Name: _____

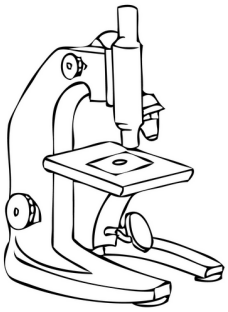
Microscope Lab

October 14, 2015

The microscope is an important scientific tool, used to examine small objects and fine detail. Today we will look at how a microscope works and use a compound microscope to examine samples from living things.

How a microscope works

Today we will work with two kinds of microscopes. First, a magnifying glass is a kind of simple microscope. It has a single lens which refracts light to provide a magnified view of an object.



A compound light microscope consists of two lenses (the eyepiece and the objective lens). The objective lens creates an enlarged image of the object. Then the eyepiece lens takes that image and magnifies it still more. The final image is magnified by the combined power of the two lenses.

Using and Caring For your Microscope

Notes on using your microscope

1. Carry the microscope by the arm with one hand under the base
2. Never touch the lenses
3. Be careful with the power cords
    - Look for frayed cords
    - Prevent tripping hazards
4. Turn on the light before you look into the eye piece
5. Holding a microscope slides gently and only by the edges, place it on the stage, securing it with the stage clips, if helpful
6. Focus and observe

Exercise 1 – Calculate the magnification power of a magnifying glass

You will need (1) a 1-page handout with the title #1, #2, #3 or #4 and (2) a magnifying glass.

1. Lay a magnifying glass on the numbered grid on the 1-page handout. At the widest part of the magnifying glass, how many squares can you see through the lens? _____ (call this number of squares "a")
2. Lift the magnifying glass until you have the largest, clearest image possible. Now how many squares do you see through the magnifying glass at its widest point: _____ (call this number of squares "b")?
3. Note "b" will be less than "a".
4. Calculate the magnification power of your magnifying glass:

    a ÷ b = _____

    For example if you see 10 squares (a = 10) with the magnifying glass flat on the paper and only 5 squares (b =5) when you hold the magnifying glass above the paper, the magnification power of your lens is a ÷ b = 10 ÷ 5 = 2

Name: _____

The power of your magnifying glass would be 2 or 2x

Exercise 2 – Calculate the magnification power of your microscope

Your microscope has 3 different objective lenses, giving you the choice of viewing objects at three different total magnification powers. The magnifying power of each lens is written on the side of the lens. The eyepiece is fixed and has a fixed magnification power. Calculate the total magnification powers of your microscope:

Objective Lens Power (variable)		Eyepiece Power (fixed)		Total Magnification
	X		=	
	X		=	
	X		=	

Exercise 3 – Practice using your microscope

You will be sharing a box of microscope slides. If the others at your bench are using the "Letter 'e'" slide (A below), start with the "cork" slide (B below).

A. Remove the "letter 'e'" slide from your box of slides. How does the sample look with the naked eye? Place the slide on the stage of your microscope, with the "e" centered over the light. Using the 4X objective lens, how does it look? Does it look different with the 10X objective lens? With the 40X objective lens?

B. Remove the "Cork" slide from your box of slides. This is similar to the sample Robert Hooke viewed in the year 1665. Record (draw) your observations below. What can you see without a microscope? Draw what you see under the microscope at two different total magnifications. Record the total magnification used.

With No Microscope – what can you see on the slide?	**Total Magnification _____**	**Total Magnification _____**

Exercise 4 – View samples of living things

Follow the list provided to guide you in which slides to view. You will be sharing the box of slides and no one group will look at all the slides. Carefully remove one slide at a time. When finished, return it to the box. Select any one total magnification power and record your observations in the space provided.

Sample #1:	**Sketch your observations:**
Total Magnification:	
Describe what you see. Is this an animal sample? A plant? Do you see individual cells? If so, one cell or many cells? If more than one cell, do the cells have difference forms, suggesting they have different functions?	

Name: _____

Sample #2:	**Sketch your observations:**
Total Magnification:	
Describe what you see. Is this an animal sample? A plant? Do you see individual cells? If so, one cell or many cells? If more than one cell, do the cells have difference forms, suggesting they have different functions?	

Sample #3:	**Sketch your observations:**
Total Magnification:	
Describe what you see. Is this an animal sample? A plant? Do you see individual cells? If so, one cell or many cells? If more than one cell, do the cells have difference forms, suggesting they have different functions?	

Sample #4:	**Sketch your observations:**
Total Magnification:	
Describe what you see. Is this an animal sample? A plant? Do you see individual cells? If so, one cell or many cells? If more than one cell, do the cells have difference forms, suggesting they have different functions?	

Sample #5:	**Sketch your observations:**
Total Magnification:	
Describe what you see. Is this an animal sample? A plant? Do you see individual cells? If so, one cell or many cells? If more than one cell, do the cells have difference forms, suggesting they have different functions?	

Name: _____

Sample #6:	**Sketch your observations:**
Total Magnification:	
Describe what you see. Is this an animal sample? A plant? Do you see individual cells? If so, one cell or many cells? If more than one cell, do the cells have difference forms, suggesting they have different functions?	

Sample #7:	**Sketch your observations:**
Total Magnification:	
Describe what you see. Is this an animal sample? A plant? Do you see individual cells? If so, one cell or many cells? If more than one cell, do the cells have difference forms, suggesting they have different functions?	

Questions for class discussion

1. What could you see in the microscope that you couldn't see with your naked eye?
2. When Robert Hooke observed a sample of cork under his microscope in 1663, he thought each square looked like a tiny room or cell. Did your observation agree with his?
3. Did any of your observations show:
    a. An organism?
    b. A tissue?
    c. Cells? No individually discernible cells?
    d. A single cell?
    e. Structures within a cell?
4. Do all cells look the same? If not, how do they differ?