

CHAPTER 2 REVIEW

Measurements and Calculations

SECTION 1

SHORT ANSWER Answer the following questions in the space provided.

1. Determine whether each of the following is an example of *observation and data*, a *theory*, a *hypothesis*, a *control*, or a *model*.

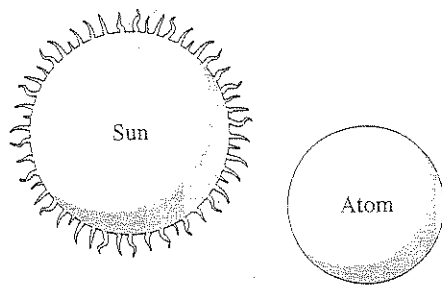
- _____ a. A research team records the rainfall in inches per day in a prescribed area of the rain forest. The square footage of vegetation and relative plant density per square foot are also measured.
- _____ b. The intensity, duration, and time of day of the precipitation are noted for each precipitation episode. The types of vegetation in the area are recorded and classified.
- _____ c. The information gathered is compared with the data on the average precipitation and the plant population collected over the last 10 years.
- _____ d. The information gathered by the research team indicates that rainfall has decreased significantly. They propose that deforestation is the primary cause of this phenomenon.

2. "When 10.0 g of a white, crystalline sugar are dissolved in 100. mL of water, the solution is observed to freeze at -0.54°C , not 0.0°C . The system is denser than pure water." Which parts of these statements represent quantitative information, and which parts represent qualitative information?

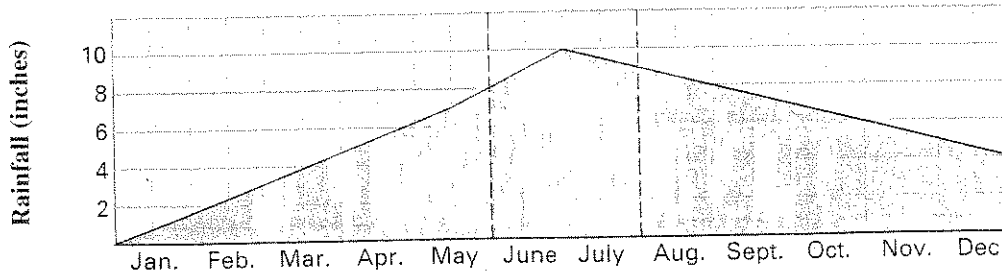
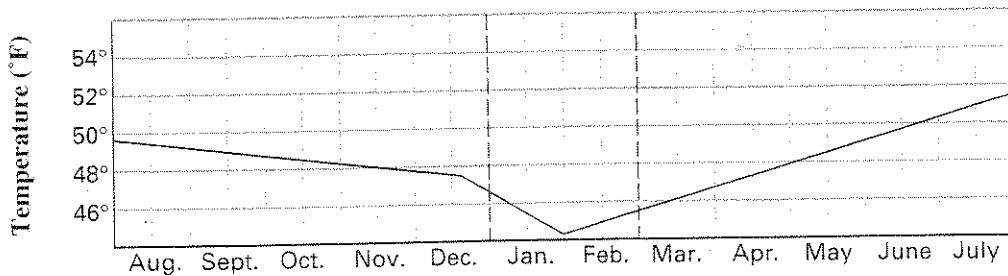
3. Compare and contrast a model with a theory.

SECTION 1 continued

4. Evaluate the models shown below. Describe how the models resemble the objects they represent and how they differ from the objects they represent.



5. _____ How many different variables are represented in the two graphs shown below?
 a. one b. two c. three d. four



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SECTION 2

SHORT ANSWER Answer the following questions in the space provided.

1. Complete the following conversions:

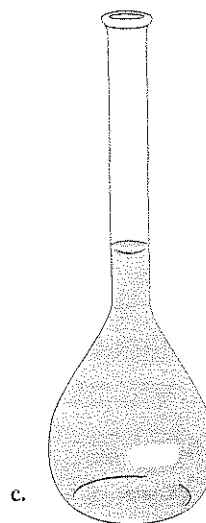
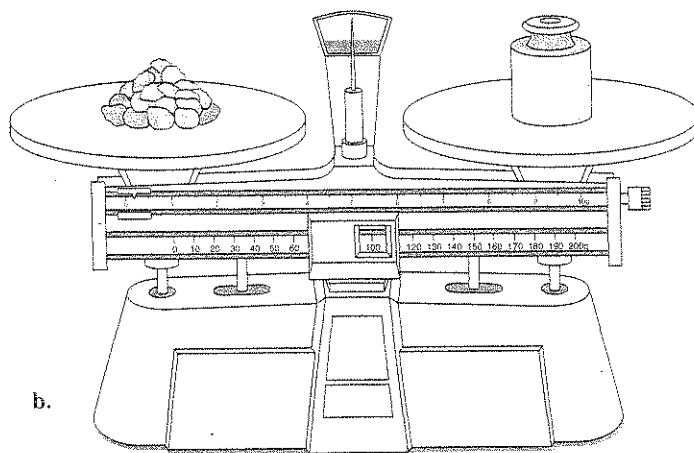
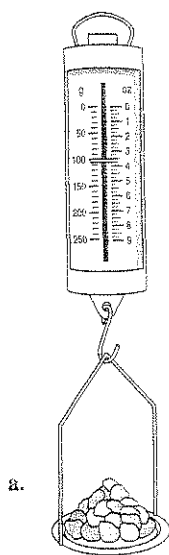
a. 100 mL = _____ L

b. 0.25 g = _____ cg

c. 400 cm³ = _____ L

d. 400 cm³ = _____ m³

2. For each measuring device shown below, identify the quantity measured and tell when it would remain constant and when it would vary.



SECTION 2 continued

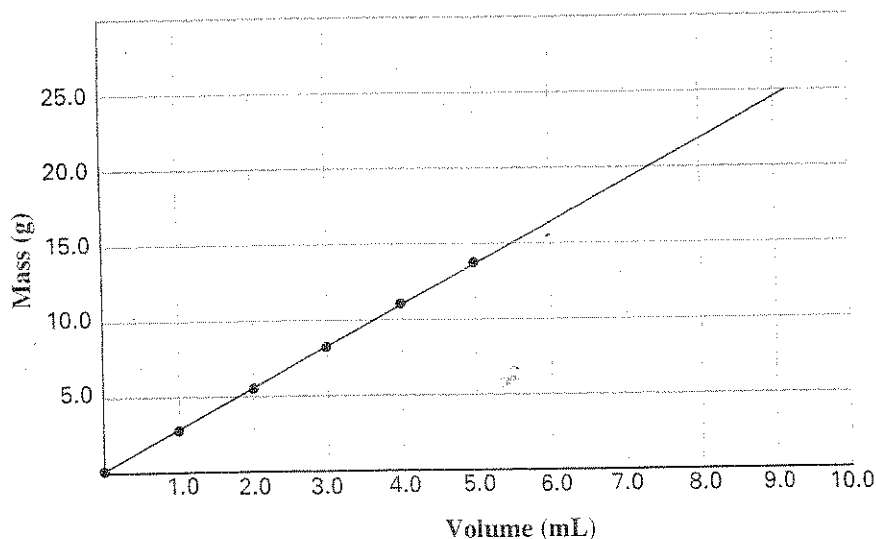
3. Use the data found in **Table 4** on page 38 of the text to answer the following questions:

- _____ a. If ice were denser than liquid water at 0°C, would it float or sink in water?
- _____ b. Water and kerosene do not dissolve readily in one another. If the two are mixed, they quickly separate into layers. Which liquid floats on top?
- _____ c. The other liquids in **Table 4** that do not dissolve in water are gasoline, turpentine, and mercury. Which of these liquids would settle to the bottom when mixed with water?

4. Use the graph of the density of aluminum below to determine the approximate mass of aluminum samples with the following volumes.

- _____ a. 8.0 mL
- _____ b. 1.50 mL
- _____ c. 7.25 mL
- _____ d. 3.50 mL

Mass vs. Volume of Aluminum



PROBLEMS Write the answer on the line to the left. Show all your work in the space provided.

5. _____ Aluminum has a density of 2.70 g/cm^3 . What would be the mass of a sample whose volume is 10.0 cm^3 ?
6. _____ A certain piece of copper wire is determined to have a mass of 2.00 g per meter. How many centimeters of the wire would be needed to provide 0.28 g of copper?

CHAPTER 2 REVIEW

Measurements and Calculations

SECTION 3

SHORT ANSWER Answer the following questions in the space provided.

1. Report the number of significant figures in each of the following values:

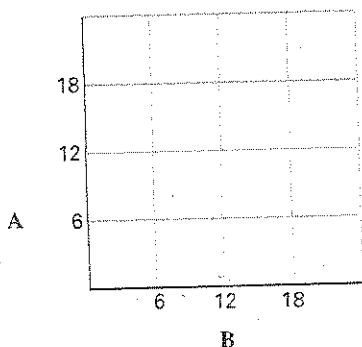
- | | |
|----------------------|--------------------------------|
| _____ a. 0.002 37 g | _____ d. 64 mL |
| _____ b. 0.002 037 g | _____ e. 1.3×10^2 cm |
| _____ c. 350. J | _____ f. 1.30×10^2 cm |

2. Write the value of the following operations using scientific notation.

- | |
|--|
| _____ a. $\frac{10^3 \times 10^{-6}}{10^{-2}}$ |
| _____ b. $\frac{8 \times 10^3}{2 \times 10^5}$ |
| _____ c. $3 \times 10^3 + 4.0 \times 10^4$ |

3. The following data are given for two variables, A and B:

A	B
18	2
9	4
6	6
3	12



a. In the graph provided, plot the data.

- | | |
|-------|---|
| _____ | b. Are A and B directly or inversely proportional? |
| _____ | c. Do the data points form a straight line? |
| _____ | d. Which equation fits the relationship shown by the data?
$\frac{A}{B} = k$ (a constant) or $A \times B = k$ (a constant) |
| _____ | e. What is the value of k? |

SECTION 3 continued

4. Carry out the following calculations. Express each answer to the correct number of significant figures and use the proper units.

_____ a. $37.26 \text{ m} + 2.7 \text{ m} + 0.0015 \text{ m} =$

_____ b. $256.3 \text{ mL} + 2 \text{ L} + 137 \text{ mL} =$

_____ c. $\frac{300. \text{ kPa} \times 274.57 \text{ mL}}{547 \text{ kPa}} =$

_____ d. $\frac{346 \text{ mL} \times 200 \text{ K}}{546.4 \text{ K}} =$

5. Round the following measurements to three significant figures.

_____ a. 22.77 g

_____ b. 14.62 m

_____ c. 9.3052 L

_____ d. 87.55 cm

_____ e. 30.25 g

PROBLEMS Write the answer on the line to the left. Show all your work in the space provided.

6. A pure solid at a fixed temperature has a constant density. We know that

$$\text{density} = \frac{\text{mass}}{\text{volume}} \text{ or } D = \frac{m}{V}$$

- _____ a. Are mass and volume directly proportional or inversely proportional for a fixed density?
- _____ b. If a solid has a density of 4.0 g/cm^3 , what volume of the solid has a mass of 24 g?

7. A crime-scene tape has a width of 13.8 cm. A long strip of it is torn off and measured to be 56 m long.

_____ a. Convert 56 m into centimeters.

_____ b. What is the area of this rectangular strip of tape, in cm^2 ?

CHAPTER 2 REVIEW*Measurements and Calculations***MIXED REVIEW****SHORT ANSWER** Answer the following questions in the space provided.

1. Match the description on the right to the most appropriate quantity on the left.

- | | |
|--------------------------|--|
| _____ 2 m^3 | (a) mass of a small paper clip |
| _____ 0.5 g | (b) length of a small paper clip |
| _____ 0.5 kg | (c) length of a stretch limousine |
| _____ 600 cm^2 | (d) volume of a refrigerator compartment |
| _____ 20 mm | (e) surface area of the cover of this workbook |
| | (f) mass of a jar of peanut butter |

2. _____ A measured quantity is said to have good accuracy if

- (a) it agrees closely with the accepted value.
- (b) repeated measurements agree closely.
- (c) it has a small number of significant figures.
- (d) all digits in the value are significant.

3. A certain sample with a mass of 4.00 g is found to have a volume of 7.0 mL. To calculate the density of the sample, a student entered $4.00 \div 7.0$ on a calculator. The calculator display shows the answer as 0.571429.

- _____ a. Is the setup for calculating density correct?
- _____ b. How many significant figures should the answer contain?

4. It was shown in the text that in a value such as 4000 g, the precision of the number is uncertain. The zeros may or may not be significant.

- _____ a. Suppose that the mass was determined to be 4000 g. How many significant figures are present in this measurement?
- _____ b. Suppose you are told that the mass lies somewhere between 3950 and 4050 g. Use scientific notation to report the value, showing an appropriate number of significant figures.

5. If you divide a sample's mass by its density, what are the resulting units?

MIXED REVIEW continued

6. Three students were asked to determine the volume of a liquid by a method of their choosing. Each performed three trials. The table below shows the results. The actual volume of the liquid is 24.8 mL.

	Trial 1 (mL)	Trial 2 (mL)	Trial 3 (mL)
Student A	24.8	24.8	24.4
Student B	24.2	24.3	24.3
Student C	24.6	24.8	25.0

- _____ a. Considering the average of all three trials, which student's measurements show the greatest accuracy?
- _____ b. Which student's measurements show the greatest precision?

PROBLEMS Write the answer on the line to the left. Show all your work in the space provided.

7. _____ A single atom of platinum has a mass of 3.25×10^{-22} g. What is the mass of 6.0×10^{23} platinum atoms?

8. A sample thought to be pure lead occupies a volume of 15.0 mL and has a mass of 160.0 g.

- _____ a. Determine its density.
- _____ b. Is the sample pure lead? (Refer to **Table 4** on page 38 of the text.)
- _____ c. Determine the percentage error, based on the accepted value for the density of lead.