Name: _____

Homework was checked against the key with wrong answers corrected.

Parent Signature: _____

Chapter 3: Scientific Measurement

Each numbered question is worth 1 point. Total possible = 39 points

Section 3.1

1. a. What is the difference between a qualitative measurement and a quantitative measurement?

   b. How is a number converted to scientific notation?

2. Classify each statement as either qualitative or quantitative.

   a. The basketball is brown.

   b. The diameter of the basketball is 31 centimeters.

   c. The air pressure in the basketball is 12 pounds per square inch.

   d. The surface of the basketball has indented seams.

3. Write each measurement in scientific notation.

   a. the length of a football field, 91.4 meters.

   b. the diameter of a carbon atom, 0.000 000 000 154 meter

   c. the radius of Earth, 6 378 000 meters

   d. the diameter of a human hair, 0.000 008 meter

   e. the average distance between the center of the sun and the center of Earth, 149 600 000 000 meters

4. Solve each problem, and express each answer in correct scientific notation.

   a. $(4 \times 10^{7})\ (2 \times 10^{-3})$

   b. $(6.3 \times 10^{-2}) / 2.1 \times 10^{4}$

   c. $(4.6 \times 10^{3}) - (1.8 \times 10^{3})$

   d. $(7.1 \times 10^{-2}) + (5 \times 10^{-3})$

Section 3.2

5. Determine the number of significant figures in each measurement.

a. 0.057 30 meter

b. 8765 meters

c. 0.000 73 meter

d. 40.007 meters

6. How many significant figures are in each measurement?

a. 143 grams

b. 0.074 meter

c. 8.750×10^{-2} gram

d. 1.072 meters

7. Round each measurement to three significant figures. Write your answers in scientific notation.

a. 87.073 meters

b. 4.3621×10^{8} meters

c. 0.015 52 meter

d. 9009 meters

e. 1.777×10^{-3} meter

f. 629.55 meters

8. Round each measurement in Practice Problem 7 to one significant figure. Write your answers in scientific notation.

a. b. c.

d. e. f.

9. Perform each operation. Provide your answers to the correct number of significant figures.

a. 61.2 meters + 9.35 meters + 8.6 meters

b. 9.44 meters – 2.11 meters

c. 1.36 meters + 10.17 meters

d. 34.61 meters – 17.3 meters

10. Find the total mass of three diamonds that have masses of 14.2 grams, 8.73 grams and 0.912 gram.

11. Solve each problem. Provide your answers to the correct number of significant figures and in scientific notation.

a. 8.3 meters x 2.22 meters

b. 8432 meters/ 12.5

c. 35.2 seconds x 1 minute/ 60 seconds

12. Calculate the volume of a warehouse that has inside dimensions of 22.4 meters by 11.3 meters by 5.2 meters. (Volume = l x w x h)

13. Explain the differences between *accuracy*, *precision*, and *error* of a measurement.

14. Determine the number of significant figures in each of the following measurements and calculation results.

a. 12 basketball players

b. 0.010 square meter

c. 507 thumbtacks

d. 0.070 020 meter

e. 10 800 meters

f. 5.00 cubic meters

15. Solve the following and express each answer in scientific notation.

a. $(5.3 \times 10^4) + (1.3 \times 10^4)$

b. $(7.2 \times 10^{-4}) / (1.8 \times 10^3)$

c. $10^4 \times 10^{-3} \times 10^6$

d. $(9.12 \times 10^{-1}) - (4.7 \times 10^{-2})$

e. $(5.4 \times 10^4) \times (3.5 \times 10^9)$

f. $(1.2 \times 10^2) \times (8.9 \times 10^2)$

16. A technician experimentally determined the boiling point of octane to be 124.1℃. The actual boiling point of octane is 125.7℃. Calculate the error and the percent error.

Section 3.3

17. Name the quantity measured by each of the following SI units and provide the SI symbol of the unit.

a. mole

b. kilogram/ cubic meter

c. second

d. pascal

e. meter

f. kilogram

18. Explain the difference between mass and weight.

19. What is the symbol and meaning of each prefix?

a. *milli-*

b. *nano-*

c. *deci-*

d. *centi-*

20. As you climbed a mountain and the force of gravity decreased, would your weight increase, decrease, or remain constant? How would your mass change?

21. What is the volume of a paperback book 21 cm tall, 12 cm wide, and 3.5 cm thick?

22. List these units in order, from largest to smallest.

a. 1 dm^3 b. 1 μL c. 1 mL d. 1 L e. 1 cL f. 1 dL

23. A student finds a shiny piece of metal that she thinks is aluminum. In the lab, she determines that the metal has a volume of 245 cm^3 and a mass of 612 g. Calculate the density. Is the metal aluminum?

24. The density of silver at 20℃ is 10.5 g/ cm^3. What is the volume of a 68-g bar of silver?

Section 3.4

26. A weather balloon is inflated to a volume of 2.2 x 10^3 L with 37.4 g of helium. What is the density of helium, in grams per liter?

27. List some applications of the measurement of specific gravity.

28. A plastic ball with a volume of 19.7 cm^3 has a mass of 15.8 g. What is its density? Would this ball sink or float in a container of gasoline?

Section 3.5

33. Chocolate cookies are baked at 190℃. Express this temperature in kelvins.

34. Surgical instruments may be sterilized by heating at 170℃ for 1.5 hours. Convert 170℃ to kelvins.

35. The boiling point of the element argon is 87 K. What is the boiling point of argon in degrees Celsius?

Chapter 3 Review

38. Under what circumstances could a series of measurements of the same quantity be precise but inaccurate? 3.2

40. Comment on the accuracy and precision of these basketball free-throw shooters. 3.2

a. 99 of 100 shots are made – through the hoop.

b. 99 of 100 shots hit the front of the rim and bounce off.

c. 33 of 100 shots are made. The rest miss.

42. Round each of these measurements to three significant figures. 3.2

a. 98.473 L

b. 0.000 763 21 cg

c. 57.048 m

d. 12.17℃

e. 0.007 498 3 x 10^4 mm

f. 1764.9 mL

46. How are the error and the percent error of a measurement calculated? 3.2

51. List the SI base unit of measurement for each of these quantities. 3.3

a. time

b. length

c. temperature

d. mass

56. Match the appropriate volume with each item. 3.3

_____	a.	Orange	1.	30 m^3
_____	b.	Basketball	2.	200 cm^3
_____	c.	Van	3.	20 L
_____	d.	Aspirin tablet	4.	200 mm^3

57. How many grams are in each of these quantities? 3.3

a. 1 cg

b. 1 μg

c. 1 kg

d. 1 mg

62. Why doesn't a measure of specific gravity have a unit? 3.4

85. The mass of a cube of iron is 355 g. Iron has a density of 7.87 g/ cm^3. What is the mass of a cube of lead that has the same dimensions? 3.4