

Chapter 2 homework

Measurement and Problem Solving

Name ANSWERS

Date _____

Write the BEST, correct answer in the blank provided.

1. The name of the official scientific system of measurement is the International System of Units (abbreviated)
1. SI
2. What relationship exists between the second and the kilogram?
2. None
3. Combinations of fundamental units are calledunits.
3. Derived
4. The is defined by the distance light travels in a vacuum in the reciprocal of the speed of light ($1/299\,792\,458$ of a second.)
4. Meter
5. The is defined by the volume of a cube measuring one decimeter on each side.
5. Liter
6. The is the only fundamental unit having a natural object for the standard (a platinum-iridium alloy cylinder).
6. Kilogram
7. The is a derived unit in the SI for force.
7. Newton
8. The is defined by the number of vibrations of a cesium-133 atom (9 192 631 770 vibrations.)
8. Second
9. The metric system is sometimes referred to as the MKS because of these three important units used in mechanics; the .(a).... to measure length, the .(b).... to measure mass, the ..(c).... to measure time.
9. (a) Meter
(b) Kilogram
(c) Second
10. The quantity of mass, 1000 kg, is known as a
10. Metric ton
11. A force of about newtons is required to support a mass of one kilogram close to the surface of the earth.
11. 9.8
12. The of an object at a specific location depends on the gravitational acceleration at that location and the mass of the object.
12. Weight
13.refers to the closeness of a measurement to the accepted value for a specific physical quantity.
13. Accuracy
14.is the agreement among several measurements that have been made in the same way.
14. Precision
15.error is the difference between the accepted value and the experimental value for a particular quantity.
15. Absolute
16.error(percent error) is the ratio of the absolute error to the accepted value for a particular quantity.
16. Relative
17.of a measuring instrument is the obtainable precision.
17. Tolerance

18.deviation is the difference between the experimental value and the average (mean) of several measurements of the same quantity. 18. Absolute
19. improves the accuracy of an instrument by matching it to a standard. 19. Calibration
20. A proportion can be expressed graphically by a line with positive slope. 20. Direct
21. Two variables whose product is constant vary as an proportion. 21. Inverse
22. The estimation of values between the plotted points on a graph is, while that beyond the measurements made in an experiment is 22. Interpolation
Extrapolation
23. A scalar is represented only by 23. Magnitude
24. A vector is represented by and 24. magnitude
Direction
25. Algebraically manipulate this equation in order to solve for acceleration (a). $d = v_0t + \frac{1}{2} at^2$ 25. $\frac{2(d - v_0t)}{t^2}$

26. Complete the following chart for the seven fundamental units in the International System of Units.

Physical Quantity	length	mass	time	temperature	amount of substance	electric current	light intensity
Quantity symbol	l	m	t	T		I	I
Unit	Meter	kilogram	second	Kelvin	mole	Ampere	candela
Unit symbol	m	kg	s	K	mol	A	cd

27. For each of the following, give the value (using power of 10 notation) AND give the accepted prefix symbol.

PREFIX	VALUE	SYMBOL	PREFIX	VALUE	SYMBOL
<i>centi-</i>	10^{-2}	<i>c</i>	<i>hecto-</i>	10^2	h
<i>kilo-</i>	10^3	<i>k</i>	<i>deka-</i>	10	da
<i>micro-</i>	10^{-6}	μ	<i>deci-</i>	10^{-1}	d
<i>mega-</i>	10^6	<i>M</i>	<i>tera-</i>	10^{12}	T
<i>pico-</i>	10^{-12}	<i>p</i>	<i>giga-</i>	10^9	G
<i>nano-</i>	10^{-9}	<i>n</i>	<i>milli-</i>	10^{-3}	m

28. Complete the following conversion problems. Conversion charts are encouraged. Give the answer with three significant digits.

- a. 246 mm = 24.6 cm g. 295 dm³ = 295 000 cm³
 b. 0.358 m = 358 mm h. 31.9 L = 31 900 cm³
 c. 209 cm = 2.09 m i. 793 g = 0.793 kg
 d. 734 km = 734 000 000 000 μm j. 0.801 mg = 801 000 000 pg
 e. 3.46 Mm = 0.003 46 Gm k. 0.000 550 dg = 0.005 50 cg
 f. 1.06 mL = 1.06 cm³ l. 817 m² = 8 170 000 cm²

29. Place the number of significant digits for each of the following measurements in the blank provided.

- a. 156.18 5 e. 9 000 000 1 i. 1750 3
 b. 381 000 3 f. 420 000 2 j. 0.020 750 5
 c. 905 3 g. 0.002 36 3 k. 9.73 x 10⁻² 3
 d. 4 000 1 h. 70.040 5 l. 8.020 x 10 4

30. Complete the following table.

PROBLEM	CALCULATOR ANSWER	ANSWER WITH CORRECT NUMBER OF SIGNIFICANT DIGITS
20.7 m + 7.01 m + 151.110 m	178.82	178.8 m
3053 L - 70 L	2 983	2 980 L
68.57 g + 358.01 g + 59 g	485.58	486 g
2000 cm ³ - 60 cm ³	1940	2000 cm ³
0.040 50 cm + 9.80 cm + 3000.240 cm	3 010.080 5	3 010.08 cm
10.790 mL - 7.0 mL	3.79	3.8 mL
(781.6)(54)	42 206.4	42 000
(952)(17.3)	16 469.6	16 500
95.0/ 10.875	8.735 632 184	8.74

31. Write the first three numbers in scientific notation. Write the final three numbers to common notation.

- a. 61 000 000 6.1 x 10⁷ d. 3.629 x 10¹⁰ 36 290 000 000
 b. 0.000 048 4.8 x 10⁻⁵ e. 7040 x 10⁻⁵ 0.070 4
 c. 502.78 5.0278 x 10² f. 9.512 3 x 10² 951.23

32. Give the order of magnitude of each of the following.

- a. 61 000 000 8 d. 3.629 x 10¹⁰ 10
 b. 0.000 048 -5 e. 7040 x 10⁻⁵ -2
 c. 502.78 3 f. 9.512 3 x 10² 3

PROBLEMS: Show your work in completing the following. Write the answers with the correct number of significant digits.

33. Express the sum of 50.7 mm, 47.5 cm, and 8.01 km in meters. 33. 8 010 m
34. What is the area of the bottom of a fish tank measuring 20.0 cm long and 15.0 cm wide? 34. $3.00 \times 10^2 \text{ cm}^2$
35. What is volume of the fish tank in the previous question if it is 10.0 cm tall? 35. $3.00 \times 10^3 \text{ cm}^3$
36. What is the volume of the fish tank in cubic meters? 36. $0.003 00 \text{ m}^3$
37. What is the volume in liters of the fish tank? 37. 3.00 L
38. What is your weight in newtons? 38. _____

39. Complete the chart for the following data obtained using a laboratory balance.

	TRIAL	MASS	ACCEPTED VALUE
	1	23.26 g	23.20 g
	2	23.28 g	
	3	22.95 g	

TRIAL	ABSOLUTE ERROR	RELATIVE ERROR	ABSOLUTE DEVIATION	RELATIVE DEVIATION
1	0.06 g	0.26 %	0.10 g	0.43 %
2	0.08 g	0.34 %	0.12 g	0.52 %
3	0.25 g	1.1 %	0.21 g	0.91 %

Use Logger Pro to answer the following questions regarding the graphs found within Logger Pro.

40. Open *Sample Data: Chemistry: Beer's Law*.
- a. What mathematical term best describes the shape of the graph? 40a. Linear
- b. What is the independent variable? 40b. Concentration
- c. What is the dependent variable? 40c. Absorbance
- d. What mathematical term best describes the ratio of the difference in the dependent variable to the difference in the independent variable? 40d. Slope
- e. What is the value of this ratio for the data? 40e. 1.171
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41. Open *Sample Data: Physics: Discharging Capacitor*
- a. What mathematical term best describes the shape of the graph? 41a. Natural exponential decay
- b. What is the independent variable? 41b. Time
- c. What is the dependent variable? 41c. Potential
- d. What is the product of the two variables? (Numerical answer) 41d. ≈ 1.409
- e. What is the equation that represents this data? 41e. $y = 1.409e^{-0.05451t} + 0.002845$