

## REVIEWING CONCEPTS

1. How does quantitative information differ from qualitative information? (2-1)
2. What is a hypothesis? (2-1)
3. a. What is a model in the scientific sense?  
b. How does a model differ from a theory? (2-1)
4. Why is it important for a measurement system to have an international standard? (2-2)
5. How does a quantity differ from a unit? Use two examples to explain the difference. (2-2)
6. List the seven SI base units and the quantities they represent. (2-2)
7. What is the numerical equivalent of each of the following SI prefixes?  
a. kilo-                                  d. micro-  
b. centi-                                 e. milli-  
c. mega- (2-2)
8. Identify the SI unit that would be most appropriate for expressing the length of the following.  
a. width of a gymnasium  
b. length of a finger  
c. distance between your town and the closest border of the next state  
d. length of a bacterial cell (2-2)
9. Identify the SI unit that would be most appropriate for measuring the mass of each of the following objects.  
a. table  
b. coin  
c. a 250 mL beaker (2-2)
10. Explain why the second is not defined by the length of the day. (2-2)
11. a. What is a derived unit?  
b. What is the SI derived unit for area? (2-2)
12. a. List two SI derived units for volume.  
b. List two non-SI units for volume, and explain how they relate to the cubic centimeter. (2-2)
13. a. Why are the units used to express the densities of gases different from those used to express the densities of solids or liquids?  
b. Name two units for density.  
c. Why is the temperature at which a density is measured usually specified? (2-2)
14. b. Which of the liquids will sink in milk?
15. a. Define *conversion factor*.  
b. Explain how conversion factors are used. (2-2)
16. Contrast accuracy and precision. (2-3)
17. a. Write the equation that is used to calculate percent error.  
b. Under what condition will percent error be negative? (2-3)
18. How is the average for a set of values calculated?
19. What is meant by a mass measurement expressed in this form:  $4.6 \text{ g} \pm 0.2 \text{ g}$ ?
20. Suppose a graduated cylinder were not correctly calibrated. How would this affect the results of a measurement? How would it affect the results of a calculation using this measurement?
21. Round each of the following measurements to the number of significant figures indicated.  
a. 67.029 g to three significant figures  
b. 0.15 L to one significant figure  
c. 52.8005 mg to five significant figures  
d. 3.174 97 mol to three significant figures (2-3)
22. State the rules governing the number of significant figures that result from each of the following operations.  
a. addition and subtraction  
b. multiplication and division (2-3)
23. What is the general form for writing numbers in scientific notation? (2-3)
24. a. State the general equation for quantities that are directly proportional.  
b. For two directly proportional quantities, what happens to one variable when the other increases? (2-3)
25. a. State the general equation for quantities that are inversely proportional.  
b. For two inversely proportional quantities, what happens to one variable when the other increases? (2-3)
26. Arrange in proper order the following four basic steps in working out the solution to a problem: compute, plan, evaluate, analyze. (2-3)