4.6 Algebra 2

Variation

Direct Variation:

- $y = mx + 0$
- $y = mx$
- m = the constant of variation
- y varies directly with x
- always linear and y-intercept always = 0

Joint Variation:

- $y = mxz$
- y varies jointly with x & z
- $y = mxwz$
- y varies jointly with x, w, & z
- m = the constant of variation
- always a power function like x^2, x^3, x^4, etc...

$x \cdot x$

Inverse Variation:

- $y = \frac{m}{x}$
- m = the constant of variation
- y varies inversely with x
- always a rational function (fraction)

In an experiment, the distance traveled by an object varies directly with the rate the object is traveling. Which type of function would be used to represent this relationship?

A) cubic

B) linear

C) quadratic

D) absolute value

Write an equation for the given relationship.

a. y varies inversely with x.

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

b. z varies jointly with x, y, and r.

$$z = mxyr$$

c. y varies inversely with the (square x^2) of x.

$$y = \frac{m}{x^2}$$

d. z varies directly with y and inversely with x.

$$z = \frac{my}{x}$$

e. x varies jointly with t and r and inversely with s.

$$x = \frac{mtr}{s}$$

Tell whether x & y show direct variation, joint variation, inverse variation, or neither.

1) $\frac{xy}{x} = \frac{7}{x}$ $y = \frac{7}{x}$ Inverse

2) $y = x + 3$ neither

3) $4 \cdot \frac{y}{4} = x \cdot 4$ $y = 4x$ Direct

4) $\frac{\frac{3x}{z}}{w^2} = \frac{yw^2}{w^2}$ $y = \frac{3x}{z} \cdot \frac{1}{w^2}$

$y = \frac{3x}{zw^2}$ Inverse joint direct

1) The variables x and y vary directly. Write an equation that relates x and y when x = -6 and y = 8. Then find x when y = -4

$y = mx$

$\frac{8}{-6} = \frac{m(-6)}{-6}$

$-\frac{4}{3} = m$

$y = -\frac{4}{3}x$

$-\frac{3}{4} \cdot -4 = \frac{-3}{4} \cdot \frac{-4}{3}x$

$3 = x$

2) The variables z varies jointly with x and y. Write an equation that relates x, y and z when x = 3, y = -5 and z = -75. Then find z when x = 2 and y = 6.

$z = mxy$

$-75 = m \cdot 3 \cdot (-5)$

$\frac{-75}{-15} = \frac{-15m}{-15}$

$m = 5$

$z = 5xy$

$z = 5 \cdot 2 \cdot 6$

$z = 60$

3) The variables x and y vary inversely. Write an equation that relates x and y when x = 4, y = 7. Then find y when x = -2.

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

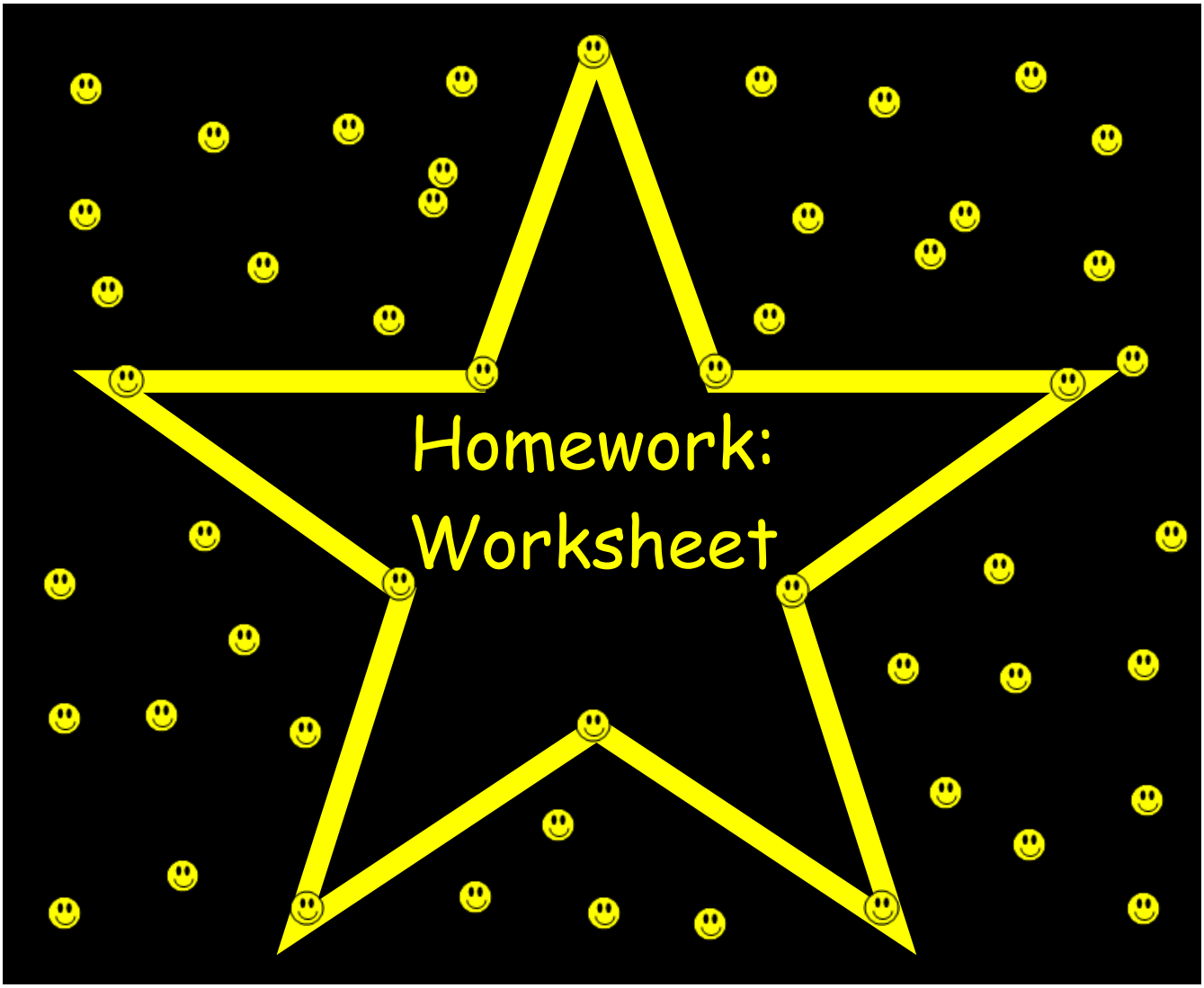
$4 \cdot 7 = \frac{m}{4} \cdot 4$

$28 = m$

$y = \frac{28}{x}$

$y = \frac{28}{-2}$

$y = -14$


Homework:
Worksheet

Algebra 2
4.6 Variation

Name: _____ Date: _____ Hr: ___

1) The number of photos your digital camera can store varies inversely with the average size of the photos. Which type of function would be used to represent this relationship?

a) quadratic
b) linear
c) rational
d) cubic

Write an equation for the given relationship.

2) x varies directly with y and inversely with z.

3) y varies jointly with x and the square of z.

4) w varies inversely with y and jointly with x and z.

Tell whether x & y show direct variation, joint variation, inverse variation, or neither.

5) $xy = \frac{1}{4}$

6) $8x + 4y = 32$

7) $y = 3x^2$

8) $2x - 3y = 0$

9) The variables x and y vary directly. Write an equation that relates x and y when x = -18 and y = -2. Then find x when y = -4.

10) The variables z varies jointly with x and y. Write an equation that relates x, y and z when x = 8, y = 6 and z = 12. Then find z when x = -4 and y = 5.

11) The variables x and y vary inversely. Write an equation that relates x and y when x = 1, y = 9. Then find y when x = 3.

12) The variables x and y vary directly. Write an equation that relates x and y when x = -12 and y = 84. Then find x when y = -4.

13) The variables z varies jointly with x and y. Write an equation that relates x, y and z when x = 5, y = -3 and z = 75. Then find z when x = -4 and y = 5.

14) The variables x and y vary inversely. Write an equation that relates x and y when x = 7, y = 2. Then find y when x = 3.