Answer Key

Unit 1: Lab Skills & Matter Review

Significant Figures Worksheet

How many significant figures are in each of the following numbers?

1) 5.40 3

2) 210 2

3) 801.5 4

4) 1,000 1

5) 101.0100 7

6) 1.2×10^3 2

7) 0.00120 3

8) 0.0102 3

9) 9.010×10^{-6} 4

10) 2,370.0 5

Significant Figure Calculations

Solve the following mathematical problems such that the answers have the correct number of significant figures:

11) 334.540 grams (3 SF) + 198.9916 grams (4 SF) = 533.5316 = 533.532 grams

12) 34 grams / 10.1 mL = 3.366336634 = 3.4 grams/mL

13) 2610000. joules / 0.0034 seconds = 767647058.8 = 770000000 joules/seconds or 7.7×10^8

14) 0.0610 m – 0.18 m = -.119 = -.12 m

15) 349.0 cm + 1.10 cm + 100. cm = 450.1 = 450 cm

16) 252 meters / 910 seconds = .276923076 = .28 meters/seconds

17) 248.01010 kilograms + 84.097 kilograms = 332.1071 = 332.107 kilograms

28) 44 m/s x 20 s = 880 = 900 m

Algebra – Solving Problems

Solve the following problems and write your answer in the correct significant figures.

22) $4.00x + 124.00 = 204.00$

$-124.00 \quad -124.00$

$4.00x = 80.00$

$\frac{4.00x}{4.00} = \frac{80.00}{4.00}$

$x = 20.0$

23) $V_A T_A = V_B T_B$ $\quad V_A$ 0.761 $\quad T_A = 20.0 \quad T_B = 33.5$

$\frac{(.761)(20.0)}{33.5} = \frac{V_B(33.5)}{33.5}$

$\frac{(.761)(20.0)}{33.5} = V_B$

$.454 = V_B$

24) $F = 1.8(C) + 32$ $\quad F = -459.4$

$-459.4 = 1.8(C) + 32$

$-32 \quad -32$

$-491.4 = 1.8(C)$

$\frac{-491.4}{1.8} = \frac{1.8(C)}{1.8}$

$-270 = C$

Scientific Notation

Write the following numbers into scientific notation:

25) 3,400 3.4×10^{3}

26) 0.000023 2.3×10^{-5}

27) 101,000 1.01×10^{5}

28) 0.010 1.0×10^{-2}

29) 1,000,000 1×10^{6}

30) 0.00671 6.71×10^{-3}

Write the following numbers into regular notation:

31) 2.30×10^{4} 23000

32) 1.76×10^{-3} .00176

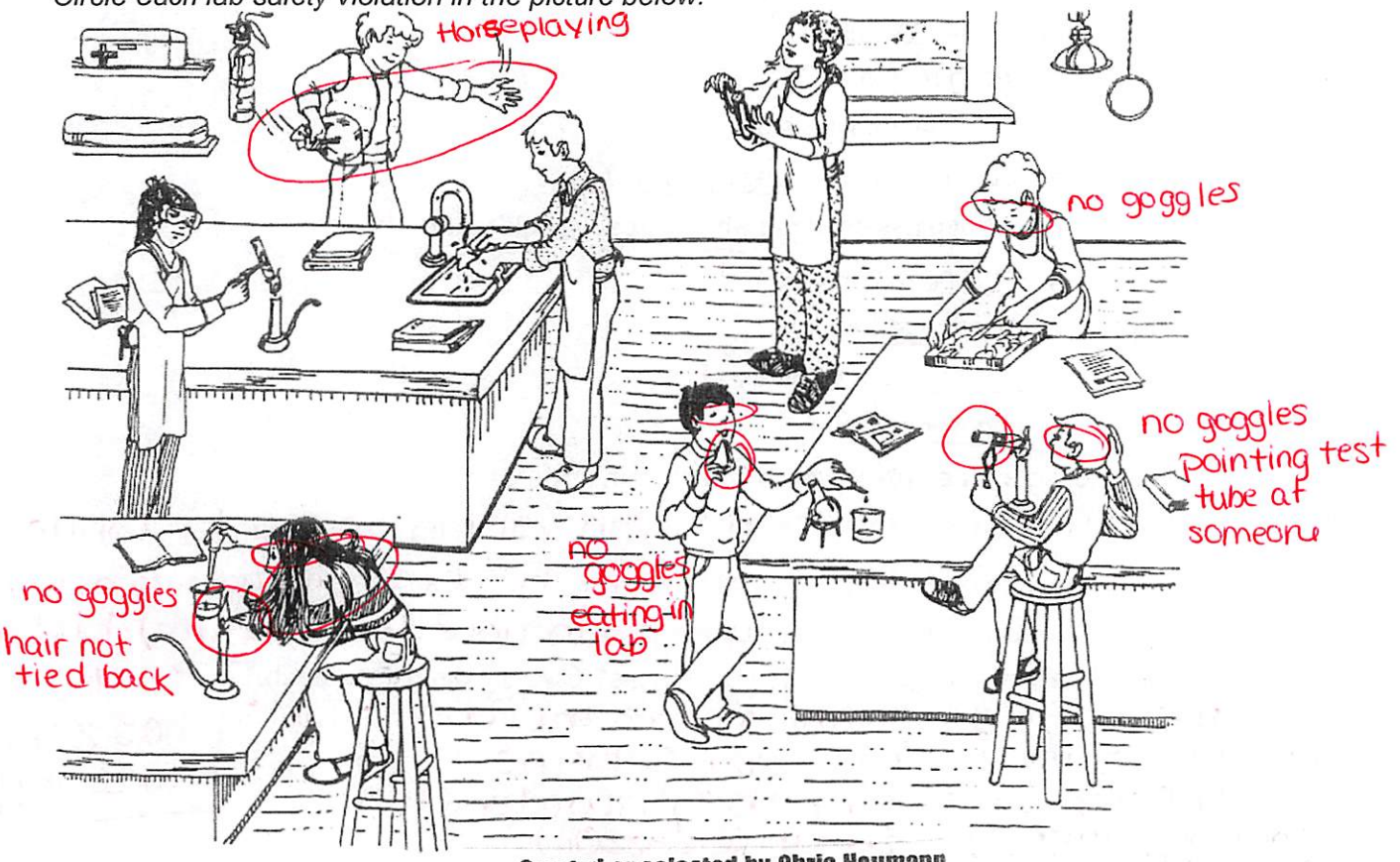
33) 1.901×10^{-7} .0000001901

34) 9.11×10^{1} 91.1

35) 7.4×10^{5} 740000

Lab Safety

Circle each lab safety violation in the picture below.



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Matter

States of Matter

1. Compare and contrast the 4 states of matter in terms of volume, shape, and how closely packed the particles are.

Solid	Liquid	Gas	Plasma	
definite	definite	indefinite	indefinite	Volume
definite	indefinite	indefinite	indefinite	Shape
very close together	close together but can slide	far apart	very far apart	Particles

2. What is the difference between a physical property/change and a chemical property/change?

Physical property/change - can be observed WITHOUT changing what the substance is made of (its composition)

Chemical property/change - can only be observed when a new substance forms (includes permanent color or odor changes too!)

3. Determine if the following changes are physical or chemical.

   a. perfume evaporating on your skin P
   b. butter melting P
   c. wood rotting C
   d. charcoal heating a grill C
   e. autumn leaves changing color C
   f. a hot glass cracking when placed in cold water P
   g. melting copper metal P
   h. burning sugar C
   i. mixing sugar in water P
   j. digesting food C

4. How are pure substances different from mixtures?

Mixture components can vary in amounts while. Pure substances cannot. For example, you can vary how much sugar you put in your tea (mixture) but water, or H_2O, always has 2 hydrogens to 1 oxygen

5. What are two types of pure substances? Give 3 examples of each.

1) Elements - anything from the Periodic Table. Iron, copper, Chlorine. (one type of atom)

2) Compounds - salt ($NaCl$), water (H_2O), sugar ($C_{12}H_{22}O_{11}$) (2 or more elements chemically bonded)

6. What are two types of mixtures? Give 3 examples of each.

1) Homogeneous mixtures - hot tea, coffee, air, brass (well blended, cannot see each component)

2) Heterogeneous mixtures - trail mix, dirt, mixed salad (can see all the components)

Elements - cannot be broken down by chemical or physical changes.

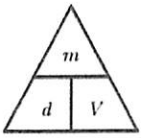
Compounds - can only be broken down by chemical changes

Mixtures (both types) - can be broken down by physical changes

- Ex) filtration
  by hand/magnet
  chromatography
  distillation
  density

Density

Use this chart of answer the questions below.



d = m/V

Substance	Density (g/cm^3)	Substance	Density (g/cm^3)
Marble	2.56	Copper	8.92
Quartz	2.64	Gold	19.32
Diamond	3.52	Platinum	21.4

7. While digging in the backyard, you find an old coin. Its mass is 26.76 g and its volume is 3.0 cm^3. Calculate its density and what it is made from?

d = ?
m = 26.76g
V = 3.0 cm^3

$d = \frac{m}{V} = \frac{26.76g}{3.0cm^3} =$ 8.9 g/cm^3 Copper

8. You think you have found a diamond. Its mass is 5.28 g and its volume is 2.00 cm^3. Calculate the density and is it really a diamond? If not, what is it made from?

d = ?
m = 5.28g
V = 2.00cm^3

$d = \frac{m}{V} = \frac{5.28g}{2.00cm^3} =$ 2.64 g/cm^3 Not diamond, it's quartz.

9. There is a block on your desk that acts as a paperweight. Its measurements are 2.0 cm by 4.0 cm by 6.00cm. The block has a mass of 184.32 g. What is its density and what is it made from?

V = l • w • h
V = 2.0cm • 4.0cm • 6.00cm
V = 48.0 cm^3

m = 184.32g
d = ?

$d = \frac{m}{V} = \frac{184.32g}{48.0cm^3} =$ 3.8 g/cm^3 Diamond

10. You find a ring with a mass of 107g. You fill a graduated cylinder with 10.3mL of water and carefully add the ring into the water. The final volume of the water is 15.3mL. Determine the density of the ring and what it is made from.

d = ?
m = 107g
V = $V_f - V_i$
= 15.3mL - 10.3mL
= 5.0mL

$d = \frac{m}{V} = \frac{107g}{5.0mL} =$ 21.4 g/mL Platinum

Remember 1mL = 1cm^3
so 21.4 g/cm^3 = 21.4 g/mL