$\qquad$ Date:

1. Lavoisier said, "There are at least two kinds of airs in air." Explain why when he made that statement he was claiming that air was not an element.

An element is only made of one type of "particle." If air has two types, then by definition it can't be an element.
2. If Lavoisier conducted his mercury experiment with 100 mL of air trapped inside of the swan necked retort and bell jar, how much would he expect the mercury to rise in the bell jar?
A) 10 mL
(B) 20 mL
C) 50 mL
D) 100 mL
3. Explain your answer to the previous question.

Lavoisier discovered that air is composed of about $20 \%$ oxygen. The oxygen is what combines with the mercury to make red powder. $20 \%$ of 100 is 20 mL , so 20 mL of mercury would rise to take the place of the oxygen.
4. True or False... Correct the false ones to make them true!

F a) Compounds can be only homogeneous or heterogeneuls.
T b) Elements are always homogeneous.
T c) Mixtures can be homogeneous or heterogeneous.
T_d) Aluminum is an example of an element.
$\qquad$ e) Water is a homogeneous compound.

F f) Milk that has been pasteurized is a pure substance. mixture
5. Antoine Lavoisier used $\qquad$ in his experiment to prove that air is not a $\frac{\text { element }}{}$ empound, or mixture?
6. When sulfuric acid is poured on sugar, the sugar bubbles and fizzes. Water actually boils away from the sugar until only a chunk of black carbon remains. This is evidence that sugar is a...
A) Element
(B) compound
C) mixture
7. Using either the term "physical change" or "chemical change," explain your answer to question 6.

The sulfuric acid caused a chemical change. Water was removed from the sugar, leaving behind only carbon. The sugar's properties were completely changed. This type of change is called a chemical change and it happens when compounds are formed, or as in this case, when they are unformed.
8. Every sample of kryptonite ever analyzed has been found to be $12.1 \%$ krypton gas and $87.9 \%$ iron metal. This suggests that kryptonite is a
A) Element
(B) compound
C) mixture
9. Explain your reasoning for your answer to question 8.

Compounds always have a definite composition. A compound will always be made of the same components in the same proportions.
10. Consider kryptonite from questions 8 and 9 . Do you expect kryptonite to be homogeneous or heterogeneous? Justify your choice.

Homogeneous; all compounds are homogeneous.
11. Salt water is a $\qquad$
$\qquad$ .
12. A bowling ball has a density of $6.5 \mathrm{~kg} / \mathrm{L}$ and a mass of 5 kg . What is its volume?
0.8 L
13. A 43 g piece of gold has a volume of $2.9 \mathrm{~cm}^{3}$. A piece of silver has a mass of 75 g and a volume of $6.7 \mathrm{~cm}^{3}$. Which metal has the greater density-the gold or the silver?

Gold has a density of $15 \mathrm{~g} / \mathrm{cm}^{3}$ compared to silver's density of $11 \mathrm{~g} / \mathrm{cm}^{3}$
14. What is the density of the fish whose mass is 5.75 g ? (Hint: Use the diagram at the right to find the volume in mL of the fish first.)
$0.96 \mathrm{~g} / \mathrm{mL}$
15. Convert the following numbers to scientific notation.
a) $14,020,000$
b) 0.00030020
c) 5200
$1.402 \times 10^{7}$
$3.0020 \times 10^{-4}$
$5.2 \times 10^{3}$

16. How many significant figures are in each of the following numbers.
a) 0.0030320
b) 120,020
c) 10.0
d) 24.01
e) 145,000
3
f) 0.0003650
4
17. Perform the following calculations making sure that your answers have the correct significant figures.
a) $1300 \times 125=$ $\qquad$ f) $\left(1.2 \times 10^{-5}\right)\left(3.00 \times 10^{12}\right)=$ $\qquad$
b) $(2150)(10)=$ $\qquad$ g) $0.0022 \div 0.0510=\_0.043$
c) $4000 \div 12=$ $\qquad$ h) $(0.04500)(0.20)=\underline{0.0090}$
d) $4.5 \times 10^{9} \div 10=$
i) $0.420 \times 0.003=$ $\qquad$
e) $358 \times 200=$ $\qquad$ j) $3200 \div 2=$ $\qquad$
18. Perform the following conversions between units:
a) $2.55 \mathrm{~m}=$ 255 cm
e) $12,040 \mu \mathrm{~L}=$ 12.04 mL
b) $0.327 \mathrm{~L}=$ $\qquad$ mL
f) $2.87 \mathrm{~cm}=\underline{28,700,000}$ nm
c) $10.5 \mathrm{~kg}=$ $\qquad$ mg
g) $402 \mathrm{mg}=\underbrace{0.000402} \mathrm{~kg}$
d) $203 \mathrm{~mm}=$ $\qquad$ m
h) $3.25 \mathrm{~km}=\quad 325,000$
$\qquad$ cm
19. There are 12 ounces of Coke in each can and 24 cans in each case. A pallet of Coke contains 80 cases of Coke. Use this information to answer the following questions.
a) How many cans of Coke would there be in $3 / 4$ of a pallet?

1440 cases
b) How many ounces of Coke are there in 1.5 cases?

430 ounces
c) During one year someone drank 450,000 ounces of Coke. How many cases did the person drink? 1600 cases
d) A store ordered 420 cases of Coke.
i. How many pallets did the store order?

### 5.25 pallets

ii. How many ounces did the store order?

120,000 ounces

