

Tools of the Biologist

Appropriately label each picture with one of the following terms:

1- Dissecting Pin

5- Erlenmeyer flask

9- Blunt probe

13- Graduated cylinder

2- Test tube

6- Beaker holder

10- Florence Flask

14- Bunsen Burner

3- Scalpel

7- Eye dropper/Pipet

11- Apron

15- Tweezer

4- Goggles

8- Test tube holder

12- Beaker

16- Funnel



B. _____



C. _____



D. _____



E. _____



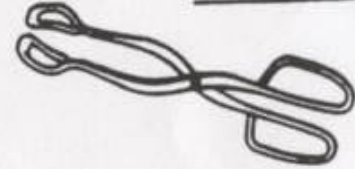
F. _____



H. _____



G. _____



A. _____



J. _____



K. _____



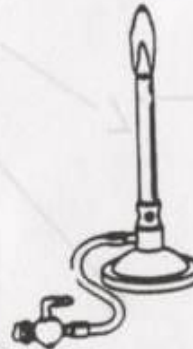
L. _____



M. _____



N. _____



O. _____



P. _____



- + ■ **Mirror/Light Source**
- **Diaphragm**
- **Ocular/eyepiece**
- **Coarse adjustment**
- **Fine adjustment**
- **Arm**
- **Nosepiece**

Stage

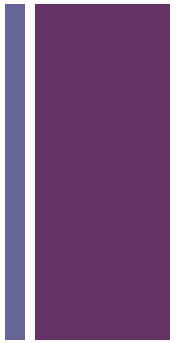
Body Tube

High power objective

Low power objective

Base

Stage clips



I Identify each part of the Compound Microscope & write down its function.

13. Eyepiece/Ocular – 10x magnification usually

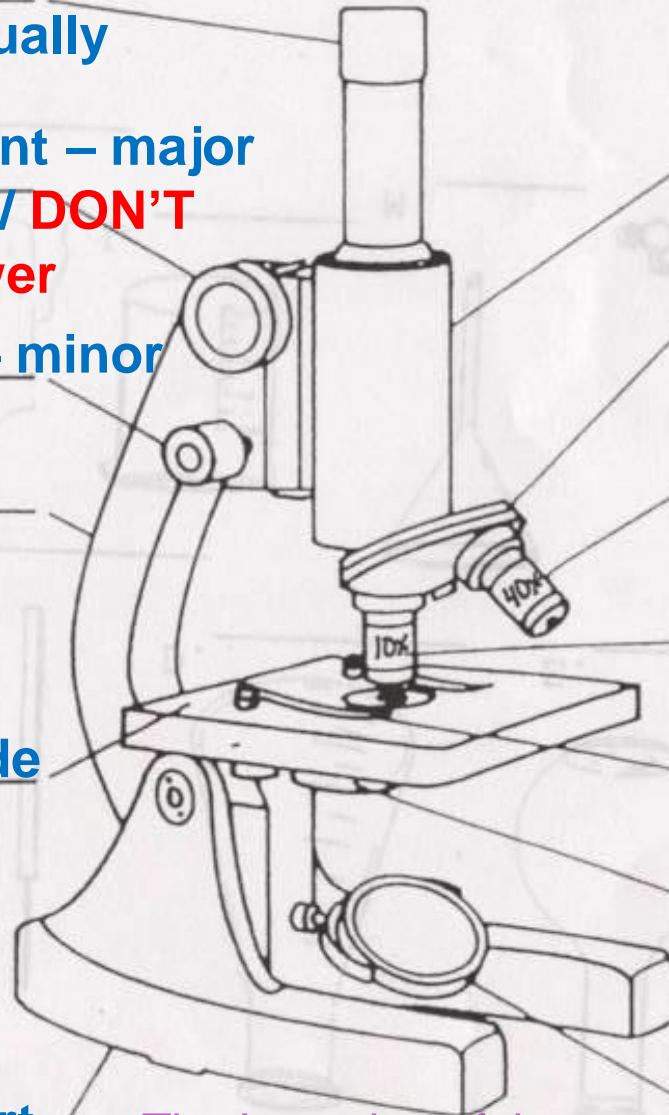
12. Coarse Adjustment – major changes in focus/ DON'T use on HIGH power

10. Fine Adjustment – minor changes in focus

9. Arm – for safe carrying

4. Stage – place slide here

1. Base – for support



11. Body tube

8. Nosepiece – rotates the objective lenses

7. High Power Objective (40x mag)

6. Low Power Objective (10x mag)

5. Stage Clips – hold specimen in place

3. Diaphragm – controls the amount of light on specimen

2. Light Source

The Invention of the Microscope - YouTube

+ The Compound Light Microscope

- One of the most important inventions in biology
- led to the discovery of the CELL
- In 1590 the first rudimentary microscope was developed, Later perfected by Galileo and later Leeuwenhoek



+ The Compound Light Microscope

Calculating Total Magnification

■ Multiply

Ocular magnification x objective lens magnification

Ex. If viewing a slide under low power what is the total magnification of the specimen? (assume ocular 10x)

Answer: ocular 10x X low power 10x
Total Magnification = 100x

+ The Compound Light Microscope

Calculating Total Magnification

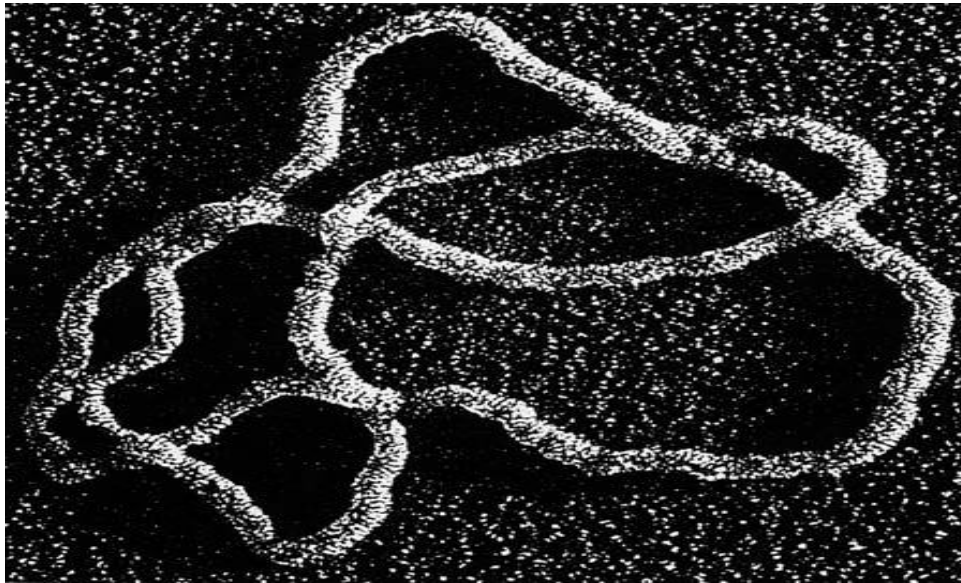
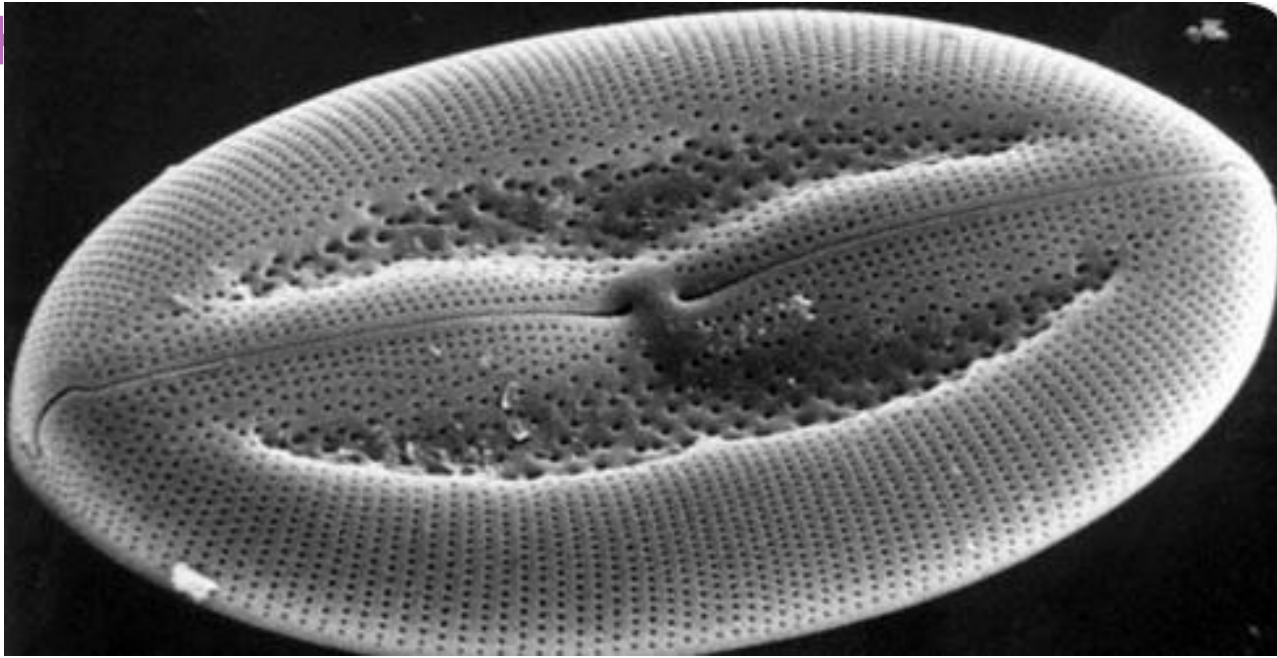
Complete the following:

<u>Objective</u>	<u>Total Magnification</u>
Scanning objective (4x)	40x
Low Power objective (10x)	100x
High Power objective (40x)	400x

+ The Electron Microscope

- Uses beams of electrons to magnify the image.
- Living specimens cannot be observed.







The Dissecting/Binocular Microscope

- Produces a 3-D image
- low magnification
- Useful for observing small organisms and body structures



DTX-10

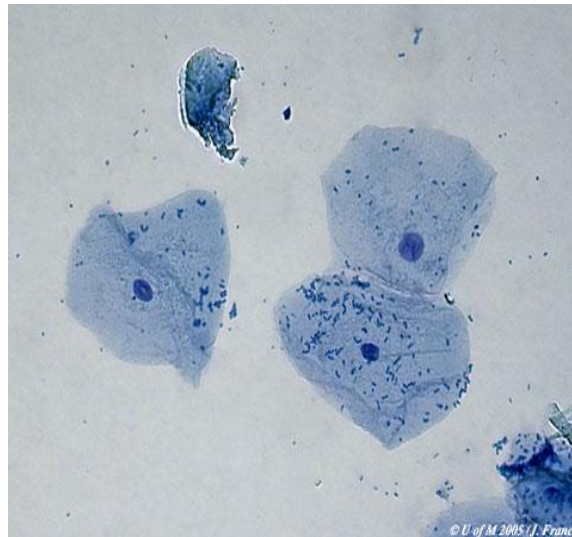
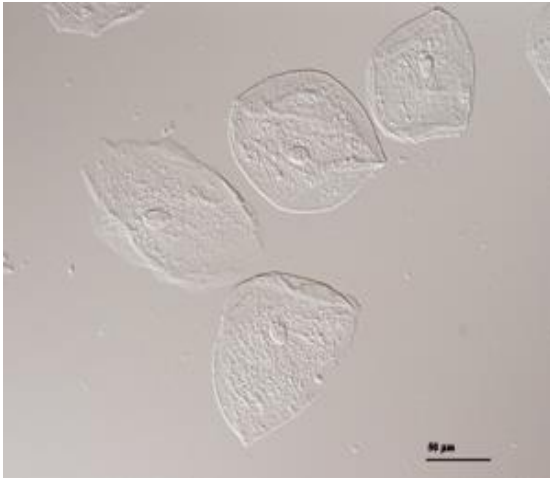


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+ Staining

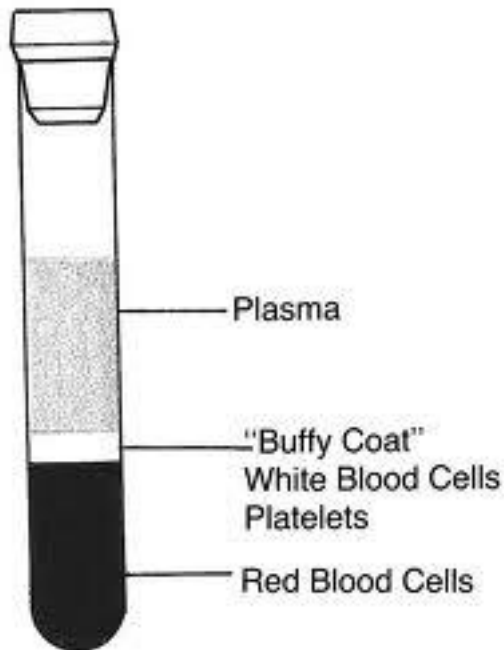
- Structures in a cell can be made visible by using solutions which stain them. (Methylene Blue or Lugol's iodine)



+ Separation Techniques

■ Ultracentrifuge

- Separates the parts of a cell according to their density by whirling them in a test tube at a high speed.



+ Microdissection Instruments

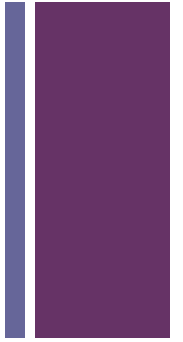
- Can be used under the microscope for removal, addition, or transfer of cell parts.





■ Of the following, which instrument is most commonly used to observe the external features of a grasshopper's abdomen?

- 1) ultracentrifuge
- 2) microdissection instrument
- 3) dissecting microscope
- 4) electron microscope





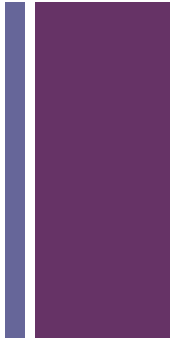
■ A student observed a Paramecium under the low power objective of a microscope (100x) and then under high power (400x). The image of the Paramecium under low power, compared to the image of the same Paramecium under high power, would be

1) smaller and in a darker field of view

2) smaller and in a brighter field of view

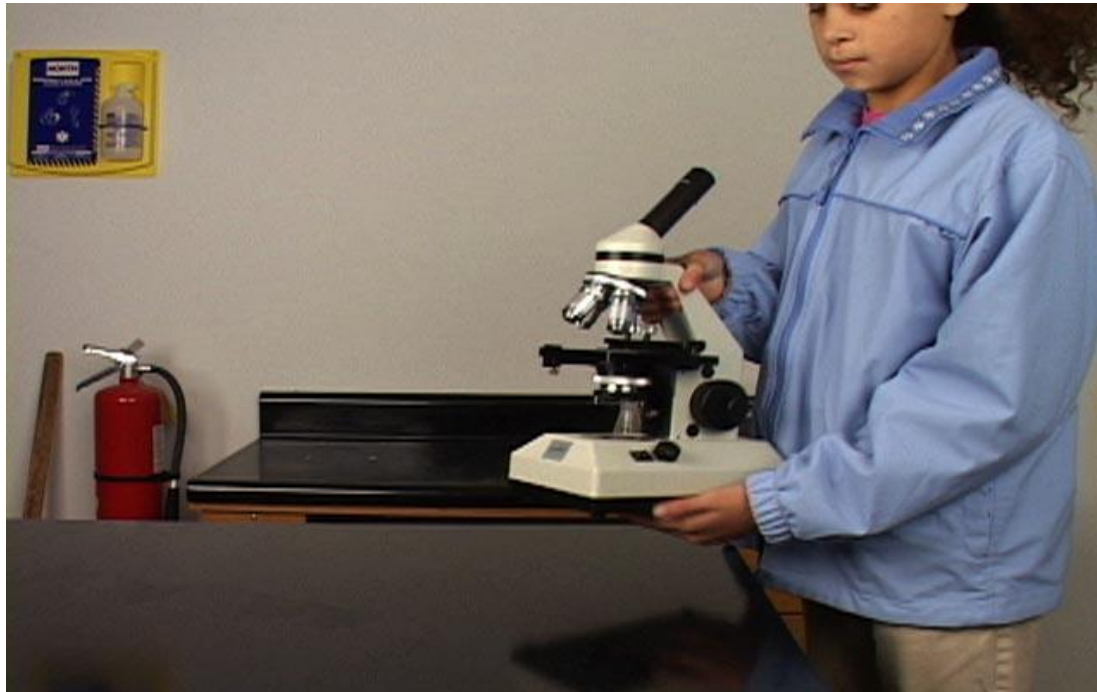
3) larger and in a darker field of view

4) larger and in a brighter field of view



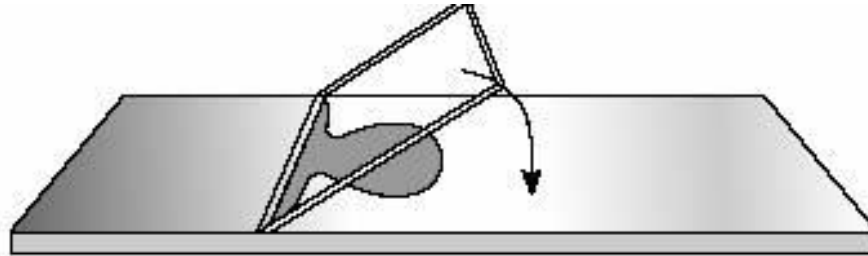
+ Microscope Safety and Care

- make sure cord is neatly wrapped
- carry with two hands (by arm and base)
- use lens paper to clean lens & stage



+ Slide Preparation

- Specimen must be THIN for light to pass through
- Stain may be needed to make specimen more visible
- Coverslip should be placed at a 45 degree angle to avoid air bubbles



[Making a Wet Mount
for Microscopy - 1:20](#)

+ Viewing a Slide

1. Always begin on the lowest available power (scanning lens)
 - Has widest and brightest field of view to locate specimen
2. Center specimen in the field of view (up is down, right is left)
3. Focus with coarse adjustment knob
4. Switch to low power and repeat #2 and #3
5. If switching to high power, only use the FINE adjustment to focus!
 - to prevent losing sight of your specimen & damaging the slide

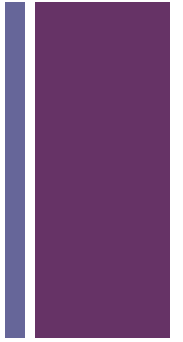


+ Measurement Conversion

Larger

Smaller

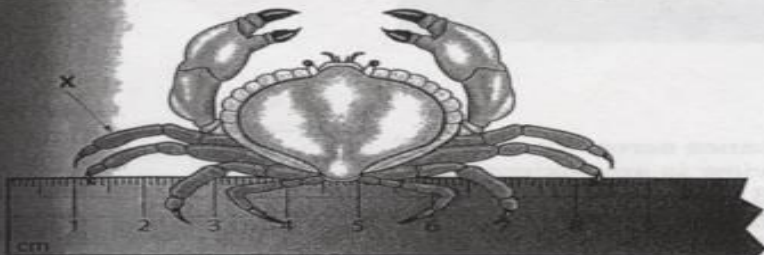
K H D U D C M



For an electronic balance, put the weighing paper on the balance and then use the re-zero button to set the balance to zero. Next, put the substance on the paper and read the mass. The re-zero button automatically subtracts the mass of the weighing paper from the total. The reading on the balance is the actual mass of the substance.

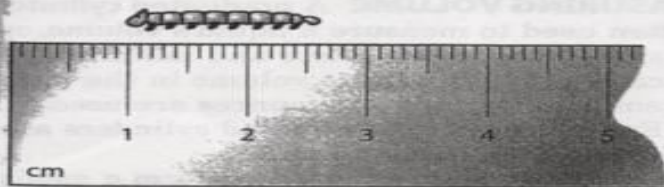
Review Questions

1. The crab shown in the following illustration has four pairs of walking legs and one pair of pincer legs. The crab is shown in its normal walking position.



In this position, what is the distance between the ends of the front pair of walking legs? (One of the front pair of walking legs is identified with an "X" in the illustration.) (1) 8.5 cm (2) 85 cm (3) 7.5 cm (4) 75 cm

2. State which piece of laboratory equipment you would use to accurately measure 10 grams of glucose.
3. Which piece of laboratory equipment would be used to most accurately measure the volume of a liquid? (1) beaker (2) balance (3) test tube (4) graduated cylinder
4. A student measured a larva using a metric ruler, as represented in the following diagram.

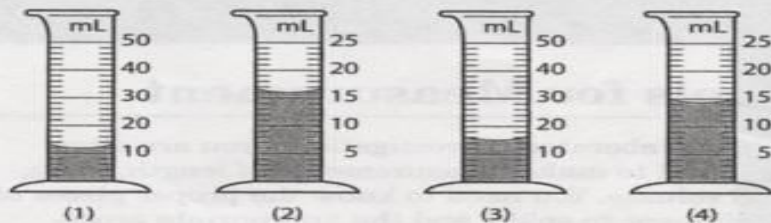


What is the length of the larva? (1) 26 cm (2) 26 mm (3) 16 cm (4) 16 mm

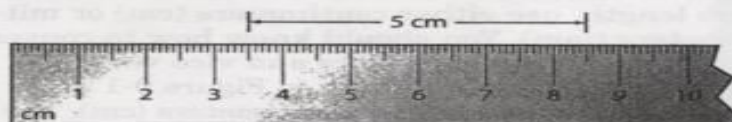
5. Draw a meniscus to represent a water level of 6 mL on the adjacent diagram of a graduated cylinder.



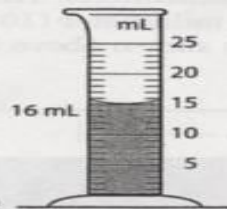
6. Which of the following graduated cylinders contains a volume of liquid closest to 15 mL?



7. Which of the following diagrams shows a correct measurement?



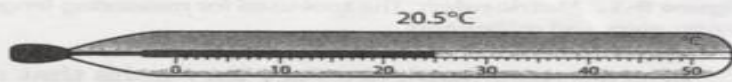
(1)



(2)



(3)



(4)