Name: _____ Date: _____ Period: _____
LTHS: Chemistry

First Semester Exam Review
Regular Chemistry 2015-2016

Unit 1- Introduction to Chemistry

1. 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.

2. What is the difference between qualitative and quantitative?
   qualitative - general characteristic
   quantitative - includes a number / measurement
3. 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

4. What is the difference between an observation and an inference?
   observation - accurate noting of phenomena
   inference - using prior knowledge, making a judgement
5. Classify each of the following as an observation or inference.
   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. Inference
   b. He beeped the horn several times in rapid succession, turned into the oncoming lane, and sped around the stalled car. observation

6. What is the difference between a theory and a law?
   theory - explains a phenomenon - "Why" - Big Bang Theory
   Law - statement of "what" - Law of gravity
7. What is the difference between accuracy and precision?
   Accuracy - how close a measured value is to the true value
   Precision - how repeatable a measurement is
   # digits in a measurement / measurement tool

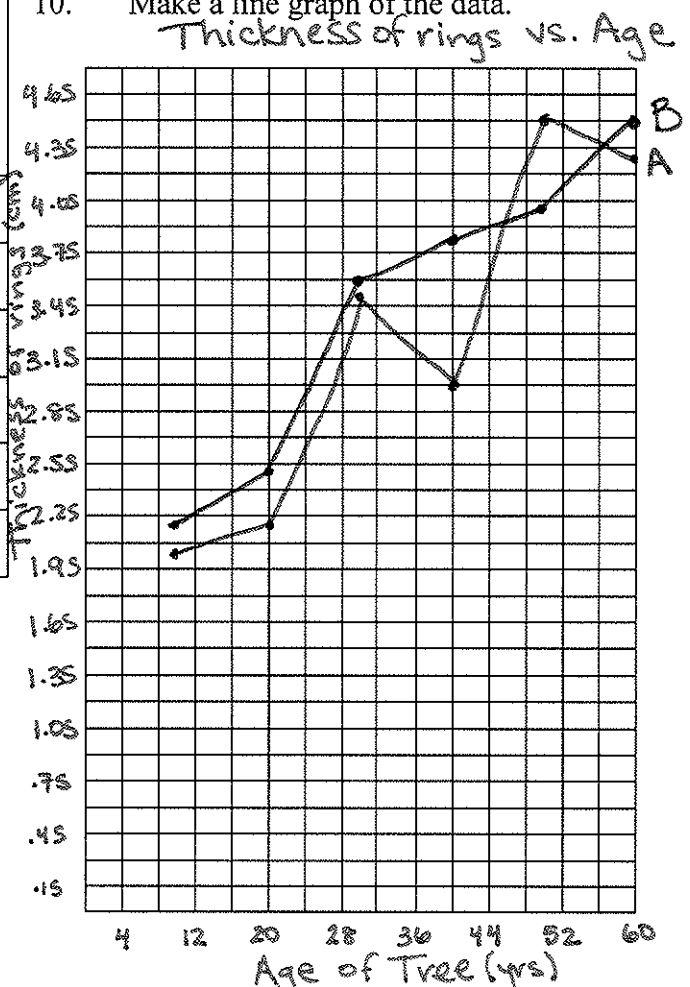
8. The science department of LTHS decided to test a brain pill which they designed to (they hoped) improve the intelligence of their students by a whopping 50%. They took all 180 students who were taking physical science classes and randomly divided them in half. One half was given the brain pill, the 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 placebo
   b. Name all of the constants — 8 oz water, same time, same lessons
   c. Name the independent variable — brain pill
   d. Name the dependent variable — grades of students

9. 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.

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

10. Make a line graph of the data.



11. What is the dependent variable?
    thickness of rings
12. What is the independent variable?
    age of tree
13. What was the average thickness of the annual rings of 40 year old trees in Forest A? in Forest B?
    3.0 3.8
14. Based on this data, what can you conclude about Forest A and Forest B?
    Forest A in general lacks water, has fires, and insect infestation except for 50 yr. ago
    Forest B has gotten drier every year

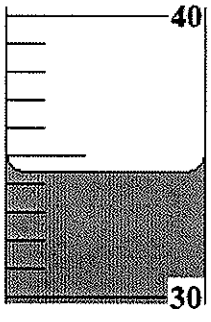
15. Why is there always uncertainty in scientific measurement?
The last digit is always estimated.

16. What digits are recorded when making a measurement?
All known digits plus 1 estimated digit

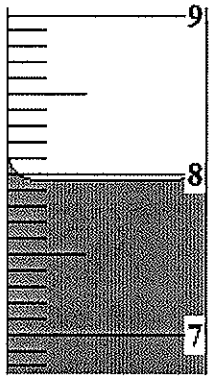
17. Identify the uncertain digit in each of the following and count the number of sig figs:

a. 53(4) cm 3 s.f.
b. 16.65(0) L 5 s.f.
c. 3(5)00 m 2 s.f.
d. 17(0) g 3 s.f.
e. 1(7)0 g 2 s.f.
f. 0.0469 g 3 s.f.
g. 1(4) g 2 s.f.
h. 5.00 cm 3 s.f.

18. On the line, write the measurement that corresponds to the picture (use precision).



34.3 mL



7.98 mL

19. Perform the following metric conversions:

a. 32.5cm = .000325 km

b. 1400 cg = .014 kg

c. 1.0 L = 10. dL

d. 1430 g = 1.43 kg

e. 1.44×10^6 nm = 14 cm

20. What would be the units for the answer to the following mathematical calculations?

a. $\frac{(g)(kg)(mL)}{(g)(mL)}$ kg

b. $\frac{(g)(C)(J)(kg)}{(g)(C)(J)(kg)(y)}$ $\frac{1}{y}$

21. Answer the following problems using appropriate significant figures:

a. 450 mL + 2.0 mL + 5.04 mL = ? 460 mL

b. .56 cm x .00145 cm x 340 cm = ? $.28 cm^3$

22. How many centimeters are in 3.50 inches? (use dimensional analysis) 1 inch = 2.54 cm

$3.50 in \times \frac{2.54 cm}{1 in} = 8.89 cm$

23. How many seconds are in 3.0 days? (use dimensional analysis)

$3.0 days \times \frac{24 hr}{1 day} \times \frac{60 min}{1 hr} \times \frac{60 sec}{1 min} = 260,000 sec$

24. What is the density of an object with a mass of 27.4 g and a volume of 4.3 cm^3.

D = ?
m = 27.4 g
$V = 4.3 cm^3$

$D = \frac{m}{V} = \frac{27.4 g}{4.3 cm^3} = 6.4 g/cm^3$

25. A liquid is placed into the cylinder, the volume of the liquid reads 14.7 mL. Then a solid with a mass of 4.56 g is added to the cylinder and the liquid level rises to 15.3 mL. What is the density of the solid?

m = 4.56 g
V = 15.3 − 14.7 = .6 mL
D = ?

$D = \frac{m}{V} = \frac{4.56 g}{.6 mL} = 8 g/mL$

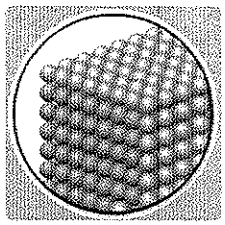
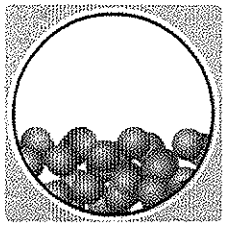
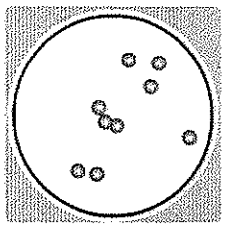
26. A sample of a solid with a density of $9.7 g/cm^3$ has a mass of 453.3g. What is the volume of the solid?

$D = 9.7 g/cm^3$
m = 453.3 g
V = ?

$D = \frac{m}{V}$ $V = \frac{m}{D} = \frac{453.3 g}{9.7 g/cm^3} = 47 g\ cm^3$

Unit 2 – Matter

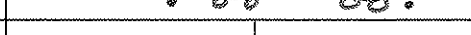
27. Complete the following table about the states of matter

Appearance on atomic level			
Volume (fixed or not fixed)	fixed	fixed	not fixed
Shape (fixed or not fixed)	fixed	not fixed	not fixed
Amount of kinetic energy of the particles	low energy	medium energy	high energy
Amount of attractive forces between particles	high attractive forces	medium forces	low attractive forces

28. Identify each of the following as a physical or chemical property:
    a. The boiling point of water is 100°C P P
    b. Magnesium reacts with chlorine to form magnesium chloride C P
    c. Potassium is a very active element C P
    d. The density of ethanol is .79 g/ml P P

29. Classify the following as physical or chemical changes:
    a. burning wood C
    b. Dissolving NaCl in water P
    c. freezing water P
    d. Crushing crystals of copper sulfate into a powder P
    e. making a cake C
    f. When combining two liquids, a color change occurs and a gas is given off. C
    g. sharpening a pencil P
    h. Combining two liquids and a precipitate forms. C
    i. chopping ice P

30. Complete the following chart about classifying matter

	Element	Compound	Homogenous Mixture	Heterogenous Mixture
Appearance on macroscopic level	looks the same throughout (Pure)	looks the same throughout (Pure)	looks the same throughout	can see separate pieces
Appearance on the molecular level	Single atoms 	molecule with multiple atoms 	multiple particles are present 	
Can it be separated by physical means?	No	No	Yes	Yes
Can it only be separated by chemical means?	No	Yes	No	No

31. Identify the following as a mixture (heterogeneous or homogeneous), element or compound.
    a. concrete heterogeneous
    b. iron element
    c. kool-aid homogeneous
    d. carbon dioxide compound
    e. sand heterogeneous
    f. sulfur element
    g. vanilla milkshake homogeneous
    h. tree heterogeneous
    i. distilled water compound

32. Give an example of the appropriate use for the following separation techniques.
    a. filtering separates a solid from a solution
    b. sifting separates solids based on particle size
    c. chromatography separates substances based on solubility
    d. distillation separates solutions based on boiling pts.
    e. decanting separates solutions based on density
    f. magnetic separation separates substances based on magnetism