Name____

Date__________Pd_____

Proportional Reasoning

1. 100 cm are equivalent to 1 m. How many cm are equivalent to 3 m? Briefly explain how you could convert any number of meters into a number of centimeters.

2. 45 cm are equivalent to how many m? Briefly explain how you could convert any number of cm into a number of m.

3. One mole of water is equivalent to 18 grams of water. A glass of water has a mass of 200 g. How many moles of water is this? Briefly explain your reasoning.

Use the metric prefixes table to answer the following questions:

4. The radius of the earth is 6378 km. What is the diameter of the earth in meters?

5. In an experiment, you find the mass of a cart to be 250 grams. What is the mass of the cart in kilograms?

Metric prefixes:

giga	= 1 000 000 000	billion
mega	= 1 000 000	million
kilo	= 1 000	thousand
centi	= 1 / 100	hundredth
milli	= 1 / 1000	thousandth
micro	= 1 / 1 000 000	millionth
nano	= 1 / 1 000 000 000	billionth

6. How many megabytes of data can a 4.7 gigabyte DVD store?

7. A mile is farther than a kilometer. Consider a fixed distance, like the diameter of the moon. Would the number expressing this distance be larger in miles or in kilometers? Explain.

8. One US dollar = 0.73 Euros (as of 8-07.) Which is worth more, one dollar or one Euro? How many dollars is one Euro?

9. In 2012, Germans paid 1.65 Euros per liter of gasoline. At the same time, American prices were $3.90 per gallon.
   a. How much would one gallon of European gas have cost in dollars?
   b. How much would one liter of American gasoline have cost in Euros?
   (One US dollar = 0.76 Euros, 1 gallon = 4.55 liters)

10. A mile is equivalent to 1.6 km. When you are driving at 60 miles per hour, what is your speed in meters per second? Clearly show how you used proportions to arrive at a solution.

11. Let $y = a/(bx^2)$. In each case listed below, describe how y will change. Explain each response.

a. Double a, keeping b and x constant.

b. Double b, keeping a and x constant.

c. Double x, keeping a and b constant.

12. For each of the following mathematical relations, state what happens to the value of y when the value of x is halved. (k is a constant)

a. $y = kx$

b. $y = k/x$

c. $y = k/x^2$

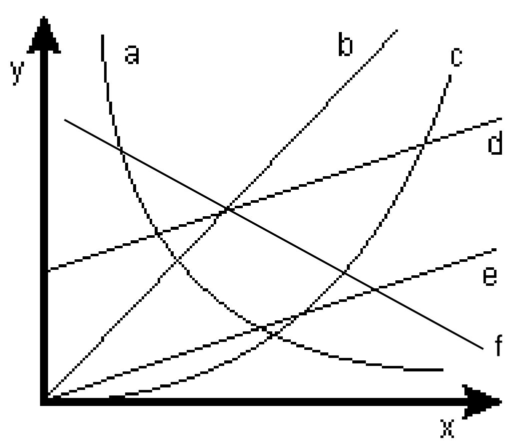
13. When one variable is *directly proportional* to another, doubling one variable also doubles the other. If y and x are the variables and a and b are constants, circle the following relationships that are direct proportions. For those that are not direct proportions, explain what kind of proportion does exist between x and y.

a. $y = 3x$
b. $y = ax + b$
c. $y = x$
d. $y = ax^2$
e. $y = a/x$
f. $y = ax$
g. $y = 1/x$
h. $y = a/x^2$

14. When one variable is *inversely proportional* to another, doubling one variable halves the other. If y and x are the variables, and a and b are constants, circle the following relationships that are inverse proportions. For those that are not inverse proportions, explain what kind of proportion does exist between x and y.

a. $y = ax$
b. $y = a/x^2$
c. $y = b/x$
d. $y = 1/(x + b)$
e. $y = ax + b$
f. $y = 5/x$
g. $y = x^2$
h. $y = 1/x$

15. The diagram shows a number of relationships between x and y.



a. Which relationships are direct relations?

b. Which relationships are indirect relations?

c. Which relationships are direct proportions? Explain.

d. Which relationships are inverse proportions? Explain.

e. Which relationships are linear? Explain.