How Many Significant Digits for Each Number?

1) 0.320 = _____
2) 46 = _____
3) 31 = _____
4) 0.0950 = _____
5) 245 = _____
6) 3103 = _____
7) 5040 = _____
8) 0.012 = _____
9) 8.17×10^{3} = _____
10) 7.279×10^{-1} = _____
11) 0.00760 = _____
12) 90 = _____
13) 9.450×10^{-8} = _____
14) 5.0×10^{-6} = _____
15) 0.27 = _____
16) 0.0518 = _____
17) 3007 = _____
18) 1.830×10^{-7} = _____
19) 4.60×10^{6} = _____
20) 2033 = _____

Solve the Problems and Round Accordingly.

1) 4.539 + 3.8887 = _____
2) 29.44 + 42.5791 + 24.9 = _____
3) 73.1251 - 18.9 = _____
4) 7.2 + 1.4473 + 12.439 = _____
5) 8.6 + 8.7638 = _____
6) 19.1 - 1.86 = _____
7) 9.85 + 3.2725 + 54.1 = _____
8) 19.5 - 6.7947 = _____
9) 62.239 + 1.959 = _____
10) 6.419 + 75.11 = _____
11) 59.113 - 6.688 = _____
12) 6.5927 + 16.75 + 4.38 = _____
13) 39.46 + 4.2273 + 4.372 = _____
14) 66.29 + 1.4416 = _____
15) 3.9425 + 51.4 = _____
16) 5.823 + 67.96 + 53.8757 = _____
17) 89.95 - 5.867 = _____
18) 92.2246 - 2.542 = _____
19) 79.254 + 1.7229 = _____
20) 97.4 - 39.84 = _____

#1

Solve the Problems and Round Accordingly.

1) 400 x 0.97 = _____
2) 15.12 x 4 x 2100 = _____
3) 410 ÷ 5.0 = _____
4) 0.0095 x 0.6 x 690 = _____
5) 3080 ÷ 4.236 = _____
6) 0.0042 x 8.721 x 3000 = _____
7) 14.780 x 0.46 x 6010 = _____
8) 0.0032 x 142 = _____
9) 6002 ÷ 9.0 = _____
10) 14.140 x 3.1 = _____
11) 3030 ÷ 7.654 = _____
12) 902 ÷ 6.82 = _____
13) 0.90 x 7.433 = _____
14) 17.1 x 0.0076 x 200 = _____
15) 100 x 9.32 = _____
16) 0.04 x 300 = _____
17) 3007 ÷ 67.46 = _____
18) 836 x 5 x 7005 = _____
19) 6.7 x 0.8 = _____
20) 0.02 x 49.252 x 8050 = _____

Scientific Notation

Question 1

Write in scientific notation: 0.000467 and 32000000

Question 2

Express 5.43×10^{-3} as a number.

Question 3

Express 4.5×10^{-14} as a number.

Question 4

Write in scientific notation .00000000000987 and 5460000

Question 5

Use your calculator: What is $1.4 \times 10^{-14} \times 3.45 \times 10^{-7}$?

Question 6

Using your calculator: What is $4.35 \times 10^{-2} / 6.02 \times 10^{23}$?

#2 – In Class – Matter

DIRECTIONS: Please work with your group on the following sorting activity. Please record your groupings and make your statements using complete sentences. Return the cards to the baggie after completion and return to your teacher

Part A – Card Sort

Particle models: gas, liquid, solid

This activity provides an opportunity to explore the use of models to describe gases, liquids and solids. Think about gases, liquids and solids in terms of the particle model.

Procedure :

Interpret the diagrams on the cards showing representations of particles and observe a demonstration.

Each group of students is to sort their cards into three categories based on similarities:

Categorize them as *Solids, Liquids, & Gases*. List the number corresponding to each card in the table below. Then List the similarities and differences of the cards in each group.

	Solid	Liquid	Gas
Card Numbers			
Similarities			
Differences			
Elements			
Compounds			
Mixtures			

Part B – Taking it further…

1. Look at the cards in your "Gas Pile". Now categorize them as Element, Compound, or Mixture.

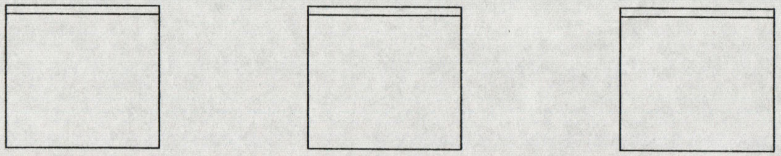
2. Do the same with your "Liquid Pile" and "Solid Pile".

Part C – Questions

1. Compare and contrast solids and liquids.

2. Compare and contrast liquids and gases.

3. Draw a diagram to represent 8 particles in each state of matter. (HINT: Recall that plasma is gas-like but with one major difference.)



SOLID LIQUID GAS

4. A common trick for removing a stubborn jar lid is to run the metal lid under hot water.

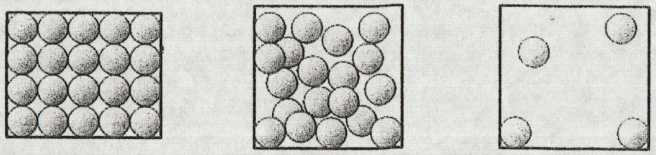
   a. What does *Kinetic Molecular Theory* tell us about the effect of temperature on the motion of particles?

   b. Describe what happens to the particles in the metal lid when it is run under hot water. Why does this trick allow the lid to be removed more easily?

5. Jiggling atoms and temperature

Can you explain why the level of alcohol in the thermometer rises when you dip a thermometer into a beaker of hot water?

Use the diagrams and your knowledge of chemistry to answer the following questions.



Solid Liquid Gas

1. According to the diagram, how do solids, liquids, and gases differ?

2. A 10-gram aluminum cube placed in a beaker will retain its shape. How ever, 10 grams of alcohol poured into a beaker will take the shape of the beaker. Use the arrangements of their particles to explain the difference in the way these two kinds of matter behave.

3. Students in a chemistry laboratory are working with barium chloride (a white powder), mercury (a silvery liquid), and hydrogen sulfide (a colorless gas). As you enter the room, you smell a strong odor. Which of the three substances is most likely producing the odor? Explain your logic.

4. A friend tells you that ice must be denser then water because ice is a solid and water is a liquid. You know, however, that this is not true. What mistaken assumptions might your friend be making?

5. Consider the following three substances: liquid mercury (Hg; density = 1.36 g/cm3); chlorine gas (Cl2; density at STP = 3.2 × 10-3 g/cm3); and solid potassium chloride (KCl; density = 1.98 g/cm3). a. Order these substances according to how freely their particles can move. Then list them in order or greatest to least density.

b. Compare your two lists. What can you conclude about the density of solids, liquids, and gases? How can you explain your conclusion?

6. Unlike electromagnetic waves, sound waves only can travel through matter. The particles of matter vibrate, and the vibrations are transferred from one particle to the next. Through which would you expect sound waves to travel most quickly: an iron bar, pure nitrogen gas, or salt water? Explain your answer.

DIMENSIONAL ANALYSIS PROBLEMS

#3

Conversions Factors

1 hr = 60 min	1 min = 60 sec	1 ton = 2000 lbs	7 days = 1 week
24 hrs = 1 day	1 kg = 2.2 lbs	1 gal = 3.79 L	264.2 gal = 1 cubic meter
1 mi = 5,280 ft	1 kg = 1000 g	1 lb = 16 oz	20 drops = 1 mL
365 days = 1 yr	52 weeks = 1 yr	2.54 cm = 1 in	1 L = 1000 mL
0.621 mi = 1.00 km	1 yd = 36 inches	1 cc is 1 cm^3	1 mL = 1 cm^3

DIRECTIONS: Solve each problem using dimensional analysis. Every number must have a unit. Work must be shown. Conversion factors are given below

1.) How many miles will Katie Nichols, Katlyn Cook, and Caitlyn Blais run during a 10.0 kilometer race?

2.) The moon is 250,000. miles away. How many feet is it from earth?

3.) Tre Williams's family pool holds 10,000. gallons of water. How many cubic meters is this?

4.) The average American student is in class 330. minutes/day. How many hours/week is this?

5) How many seconds are there in 1.00 year?

6) Lake Michigan holds 1.30×10^{15} gallons of water. How many liters is this?

7) Pepsi puts 355 ml of pop in a can. How many drops is this?

8) Charlotte uses 1.2×10^9 gallons of water /day. How many gallons per second must be pumped from the lake every second to supply the city?

9) Kaemon Lee is going sixty miles/ hour, which is how many ft/sec?

10) Lake Michigan holds 1.3×10^{15} gallons of water. If just Chicago removed water from the lake and it never rained again, how many days would the water last? Chicago uses 1.2×10^9 gallons of water /day.

11). How many minutes are in 180.0 days?

12). If a Myquon Stout weights 250 lbs, 8 oz., (about right for a starting linebacker at App State) how many mg does he weigh?

13). The distance from Carson to Efird's house is 16.25 mi. What is the distance in cm?

14). Santa Maria has an elevation of 6.30×10^5 mm. How many km is this elevation?

15). If Zach Hesse hearls a projectile across the room at 3.00×10^3 feet in one second, how far will it travel in 18 minutes? (wow, what an arm!)

16). A small herd of cattle consumes fourteen bales of hay in two weeks. How many bales must Demond Cunningham feed the herd in a year?

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17). During the previous year, Emily Hiatt's weather station measured 0.8 yards of rain. Express this amount in cm.

18). If a Emily Wilhelm swims 85.4 yards in five minutes, how many meters will she swim in 70.0 seconds?

19). Saffron costs $368.00 per ounce. Determine how many grams you can purchase for $15.00.

20). How many grams are equivalent to 1.80×10^{-4} tons? (English tons)

21). A gas station where Kelly Roberts is getting gas is charging $1.299 per gallon of gas. (In her dreams!) What would be the price for a liter of gas?

22). Determine the number of years in 8.35×10^{6} minutes.

23). A quart of a liquid in Ethan Goss's backyard has a mass of 2.70 kilograms. How many quarts will it take to weigh 100.0 pounds?

24). Sixty-two months is equivalent to how many seconds?

25). Rachel Freeze's car consumes 25.00 gallons of fuel when driving a distance of 400.0 km. How many gallons will it consume when driving 250.0 miles?

26). 0.0054 weeks is equivalent to how many minutes?

27). How many feet per second is a wave going if it travels a distance of one mile in 7.35 seconds?

Now, try these you dimentional analysis champions.

1. Every three times I clean my bedroom, my mother makes me an apple pie. I cleaned my bedroom 9 times. How many apple pies does she owe me? (What? Your mother doesn't reward you for cleaning your bedroom? Aren't there child labor laws? To make up for that injustice, you may have this very easy extra credit problem.)

2. A chemistry teacher working at a golf camp during the summer found a liquid, which caused him to slice ball after ball into the water without disturbing him at all. He thought that this was an important liquid to identify so he set out to determine its density. He found that a sample of the liquid had a mass equal to 455 golf balls and occupied a volume of 620 water cups that he obtained at the 7^{th} hole. Each golf ball massed 50 g and the water cups at the 7^{th} hole of the golf course held 45 mL each. What is the density of the unknown liquid?

3. A Carson High School senior was applying to college and wondered how many applications she needed to send. Her counselor explained that with the excellent grade she received in chemistry she would probably be accepted to one school out of every three to which she applied. [*3 applications = 1 acceptance*] She immediately realized that for each application she would have to write 3 essays, [*1 application = 3 essays*] and each essay would require 2 hours work *[1 essay = 2 hours]*. Of course writing essays is no simple matter. For each hour of serious essay writing, she would need to expend 500 calories [*1 hour = 500 calories*] which she could derive from her mother's apple pies [1 pie = 1000 calories]. How many times would she have to clean her room in order to gain acceptance to 10 colleges? Hopefully you didn't skip problem No 1. I'll help you get started.... 10 acceptances [ ] [ ] etc.

4. How much force, in $g*cm / s^2$, is exerted by a golf ball described in problem 2 striking a tree while accelerating at 20 cm / s^2 ? Show how you can solve this problem without knowing that F = m a. Explain your solution.

5. Because you never learned dimensional analysis, you have been working at a fast food restaurant for the past 35 years wrapping hamburgers. Each hour you wrap 184 hamburgers. you work 8 hours per day. you work 5 days a week. you get paid every 2 weeks with a salary of $840.34. How many hamburgers will you have to wrap to make your first one million dollars? [You are in a closed loop again. If you can solve the problem, you will have learned dimensional analysis and you can get a better job. But, since you won't be working there any longer, your solution will be wrong. If you can't solve the problem, you can continue working which means the problem is solvable, but you can't solve it. We have decided to overlook this impasse and allow you to solve the problem as if you had continued to wrap hamburgers.]

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