

biology

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A- Hands-On Guide To The Use And Understanding Of Biology

B- This is a hands-on biology unit is intended for use in the middle school. It can, however, be modified for use in lower or upper grades.

C- Students will work cooperatively to conduct scientific investigations that will help them solve a scientific problem using a variety of inquiry skills including observing, predicting and testing solutions. Students will communicate their experiences through their student worksheets and in class presentations

D- Materials- Each cooperative work group will need one microscope and illuminator. Other items are listed in box number one on each experiment sheet.

E- Each experiment in this unit will require one to two class periods (approx 45 min) to complete. The entire unit requires at least two weeks.

F -This unit includes ten hands-on experiments that introduce students to the world of biology. Scientific vocabulary is introduced throughout the unit.

G- Safety- Since the microscopes require illumination you may have electric cords about your classroom. Please note that they should be taped to the floor so that no one falls

over them. Also note that since the children will **be** preparing wet mount slides in this unit care must be taken not to mix the water on the slides with the electric from the lights. Students will also be blowing carbon dioxide from their lungs into a glass of bromthymol blue. It is important for them to realize that they should not suck up or swallow this liquid. If they do seek a physician.

H- Teachers should send a note home to parents explaining the upcoming unit. It is important to explain that the children will be sharing equipment and that the children are working in cooperative learning groups whereby they learn from each other. Each student is responsible to **do** their share of the required work.

I- Questions for students are on the worksheets.

J- Assessment- After collection and review, the student worksheets should be graded from one to ten, ten being the highest grade. During lab time, question the students to see if they understand the material being presented to them. See if the students are engaged in the activity and if they are working cooperatively. Finally, after students finish with the unit test, have the students write in their lab notebooks their ideas and comments about this biology unit.

Biology

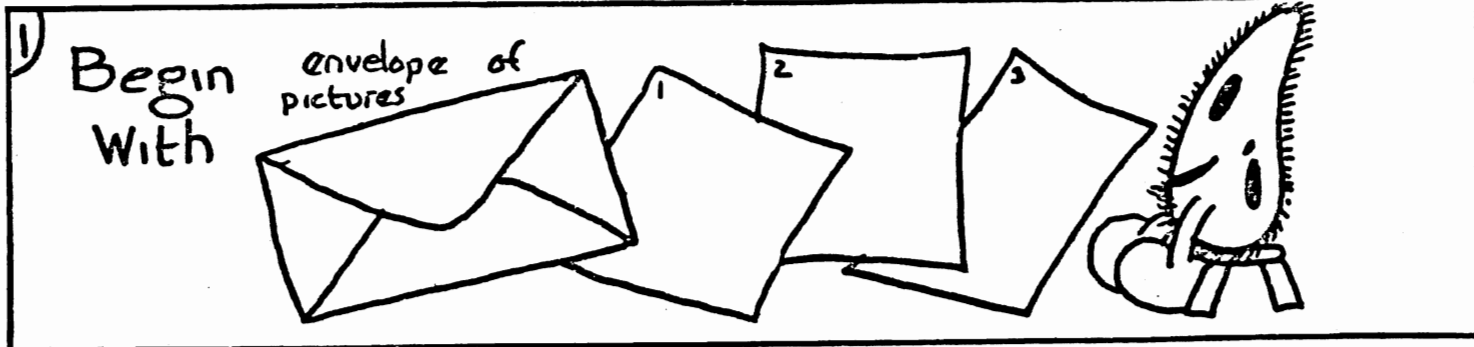
Name

Class

Group No

How can you tell living things from non-living things?

Experiment 1



2) Remove the group of pictures from the envelope. Put them into two (2) groups living and non-living

3) How are the groups different?

4) How do you know which objects are alive?

5) Make a list of things that something has to do in order to be alive.

6) How can you tell that a rock is not alive? (give at least 5 reasons)

8) Define these life processes
growth -
locomotion -
respiration -
digestion -
reproduction -

7) living things carry on certain basic life processes or activities

9) Do plants carry on life activities? (How can you tell?)

10) Define Biology -

Homework -

1) Why are you considered a living thing? (give at least 5 reasons)

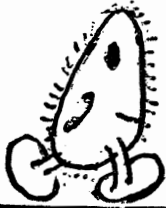
11) How does biology relate to living things?

2) What are life activities?

How can a microscope help you study living things?

Experiment 2

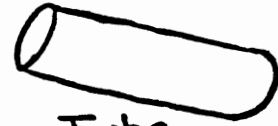
1) Begin With



Compound Microscope

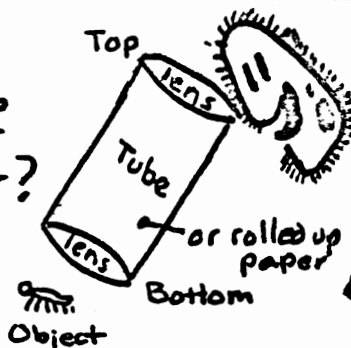


Lens



Tube

2) How will this set up of lenses help see small things better?

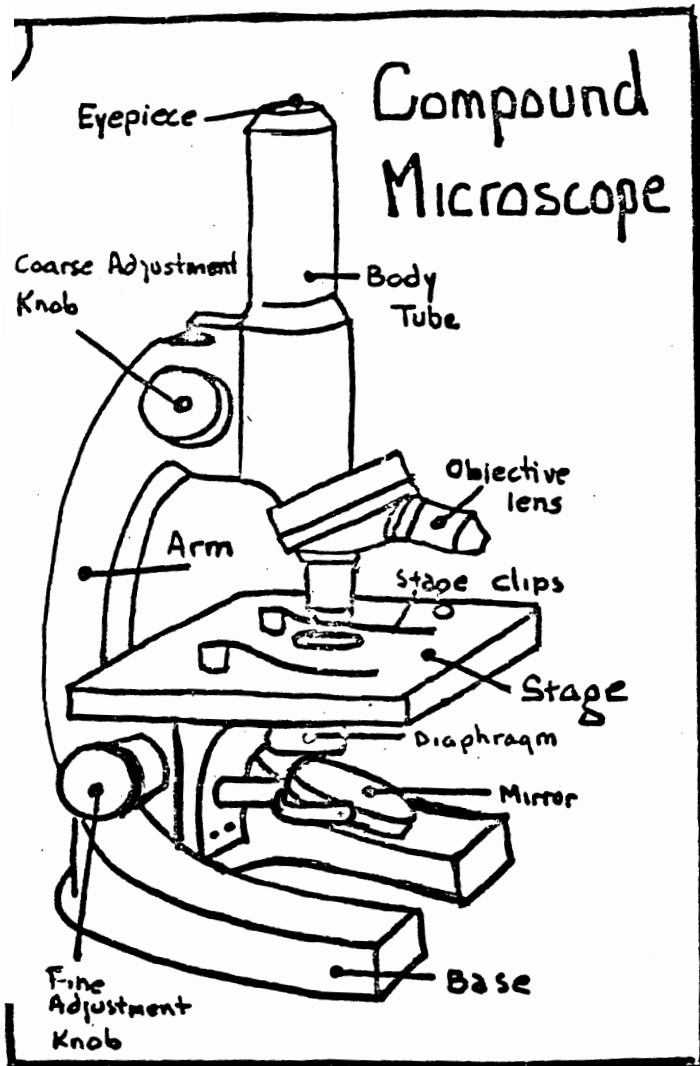


3) What might happen if we put a more powerful lens on the bottom?

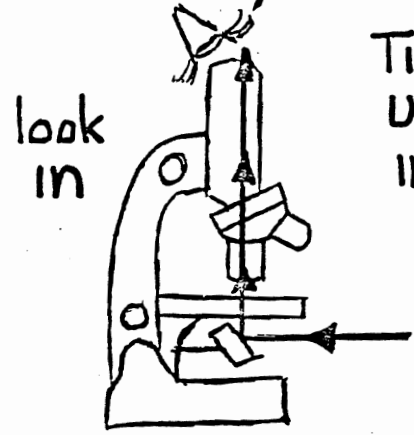
4) Scientists built a microscope with tubes and lenses. On the bottom is a changeable lens. These lenses are called objectives. The lens you look through is called the eyepiece. (see other side)

6) Why might we call the place we put the object to be viewed, a stage?
(on a microscope)

5) What do we call the thing actors stand on during a play?



8) light bounces off the mirror, goes, through the stage, through the lenses, and to the eye.



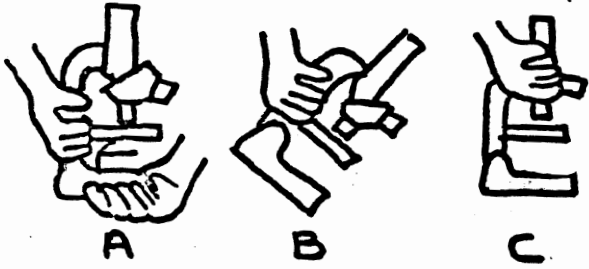
Tip the mirror until the inside lights up

Try it

The arm should face the body.
Never Tip A microscope

9) There is a hole in the stage to let the light through.

10) Which do you think is the best way to hold the compound microscope?



11) Why is this the best way to hold the microscope?

Homework-

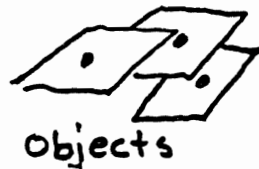
1-Why shouldn't you stand in front of the mirror?

2-Why shouldn't you drop a microscope?

How can you use a microscope?

Experiment 3

1) Begin With



objects



slide

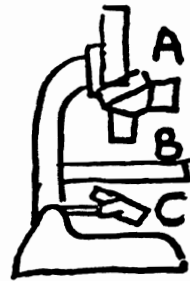


microscope

2) Describe how light moves through the microscope.

3) You look through the microscope on low power. You have light and now want to look at an object.

Where would you put the object?



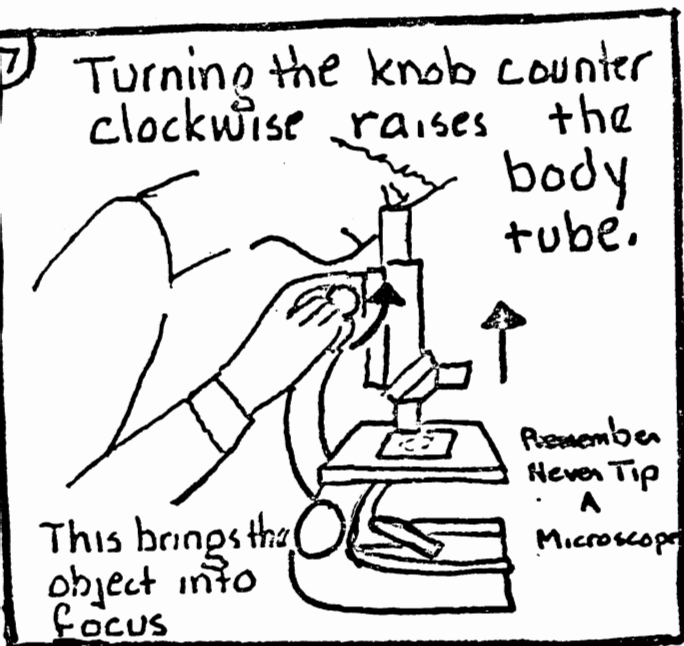
Why would you put it there?

6) Place object on the microscope. Turn the coarse adjustment knob clockwise until the objective lens almost touches your object. Look through the eyepiece. Turn the coarse adjustment knob counter clockwise until the dot on the object can be seen clearly. (see pictures)

(in focus)

There are 3 objects in an envelope in your box.

How can we view these objects under a microscope?



8) Can you see the dot on each object?

Why or Why not?

Why does the object have to be Thin?

9) look at the stage
You want to look at small objects. Why can't you just dump these objects on the stage?

10) Ask for a Slide
How can this help you see your objects?

11) look under the stage. Find the diaphragm. Turn it.
What do you think its job is?

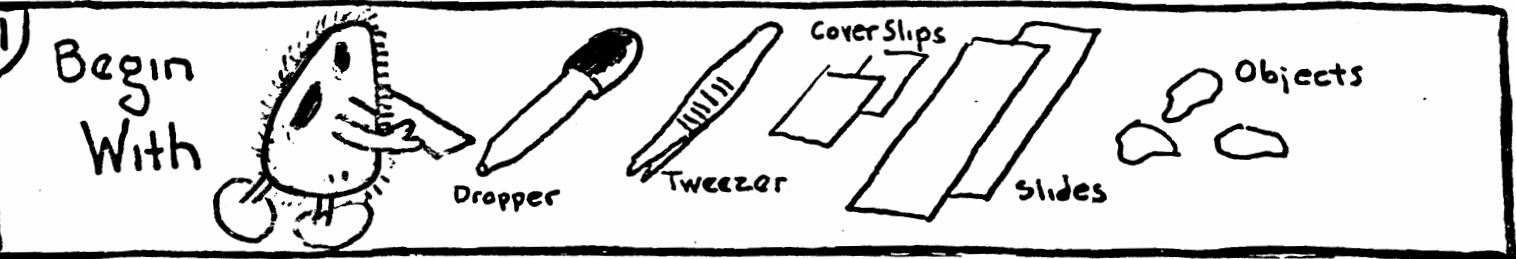
12) Why is there a base on a microscope?

13) On a microscope what is the job of the Arm?

Homework-

1- Describe how to focus a microscope?

How can you make a slide? Experiment 4



2) Examine a prepared slide.
 What is it made of?
 How was it made?

3) Why must the object you put on the slide be very thin?

Objects are put on slides so they won't fall through the stage

4) This is how we make a **Wet Mount Slide**

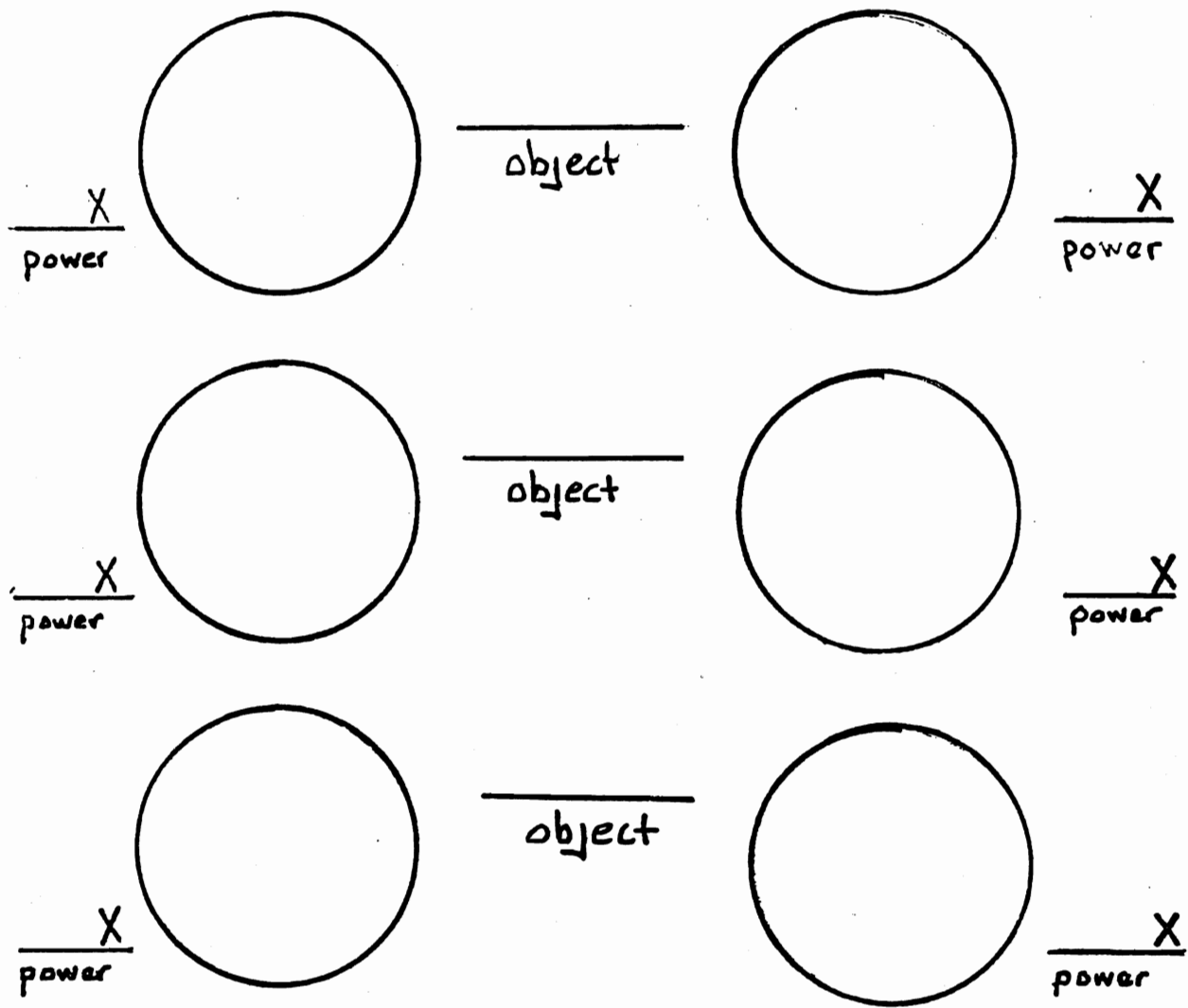
Step 1: Put a drop of water on the slide

Step 2: Place object in the water

Step 3: Put a cover slip over the object

Step 4: The finished wet mount slide.

5) Prepare Three (3) wet mount slides. Draw what you see under high and low power. Call teacher when your slides are ready.

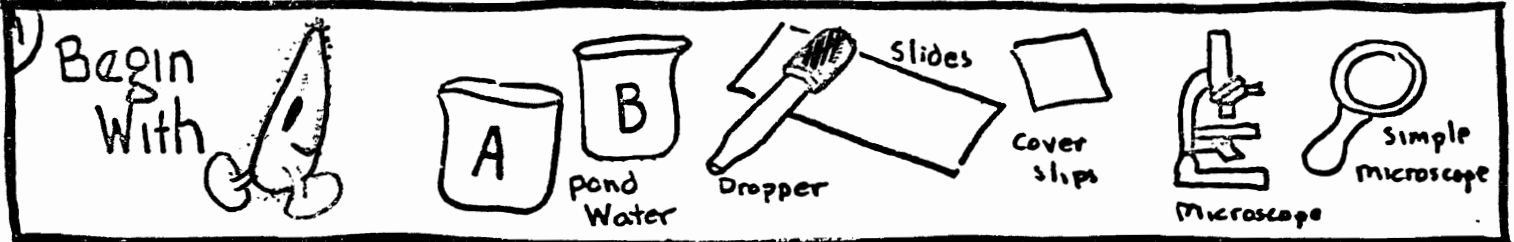


Homework -

- 1- Bring objects from home to make a slide from.
- 2- Explain how to make a wet mount slide. (In your words)

What can you see in a drop of pond water?

Experiment 5



2) Examine a sample of pond water with a simple microscope. Describe what you see.



3) What might we see if we look closer?

4) How can we get a closer look at the pond water?

5) How is a pond different from a lake?

7) Why is a pond usually dirtier than a lake or the ocean?

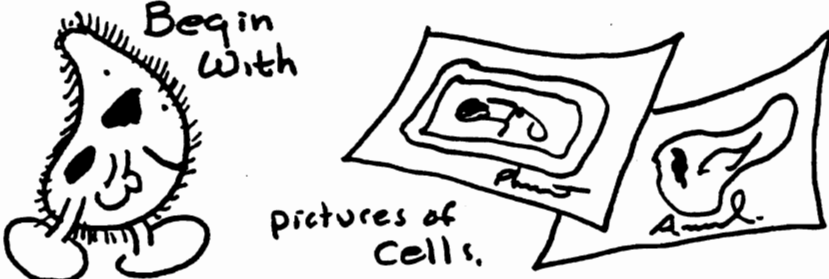
6) How does a pond get fresh clean water?



8) Have you ever noticed that fish tanks get very Green? This is because a very small green plant called Algae begins to live in the water. Why is pond water Green?

How are animal and plant cells different?

Experiment 10

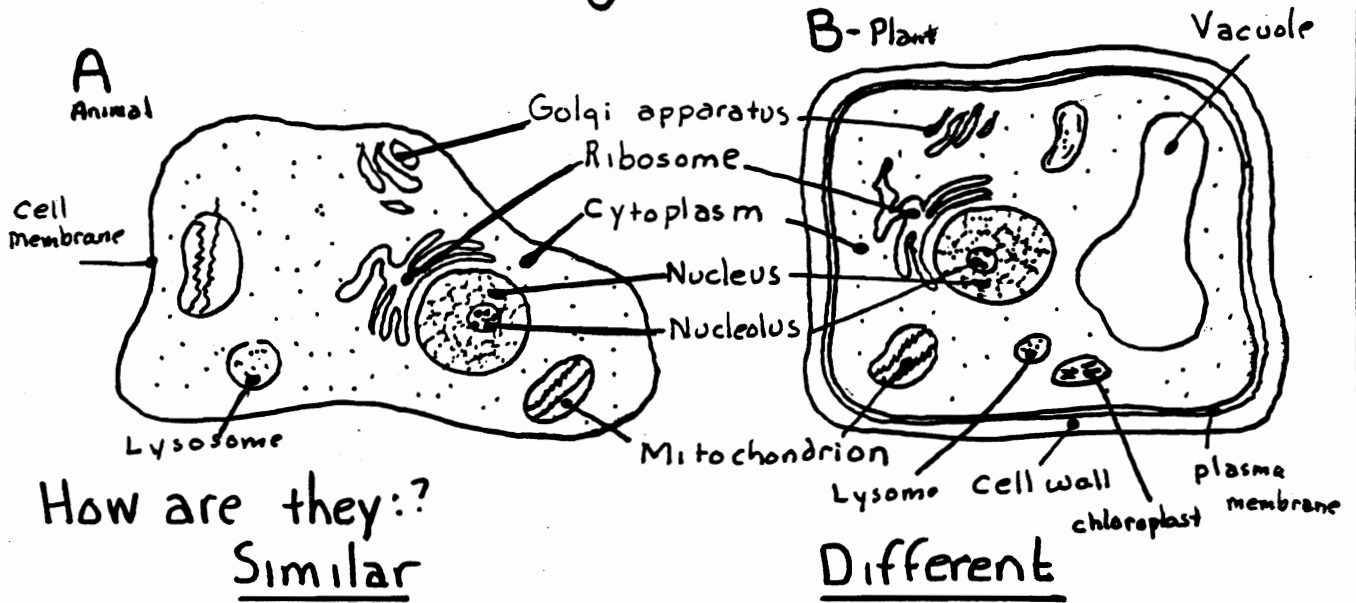
1) 
Begin with
pictures of cells.

2) In what ways are animals similar to plants?

4) list the life functions of living things

3) How are animals different from plants?

5) Look at these drawings



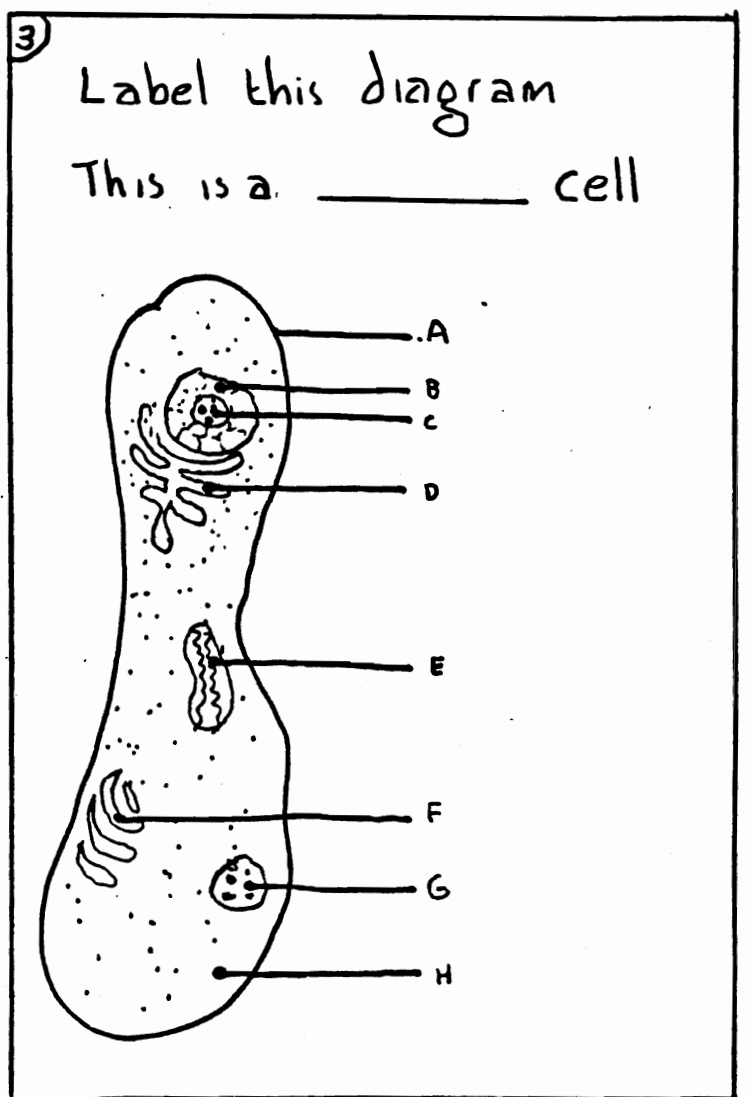
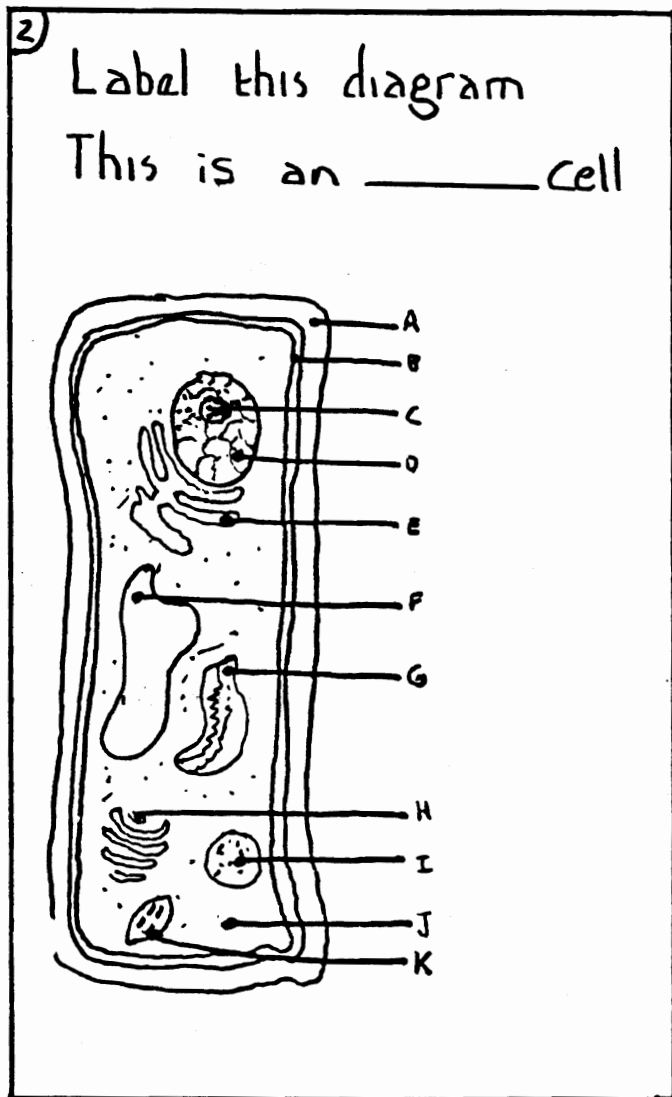
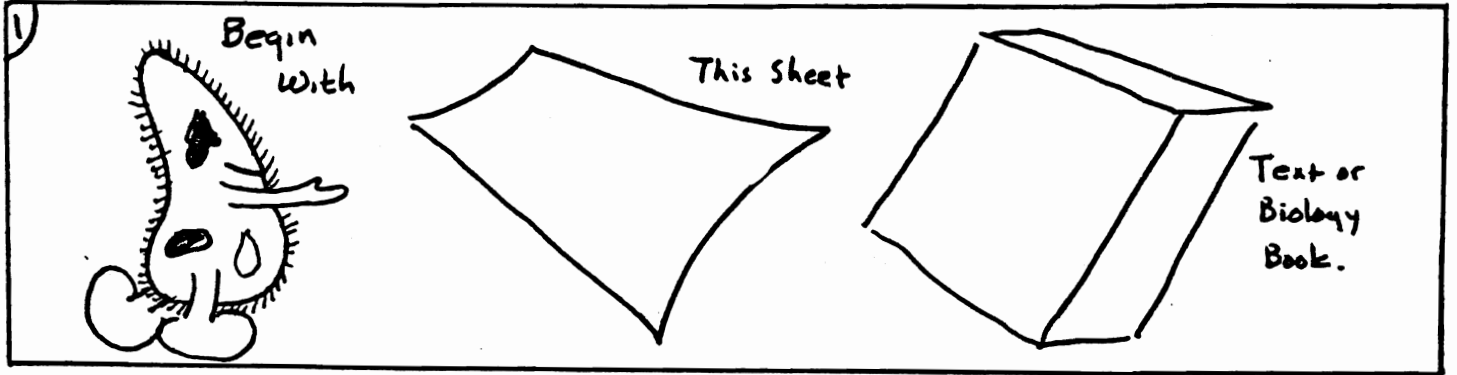
6) A is a typical animal cell. B is a typical plant cell

7) Both have similar parts, however sometimes the name of those parts are different.

8) Your body needs protection as does cells. Skin protects your body and cell membranes or cell walls protect cells. Your brain controls your life functions. The nucleus of a cell controls the life functions of the cell.

Homework - Define -
chloroplast
chlorophyll
vacuole
nucleus.

What do the parts of a cell do?



4) What is the job of the: (Use your textbook)

cytoplasm -

cell membrane -

cell wall

vacuole

nucleus

chloroplasts

ribosome -

lysosome -

chlorophyll -

lysosome -

mitochondrion -

cell -

Homework -

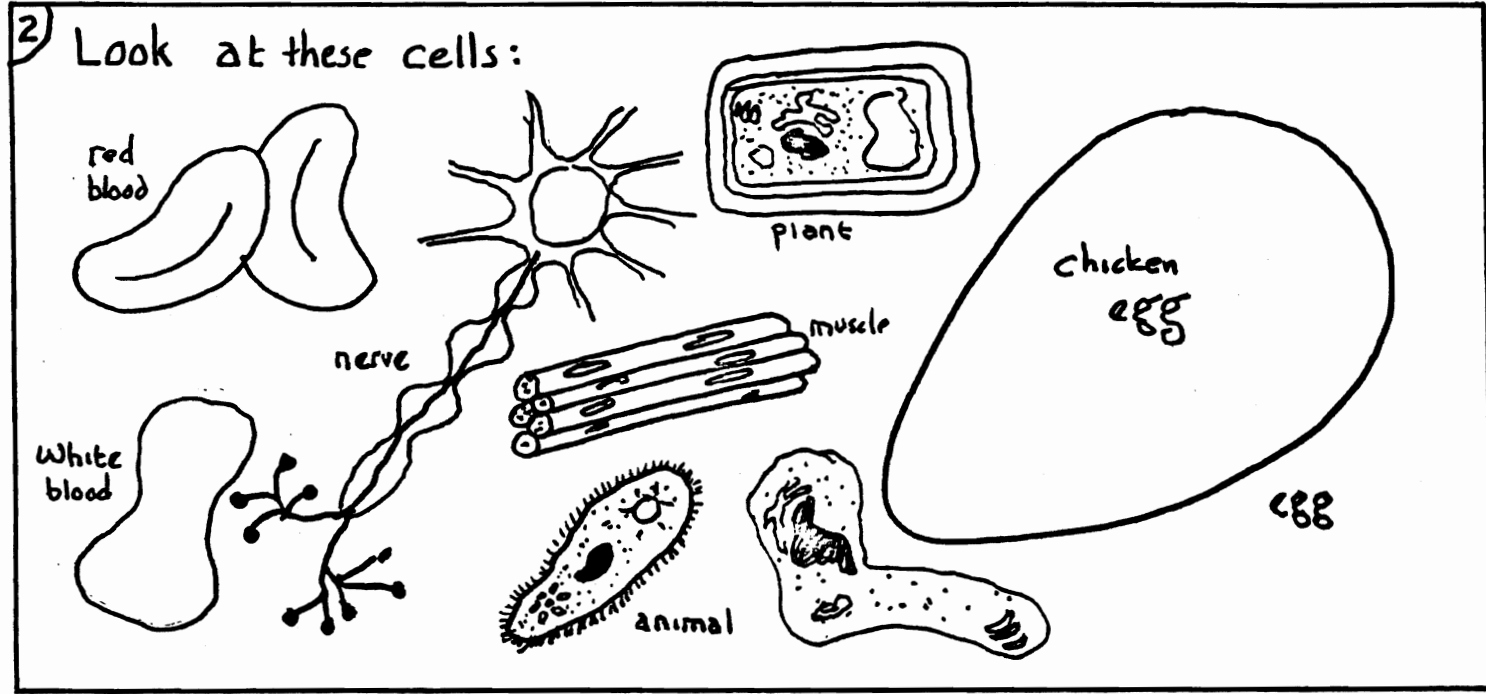
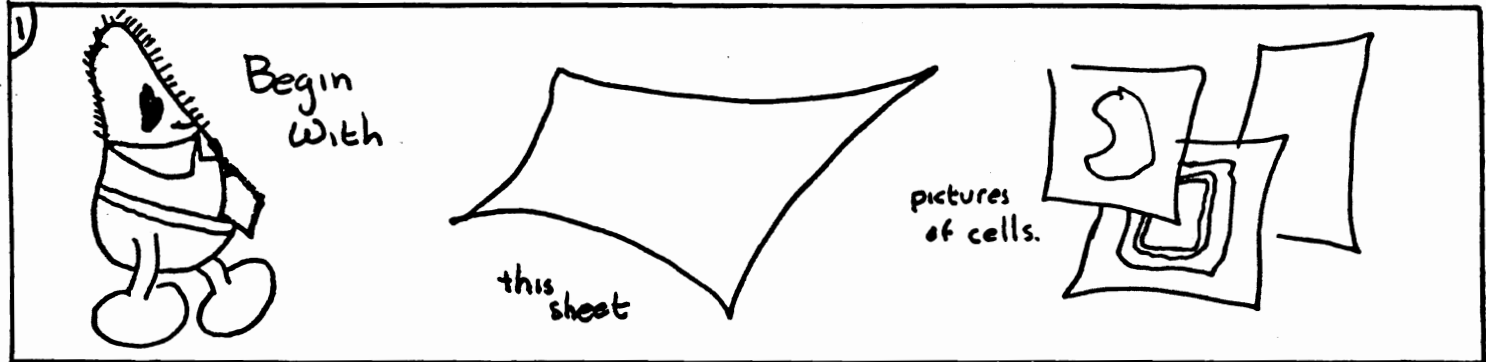
1 - Name 5 parts found in both plant and animal cells?

2 - How do you think cells stay alive? (use your text)

3 - How are plant and animal cells different?

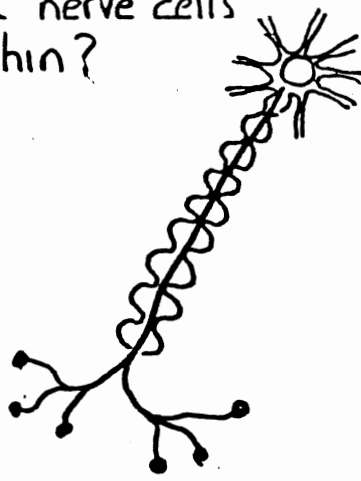
How can you tell cells apart?

Experiment 12



3) How are these cells different?

4) Why do you think nerve cells are long and thin?



5) How do you think muscle and bone cells work together?

6) Red blood cells carry oxygen to the body. White blood cells fight disease. Platelets, along with fibrinogen, help blood to clot.



7) When cells work together like members of a football team. They form a Tissue.

8) The cells in a tissue look alike. Tissues are named for the Jobs they do.

9) What do you think nerve tissue is made of?

Homework -

1) Why are tissues important?

2) How are tissues formed?

3) What is a neuron? (look it up)

10) The skin that covers your body is made of epithelial tissue consisting of epithelial cells.



Biology

Name

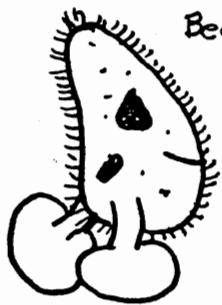
Class

Group No

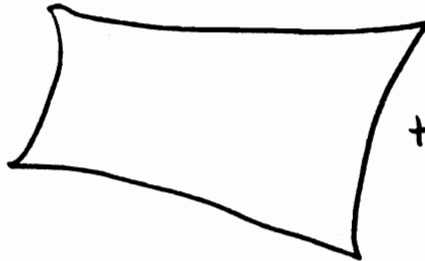
Experiment 13

How do tissues form organs?

1)



Begin With



this sheet

2)

How is a tissue formed?

3)

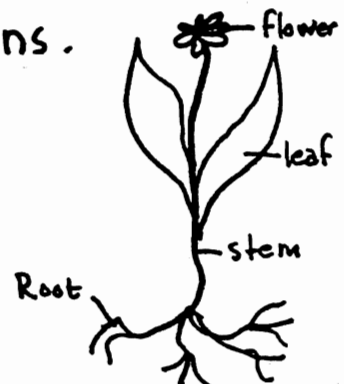
How can you identify a tissue?

4)

Groups of cells can work together. They form tissues. Groups of tissues can also work together. They will form organs.

5)

Plants have four (4) main organs.



Grambo

6) What might be the job of these organs of a plant?

Flower -

stem -

leaf -

root -

7) How does your arm know when to move?

8) Describe how you move your arm.

9) Nerves carry impulses to and from organs. Muscles and bones help move an organ. Blood carries food and oxygen to and from an organ.

10) Why is your arm considered an organ?

Homework -

Pick an organ and write a report of about 150 words on "Why it is important and how it works."

11) Some organs are: heart, eye, brain, tongue and the stomach.

List Others:

How do organs work together?

Experiment 14

1)

Begin With

this sheet.

2) Finish this chart:

Organ	Job
heart	
	smell
mouth	
eye	
flower	

Organ	Job
	hearing
brain	
skin	
	make food
roots	

3) What happens to food after it enters your mouth?

4) Food cannot go through your body in large lumps. Your body must change it to a more useful form, as a liquid

5) Cells work together to form tissues. Tissues working together can form organs. Organs, such as the mouth, esophagus, stomach, etc, can work together to form an organ system.

6) What is the job of these organ systems?

Digestive system -

respiratory system -

excretory system -

7) Why do you need organ systems?

8) Pick two (2) systems -
How are they similar?

Homework -

1- How do cells form organ systems?

9) If you saw plant cells under a microscope, how would you know they were plant cells and not animal cells?

10) Place a drop of pond water on a slide. Should you view it under high or low power? Why?

11) Many things live in pond water. Some are plants, some are one cell animals, some are multi cell animals. Some have a particular shape some do not. These cells reproduce, or make new cells, by dividing themselves.

Sample A
power _____
eyepiece _____
total magnification _____

Sample B
power _____
eyepiece _____
total magnification _____

12) Check your pond life sheet. What kind of things are living in your pond water?

Sink Water
power _____
eyepiece _____
total magnification _____



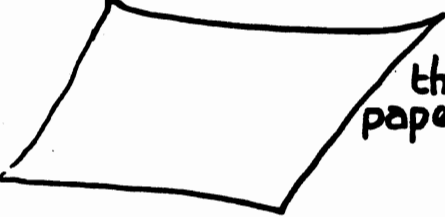
Dump Slides in Beaker on Desk

Homework -


1- How is pond water different from sink water?

Experiment 6


What are the needs of living things?

1)  Begin with plants   this paper

2) Look at the plants around the room. How do they survive?




3) Why must you water the plants? (Why do they need the water?)



4) Why do you eat food?

Why is food necessary for life?



5) How can/do animals get food?

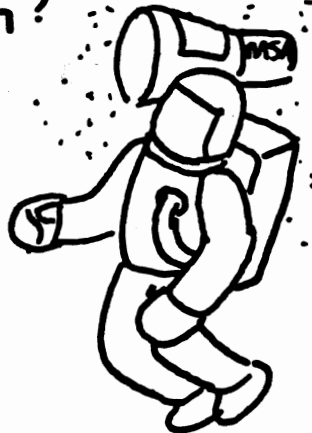
6) How can/do plants get food?

7) How would you feel if someone cut off your supply of air?



8) What are three (3) things necessary for life?

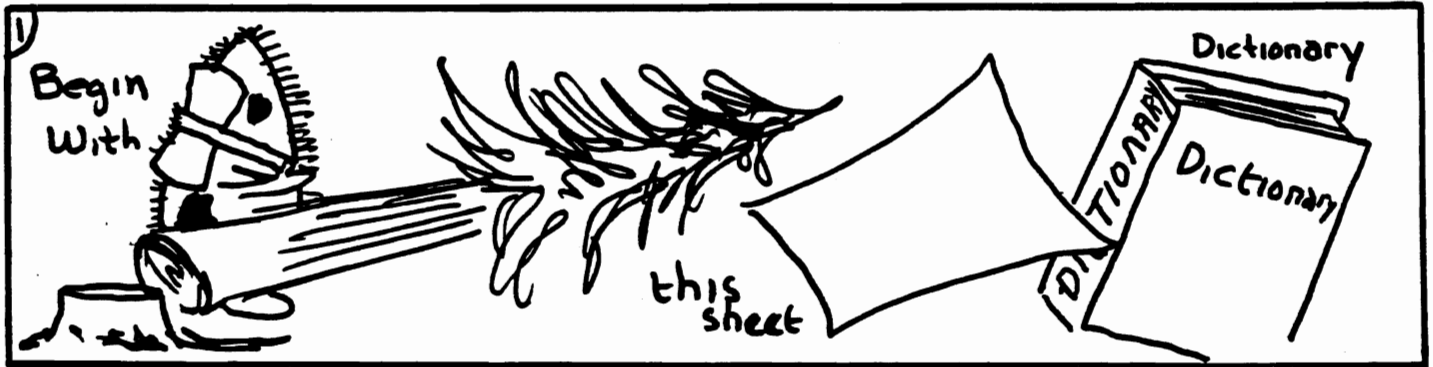
9) Why must astronauts bring food, oxygen (in air) and water (H_2O) with them?



Homework-

- 1)- What are the needs of a dog or cat?
- 2)- How might temperature affect living things?

What are life functions? Experiment 7



2) What are three (3) things you need to stay alive?

1-

2-

3-

3) In what ways are you like a tree?



4) How can you tell the difference between a live object and a dead (or non-living) object? (give at least 4 reasons)

5) How do living things get from one place to another?

Define
Locomotion-

6) Why do all living things need food?



7) How do you think your body uses the food?

8) How does your body feel when you run out of food? (In your body)

9) Why do you need air?

10) Why must you go to the bathroom?

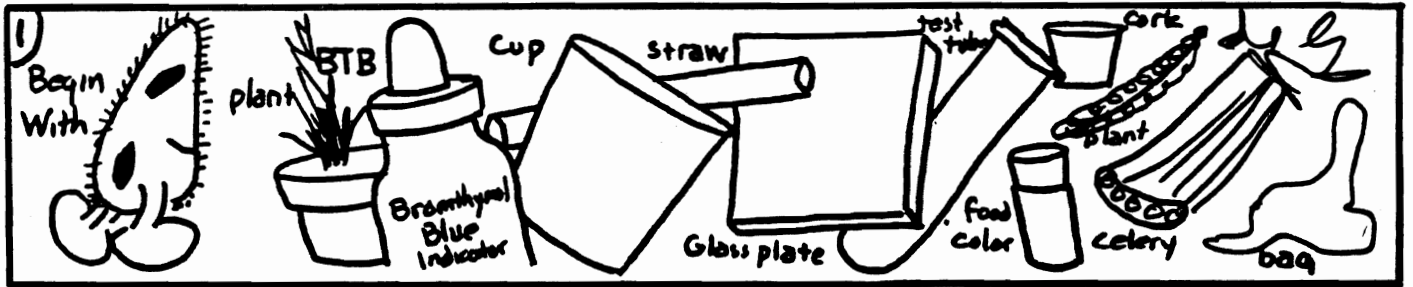
Homework- Define
respiration-

Urine -

waste product-

How can you study the life functions of a plant?

Experiment 8



2) Put three (3) drops of brom thymol blue (BTB) in a glass or test tube $\frac{1}{2}$ full of water. Put a straw into this blue solution and breath into it.

3) Describe what happens.

This is a color test for carbon dioxide gas

4) Breath on a glass plate

Describe what happens:

5) Why did the glass plate fog up?

6) Carbon dioxide gas as well as water vapor are removed from your body when you exhale.

7) Put a plant in a plastic bag. Tie the bag and put it in the sun. Look at it tomorrow.



8) How does the bag look the next day?

Why does it look this way?

9) Put an aquarium plant into a test tube of water. (Cover the plant with water). Add a few drops of BTB. Cover the test tube and put it in the sun.



10) How does the test tube look after a few days?

11) It seems plants as well as animals carry on the process of respiration or breathing.

12) Veins and arteries carry blood through animals. Plants do the same (but they don't carry blood). Put a celery stalk into some colored water.



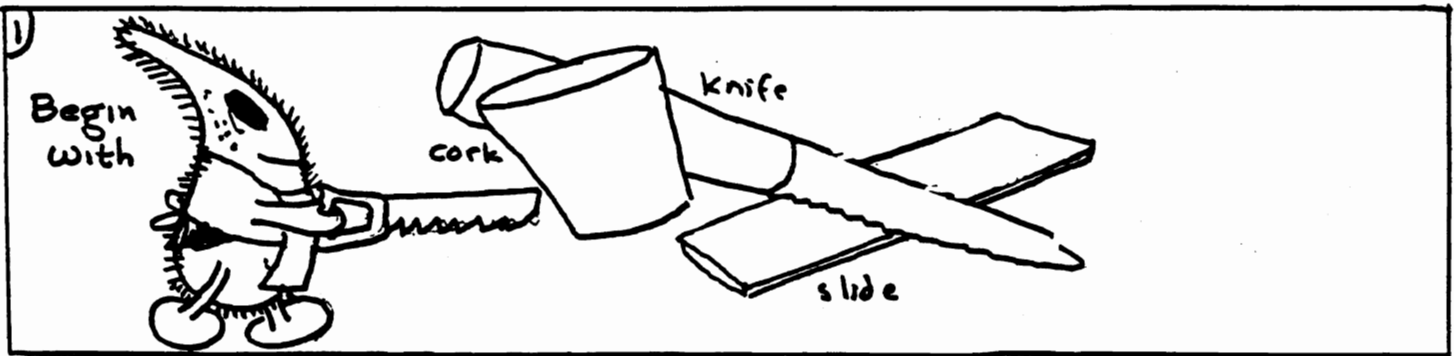
13) How does it look after a while.

Homework -

1- Why did the celery leaves change color?

What are living things made of?

Experiment 9



2) Cut a slice of cork very thin. Look at it under a microscope (use low power) Draw What You See

Power _____ X

Use Color

The diagram illustrates the preparation of a cork slice. Step 1 shows a cork being cut by a knife. Step 2 shows the resulting thin slice being placed on a slide. Step 3 shows the slide with the cork slice on it. To the right is a large empty circle for drawing, with the text 'Use Color' written above it. The word 'Power' is written above a horizontal line with an 'X' at the end, indicating a scale for magnification.

3) Describe, In Words, how the cork looked

Now look at it under high power

4) In what ways does high power differ from low power in the image you see?

5) You have just performed an experiment that was first done around 1800, by Robert Hooke, an English scientist. He called the boxes that you saw **cells**

6) After studying many plants and trees Hooke found that all these living things had cells. After much research many scientists along with Hooke came to a conclusion

7) In 1839 they came up with the **Cell Theory** which said:

- A) All living things are made of cells
- B) Cells carry on the life functions
- C) Cells make or produce new cells

8) In what ways do living and non-living things differ?

Homework -

1- Define - Cell -

9) Why are cells important?

2- What does the cell theory tell us?