Unit 1 Test Review

Key

Scientific Method

1. Suppose you work for a Blabbit Labs, the developer of many different pharmaceutical products. Your research division has stumbled across a new drug that you believe cures male pattern baldness. Before you can start selling the drug, you must demonstrate to the U.S. Food and Drug Administration that the drug is effective.
   a. What is the question being asked? → is the drug an effective cure for male pattern baldness
   b. What is the hypothesis? → when used, the drug will grow hair in areas affected by male pattern baldness.

2. You design an experiment with 500 men who have been diagnosed with male pattern baldness. They are divided up into two groups, group A men receiving the drug while group B men receive a placebo, a drug that is known not to effect baldness. The drug is referred to as the ***independent variable***, since this is what is being tested. As a hint, the hypothesis will usually identify the independent variable of a study.

   In this study, the men receive the drug or a placebo once a day. All of the men will have the number of hairs per square inch of scalp measured in a clinic once per week. The number of hairs per square inch will be the ***dependent variable*** since this variable depends on the effectiveness of the independent variable. The dependent variable is also what we use to determine if the independent variable is actually acting according to the hypothesis and the data collected will usually tell what the dependent variable is.

   Men in group A belong to the ***experimental group***, since they received the experimental variable. Men in group B belong to the ***control group***. The control group is important since it gives the researchers something to compare the experimental group to. For instance, if the men in the experimental group were shown to have hair growth, then that would indicate that the hypothesis was supported and the drug grows more hair. However, if the control group also grew hair, then something in the environment besides the drug was responsible for hair growth.
   a. Define dependent and experimental variables. → dependent: hairs per square inch; independent: experimental: → the drug
   b. Compare and contrast the experimental and control group. → The experimental group receives the drug while the control group receives a placebo. Otherwise, both groups are exactly the same.

3. You are conducting an experiment to determine if increased ultraviolet radiation from the decrease in the ozone layer is killing off frog tadpoles. After examining all of the data available in the library, you decide to go with a hypothesis that increased ultraviolet radiation from the sun is killing off the tadpoles.

   You design an experiment with a control and an experimental group. Group 1 involves 100 tadpoles in a five gallon container of water, which is covered by glass (knowing that the glass will filter out the ultraviolet radiation). Group 2 will be set up exactly like group 1, except that instead of being covered with glass, it is covered with an acrylic Plexiglas, which will not filter out the U.V. radiation. You then place the groups outside for a period of a month, and observe the results.

Results

	Group 1	Group 2
Number of tadpoles started with	100	100
Number finished	96	96

a) independent (experimental): UV light
dependent: # tadpoles that survive

b) No,

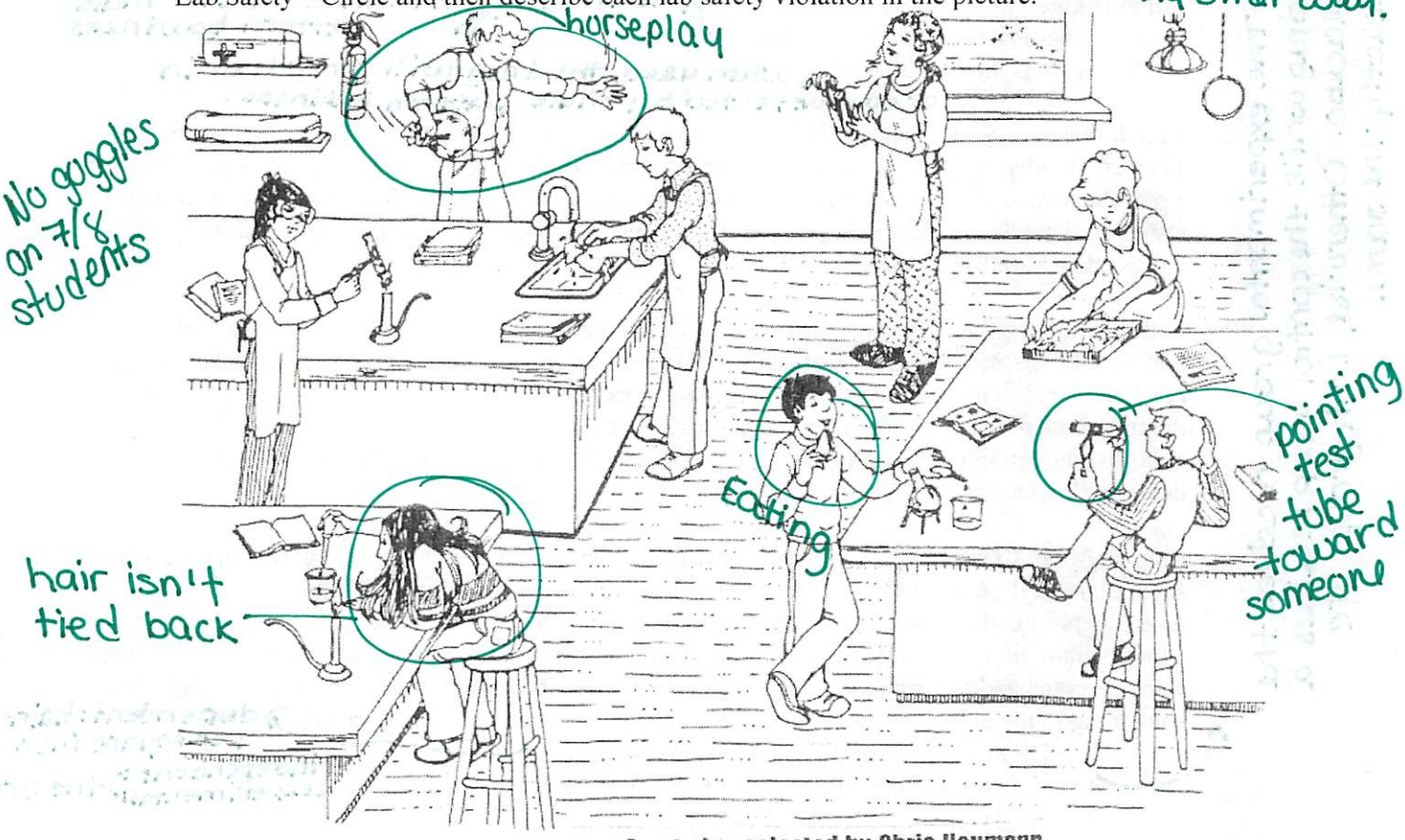
c) Something other than UV radiation is causing the death.

Using this information, answer the following questions.

d) control: group 1
experimental: group 2

a. What is the experimental variable and what is the dependant variable?
b. Does the information from this experiment support the hypothesis?
c. If no, then what might be causing the decrease in frog populations?
d. Which is the control group, and which is the experimental group?
e. What is the difference between the two groups? Should they be different in any other way? There is no difference except that UV light is absent from 1 group but not the other. They should NOT be different in any other way.

Lab Safety – Circle and then describe each lab safety violation in the picture.



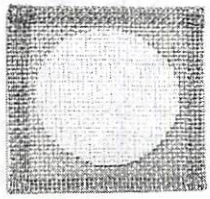
Created or selected by Chris Heumann

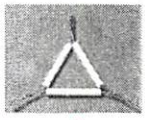
Lab Equipment- Identify the name for each piece of lab equipment

1.  beaker

2. thermometer

3.  Erlenmeyer flask

4.  wire gauze

5.  Pipestem triangle

6.  crucible & lid

The Nature of Matter

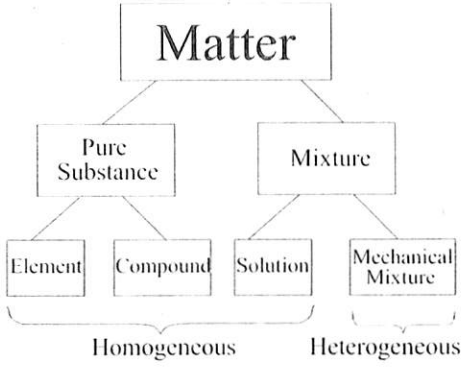
Aim

- list the properties of matter and describe a classification scheme for it that distinguishes between types of pure substances and mixtures

Notes

Matter

- ★ Chemistry - study of the nature of matter - its composition and the changes it undergoes
- ★ Definition - anything that has mass and takes up space
- ★ Properties of matter
  - ☆ has mass
  - ☆ takes up space
  - ☆ has inertia
  - ☆ composed of elements, compounds, or mixtures
- ★ Classification scheme



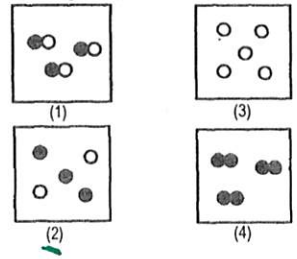
Answer the questions below by circling the number of the correct response

1. Which of the following is NOT matter? (1) a chair (2) air (3) light (4) water
2. Which of the following is NOT a property of matter? (1) inertia (2) occupies space (3) composed of elements (4) weightlessness
3. Which of the following may be heterogeneous? (1) elements only (2) compounds only (3) mixtures only (4) elements and compounds
4. Which of the following is pure? (1) elements only (2) compounds only (3) mixtures only (4) elements and compounds
5. Which of the following consists of more than one substance? (1) elements only (2) compounds only (3) mixtures only (4) elements and compounds
6. Which of the following are types of matter? (1) elements only (2) compounds only (3) mixtures only (4) all of these
7. Which of the following is a type of mixture? (1) elements only (2) compounds only (3) solutions only (4) elements and compounds

8. Which of the following is matter? (1) love (2) ideas (3) rock (4) heat
9. The tendency of matter to maintain its state of motion is known as (1) density, (2) inertia, (3) mass, (4) volume.
10. Which of the following is NOT composed of two or more types of atoms? (1) element (2) compound (3) solution (4) mechanical mixture
11. Which represents a homogeneous mixture? (1) $CuSO_4(s)$ (2) NaCl(aq) (3) $Br_2(\ell)$ (4) $CO_2(g)$
12. Which substance can be decomposed by a chemical change? (1) ammonia (2) iron (3) argon (4) helium
13. Given:

    ● = particle X
    ○ = particle Y

    Which diagram represents a mixture?



1) A student measures the mass of an 8 cm^3 block of brown sugar to be 12.9 g. What is the density of the brown sugar?

$d = \frac{12.9\,g}{8\,cm^3} = 1.61\ g/cm^3$

2) A chef fills a 50 mL container with 43.5 g of cooking oil. What is the density of the oil?

$d = \frac{43.5\,g}{50\,mL} =$

3) Calculate the mass of a liquid with a density of 2.5 g/mL and a volume of 15 mL.

$m = d \cdot V = (2.5\ g/mL)(15\,mL) = 37.50\,g$

4) Calculate the volume of a liquid with a density of 5.45 g/mL and a mass of 65 g.

$V = \frac{m}{d} = \frac{65\,g}{5.45\ g/mL} = 11.93\,mL$

5) A machine shop worker records the mass of an aluminum cube as 176 g. If one side of the cube measures 4 cm, what is the density of the aluminum?

$V = l \times w \times h$

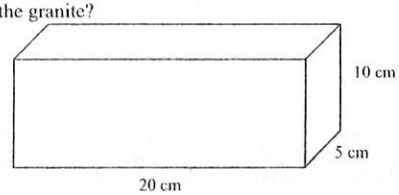
$V = (4\,cm)^3 = 64\,cm^3$

$d = \frac{176\,g}{64\,cm^3} = 2.75\ g/cm^3$

6) A teacher performing a demonstration finds that a piece of cork displaces 23.5 mL of water. The piece of cork has a mass of 5.7 g. What is the density of the cork?

$d = \frac{5.7\,g}{23.5\,mL} =$

7) A carver begins work on the following block of granite that weighs 2700 g. What is the density of the granite?



$V = l \times w \times h = 20\,cm \times 5\,cm \times 10\,cm$

$V = 1000\,cm^3$

$d = \frac{2700\,g}{1000\,cm^3} = 2.70\ g/cm^3$

8) A piece of PVC plumbing pipe displaces 60 mL when placed into a container of water. If the pipe has a mass of 78 g, what is the density of PVC?

$d = \frac{78\,g}{60\,mL} = 1.30\ g/mL$

9) A solid magnesium flare has a mass of 1300 g and a volume of 743 cm^3. What is the density of the magnesium?

$d = \frac{1300\,g}{743\,cm^3} = 1.75\ g/cm^3$

Density

$d = \frac{m}{V}$

10) A graduated cylinder has a mass of 50 g when empty. When 30 mL of water is added, the graduated cylinder has a mass of 120 g. If a rock is added to the graduated cylinder, the water level rises to 75 mL and the total mass is now 250 g. What is the density of the rock?

$m = 250\,g - 50\,g - 120\,g$

$m = 80\,g$

$V = 75\,mL - 30\,mL$

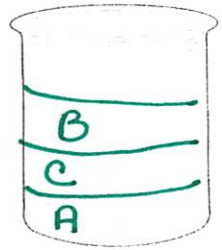
$V = 45\,mL$

$d = \frac{80\,g}{45\,mL} = 1.78\ g/mL$

11) A student performs an experiment with three unknown fluids and obtains the following measurements:

Fluid A: m = 2060 g, V = 2000 mL
Fluid B: m = 672 g, V = 850 mL
Fluid C: m = 990 g, V = 1100 mL

Draw how the fluids would be layered if they were combined in a beaker.



most dense

Fluid A

$d = \frac{2060\,g}{2000\,mL}$

$d = 1.03\ g/mL$

least dense

Fluid B

$d = \frac{672\,g}{850\,mL}$

$d = .79\ g/mL$

Fluid C

$d = \frac{990\,g}{1100\,mL}$

$d = .90\ g/mL$

12) Use your density skills to find the identity of the following mystery objects.

Table of Densities

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

While digging in the backyard, you find an old coin. Its mass is 26.76 g and its volume is 3 cm.

$d = \frac{26.76\,g}{3\,cm^3} = 8.92\ g/cm^3$

What is the coin made of? copper

You think you have found a diamond. Its mass is 5.28 g and its volume is 2 cm^3.

$d = \frac{5.28\,g}{2\,cm^3} = 2.64\ g/cm^3$

What did you find? Quartz

You find a ring with a mass of 107 g. You fill a graduated cylinder up with 10 mL of water and put the ring into the cylinder. The water rises up to the 15 mL mark.

$V = 15\,mL - 10\,mL$

$V = 5\,mL$

$d = \frac{107\,g}{5\,mL} = 21.4\ g/mL$

What is the ring made of? platinum

There is a block on your desk that acts as a paperweight. Its measurements are 3 cm by 4 cm by 6 cm. The block has a mass of 184.32 g.

$V = l \times w \times h$

$V = 3\,cm \times 4\,cm \times 6\,cm$

$V = 72\,cm^3$

$d = \frac{184.32\,g}{72\,cm^3}$

$d = 2.56\ g/cm^3$

What is the block made of? marble