little bit about snails?

_____

_____

_____

_____

10. Besides the experiment you described in question 7, briefly describe an additional experiment you would like to try with your snail.

_____

_____

_____

_____

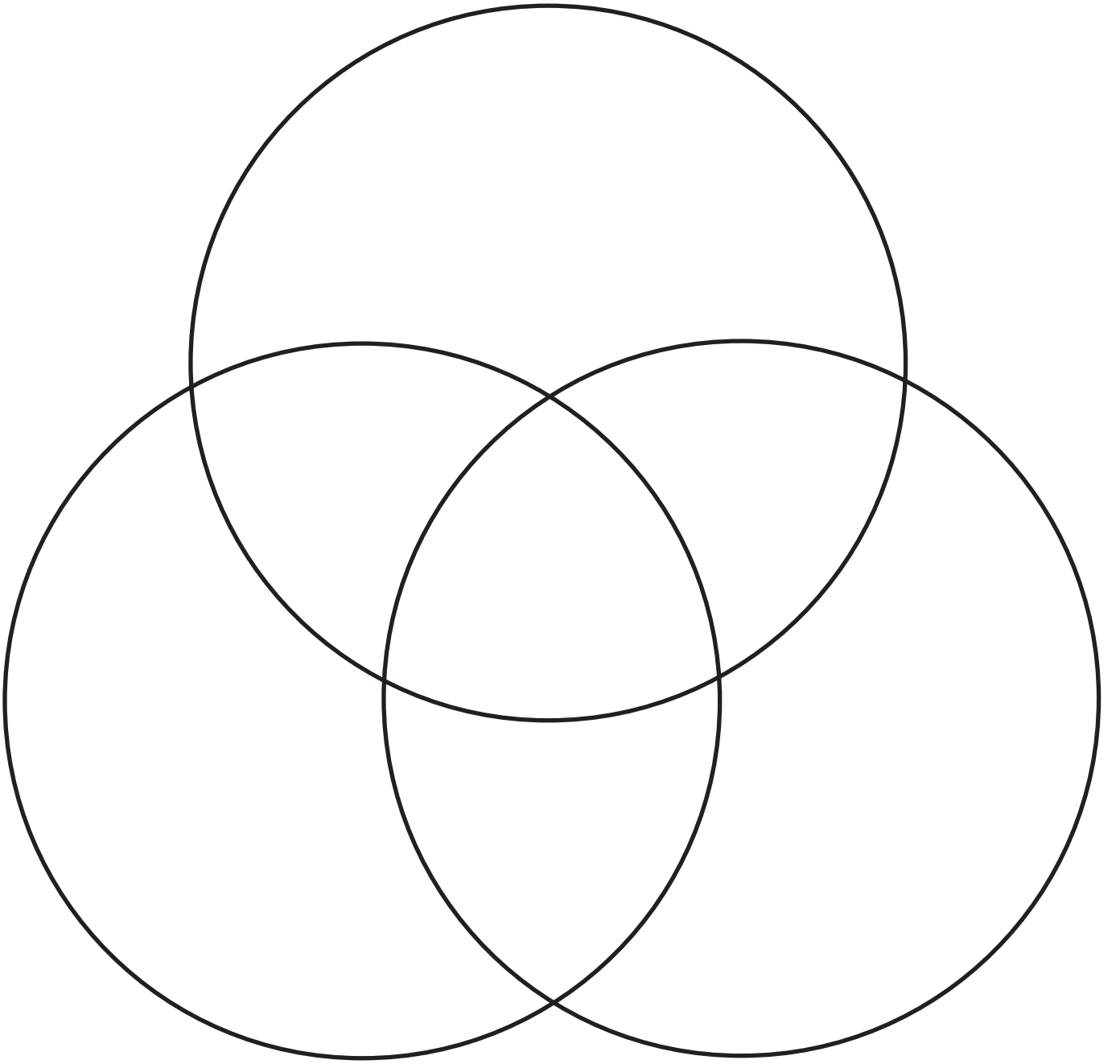
_____

_____

Name _____

Period _____ Date _____

VENN DIAGRAM



Name _____

Period _____ Date _____

INSECT ADAPTATIONS

1. What structures do *all* insects have in common?

2. What additional structures do *most* insects have?

Remember, structures and behaviors that increase an organism's chances to survive and reproduce are called **adaptations.** Answer the questions below, using the pictures of insects on the overhead and information from the reading to discuss the adaptations.

3. Flying insects have large muscles to operate their wings. Large muscles use a lot of energy, so flying insects need to eat more food than animals that do not have wings. Wings are fragile and must be protected. Wings can make an insect more visible. With all these disadvantages, there must be some important reasons why so many insects with this adaptation are thriving. Give several advantages of having wings.

4. Grasshoppers and praying mantises both have leg adaptations. Describe how the adaptations are different and explain how the adaptations help these insects survive.

Name _____

Period _____ Date _____

5. Beetles, butterflies, flies, and bugs get their food from different sources. What kind of adaptation does each have for getting the food it needs? What is the advantage of having diverse adaptations for getting food?

6. There is a moth that has brown and tan wings. There is a katydid that has green leaf-shaped wings. There is an insect that looks just like a dead, brown stick. Discuss how the colors and shapes of these insects help them survive. What can you infer about the habitats of these three insects?

Name _____

Period _____ Date _____

COCKROACHES

What I know about roaches	What I'd like to find out about roaches

Name _____

Period _____ Date _____

COCKROACH OBSERVATIONS

1. Observe the Madagascar hissing cockroach for a couple of minutes. Make a sketch.

2. Watch the cockroach walk across the bottom of the terrarium. Which legs move at the same time? _____

_____

3. Feed the cockroach a piece of fruit. Carefully observe how it bites and chews the food. Draw the mouthparts at the right and indicate which parts bite and chew.

4. Place a tiny amount of syrup on one of the antennae of the cockroach with a toothpick. Describe how the cockroach responds. _____

_____

_____

5. Observe how the cockroach responds to different stimuli when you do the following things:

   a. Blow on it.

   b. Move a pencil in front of its eyes.

   c. Drop water on its back.

   d. Drop a piece of banana in front of it.

   e. Drop ammonia in front of it.

Name _____

Period _____ Date _____

COCKROACH-INVESTIGATION PLAN

1. What question are you investigating?

_____

_____

2. Restate the question as an "if-then" statement.

_____

_____

3. What will be measured?

_____

_____

_____

4. How will you collect the data?

_____

_____

_____

5. What materials will you use?

_____

_____

_____

6. Outline the procedure.

_____

_____

_____

_____

Review your plan

Can the question be clearly answered by an experiment?
Are all of the essential measurements being made?
Will the data answer the original question?
Are materials clearly described in terms of size and quantity? Are all materials available?
Is the procedure clear and thorough?
Is there a control or standard to compare to?
Could someone else easily follow these directions?

Name _____

Period _____ Date _____

COCKROACH-INVESTIGATION RESULTS

Part 1: Data table and illustrations

Part 2: Results

_____

_____

_____

_____

_____

_____

_____

Part 3: Conclusions and further investigations

_____

_____

_____

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_____

Review your results
Are the data recorded clearly, and are they easy to read? Are the illustrations labeled?
Are the data calculations displayed clearly?
Did I describe the results completely and clearly?
Did I explain my conclusion? Does the conclusion provide an answer to the original question?
Did new questions come up? Are further investigations needed? Have I described them?

Name _____

Period _____ Date _____

INSECT MYSTERIES

1. From what you have observed about its body structures and behavior, where do you think a Madagascar hissing cockroach would spend most of its time? Check the statements you think are correct.

- ☐ Feeding on green grass
- ☐ Looking for food in tree branches
- ☐ Sunning itself on rocks
- ☐ Hiding under leaves on the ground
- ☐ Resting in shallow water
- ☐ Digging for worms

What is your evidence for your ideas? _____

_____

_____

2. How would the hissing cockroach probably obtain its food?

- ☐ Dig up worms and grubs
- ☐ Climb to treetops for fruit and flowers
- ☐ Eat fruit that falls near its nest
- ☐ Eat grass and other green leaves
- ☐ Catch insects and small rodents
- ☐ Catch small fish and tadpoles

What is your evidence for your ideas? _____

_____

_____

Questions 3–5 describe structures and behaviors of other insects. Use the descriptions to infer where they might live, their feeding habits, and their defense against predators.

3. This insect is green and slow moving. Its body is about 1–2 mm long. It has piercing/sucking mouthparts. It does not have wings. Where do you think this insect spends most of its time? What is your evidence? _____

_____

What type of food does it probably eat? What is your evidence? _____

_____

What must be its defense against predators? What is your evidence? _____

_____

Name _____

Period _____ Date _____

4. These insects have soft, pale tan (almost white) bodies about 5 mm long. They are slow moving. They have no eyes, no wings, small legs, and powerful chewing mouthparts.

   Where do you think they spend most of their time? What is your evidence?

   _____

   _____

   What would they probably eat? What is your evidence? _____

   _____

   What is their defense against predators? What is your evidence? _____

   _____

   _____

5. The blue body of this insect is about 4 cm long. It has huge compound eyes to see in all directions. Its four narrow wings are about 6 cm tip to tip. It can fly very rapidly in any direction, even backwards. It has chewing mouthparts covered by a large scooplike lip.

   Where do you think this insect spends most of its time? What is your evidence?

   _____

   _____

   What type of food does it probably eat? What is your evidence? _____

   _____

   What must be its defense against predators? What is your evidence? _____

   _____

6. Describe the Madagascar hissing cockroach's habitat and what the roach does in its habitat. Use all the information you have about these roaches to explain its lifestyle.

   _____

   _____

   _____

   _____

   _____

   _____

BACTERIA AND MOLD TESTING

Test for bacteria

1. Work with your group. Select an object, material, or location to test for bacteria.

2. Inoculate the sterile agar. For surfaces or liquids, use a cotton swab.
   - For *surfaces,* rub and roll the cotton end of the swab on the surface.
   - For *liquids,* touch the swab in the liquid to get liquid on the swab.
   - For *air,* leave the petri dish open for 4 minutes.

   NOTE: Don't let the swab touch *anything* except what you are testing.

3. Lift one edge of the petri-dish lid just high enough to insert the swab. Make an S streak across the surface of the agar, going from one side of the petri dish to the other.

4. Tape the lid onto the bottom of the dish, using two small pieces of tape. Label the petri dish with your group number and class period. Remember what you inoculated each section of the dish with.

5. Place the petri dish in a warm, dark place. Store it upside down so that moisture inside the dish will not drip onto the agar.

Test for mold

1. Work with your group. Choose a material or a surface you want to test. (Do not choose a liquid, because it will make the bread too soggy.)

2. Rub a half slice of bread over the surface or material.

3. Place the piece of bread in a zip bag so that the inoculated side is up.

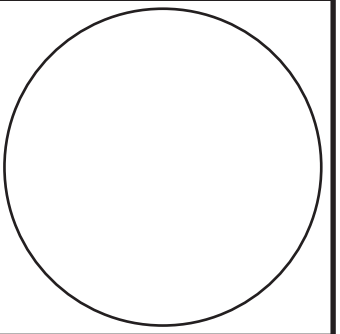
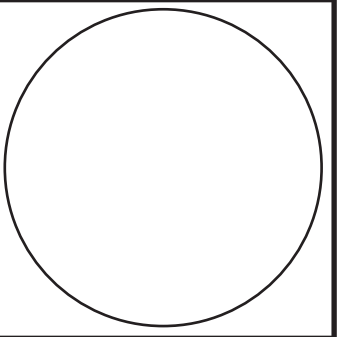
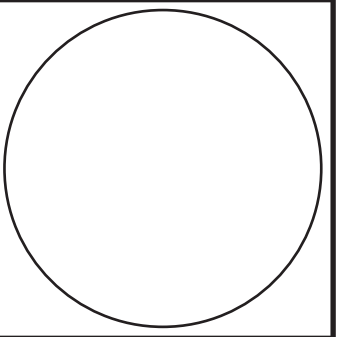
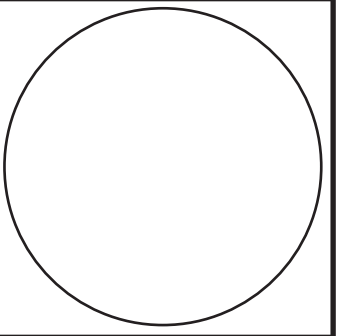
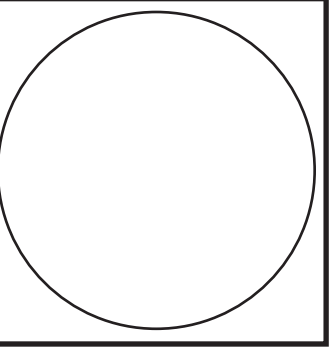
4. If the bread is dry, put a damp cotton ball in the bag with the bread. You want the bread soft and moist, but not damp and soggy.

5. Label the bag with your group number, class period, and the date. Seal the bag, leaving enough air in the bag so that it is not touching the bread on the top. Store the bag in a warm, dark place.

Name _____

Period _____ Date _____

OBSERVING BACTERIA

Date	Description of petri dish	No. of colonies	Drawing of petri dish
			
			
			
			
			

Name _____

Period _____ Date _____

OBSERVING FUNGI

Date	Description of bread	No. of colonies	Drawing of bread

Name _____

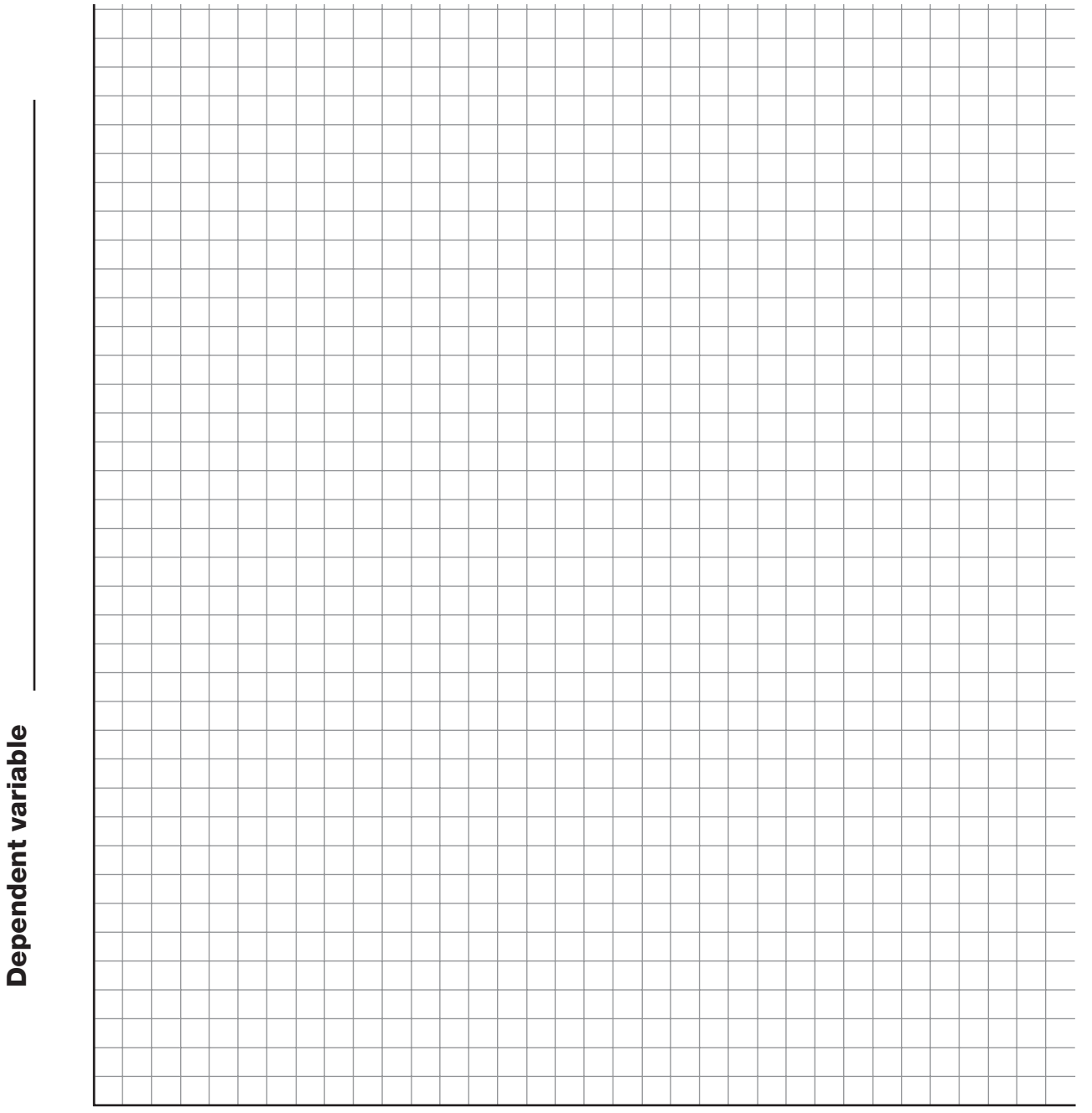
Period _____ Date _____

ONE MILLION DOTS

Name _____

Period _____ Date _____

EXPONENTIAL GROWTH OF BACTERIA



Independent variable _____

- What do the results on the graph show?

_____

_____

_____

Name _____

Period _____ Date _____

THE UNKNOWN WORLD

1. What do you provide for the hair-follicle mites?

   _____

2. We all have hair-follicle mites in and on our scalps. Why don't we scratch all the time?

   _____

   _____

3. Many people are allergic to dust and dust mites. Why can't we get rid of them in our homes?

   _____

4. Why isn't it a good idea to get rid of all the dust mites?

   _____

5. Silverfish eat old books and paper. What do you think they ate before there was paper or books?

   _____

6. Museum beetles existed for millions of years before there were museums. What do you think they ate before there were museums?

   _____

7. How do white blood cells (macrophages and lymphocytes) protect you from intruders?

   _____

   _____

   _____

Name _____

Period _____ Date _____

8. Why aren't viruses considered living organisms?

_____

_____

9. How do viruses reproduce?

_____

_____

10. Why can't the body fight off HIV?

_____

_____

11. How do stag beetles fit the model for natural selection?

_____

_____

12. Why don't ants eat aphids?

_____

_____

13. How does the digitalis leaf protect itself from insects?

_____

_____

14. How does the potato leaf protect itself?

_____

_____

15. How do insects and bacteria turn death into life?

_____

_____

_____

Name _____

Period _____ Date _____

MICROBES WE EAT

If you are allergic to any of these foods, do not eat them. Work with a partner.

Lab Station 1: Bread and Swiss cheese

1. What are some similarities you see between the bread and the Swiss cheese?

   _____

2. What would cause the sour taste in sourdough bread?

   _____

3. What process creates the holes in the bread and the cheese?

   _____

4. What is the bacteria or yeast doing to cause the holes?

   _____

5. What are some indicators that yeast and bacteria used to make bread and cheese are living organisms?

   _____

Lab Station 2: Vinegar, wine, and root beer

Fruit juices taste sweet because they contain sugar. Apple and grape juice can be used to make either vinegar or wine.

1. How does the vinegar taste (sweet, sour, salty, or bitter)?

   _____

2. Test the vinegar with the acid-base indicator paper. What do you find?

   _____

3. Look at the label on the vinegar. What is vinegar made of?

   _____

4. What organism must have been used to make the vinegar?

   _____

Name _____

Period _____ Date _____

5. Wine contains alcohol. What organism must have been used to make wine?

_____

6. What must be done to apple juice to make vinegar?

_____

7. What must be done to apple juice to make wine?

_____

8. What causes the yeast to stop growing in the wine?

_____

9. What causes the bacteria to stop growing in the vinegar?

_____

Lab Station 3: Yogurt

1. Describe the taste of the yogurt (sweet, sour, salty, or bitter).

_____

2. Look at the drawings of bacteria. Compare the drawings to what you see in the yogurt under the microscope. What type of bacteria do you see in the yogurt?

_____

3. The yogurt has been stained so the bacteria will show up better. In the space to the right, draw at least one type of bacterium and label what type it is.

4. When a person has been taking antibiotics for an infection, helpful bacteria in the digestive track can be killed. Many times doctors will recommend eating yogurt for a while following a round of antibiotics. Why would eating yogurt be helpful?

_____

_____

_____

Name _____

Period _____ Date _____

Lab Station 4: Mushrooms and bread mold

Do *not* open the container that contains the bread mold.

Draw a few stalks of mold, showing the spore case.	Draw the underside of the cap of a mushroom, showing the gills.

Lab Station 5: Sauerkraut and kimchi

1. How does sauerkraut taste (sweet, sour, salty, or bitter)?

   _____

2. What about the taste of kimchi?

   _____

3. Were they fermented with bacteria or a fungus? How do you know?

   _____

4. What caused the organisms to stop growing?

   _____

5. Why could these foods be kept for long periods of time, but cabbage can't?

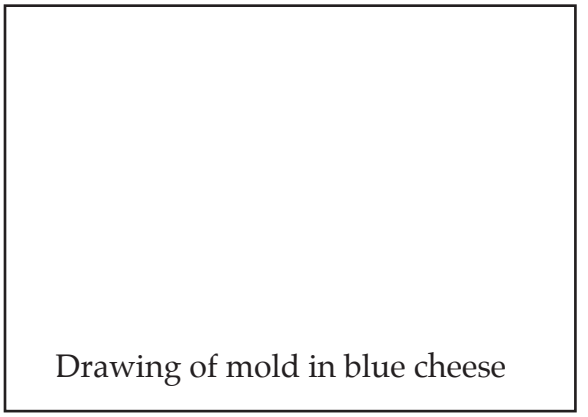
   _____

   _____

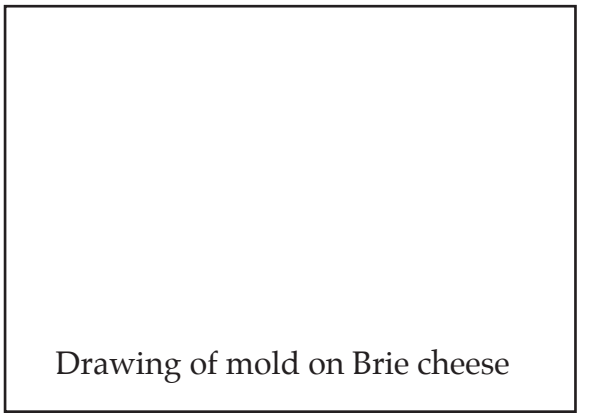
Name _____

Period _____ Date _____

Lab Station 6: Blue cheese and Brie cheese



Drawing of mold in blue cheese



Drawing of mold on Brie cheese

1. This is penicillin mold, the same type of mold that is used to make the antibiotic penicillin. Many antibiotics are made from molds. What would be the advantage to the mold of making a chemical that kills bacteria or other molds?

_____

_____

2. What other organisms have we studied that do something similar?

_____

_____

Lab Station 7: Seaweed, agar plates, and ice cream

1. Think about the characteristics of agar, which is made from powdered seaweed. Which of these characteristics would be a helpful characteristic for ice cream to have?

_____

_____

2. Describe the taste of seaweed (sweet, sour, salty, or bitter).

_____

3. Describe the taste of ice cream (sweet, sour, salty, or bitter).

_____

Name _____

Period _____ Date _____

Lab Station 8: Buttermilk, cottage cheese, and sour cream

1. How does the buttermilk taste (sweet, sour, salty, or bitter)?

   _____

2. How does the cottage cheese taste?

   _____

3. How does the sour cream taste?

   _____

4. What did you find when you tested the buttermilk with acid-base indicator paper?

   _____

5. When you tested the cottage cheese with indicator paper?

   _____

6. When you tested the sour cream with indicator paper?

   _____

7. What type of organism must have been put in milk to produce these foods?

   _____

Lab Station 9: Toothpaste

1. Why would toothpaste companies put diatoms in toothpaste?

   _____

   _____

ASSESSMENT—GENERAL RUBRIC

4 The student uses two or more facts to explain a bigger idea by making connections between those facts. All of the information is correct, and the connections and conclusions are correct.

3 The student uses two or more facts to attempt to explain a bigger idea by making connections between those facts. The facts or the connections have minor errors.

2 The student provides two or more facts that are related to the task or questions asked, but does not make any connections between the facts.

1 The student provides one fact that is related to the task or question asked.

0 The student does not answer the question, does not complete the task, or gives an answer that has nothing to do with what was asked.

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