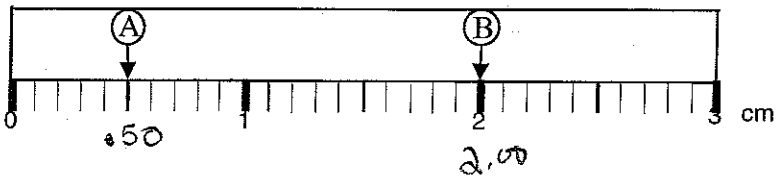
Chem 10, Fall 2009 — Name KEY
Exam 1 (Chp 1, 2 and 3) — *100 pt*

Mark your scantrons to answerQuestions 1-28. Each question has only one answer unless otherwise stated. Each question is worth 3 pt.

1. (2 pt) What are the correct values in significant digits for the measurements indicated by the arrows on the following scale?

	A	B
A)	5 cm	2 cm
B)	0.5 cm	2 cm
C)	0.5 cm	2.0 cm
D)	0.50 cm	2.00 cm



2. The most important step in the scientific method ~~and why? Explaining a few words~~.
A) Observation B) Hypothesis C) Experimentation D) Theory E) Law

3. Which of the following has the metric prefix correctly matched with its value?
A) 1000, milli B) $1x10^6$, micro C) 100, c D) 0.001, k E) None are correct.

4. What is the correct rounded answer for the following?Solve each of the following (be sure to round the answer to the correct number of significant figures): 4, 3

I. $x = \frac{4.5\text{ mL} - 0.16\text{ mL}}{256\text{ g}}$ II. $(6.022 \times 10^{23}\text{ atoms}) / 293.8\text{ g} = y$

	I	II
A)	0.016953125 mL/g	$2.049693669 \times 10^{21}$ atoms/g
B)	~~0.07~~ mL/g 0.02	2.049 atoms/g
C)	~~0.0169~~ mL/g 0.0170	2.049×10^{21} atoms/g
D)	~~0.070~~ mL/g 0.017	2.049×10^{21} atoms/g

2.0502×10^{21}

5. The decimal number 0.0000010 expressed in scientific notation is 1.0×10^{6}.
A) True B) False

6. The decimal number 0.0210 expressed in scientific notation is 2.10×10^{-2}.
A) True B) False

7. The mass of an object, 4.55×10^{-3} g, expressed in decimal notation is 0.000455 g.
A) True B) False

8. If you count 7 pennies, you can only report one significant figure in that measurement.
A) True B) False
counting sig. fig. don't apply.

9. In the number 48.93, which digit is estimated?
A) 4 B) 8 C) 9 D) 3 E) None of the above, all digits are certain.

10. An American nickel five cent coin has a mass of approximately 5 grams. Five grams is equivalent to which term?
A) 5000 kg B) 5000 mg C) 50 cg D) 5000 micrograms E) none of the above
$5000\ \mu g \times \frac{10^{-6}\text{ g}}{1\ \mu g} = 0.005$

11. Matter is defined as anything that is visible to the human eye.
A) True B) False

12. The distance from New York City to Washington, DC is approximately 235 miles. Identify the correct solution map to convert from miles to kilometers. 1 mile = 5280 ft; 1 ft = 12 in; 1 in = 2.54 cm.

A) $235\text{ mi} \times \frac{1\text{ ft}}{5280\text{ mi}} \times \frac{12\text{ in}}{1\text{ ft}} \times \frac{1\text{ in}}{2.54\text{ cm}} \times \frac{10^{-2}\text{ cm}}{1\text{ m}} \times \frac{1\text{ km}}{10^{3}\text{ m}}$

B) $235\text{ mi} \times \frac{5280\text{ ft}}{1\text{ mi}} \times \frac{1\text{ in}}{12\text{ ft}} \times \frac{2.54\text{ in}}{1\text{ cm}} \times \frac{1\text{ cm}}{10^{-2}\text{ m}} \times \frac{10^{3}\text{ km}}{1\text{ m}}$

C) $235\text{ mi} \times \frac{5280\text{ ft}}{1\text{ mi}} \times \frac{12\text{ in}}{1\text{ ft}} \times \frac{2.54\text{ cm}}{1\text{ in}} \times \frac{10^{-2}\text{ m}}{1\text{ cm}} \times \frac{1\text{ km}}{10^{3}\text{ m}}$

D) $235\text{ mi} \times \frac{12\text{ in}}{1\text{ ft}} \times \frac{2.54\text{ cm}}{1\text{ in}} \times \frac{10^{-2}\text{ cm}}{1\text{ m}} \times \frac{1\text{ km}}{10^{3}\text{ m}}$

E) $235\text{ mi} \times \frac{12\text{ in}}{1\text{ ft}} \times \frac{2.54\text{ cm}}{1\text{ in}} \times \frac{1\text{ m}}{10^{-2}\text{ cm}} \times \frac{10^{3}\text{ km}}{1\text{ m}}$

13. Which state of matter has atomic spacing that is close together and indefinite shape?
A) liquid B) solid C) gas D) plasma E) none of the above

14. Which among the following statements is true?
A) A solid has a definite shape and a definite volume.
B) A liquid has a definite volume; but it has no definite shape.
C) A gas has neither definite volume nor definite shape.
D) Both solids and liquids are incompressible while gases are compressible.
E) all of the above are true

15. A pure substance is:
A) composed of two or more different types of atoms or molecules combined in variable proportions.
B) composed of only one type of atom or molecule.
C) composed of two or more regions with different compositions.
D) composed of two or more different types of atoms or molecules that has constant composition.

Matter is classified by the following terms:
A) Pure B) Mixture C) Element D) Compound E) Homogeneous
For each of the following items in Questions #16-#19 mark your scantron for each term that applies. More than one term may apply to each item.

16. Fruit salad	B
17. Vitamin C ($C_6H_8O_6$)	A, D, E
18. Nitrogen (N_2)	A, C, E
19. A clear solution of salt and water	B, E

20. Which statement is concerning the state of matter (solid, liquid or gas) is correct?
A) The term, evaporation, refers to a solid changing to a gas.
B) A liquid loses heat when it changes to a solid.
C) Condensation is an endothermic change.
D) Condensation occurs when a liquid changes into a gas.

The following terms apply to the characterization of matter:
A) physical property B) physical change C) chemical property D) chemical change
For each of the following statements in questions #21 - #24 use <u>one</u> of the terms above.

21. Acid rain is corrosive to granite. C
22. The odor of spearmint gum. A
23. When methane is burned with oxygen the products are carbon dioxide and water. D
24. Natural gas is very flammable. C

25) Which of the following statements about energy is FALSE?
A) An object possessing energy can do work on another object.
B) Energy can neither be created nor destroyed.
C) Energy is the single main component of the universe.
D) Energy is the capacity to do work.
E) All of the above statements are true

26. How many calories are there in a 255 Calorie snack bar?
A) 2.55×10^5 B) 1.07×10^3 C) 60.9 D) 1×10^3

1000 cal = 1 Cal
$255\ \text{Cal} \times \frac{1000\ \text{cal}}{1\ \text{Cal}} = 2.55 \times 10^5\ \text{cal}$

27. How many joules are there in a 255 calorie snack bar?
A) 2.55×10^5 B) 1.07×10^6 C) 1.07×10^3 D) 6.09×10^4

$255 \times 4.184 =$

28. In order, what is the freezing point, room temperature and boiling point of water according to the Celsius scale?
A) 32-75-212 B) 0-75-100 C) 0-25-100 D) 0-298-373

Show all work for Questions 29-32 for full credit. Be sure to round your answers to the correct number of significant figures.

29. (8 pt) The sun is 93,000,000 mi from earth. How long (min) does it take light to reach earth if the speed of light is 180,000 m/s? 1 m = 3.048 ft, 5280 ft = 1 mi

1 pt 6 pt

$$9.3 \times 10^7\ \text{mi} \times \frac{5280\ \text{ft}}{1\ \text{mi}} \times \frac{1\ \text{m}}{3.048\ \text{ft}} \times \frac{1\ \text{s}}{1.8 \times 10^5\ \text{m}} \times \frac{1\ \text{min}}{60\ \text{s}} =$$

$$\frac{9.3 \times 10^7 \times 5280}{3.048 \times 1.8 \times 10^5 \times 60}$$

1 pt

15,000 min = 1.5×10^4 min

$$9.3 \times 10^7\ \text{mi} \times \frac{1.6093\ \text{km}}{1\ \text{mi}} \times \frac{1000\ \text{m}}{1\ \text{km}} \times \frac{1\ \text{s}}{180{,}000\ \text{m}} \times \frac{1\ \text{min}}{60\ \text{s}} =$$

$$\frac{9.3 \times 10^7 \times 1.6093 \times 1000}{1.8 \times 10^5 \times 60} = 14{,}020\ \text{min}$$

30. (5 pt) Farmer Brown's farm is 1.00 mi^2. How many acres is this? (1 acre = 43560 ft^2 and 1 mile = 5280 ft)

$$1.00\ mi^2 \times \frac{5280^2\ ft^2}{1\ mi^2} \times \frac{1\ acre}{43560\ ft^2} = 640.\ acres$$

1 2 1 1

5

31. (5 pt) A bag of sand has a mass of 1.75 lb and sand has a density of 3.00 g/cm^3. What is the volume (in cm^3) of the sand? 1 lb = 454 g

$$1.75\ lb \times \frac{454\ g}{1\ lb} \times \frac{1\ cm^3}{3.0\ g} = 265\ cm^3$$

1.5 pt 1.5 pt 1 pt

$$D = \frac{m}{V} \rightarrow V = \frac{m}{D}$$

32. (5 pt) A 15.0 gram lead ball at 25.0 °C was heated with 40.5 joules of heat. Given the specific heat of lead is 0.128 J/g°C, how many degrees did the temperature of the lead increase?

$$C = \frac{J}{1\ g\ ^\circ C} \qquad ^\circ C = \frac{J}{g\ C}$$

$$\Delta^\circ C = \frac{40.5\ J}{15\ g \times 0.128\ \frac{J}{g\ ^\circ C}} = \frac{40.5}{15 \times 0.128} = 21\ ^\circ C \text{ temp change}$$