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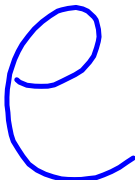
The Microscopic Image

Pretend you could travel back in time to the late 1500s. How would your life be different? Think of where you would live, how you would dress, and what you might do for fun. Most importantly, imagine how limited your knowledge of science would be. People who lived in this time believed that diseases were caused by "bad air" or "evil spirits." Although it was common for people to get sick, there was very little known about how to help sick people or how to prevent them from getting sick. Fortunately, because of an interest in lenses, **Zacharias Janssen** (with the help of his father) put together the first **compound microscope** in 1595. This invention actually ended up changing the world...what once was too small to be seen all the sudden came to life. In this activity, you will practice using this important tool so you too can see how differently your world looks magnified hundreds of times!

Prediction

hypothesis

In this activity, you will examine the small letter "e" under the microscope (you will be cutting out the word microscope on the bottom of this page). In the space below, draw the letter as it appears on the paper and what you think the image will look like when you view it through the microscope at its highest setting.

<p>The letter as it appears on paper:</p> 	<p>The letter as it will appear under the microscope:</p>
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Materials

- Compound light microscope
- Microscope diagrams
- Microscope slide
- Cover slip

- Dropper
- Water
- Scissors
- ILL

microscope

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Part 1: Microscopes Parts and Functions

1) Turn to your notes on microscopes. Using this page as a resource, identify the parts described below. There may be more than one answer or parts may be used more than once.

Function	Part(s)
Where you put your specimen for viewing	stage
Controls the amount of light coming through the stage	diaphragm
Contains a lens	eyepiece, objective
Two parts you hold when carrying the microscope	arm + base
Holds the slide/specimen in place	stage clips
Only used in low or medium power to focus	course
Only used when focusing in high power	fine
Allows you to select a different power objective	nose piece

2) Why do you think the microscope we labeled is called a **compound** light microscope?

Uses 2 lenses to bend light

A microscope works by using a lens or multiple lenses to bend light rays so an object appears larger than it really is. Because more than one lens is used in a compound light microscope, you have to account for every lens light travels through when trying to figure out how large the object has been magnified. To calculate **total magnification**, you need to know the magnification of the eyepiece lens and the objective lens you are using. These two numbers are then multiplied together to give you the total magnification. Whenever drawing images seen through a microscope, you must indicate the total magnification power near your drawing.

3) In your own words, write a word formula for solving for total magnification of a compound light microscope.

Total magnification = eyepiece X objective

4) Try calculating total magnification for your microscope.

a) What is the large, whole number (magnification power) written on the low-power objective?

4x

b) What is the large, whole number (magnification power) written on the eyepiece?

10x

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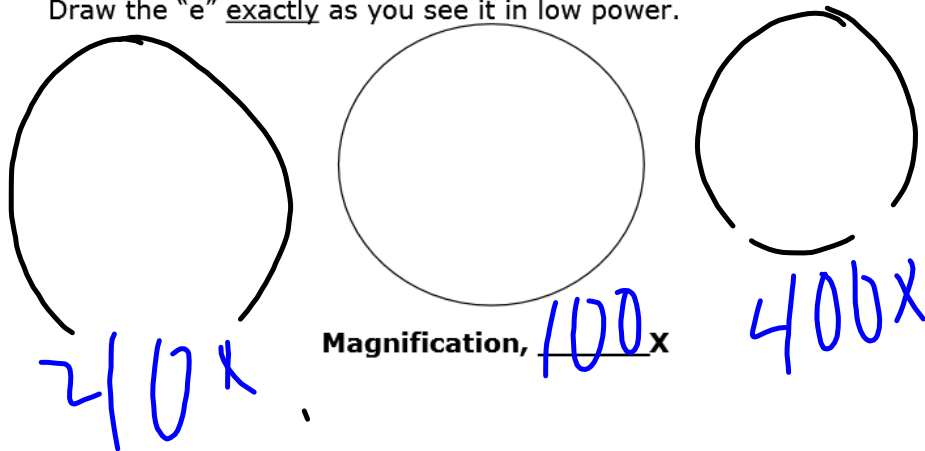
- c) What is the total magnification in low power? **40x**
- d) What would be the total magnification for medium power? High power? Show your work.
100x ← **400x**

Part 2: Set Up and Use a Compound Light Microscope

- 1) Using the "Proper Microscope Use" as your guide, correctly "set up" your microscope.
- 2) Prepare your slide using a wet mount prep (check off steps as you do them below):
 - Cut out the word "microscope" from the bottom right corner of the first page of this lab. You and your partner(s) will only need to cut out one between the two/three of you.
 - Place the object in the center of a clean microscope slide so you can read the entire word "microscope" from left to right.
 - Use a dropper to place 3 to 4 drops of water over the "e" of the word microscope.
 - Slowly lower the cover slip (coming in at an angle like you are landing a plane) onto the water. This was demonstrated by your teacher. The cover slip will use the water to adhere to the slide...it will not cover the entire word "microscope" but should cover the letter "r" which you will be examining.
- 3) Place your slide on the stage and fasten it with your stage clips. Make sure you can read the word "microscope" from left to right on the stage as demonstrated below.



- 4) Move the slide around so the letter "e" is directly over the center of the hole in the stage where the light comes through.
- 5) Using the "Proper Microscope Use" as your guide, following the directions for "viewing your specimen" until your object (the letter "e") is focused in low power. Draw the "e" exactly as you see it in low power.



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- 6) While you are looking at the "e" through the eyepiece of the microscope, gently move the entire slide to the right. Describe what happened to the "e".

- 7) While you are looking at the "e" through the eyepiece of the microscope, gently move the entire slide away from you...pushing it up. Describe what happened to the "e".

- 8) Continue to follow the "Proper Microscope Use" to focus in medium and high power. How does high power compare to low power?

- 9) Using the "Proper Microscope Use" as your guide, follow the "clean-up" instructions.

Summary

Describe the microscopic image. How did the "e" look without the microscope...how did it look in the various powers of the microscope?

Application

As you discovered, it is difficult to see an object perfectly without making some minor adjustments. For each of the following situations, tell what you would do to see the image more clearly.

- 1) The specimen appears fuzzy in low power.

- 2) The object is still too small to be seen.

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3) You can only see part of the object at the very left edge when looking through the eyepiece.

4) The image is too dark.

Reflection

The invention of the microscope changed the way many scientists viewed the world and shed some light on how organisms are able to live and reproduce. After using the microscope just this once, predict why you think the microscope had such an impact on life in the early 1600s.