

Name _____

Hour _____

MEASURING MATTER - STUDY GUIDE

Goal 1:

1. Measure the lines to the nearest millimeter and to the nearest tenth of a centimeter (2.3 cm).

71 mm 7.1 cm

Within 1mm is acceptable answer

136 mm 13.6 cm

11 mm 1.1 cm

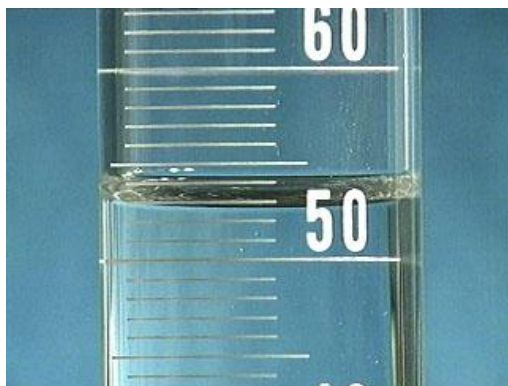
2. List the following in order from longest to shortest.

78 m, 78 mm, 78 cm, 78 km

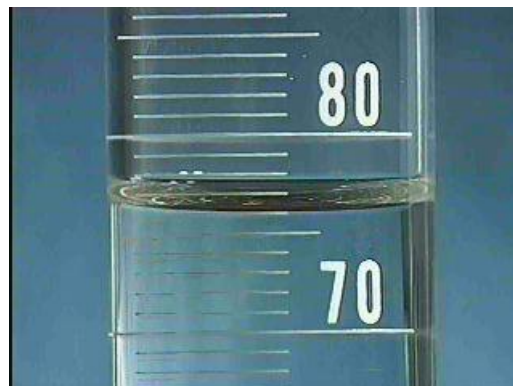
78 km, 78 m, 78 cm, 78 mm

Goal 2:

3. Define volume – **The amount of space an object takes up; “how much there is”**
4. What is the volume of the liquids below? Include the correct units. Write the volume on the lines below.



53 mL



76 mL

5. List the volumes in order from smallest to largest. *3 L, 3 kL, 3 mL*

3 mL, 3 L, 3 kL

6. How do you accurately measure the volume of a liquid in a graduated cylinder?

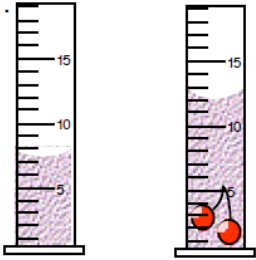
Set the graduated cylinder on a flat surface at eye level, and measure from the BOTTOM OF THE MENISCUS

Goal 3:

7. What are the steps in finding the volume of an irregularly shaped solid object such as a key? Number your steps.

1. Pour water into a graduated cylinder and record the measure in mL.
2. Carefully slide the object in and measure and record the new measure in mL.
3. Subtract the two measures and change the units to cm^3 since it is a solid object.

8. Find the volume of the cherry by using water displacement. Include the correct units.



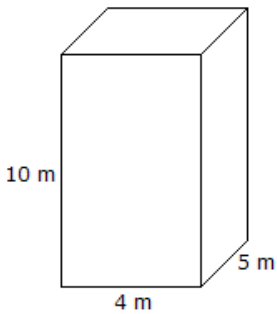
$$12 \text{ mL} - 7 \text{ mL} = 5 \text{ mL} = 5 \text{ cm}^3$$

Goal 4:

9. How do you find the volume of a regularly shaped solid object?

Measure the length, width and height. Multiply $L \times W \times H$. Units are cubed.

10. Find the volume of the object below. Include correct units.

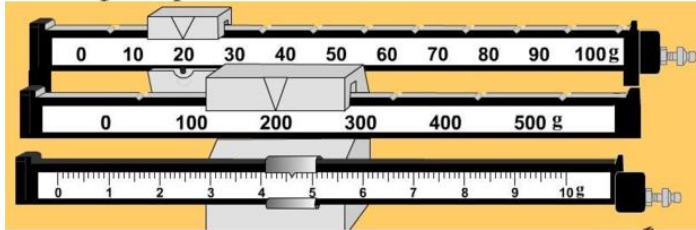


$$L \times W \times H = 10 \text{ m} \times 4 \text{ m} \times 5 \text{ m} = 200 \text{ m}^3$$

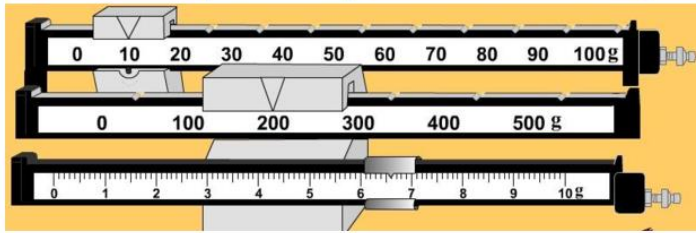
Goal 5:

11. Define mass. **Mass is the amount of matter in an object or substance.**

12. Read the pictures of the triple beam balances below. Include correct units.



224.6 grams



216.6 grams

Goal 6:

13. What is the difference between mass and weight?

Mass is the amount of matter in an object and weight is a measure of the amount of gravitational pull on an object.

14. Describe what happens to your weight and mass when you go to the moon and Jupiter.

Your mass will be the same on Earth, the moon, and Jupiter. However, your weight will be less on the moon and more on Jupiter due to the gravitational pull. The moon has less gravity and Jupiter has much more gravity.

Goal 7:

15. A liquid has a volume of 15 mL and a mass of 30 g. What is the density of this liquid? Include correct units.

$$D = \frac{M}{V} = \frac{30 \text{ g}}{15 \text{ mL}} = 2.0 \text{ g/mL}$$

16. A pencil has a mass of 24 g and a volume of 11 cm³. Find the density of the pencil. Include correct units.

$$D = \frac{M}{V} = \frac{24 \text{ g}}{11 \text{ cm}^3} = 2.18 \text{ g/cm}^3$$

17. An object has the dimensions of 2.3 cm by 8.9 cm by 1.4 cm. The mass of this object is 46 g. What is the density of this object? Include correct units. $V = L \times W \times H = 28.66 \text{ cm}^3$

$$D = \frac{M}{V} = \frac{46 \text{ g}}{28.66 \text{ cm}^3} = 1.61 \text{ g/cm}^3$$

18. A graduated cylinder with water in it reads 62 mL. You place a toy car in the gc to find the volume. The water level rises to 78 mL after you drop in the toy car. The mass of the toy car is 93 g. Find the density of the toy car. Include correct units. $V = 78 \text{ mL} - 62 \text{ mL} = 16 \text{ cm}^3$

$$D = \frac{M}{V} = \frac{93 \text{ g}}{16 \text{ cm}^3} = 5.81 \text{ g/cm}^3$$

Goal 8:

19. Define density – **Density is the amount of mass in a given volume (space).**

20. What is the equation for density? $D = \frac{M}{V}$ $D = \frac{\text{heart}}{\text{line}}$

21. Which object has a greater density, a sponge or a brick? Explain why or how you know.

A brick has the greater density since it has more mass in the same amount of space. The two have the same volume, but the brick is heavier because it has more mass which means it is more dense.

22. What is the density of water? Would an object with a density of 0.78 g/cm³ sink or float in water?

Water has a density of 1.0 g/mL.

An object with a density of 0.78 g/cm³ would float in water since it is less than 1.0 g/mL.

23. A liquid has a density of 2.34 g/mL. If you drop an object with a density of 3.4 g/cm³ in the liquid, does it sink or float? How do you know?

The object will sink because it has a greater density than the liquid.

24. Why does olive oil settle on top of water in a graduated cylinder?

The olive oil settles on top of the water because it is less dense than the water. Water has a density of 1.0 g/mL, so the oil's density must be less than 1.0 g/mL.

Goal 9:

Directions: Write all possible metric units for numbers 32-37.

25. Mass **_mg, g, kg_** _____

26. Solid Density **_g/cm³, kg/m³_** _____

27. Liquid Density **___g/mL, kg/L_** _____

28. Liquid Volume **___mL, L, kL_** _____

29. Solid Volume **___mm³, cm³, m³, km³_** _____

30. Length **_mm, cm, m, km_** _____

31. What metric unit would you use for the density of a liquid? **_g/mL_**

32. What metric unit would you use to measure the distance you drive in a car? **_km_**

33. What metric unit would you use to measure the mass of a person? **_kg_**

34. What metric unit would you use to measure the density of a golf ball? **___g/cm³_**

35. What metric unit would you use to measure the volume of soda? **___mL or L_**

Goal 10:

36. Circle all of the metric units below. Leave non-metric units un-circled.

inches **millimeters** feet miles **kilometers** yards **centimeters** **meters**

Goal 11:

Kilo-

Hecto-

Deka-

Base (M,L,G)

Deci-

Centi-

Milli-

37. Convert 123.4 mm to km

0.0001234 km

38. Convert 0.0428 kg to g

42.8 g

39. Convert 93 cm to m

0.93 m

40. Convert 23.6 L to mL

23,600 mL