

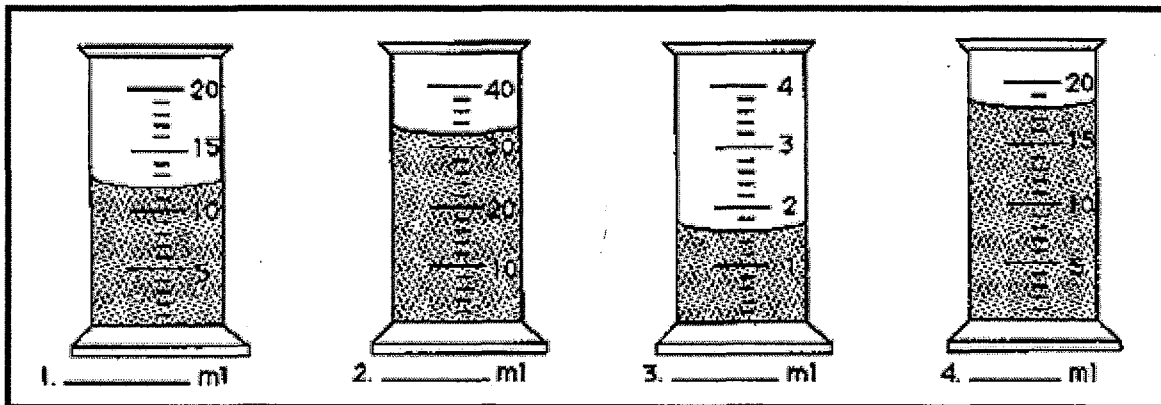
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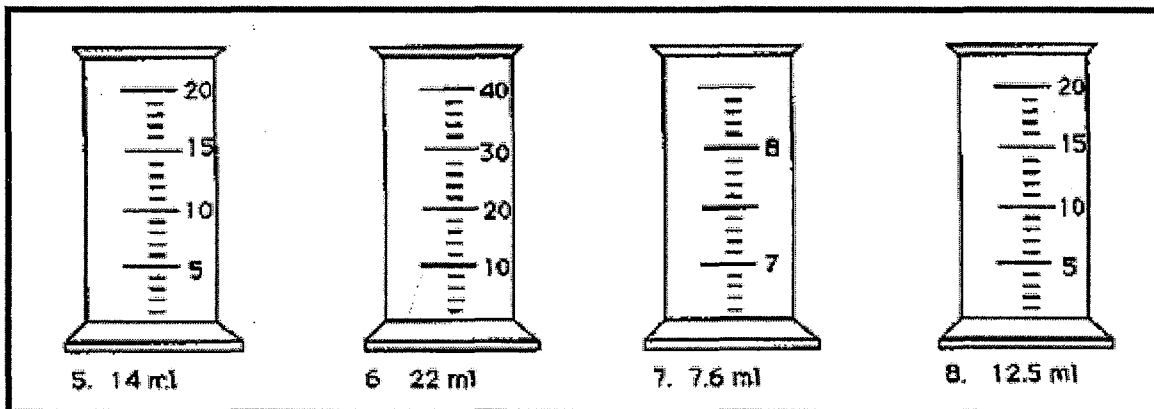
## Tools of the Biologist

**Directions:** Please complete the following problems directly in this packet. You may work with your table partner. Any unfinished questions should be completed for homework. This packet will be collected and graded.

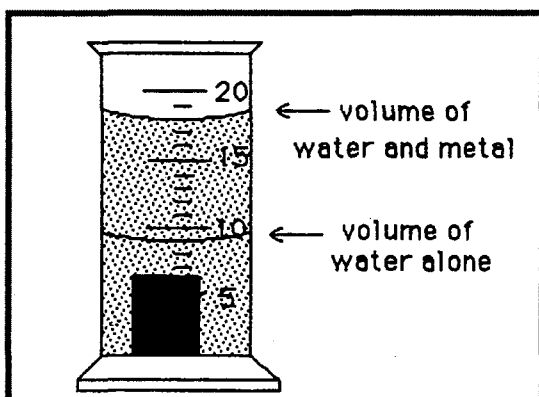
1. Record the measurement for each graduated cylinder pictured. Remember to calculate the graduation intervals correctly!



2. Draw in the correct meniscus on each of the graduated cylinders below:



3. What is the volume of the metal block?

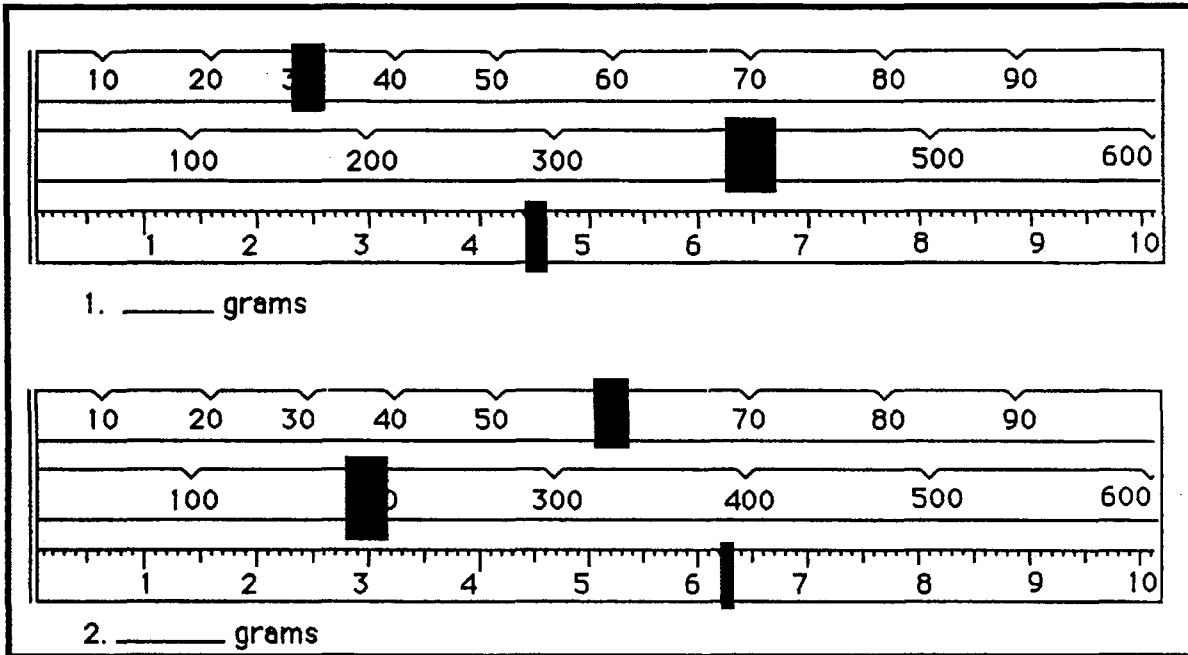


Answer: \_\_\_\_\_ mL.

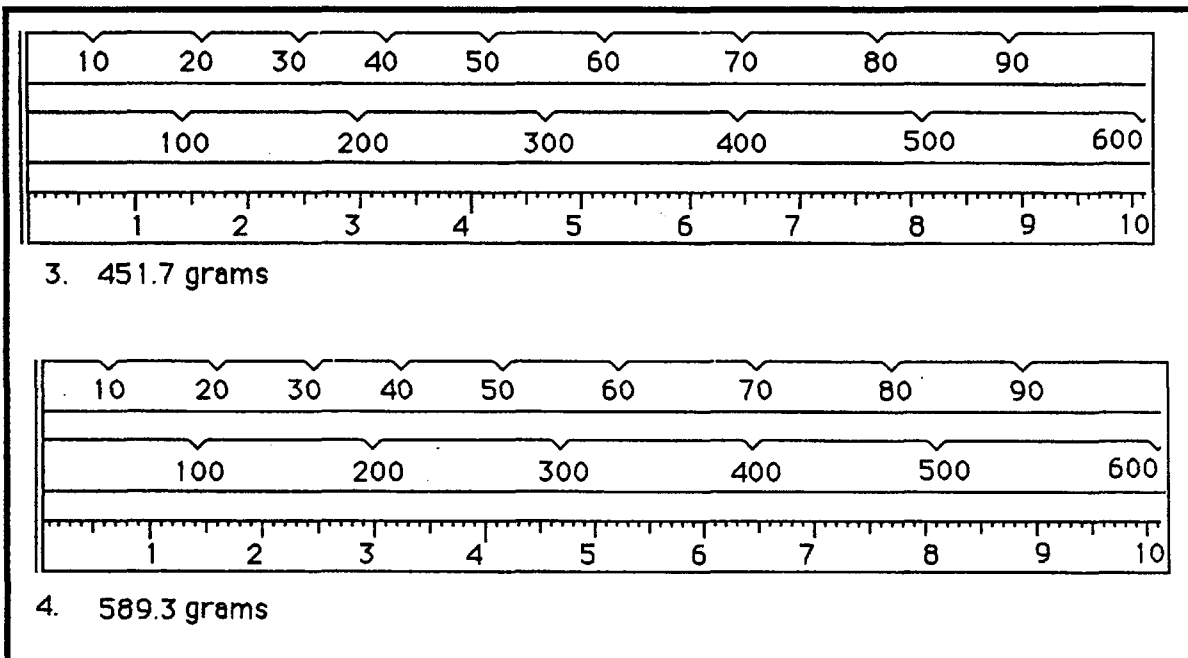
4. What is the mass of this metal block in grams?

Answer: The mass of the metal block is \_\_\_\_\_ grams.

5. Each of the two triple beam balances pictured below record specific measurements of certain objects. Examine each carefully and record the mass in grams for each balance in the space provided.

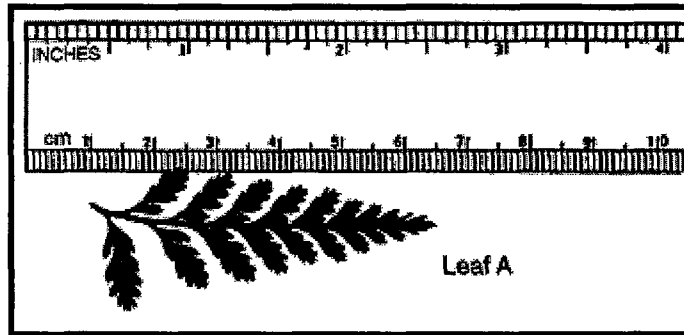


6. Mark the proper scales on each triple beam balance so that each balance properly reflects the mass of the given object.



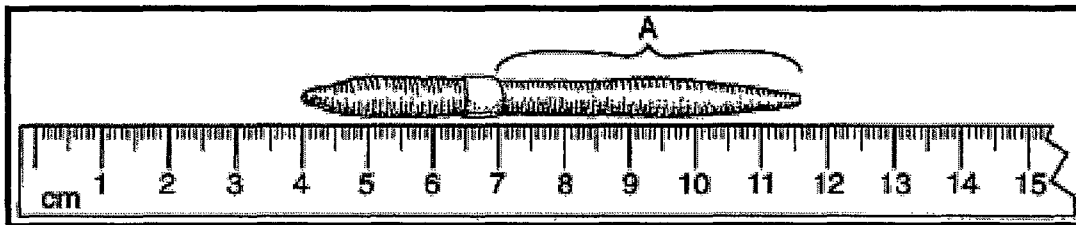
7. Follow the directions for the measurement of each line.
- a. Measure Line AA in centimeters (to the nearest 1/10). Convert this measurement to mm.  
AA. \_\_\_\_\_
  - b. Measure Line BB in millimeters (to the nearest 1/10). Convert this measure to  $\mu\text{m}$ .  
BB. \_\_\_\_\_
  - c. Measure Line CC in centimeters (to the nearest 1/10). Convert this measure to km.  
CC. \_\_\_\_\_

8. Using the ruler provided in the illustration below, calculate how long the leaf is in mm.



The leaf is \_\_\_\_\_ mm.

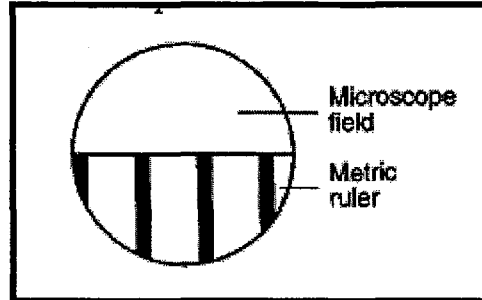
9. Determine the length of the earthworm pictured below in cm.



The earthworm measures \_\_\_\_\_ cm in length. The length of the earthworm in meters is \_\_\_\_\_ m.

This one may be a bit of a challenge, but it's really simple if you think it through!

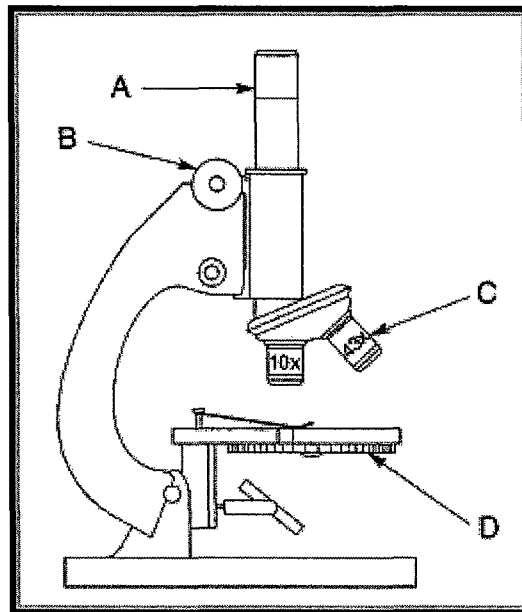
9. Each division of the metric ruler shown in the diagram below equals 1 millimeter.



a. The diameter of the field of vision is approximately \_\_\_\_\_  $\mu\text{m}$

b. Explain how you arrived at your answer. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

10. A compound light microscope is represented in the diagram below.



Identify the part of the microscope and describe the functions of each of these parts.

A. \_\_\_\_\_  
\_\_\_\_\_

B. \_\_\_\_\_  
\_\_\_\_\_

C. \_\_\_\_\_

\_\_\_\_\_

D. \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

11. Which piece of equipment would most likely be used to separate organelles (the parts of cells) from a mixture of crushed cells? (circle the correct answer).

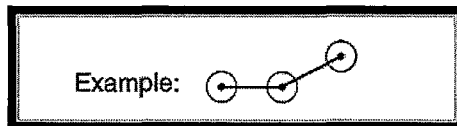
- 1 dissecting microscope
- 2 electron microscope
- 3 ultracentrifuge
- 4 microdissection instrument

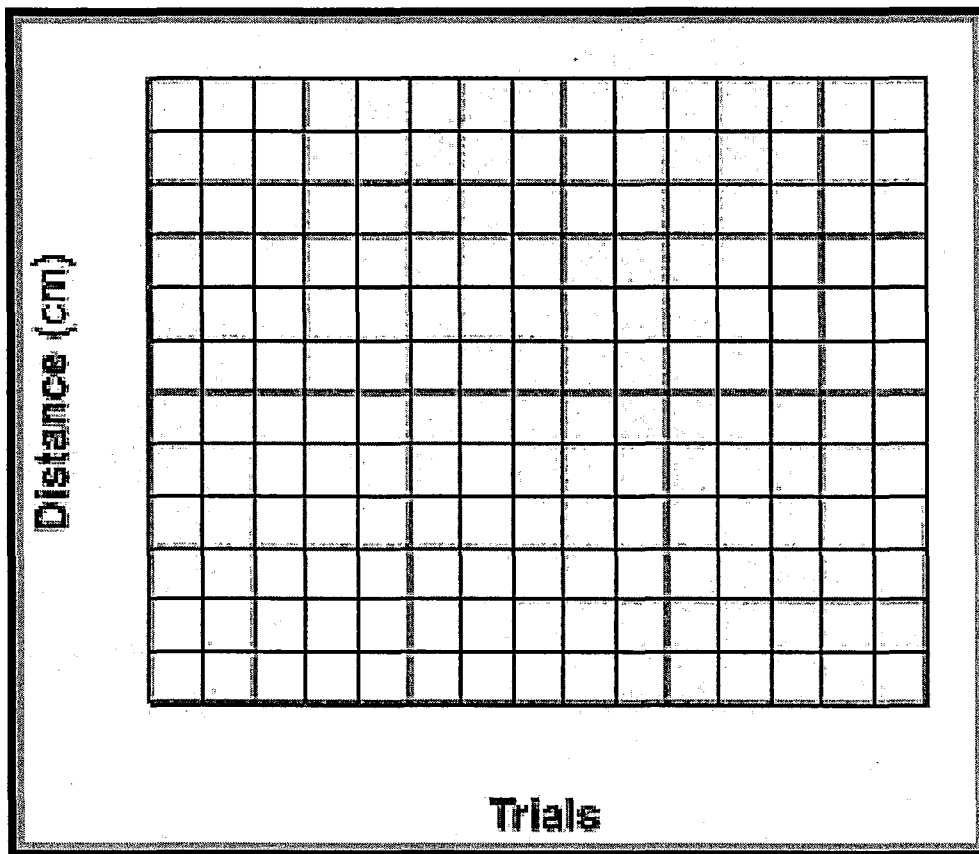
12. Reaction time is a measure of how quickly an individual responds to a stimulus. An activity was performed to determine the reaction time of a student. To do this, Ariana stood on her chair and suspended the zero end of a meter stick between her thumb and index finger. Gavin stood next to her, ready to catch the meter stick when Ariana let it go. The distance the meter stick dropped and the time it took for Gavin to catch the meter stick were recorded. This procedure was repeated four more times. The results are summarized in the data table below..

Trial	Distance (cm)	Time (sec)
1	90	0.43
2	75	0.39
3	50	0.32
4	45	0.30
5	35	0.29

Using the information in the data table, construct a line graph.

- a. Mark an appropriate scale on each labeled axis.
- b. Plot the data for distance on the graph. Surround each point with a small circle and connect the points.





c. If the meter stick was caught at the 70 centimeter mark, the amount of time needed to catch it would most likely be between (circle the correct answer).

- (1) 0.1 and 0.15 sec      (3) 0.3 and 0.32 sec  
(2) 0.2 and 0.3 sec      (4) 0.35 and 0.4 sec

d. Using one or more complete sentences, state the relationship between the number of trials and the reaction time.