Name _____ Period _____
LTHS: Chemistry

Unit 1 Review - Intro to Chemistry

1. Know your vocabulary from the Unit

I can use safety protocols and equipment in the classroom

2. What is the proper way to smell a chemical?
   waft it

3. List 3 items that would be appropriate laboratory attire and 3 items that would be inappropriate attire in a laboratory setting.

Appropriate Attire	Inappropriate Attire
closed toed shoes long pants hair back lab apron goggles	loose strings dangly jewelry open toed shoes shorts long hanging hair

4. Describe the use for the following safety equipment

Safety Shower	chemical spill on clothing
Eye Wash Station	chemicals in eyes
Fire Blanket	person on fire
Fire Extinguisher	fire on table / floor
Broken Glassware Container	broken, cracked, damaged glass
Evacuation Plan	close chemicals, turn off burners etc.

I can differentiate and identify the steps of the scientific method
I can develop a lab based on steps of scientific method

5. In 1872, a wealthy railroad tycoon named Leland Standford (Standford University is named after him) made a bet with a friend about a galloping horse. Put the step number next to each step of the scientific method for this problem.

1 Mr. Standford wondered if there was some point in time during the gallop that the hooves of a horse don't touch the ground.
6 Some of the pictures showed that the horse's hooves were all in the air at the same time.
2 Leland Standford made a bet that there is a time at which all of the hooves of a galloping horse don't touch the ground.
3 Mr. Standford decided to ask a photographer to take some pictures of a horse galloping at the racetrack.
4 The jockey rode the galloping horse around the racetrack.
5 Mr. Standford looked at the pictures the photographer brought him.

6. What is the difference between qualitative and quantitative?
quantitative - uses #s
qualitative - uses words

7. Classify each of the following as qualitative or quantitative:
   a. The object had a mass of 2.3 grams. quantitative
   b. Carbon dioxide was produced. qualitative
   c. The liquid looked yellow. qualitative
   d. A yellow solid formed. qualitative
   e. The object has a temperature of 75.6°C quantitative

8. What is the difference between an observation and an inference?
observation - uses senses to describe what is inference - uses prior knowledge

9. Classify each of the following as an observation or inference.
I a. When the dinner with her husband's parents was over, she was so anxious to leave and go home that she left her coat behind.
O b. He beeped the horn several times in rapid succession, turned into the oncoming lane, and sped around the stalled car.

10. What is the difference between a theory and a law?
theory - explain why something occurs
law - summarizes / states a relationship / fact

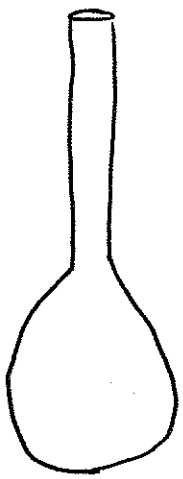
11. What is the difference between accuracy and precision?
accuracy - how close a measurement is to the true value
i.e. shooting a bball into the basket
precision - how close a measurement is to another.
how repeatable a measurement is.
i.e. hitting the same spot on the rim everytime

I can identify dependent and independent variables, controls, and constants

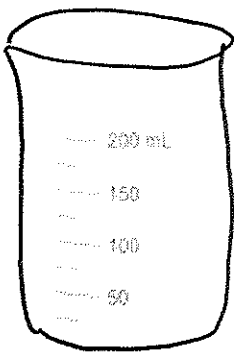
10. The science department of LTHS decided to test a brain pill which they designed to (they hoped) improve the intelligence of their students by a whopping 50%. They took all 180 students who were taking physical science classes and randomly divided them in half. One half was given the brain pill, the other half was given an identical looking pill but without the brain stimulating ingredients. The students were given the pill with 8 ounces of water the same time every day for an 8 week period. The staff was told exactly what lessons were to be taught. At the end of the first semester the grades of all students participating in the experiment were checked
    a. Name the control
    Students given the identical looking pill (placebo)
    b. Name all of the constants
    8 oz H_2O, same time, same lessons
    c. Name the independent variable
    brain pill
    d. Name the dependent variable
    scores/grades of the students

I can identify different pieces of lab equipment

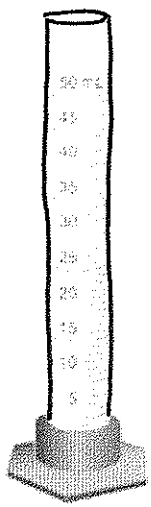
Identify each piece of glassware by labeling the images.



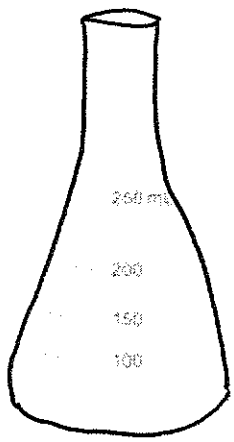
Volumetric / florence flask



beaker



graduated cylinder

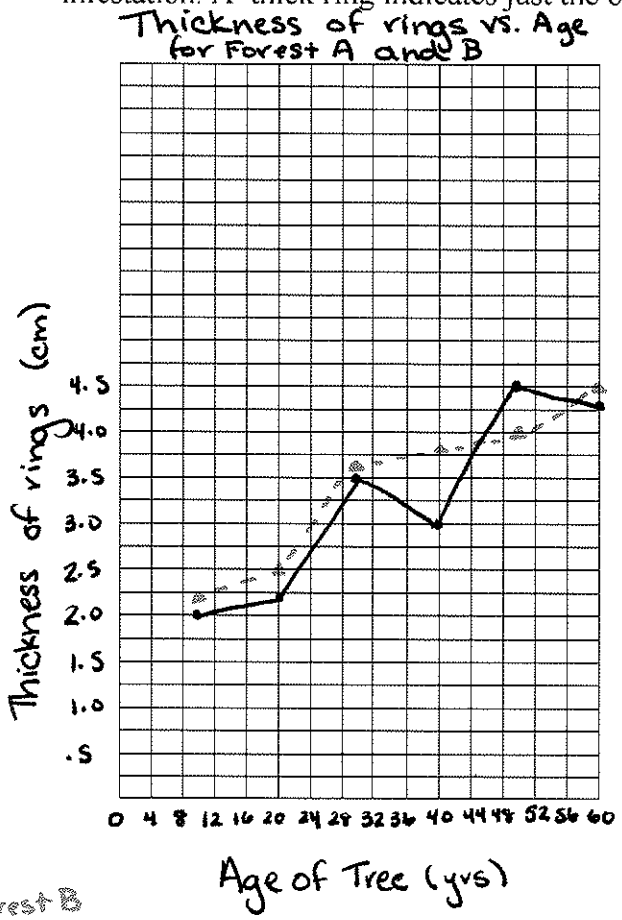


Erlenmeyer flask

I can identify graphical relationships and variables using graphs
I can extrapolate and interpret data using graphs and tables
I can produce a graph with appropriate scales, labels, and titles

Age of the tree in years	Average thickness of the annual rings in cm. Forest A	Average thickness of the annual rings in cm. Forest B
10	2.0	2.2
20	2.2	2.5
30	3.5	3.6
40	3.0	3.8
50	4.5	4.0
60	4.3	4.5

The thickness of the annual rings indicates what type of environment was occurring at the time of its development. A thin ring usually indicates a lack of water, forest fires, or a major insect infestation. A thick ring indicates just the opposite.



11. Make a line graph of the data.
12. What is the dependent variable?

13. What is the independent variable?

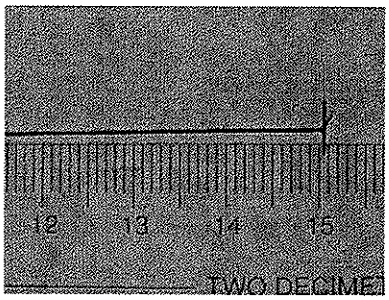
14. What was the average thickness of the annual rings of 40 year old trees in Forest A? in Forest B? 3.0 - A
3.8 - B

15. Based on this data, what can you conclude about Forest A and Forest B?

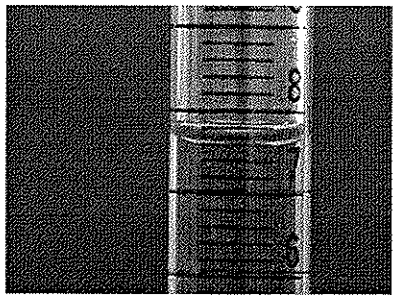
Forest B appears to have less problems. More water, fewer fires, less insect damage

I can measure solids and liquids to correct number of significant figures using lab equipment

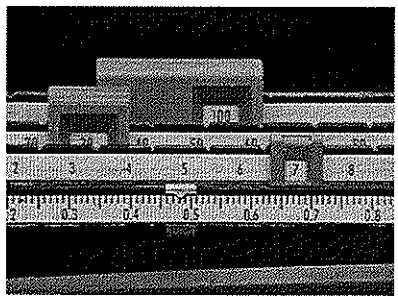
16. **Reading with Precision** – Provide precise readings (including a value and units) for each of the following instruments.



Reading: 15.05 cm



Reading: 7.60 mL



Reading: 127.485 g

I can identify number of significant figures and use math rules appropriately

17. Count the number of significant figures for each number below:

a. 16.0 3
b. 54,000 2
c. 54,000.0 6
d. 0.000107 3
e. 6,007 4
f. 14 2

18. Perform the following mathematical operations and express your answers to the proper number of significant figures

a. $642 \times (4.0 \times 10^{-5})$ .026
b. $59 \times (3.24 \times 10^{-2}) / 4.80 \times 10^{4}$ 4.0×10^{-5}

a. $0.00000016 / 74.3$ 2.2×10^{-9} or 2.0×10^{-9}
b. $2.45 \times .042$ .10

a. $4.5 + 84.23$ 88.7
b. $9.43 - 8.2005$ 1.23

I can convert numbers into and out of scientific notation

19. Change the following numbers into scientific notation:

123,000,000,000 g 1.23×10^{11} g
0.005406 Mg 5.406×10^{-3} Mg
105,000 mL 1.05×10^{5} mL
0.000064 sec 6.4×10^{-5} sec

20. Take the following numbers out of scientific notation:

1.45×10^{4}	6.521×10^{-7}	4.84×10^{-3}	2.1×10^{2}
14500	.0000006521	.00484	210

21. Perform the following calculations. Your answer must be in proper scientific notation.

$5.7 \times 10^{4} + 0.23 \times 10^{5}$	$1.0 \times 10^{-5} \times 3.0 \times 10^{6}$	$(3.76 \times 10^{3} + 2.1 \times 10^{3}) / 2.5 \times 10^{-5}$
8.0×10^{4}	3.0×10^{1}	2.4×10^{8}
$9 \times 10^{-3} - 3 \times 10^{-4}$	$8.0 \times 10^{-4} \div 2.0 \times 10^{-3}$	
9×10^{-3}	4.0×10^{-1}	

I can convert between metric units and prefixes

22. Write out all of the metric prefixes and symbols, and the numerical value for each

M - mega 10^{6} or 1,000,000

=

k - kilo 10^{3} or 1000

h - hecta 10^{2} or 100

D - Deka 10^{1} or 10

base unit (g, m, L, etc) 10^{0} or 1

d - deci 10^{-1} or $1/10$ or .1

C - centi 10^{-2} or $1/100$ or .01

m - milli 10^{-3} or $1/1000$ or .001

=

μ - micro 10^{-6} or $1/1000000$ or .000001

23. Perform the following metric conversions by moving the decimal or using dimensional analysis

89.75 kg to cg	165 cm to m	0.056 ML to hL	0.0046 µg to Dg
8975000 cg	1.65 m	560 hL	.00000000046

I can solve mathematical problems using dimensional analysis using dimensional analysis

24. Perform the following conversions using Dimensional Analysis

a. 17.50 days into seconds

$$17.50\ \text{days} \times \frac{24\ \text{hours}}{1\ \text{day}} \times \frac{60\ \text{min}}{1\ \text{hr}} \times \frac{60\ \text{sec}}{1\ \text{min}} = 1512000\ \text{sec}$$

b. 1.124 km into inches

$$1.124\ \text{km} \times \frac{1\ \text{mi}}{1.609\ \text{km}} \times \frac{5280\ \text{ft}}{1\ \text{mi}} \times \frac{12\ \text{in}}{1\ \text{ft}} = 44260\ \text{in}$$

c. 16.54 yards to mm

$$16.54\ \text{yds} \times \frac{3\ \text{ft}}{1\ \text{yd}} \times \frac{12\ \text{in}}{1\ \text{ft}} \times \frac{2.54\ \text{cm}}{1\ \text{in}} = 1512\ \text{cm} = 15120\ \text{mm}$$

d. 1,768.0 pencils to gross (1 gross =12 dozen)

$$1768.0\ \text{pencils} \times \frac{1\ \text{doz}}{12\ \text{pencils}} \times \frac{1\ \text{gross}}{12\ \text{dozen}} = 12.278\ \text{gross}$$

I can differentiate between mass and density

I can describe how density relates to mass and volume for matter

I can calculate density given the mass and volume or calculate relationships between density mass and volume.

25. Solve the following density problems using the GUESS method:

a. What is the density of an object that has a mass of 67.0 g and a volume of 14.7 mL?

$m = 67.0\ \text{g}$
$V = 14.7\ \text{mL}$
$D = ?$

$$D = \frac{m}{V} = \frac{67.0\ \text{g}}{14.7\ \text{mL}} = 4.56\ \text{g/mL}$$

b. What is the density of an object that has a mass of 17.0 g and is a cube with the dimensions of 1.2 cm, 7.4 cm, and 3.0 cm?

$m = 17.0\ \text{g}$
$V = 1.2\ \text{cm} \times 7.4\ \text{cm} \times 3.0\ \text{cm} = 27\ \text{cm}^3$
$D = ?$

$$D = \frac{m}{V} = \frac{17.0\ \text{g}}{27\ \text{cm}^3} = .63\ \text{g/cm}^3 \text{ or } .64\ \text{g/cm}^3$$

c. What volume will 88.0 g of an object with a density of 3.44 g/mL occupy?

$m = 88.0\ \text{g}$
$V = ?$
$D = 3.44\ \text{g/mL}$

$$V = \frac{m}{D} = \frac{88.0\ \text{g}}{3.44\ \text{g/mL}} = 25.6\ \text{mL}$$

d. What will be the mass of 0.047 liters of a substance with a density of 8.73 g/mL?

$m = ?$
$V = .047\ \text{L}\ \ 47\ \text{mL}$
$D = 8.73\ \text{g/mL}$

$$m = V \cdot D = 47\ \text{mL} \times 8.73\ \text{g/mL} = 410\ \text{g}$$