Direct & Inverse Variation

Direct Variation

$x \uparrow \; y \uparrow$ (or) $x \downarrow y \downarrow$

(ex) studying time ↑ grade ↑

(ex) clouds ↑ rain ↑

(ex) practice ↑ points per game ↑

$$y = kx$$

k = constant of variation #

(ex) If x and y vary directly and $y = -18$ when $x = 3$

Find x when $y = 30$

$y = kx$

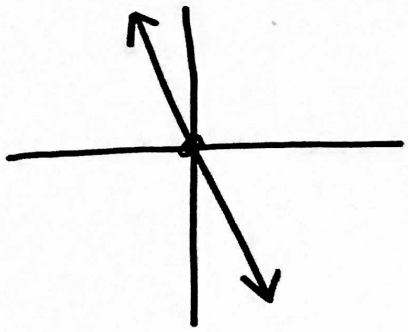
$-18 = k(3)$

$-6 = k$

$y = -6x$

$30 = -6x$

$-5 = x$



Inverse Variation

$$y = \frac{k}{x} \; *$$

$x \uparrow \; y \downarrow$ or $x \downarrow \; y \uparrow$

(ex) gas supply ↓ price of gas ↑

phone use ↑ grade in class ↓

speed ↑ time ↓

(ex) If $y = 9$ when $x = -6$ find x when $y = 3$

$y = \frac{k}{x}$

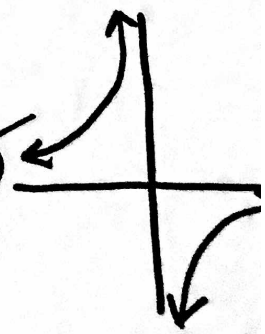
$9 = \frac{k}{-6}$

$-54 = k$

$y = \frac{-54}{x}$

$(x)3 = \frac{-54}{x}(x)$

$x = -18$



Direct and Inverse Variation Worksheet Name:_____

Find the Missing Variable:

1) y varies directly with x. If y = -4 when x = 2, find y when x = -6.

$Y = KX$ $-4 = K(2)$ $K = -2$ $Y = -2X$ $Y = -2(-6) = 12$

2) y varies inversely with x. If y = 40 when x = 16, find x when y = -5.

$Y = \frac{K}{X}$ $40 = \frac{K}{16}$ $K = 640$ $Y = \frac{640}{X}$ $(X)-5 = \frac{640}{X}(X)$ $X = -128$

3) y varies inversely with x. If y = 7 when x = -4, find y when x = 5.

4) y varies directly with x. If y = 15 when x = -18, find y when x = 1.6.

5) y varies directly with x. If y = 75 when x =25, find x when y = 25.

Classify the following as: a) Direct b) Inverse c) Neither

6) m = -5p direct

7) $r = \frac{9}{t}$

8) d = 4t (K)

9) $c = \frac{e}{-4}$

10) n = ½ f

11) $z = \frac{-.2}{t}$ inverse

12) c = 3v

13) $u = \frac{i}{18}$ $u = \frac{1}{18}i$ direct

What is the constant of variation for the following?

14) d = 4t [4]

15) $z = \frac{-.2}{t}$ [-.2]

16) n = ½ f

17) $r = \frac{9}{t}$

Answer the following questions.

18) If x and y vary directly, as x decreases, what happens to the value of y?

19) If x and y vary inversely, as y increases, what happens to the value of x?

20) If x and y vary directly, as y increases, what happens to the value of x?

21) If x and y vary inversely, as x decreases, what happens to the value of y?

INDEPENDENT PRACTICE

1. R varies inversely with variable T. If R is 168 when T = 24, find R when T = 30. *HINT: Remember* $y = \frac{k}{x}$

* 2. The volume, V, of a gas varies inversely as the pressure, p, in a container. If the volume of a gas is 200cc when the pressure is 1.6 liters per square centimeter, find the volume (to the nearest tenth) when the pressure is 2.8 liters per sq centimeter.

$V = \frac{K}{P}$ $200 = \frac{K}{1.6}$ $K = 320$ $V = \frac{320}{P} = \frac{320}{2.8}$ $V = 114.3$ cc

3. In science, one theory of life expectancy states that the lifespan of mammals varies inversely to the number of heartbeats per minute of the animal. If a gerbil's heart beats 360 times per minute and lives an average of 3.5 years, what would be the life expectancy of a human with an average of 72 beats per minute? Does this theory appear to hold for humans?

x y

4. The values (9.7, 8) and (3, y) are from an inverse variation. Find the missing value and round to the nearest hundredth.

$Y = \frac{K}{X}$ $8 = \frac{K}{9.7}$ $K = 77.6$ $Y = \frac{77.6}{X} = \frac{77.6}{3} = 25.9$

5. A drama club is planning a bus trip to New York City to see a Broadway play. The cost per person for the bus rental varies inversely as the number of people going on the trip. It will cost $30 per person if 44 people go on the trip. How much will it cost per person if 60 people go on the trip? Round your answer to the nearest cent, if necessary.