NAME **KEY**

105 pt

Mark only one answer on your scantron unless it is written to mark more than one. Each question is worth 2 pt.

Chapter 1.

1. (1.3) <u>Testing a hypothesis is</u> which step of the scientific method?
   A) Observation   B) Hypothesis   C) Experimentation   D) Theory   E) Law

2. (1.4) An example of speed is <u>miles</u> per <u>hour</u>. What quantities are measured to determine speed? *Mark all that apply.*
   A) Volume   B) Mass   C) Temperature   D) Length   E) Time

---

(1.4) For the units.

3. 1 gigagram = _____A_____ gram

4. 1 centimeter = __AB__ meter

5. 1 nanometer = __DE__ meter

6. 1 mL = __E__ cm^3

USE THESE ANSWERS FOR QUESTIONS 3-6

A) 10^9	AB) 10^{-2}
B) 10^6	BC) 10^{-3}
C) 10^3	CD) 10^{-6}
D) 10^2	DE) 10^{-9}
E) 10^0	

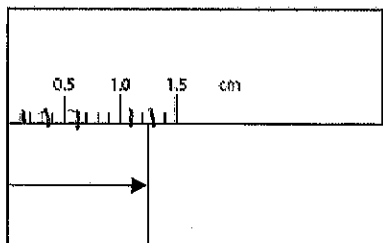7. (1.4) Which is the smallest increase in temperature:
   A) 10 °C (such as from 100 °C to 110 °C),
   B) 10 K (such as from 100 K to 110 K),
   C) 10 °F (such as from 100 °F to 110 °F)?

(1.5) (6 pt) For each of the following measurements:
   a) Write the volume with the correct number of significant digits.
   b) Circle the uncertain digit
   c) Write the error in this measurement (the ±)

4.3(3) ± .01 _____psi?

1.2(5) ± .01 _____cm?

20 pt
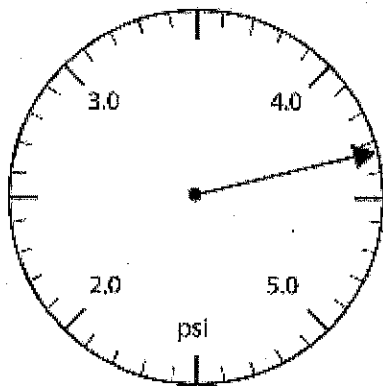
8. (1.5) How would you describe the following density measurements in terms of accuracy and precision: 1.8 g/cm^3, 1.7 g/cm^3, 1.9 g/cm^3, 1.8 g/cm^3 **The accepted value for this density = 1.8 g/cm^3.**

A) accurate / precise   B) inaccurate / precise   C) inaccurate / imprecise   D) accurate / imprescise

Chapter 2.
(2.1) **USE THESE ANSWERS FOR QUESTIONS 9-14**

A) cancel	E) exact unit	DE) left
B) decrease	AB) given value	ABC) unwanted
C) defined	BC) inexact	BCD) variable
D) desired	CD) known	

9. The first step in the unit analysis procedure is to identify the unit for the value we want to calculate. We write this on the ___left DE___ side of an equals sign.

10. Next, we identify the ___AB given value___ that we will convert into the desired value and we write it on the other side of the equals sign. C or CD

11. In the unit analysis process, we multiply by one or more conversion factors that cancel the ___unwanted___ ABC or AB units and

12. generate the ___D desired___ units.

13. Note that the units in a unit analysis setup cancel just like the ~~the~~ variables (BCD) in an algebraic equation.

14. If you have used correct conversion factors in a unit analysis setup, and if your units ___A cancel___ to yield the desired unit or units, you can be confident that you will arrive at the correct answer.

---

15. (2.2) *Mark all answers on your scantron* that are exact (E) numbers.

A) 25 pounds of sugar   B) 2 dozen apples   C) $24.54   D) 55.5 m

16. (2.2) Which value has 3 significant figures?

A) 300 oz   B) 0.70 x 10^4 kg   C) 0.0230 L   D) 231.0 kg

(2.2) (4 pt) Report the answers to the following calculations to the correct number of significant figures

$23.40 - 18.2 =$ __5.2__   1 dec. place $\dfrac{456.8(5280)^2}{(10^3)^2(1.609)^2} = 4920$ 3 sig figs

(2.3) (6 pt) When a rubber stopper that weighs 77.7 g is submerged in water in a graduated cylinder, the water level rises from 55.5mL to 62.7 mL. Calculate the density (g/mL) of the riubber stopper. *Round your answer to the correct number of significant figures.*

$D = \dfrac{mass}{vol}$

vol = 62.7 mL − 55.5 mL = 7.2 mL   mass = 77.7 g

$D = \dfrac{77.7\,g}{7.2\,mL} = $ __11 g/mL__

28 pt

20. (3.2) Which is the most abundant element on the earths surface?
    (a) hydrogen   (b) oxygen   (c) silicon   (d) iron

21. (3.3) Which two elements have similar properties?
    A) Kr   B) He   C) K   D) F   E) Se

22. (3.3) Group 1A elements are also called:
A) noble gases.   B) halogens.   C) alkaline earth metals.   D) alkali metals.

(3.3) (10 pt)
Complete the following table.

Name	Symbol	Group number	Metal, nonmetal, or metalloid?	Representative element, transition metal,	Number for period
aluminum	Al	3A	Metal	Rep	3
silicon	Si	4A	metalloid	Rep	3
nickel	Ni	B group	Metal	Trans	3
sulfur	S	6A	Non	Rep	4

(3.4) (10 pt) Fill in the following table for these elements.

ISOTOPE NAME	ISOTOPE SYMBOL	ATOMIC #	MASS #	# PROT	# ELEC	# NEUT	CHARGE #
aluminum -27	$^{27}_{13}Al$	13	27	13	13	14	0
Chlorine-37	$^{37}_{17}Cl$	17	37	17	18	20	−1

(3.4) (8 pt) Calculate the average atomic mass of an element that has two isotopes.

	Mass (amu)	Percent Abundance
Isotope 1	10.012937	X 19.9 /100 = 1.9925
Isotope 2	11.009305	X 80.1 /100 = 8.8185

10.811

What element is this? Boron

23. (3.5) Which of the following is NOT a physical property of metals?
    A) are solids, liquids or gases at room temp.   B) shiny   C) conduct electricity   D) conduct heat   E) ductile

36 pt

(2.4) (4 pt) Calculate the grams of alcohol in 100.0 grams of a solution that contains 23.0% alcohol. *Round your answer to the correct number of significant figures.*

$$\% = \frac{part}{whole} \times 100 = 23.0\% = \frac{part\ alcohol}{100.0\ g\ solution}$$

$$\left(\frac{23.0\ al}{100\ soln}\right) \times 100\ g = part\ alcohol$$

$$\boxed{23.0\ g\ alcohol}$$

(2.3 & 2.5) (7 pt) The density of whole blood is 1.05 g/mL. A typical human has about 5.5 quarts of whole blood. How many kg is this? *Round your answer to the correct number of significant figures.*

$$? \ kg = 5.5\ qt \times \frac{1\ L}{1.0567\ qt} \times \frac{1\ mL}{0.001\ L} \times \frac{1.05\ g}{1\ mL} \times \frac{1\ kg}{1000\ g}$$

$$= \frac{5.5 \times 1.05}{1.0567 \times 0.001 \times 1000}$$

$$= 5.465\ kg \ \approx \ \boxed{5.5\ kg}$$

17. (2.6) Temperature scales. Which of the following temperatures is the lowest?

A) 0 °C   B) 0 °F   C) 32 °F   (D) 212 K

$$0°C$$

$$C = \frac{F - 32}{1.8}$$
$$-17.7°C$$

$$0°C$$

$$C = K - 273$$
$$C < 212 - 273$$
$$C = -61$$

Chapter 3.

18. (3.1) Which of the following *does not* describe the gaseous state?
   A. Same shape as a closed container
   B. Same volume as a closed container
   C. Random, independent particle movement
   D. Easily compressed
   (E.) All describe the gaseous state

19. (3.1) The change of state from a gas to a solid is called
A) evaporation   B) condensation   C) sublimation   D) freezing   (E) deposition   AB) melting

17 pt

(3.6) The Mole

24. One mole of copper atoms is 6.022×10^{23} copper atoms.
    A) True   B) False

25. One mole of copper has a mass of 29 grams.
    A) True   B) False

(F)

26. How many atoms are in 1.50 moles of fluorine gas?
    A) 6.022×10^{23} B) 9.03×10^{23} C) 18.98   D) 1.81×10^{24} E) none of the above

? atoms $= 1.50$ mol $\times \dfrac{6.022 \times 10^{23} \text{ atoms}}{1 \text{ mol}} = 9.03 \times 10^{23}$ atom F

27. How many moles of Cu are in 1.48×10^{25} Cu atoms?
    A) 0.0408   B) 24.6   C) 1.54×10^{25} D) 6.022×10^{23} E) none of the above

? mol $= 1.48 \times 10^{25}$ Cu atoms $\times \dfrac{1 \text{ mol}}{6.022 \times 10^{23} \text{ atom}} \times \dfrac{63.54 \text{ g Cu}}{1 \text{ mol}}$

$= \dfrac{1.48 \times 10^{25} \text{ Cu atoms mol}}{6.022 \times 10^{23}}$

$= 24.6$ mol

8 pt

USEFUL CONVERSION FACTORS AND RELATIONSHIPS

Length
SI unit: meter (m)
$$1 \text{ km} = 0.62137 \text{ mi}$$
$$1 \text{ mi} = 5280 \text{ ft}$$
$$= 1.6093 \text{ km}$$
$$1 \text{ m} = 1.0936 \text{ yd}$$
$$1 \text{ in.} = 2.54 \text{ cm (exactly)}$$
$$1 \text{ cm} = 0.39370 \text{ in.}$$
$$1 \text{ Å} = 10^{-10} \text{ m}$$

Mass
SI unit: kilogram (kg)
$$1 \text{ kg} = 2.2046 \text{ lb}$$
$$1 \text{ lb} = 453.59 \text{ g}$$
$$= 16 \text{ oz}$$
$$1 \text{ amu} = 1.6605402 \times 10^{-24} \text{ g}$$

Energy (derived)
SI unit: Joule (J)
$$1 \text{ J} = 1 \text{ kg-m}^2/\text{s}^2$$
$$1 \text{ J} = 0.2390 \text{ cal}$$
$$= 1 \text{ C} \times 1 \text{ V}$$
$$1 \text{ cal} = 4.184 \text{ J}$$
$$1 \text{ eV} = 1.602 \times 10^{-19} \text{ J}$$

Pressure (derived)
SI unit: Pascal (Pa)
$$1 \text{ Pa} = 1 \text{ N}/\text{m}^2$$
$$= 1 \text{ kg}/\text{m-s}^2$$
$$1 \text{ atm} = 101,325 \text{ Pa}$$
$$= 760 \text{ torr}$$
$$= 14.70 \text{ lb}/\text{in}^2$$
$$1 \text{ bar} = 10^5 \text{ Pa}$$

Volume (derived)
SI unit: cubic meter (m^3)
$$1 \text{ L} = 10^{-3} \text{ m}^3$$
$$= 1 \text{ dm}^3$$
$$= 10^3 \text{ cm}^3$$
$$= 1.0567 \text{ qt}$$
$$1 \text{ gal} = 4 \text{ qt}$$
$$= 3.7854 \text{ L}$$
$$1 \text{ cm}^3 = 1 \text{ mL}$$
$$1 \text{ in}^3 = 16.4 \text{ cm}^3$$

PERIODIC CHART OF THE ELEMENTS

Lanthanide Series

58	59	60	61	62	63	64	65	66	67	68	69	70	71
Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
140.12	140.907	144.24	[147]	150.35	151.96	157.25	158.924	162.50	164.930	167.26	168.934	173.04	174.97

† Actinide Series

90	91	92	93	94	95	96	97	98	99	100	101	102	103
Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr
232.038	[231]	238.03	[237]	[242]	[243]	[247]	[247]	[249]	[254]	[253]	[256]	[256]	[257]