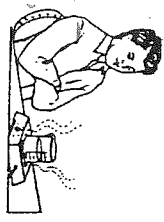


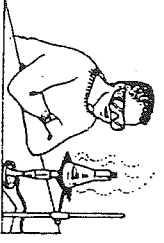
p.3 3. Look at each of the following drawings and explain why the laboratory activities pictured are unsafe:



1. _____



2. _____



3. _____



4. _____

4. In each of the following situations, write "YES" if the proper safety procedures are being followed and "NO" if they are not. Then give a reason for your answer.

1. Sue cannot find a gas lighter to light her Bunsen burner. The student next to her picks up a lit burner and says, "You can use my flame to light your burner."

2. Nathan notices that the electrical cord on his microscope is frayed near the plug. He takes the microscope back and gets another one to use.

p.2 3. Describe what action you should take if the following accidents occurred in the laboratory:

a small fire occurs at your table

a student's clothing catches fire

a large fire occurs in the room

a toxic (poisonous) gas is released into the room

you receive a minor cut or burn

a corrosive chemical spills on your skin or clothing

a chemical splashes on your face or in your eyes

Part B: Reviewing Laboratory Safety Rules

1. Carefully read the list of laboratory safety rules you have received.

2. Understanding the reason for a safety rule will make you aware of why it is important to follow that rule. Explain the reason for each of the following rules:

Never engage in horseplay or practical jokes.

Never do unauthorized experiments.

Never consume food or drinks in the laboratory.

Never return unused chemicals to the stock bottles or containers.

Never use cracked, broken, or chipped glassware.






3. The printed directions in the laboratory manual tell a student to pour a small amount of hydrochloric acid into a beaker. Cory puts on safety goggles before pouring the acid into the beaker.

4. It is rather warm in the laboratory during a late spring day. Joanne slips off her shoes and walks barefoot to the sink to clean her glassware.

5. While washing glassware, Mike splashes some water on Tim. To get even, Tim splashes him back.

Part C: Reviewing Hazard Symbols

Briefly describe what each of the following safety symbols means and how it should be handled:

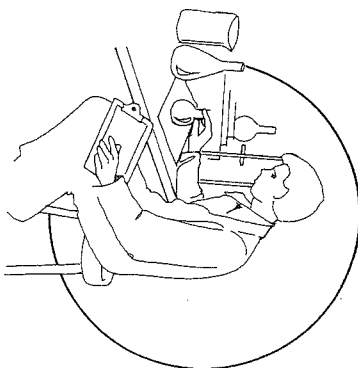
	MEANING	PRECAUTIONS WHEN HANDLING
		
		
		
		
		

SCIENTIFIC METHOD

Name _____

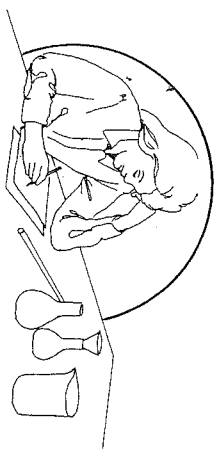
Put the following steps of the scientific method in the proper order.

- _____ Research the problem.
- _____ Observe and record.
- _____ Make a hypothesis.
- _____ Identify the problem.
- _____ Arrive at a conclusion.
- _____ Test the hypothesis.



Match the following terms with the correct definition.

- | | |
|---------------------|--|
| _____ 1. hypothesis | a) organized process used to test a hypothesis |
| _____ 2. control | b) an educated guess about the solution to a problem |
| _____ 3. variable | c) observations and measurements recorded during an experiment |
| _____ 4. experiment | d) a judgment based on the results of an experiment |
| _____ 5. conclusion | e) a logical explanation for events that occur in nature |
| _____ 6. theory | f) used to show that the result of an experiment is really due to the condition being tested |
| _____ 7. data | g) factor that changes in an experiment |



Name _____ Date _____ Class _____

1-4 Review and Reinforcement (continued)

For each of the units listed in the chart, indicate whether the prefix has made the unit larger or smaller. Then fill in the proper symbol for the unit and the decimal equivalent of the prefix, and convert the number as shown.

Unit	Makes the base unit...	Symbol	Decimal Equivalent
Example: kilogram	larger	kg	1000
16. milligram			
17. centigram			
18. megagram			
19. microgram			
20. decigram			

Convert each of the following measurements to the given units.

21. 6.03 L = _____ mL

22. 0.025 m = _____ μ m

23. 5320 g = _____ kg

24. 12.1 mm = _____ cm

25. 1.5 Ms = _____ s

Name _____ Date _____ Cla _____

1-4 Practice Problems

Solve each of the following problems as directed. Show all your work. Use the correct abbreviation for each unit.

1. Convert 83 cm into meters.

6. Which is the longer amount of time, 1351 ps or 1.2 ns? Explain your answer.

2. Convert 459 L into milliliters.

7. Which is the larger pressure, 232.1 kPa or 125.487 Pa? Explain your answer.

3. Express 1123 pg in nanograms.

8. Which is the smaller mass, 285.0 cg or 23.78 dg? Explain your answer.

4. Express 0.032 m³ in liters.

9. Which is the shorter length, 175.6 mm or 38.4 cm? Explain your answer.

5. Express 2.5 mm in micrometers.

10. Convert the following masses into grams.
a. 0.7824 mg
b. 345,000 ng
c. 0.00378 kg
d. 34,981 μ g

1-4 Review and Reinforcement

Units of Measurement

Answer each of the following questions in the space provided.

- Explain the usefulness of the International System of Units to scientists.

- If a chemist performed an experiment in Spain, how could she be sure that chemists in China could interpret the measurements she obtained?

- List the SI base units.

Give two examples of derived units. Include the units of measurement.

Match the following SI base units with the physical quantities they measure. Write the letter on the line.

- | | |
|-------------------|---------------------|
| _____ 5. kilogram | a. length |
| _____ 6. meter | b. electric current |
| _____ 7. second | c. mass |
| _____ 8. kelvin | d. temperature |
| _____ 9. mole | e. time |
| _____ 10. ampere | f. quantity, count |

Match the following derived units with the units in which they are expressed. Write the letter on the line.

- | | |
|--------------------|-------------------|
| _____ 11. area | a. N |
| _____ 12. volume | b. Pa |
| _____ 13. pressure | c. m ² |
| _____ 14. force | d. m ³ |
| _____ 15. energy | e. J |

UNITARY RATES

EXERCISE:

- For each of the following problem statements identify
 - the unknown amount and its unit,
 - the initial amount and its unit, and
 - the conversion factors and their units.
 (You aren't required to put everything together and solve the problem yet... that comes next.)
 - If a chemical costs \$50 per gram, what is the cost of 100 g of the chemical?
 - Computer disks cost \$6.00 for 10 disks. How many disks can you buy for \$36.00?
 - Cork has a density of 0.35 g/mL. What is the volume of 20 g of cork?
 - If 3 kiwi fruit sell for \$1, how many kiwi fruit can you buy for \$5?
 - If 4 bins are worth 5 tuds, how many bins can you buy for \$5?
 - A farmer trades 2 cows for 7 goats. At this rate, how many goats can he get for 10 cows?
 - One mole of oxygen has a mass of 32 g. What is the mass of 5.5 moles of oxygen?
 - One molecule of sulphur contains 8 sulphur atoms. How many sulphur molecules can be made from 104 sulphur atoms?
 - How long must an electrical current of 35 coulombs flow in order to deliver 200 coulombs?
 - What temperature increase is caused by 100 kJ of heat if 4.18 kJ of heat causes a 1°C increase in temperature?

- Solve the following using the method of unit conversions.

- If there are 6.02×10^{23} atoms in 1 mol of atoms, how many atoms are there in 5.5 mol of atoms?
 - If one mole of a gas has a volume of 22.4 L, how many moles are there in 25.0 L of gas?
 - If one mole of nitrogen has a mass of 28 g, how many moles of nitrogen gas are in 7.0 g of nitrogen gas?
 - How many seconds must an electrical current of 35 coulombs flow in order to deliver 200.0 coulombs?
 - A quiet sound exerts a pressure of 4×10^{-8} kPa ("kPa" = kilopascals, an SI pressure unit). What is this pressure in atmospheres if 1 atmosphere is 101.3 kPa?
 - A large nugget of naturally occurring silver metal has a mass of 3.20×10^4 troy ounces. What is the mass in kilograms if 1 troy ounce is equivalent to 0.0311 kg?
 - A reaction is essentially complete in 5.0×10^{-4} s. If one millisecond (1 ms) equals 10^{-3} s, how many milliseconds does the reaction take?
 - If 1 mol of octane produces 5450 kJ of heat when burned, how many moles of octane must be burned to produce 15 100 kJ of heat?
 - Our fingers can detect a movement of 0.05 micron. If 1 micron is 10^{-6} m, what is this movement expressed in millimetres (mm)?
 - If concentrated hydrochloric acid has a concentration of 11.7 mol/L, what volume of hydrochloric acid is required in order to have 0.0358 mol of hydrochloric acid?
- An old barometer hanging on the wall of a mountain hut has a reading of 27.0 inches of mercury. If 1 inch of mercury equals 0.0334 atm ("atmospheres") and 1 atm = 101.3 kPa ("kilopascals"), what is the pressure reading of the barometer, in kilopascals?
 - It requires 334 kJ of heat to melt 1 kg of ice.
 - The largest known iceberg had a volume of about 3.1×10^{13} m³. How much heat was required to melt the iceberg if 1 m³ of ice has a mass of 917 kg?
 - The explosive "TNT" releases 1.51×10^4 kJ of energy for every kilogram of TNT which explodes. Provided that all the energy of an explosion went into melting the ice, how many kilograms of TNT would be needed to melt the iceberg in part (a) of this question?
 - Sugar costs \$0.980/kg. 1 l = 1000 kg. How many tonnes ("t") of sugar can you buy for \$350?
 - The Cullinan diamond, the largest diamond ever found, had an uncut volume of 177 mL. If 1 mL of diamond has a mass of 3.51 g and 1 carat = 0.200 g, how many carats was the Cullinan diamond?
 - How many kilometres ("km") will a car travelling at 120 km/h go in: (a) 0.25 h? (b) 12 min?
 - Solve the following, using the fact that beakers cost \$8.40 per dozen.

Significant Figures and Errors of Measurement

I. Determine the number of significant figures in each of the following numbers:

- | | |
|---------------------------|--------------------------------|
| 1. 5.432 g | 11. 2500 cm |
| 2. 40.319 g | 12. 2500.0 cm |
| 3. 146 cm ³ | 13. 1.04 x 10 ⁴ g |
| 4. 3.285 cm | 14. 3.58 x 10 ⁻⁹ mm |
| 5. 0.189 lb | 15. 48.57193 lb |
| 6. 429.3 g | 16. 8365.6 g |
| 7. 2873.0 cm ³ | 17. 0.002300 mg |
| 8. 99.9 mL | 18. 7.500 x 10 ⁸ oz |
| 9. 0.000235 g | 19. 3.92 x 10 ⁻⁴ g |
| 10. 144 lb | 20. 1.000 x 10 ³ lb |

II. Add:

- 12 cm + 0.031 cm + 7.969 cm =
- 0.085 cm + 0.062 cm + 0.14 cm =
- 3.419 g + 3.912 g + 7.0518 g + 0.00013 g =
- 30.5 g + 16.82 g + 41.07 g + 85.219 g =
- 143.0 cm + 289.25 cm + 68.45 cm + 6.00 cm =
- 29.49 cm + 83.46 cm + 107.05 cm + 26.618 cm =
- 0.0653 g + 0.08538 g + 0.07654 g + 0.0432 g =
- 1.8 x 10⁻⁹ cm + 3.25 x 10⁻⁴ cm + 4.6 x 10⁻⁵ cm =
- 63.489 mL + 126.2 mL + 68.85 mL + 12.05 mL =
- 2.3 x 10² g + 4.62 x 10² g + 3.852 x 10² g =

III. Subtract:

- 41.025 cm - 23.28 cm =
- 289 g - 43.7 g =
- 145.63 mL - 28.9 mL =
- 62.47 g - 39.9 g =
- 40.008 mL - 29.0941 mL =

IV. Multiply:

- | | |
|--------------------------|--|
| 1. 2.89 cm x 4.01 cm = | 9. 4.8 x 10 ² m x 2.101 x 10 ³ m = |
| 2. 17.3 cm x 6.2 cm = | 10. 9.13 x 10 ⁻⁴ cm x 1.2 x 10 ⁻³ cm = |
| 3. 3.08 m x 1.2 m = | 11. 4.218 cm x 6.5 cm = |
| 4. 5.00 mm x 7.3216 mm = | 12. 150.0 m x 4.00 m = |
| 5. 20.8 dm x 123.1 dm = | 13. 282.2 km x 3.0 km = |
| 6. 5 cm x 5 cm = | 14. 14 x 10 ⁻⁸ m x 3.25 x 10 ⁻⁶ m = |
| 7. 5.0 cm x 5 cm = | 15. 2.865 x 10 ⁴ m x 1.47 x 10 ³ m = |
| 8. 5.0 cm x 5.0 cm = | |

V. Divide:

- 8.071 cm² ÷ 4.216 cm =
- 109.3758 m² ÷ 5.813 m =
- 24,789.4 km² ÷ 43.5 km =
- 6.058 mm² ÷ 0.85 mm =
- 4.819 cm² ÷ 9.852 cm =
- 139.482 m² ÷ 68.75 m =
- 4.23 m² ÷ 18.941 m =
- 85.621 km² ÷ 8.05 km =
- 6.023 x 10⁴ mm² ÷ 5.813 x 10¹² mm =
- 1.142 x 10⁻⁸ mm² ÷ 8.5 x 10⁻⁴ mm =