

Direct and Inverse Variation Test REVIEW

1. Tell whether the following are **Direct Variation**, **Inverse Variation**, or **Neither**.

A. $A = \pi r^2$
 Direct

B. $a = \frac{75}{m}$
 Inverse

C. $y = -x^2 + 4x$ Neither
 (Quadratic)

D. $25 = ab$

Inverse
 (Solved for constant k)

E. $b = 3^x$
 Neither
 (exponential)

F. $5.5 = \frac{V}{b}$
 Direct (solved for constant k)

2. Write sentences in the following form: "The variable _____ is _____ proportional to _____, with constant _____."

A. The time, t , to stop a 1200 lb. moving car changes as the breaking force, F , is applied by the equation

$t = \frac{1200}{F}$
 The variable t , time is inversely proportional to F , force, with constant 1200.

B. The perimeter of an equilateral triangle can be found by the equation: $P = 3s$, where s is side length.

The variable P , perimeter is directly proportional to s , side with constant 3.

3. Direct, Inverse or Neither.

3. **Direct, Inverse or Neither.**

Direct A. As the ramp length increases, the time it takes a ball to roll down increases.

Inverse B. As the height of the ramp increases, the time it takes a ball to roll down decreases.

Direct C. The more you study for this test, the better your grade will be.

Direct D. The more current sent through a circuit, the brighter the bulb becomes.

Inverse E. The longer the air conditioner runs, the colder the temperatures become inside.

4. Based on the following table, label the function as **Direct**, **Inverse**, or **Neither**. If the function is Direct or Inverse, find the constant of proportionality.

A. $k = \frac{y}{x} = 3$ $k = 3$ $k = 3$ $k = 3$ $k = 3$

X	1	10	18	24	34
Y	12	30	54	72	102

$x \uparrow$ $y \uparrow$
 Direct
 Must check constant.
 Yes it is direct.
 $K = \frac{y}{x}$
 $K = 3$ or $y = 3x$

B. $k = 3$ $k = 45$

X	1	2	3	5	7
Y	3	9	27	243	2187

$x \uparrow$ $y \uparrow$
 Neither
 maybe
 Direct
 Must check constant.
 NO - not direct
 (is exponential)

C.

X	1	2	3	5	10
Y	100	50	33.33	20	10

$x \uparrow$ $y \downarrow$
 Inverse
 Inverse - must check constant
 $K = x \cdot y$
 Yes it is
 $K = 100$
 $y = \frac{100}{x}$

$K = 1 \cdot 100 = 100$
 $K = 2 \cdot 50 = 100$
 $K = 3 \cdot 33.33 = 100$
 $K = 5 \cdot 20 = 100$
 $K = 10 \cdot 10 = 100$

For each equation, tell whether y varies directly with x . Write *Yes* or *No*.

5. A. $y = \frac{2}{5}x$ yes B. $y = \frac{2}{5x}$ NO

6. Writing Equations from Sentences. (Direct, Inverse, Joint and Combined Variation)

A. $E = \frac{500}{g}$ The fuel efficiency, E , in a 500 mile race is inversely related to the gallons of gasoline, g , used by the car.

B. $S = \frac{4}{3}\pi r^3$ The surface area, S , of a sphere is directly related to a cube of the radius, r , with constant $\frac{4}{3}\pi$.

C. $I = ms^2$ The collision impact, I , of an automobile varies jointly as mass, m and the square of the speed, s . directly

D. $P = \frac{V^2}{R}$ P , Power varies directly as the square of V , voltage, and inversely as R , resistance.

E. $S = \frac{5.5A}{d^2}$ The intensity of the sound, S , varies directly with amplitude A of the sound source and inversely as the square of the distance d from the source, with constant 5.5.

F. $V = L \cdot W \cdot H$ Volume, V , of a box varies jointly with length L , width W , and height H .

G. $P = \frac{A}{V}$ The air pressure, P , on a surface is directly proportional to the cross sectional area, A , and inversely proportional to velocity V of the air passing over the area.

B 7. The amount of Mr. Brown's water bill, A , is directly proportional to the number of gallons of water used, g , during the month with constant of proportionality k . Which of the following equations correctly express this relationship?

- a. $Ag = k$ c. $A = \frac{k}{g}$ e. $A = g + k$
b. $A = kg$ d. $A = \frac{g}{k}$

B 8. Suppose that y is inversely proportional to x and when $y = 18$ then $x = 2$. Find the constant of proportionality, k . $k = x \cdot y$ $k = 36$

- a. 9 b. 36 c. 4 d. $\frac{1}{9}$

B 9. If y varies directly as x and $y = 9$ when $x = -3$, find y when $x = 18$. $k = \frac{y}{x} = \frac{9}{-3} = -3$ $y = -3x$
 $y = -3(18)$

- a. 54 b. -54 c. 486 d. -486

D 10. If y varies inversely as x and $y = 107$ when $x = -12$, find y when $x = 2$. $k = x \cdot y = -12 \cdot 107 = -1284$

- a. -17.83 b. 17.83 c. 642 d. -642

B 11. Stephen gets paid to mow the lawn at a business in town. His pay varies directly with the hours he works. If Stephen got paid \$105 for 7 hours of work, how much would he get for only 5 hours of work?

- a. \$55 b. \$75 c. \$147 d. \$735

$$P = kh$$

$$k = \frac{P}{h} = \frac{105}{7}$$

$$= 15$$

$$P = 15h$$

$$P = 15(5)$$

Name: _____

ID: A

$$l = \frac{k}{s} \quad k = l \cdot s = 6 \cdot 8 = 48 \quad l = \frac{48}{s} \quad l = \frac{48}{3} = 16$$

- D** 12. The number of lawns l that a volunteer can mow in a day varies inversely with the number of shrubs s that need to be pruned that day. If the volunteer can prune 6 shrubs and mow 8 lawns in one day, then how many lawns can be mowed if there are only 3 shrubs to be pruned?
- a. 4 lawns b. 5 lawns c. 11 lawns **d. 16 lawns**

- B** 13. If $I = \frac{V}{R}$, then current, I , is directly related to V and inversely related to R . (I =current, V =voltage, and R =resistance)
- a. voltage, current c. resistance, voltage
b. voltage, resistance d. resistance, current

14. The length of a spring (in cm) is related to the mass (in gm) of the object attached to the spring by the formula $L = 5 + 0.25m$. Is this an example of direct variation, inverse variation, or neither? Explain your reasoning.

Neither

you can't add to direct equation (no y-intercept)

15. The formula for converting length in feet F to length in inches I is $I = 12F$. Is this an example of direct variation, inverse variation, or neither? Explain your reasoning.

Direct, I and F are both in numerator.

As F increases, I would also increase.

15. The formula for converting length in feet F to length in inches I is $I = 12F$. Is this an example of direct variation, inverse variation, or neither? Explain your reasoning.

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As F increases, I would also increase.

16. The surface area of a cube S is related to the length of a side of the cube l by the formula $S = 6l^2$.

- a. Is this relationship an example of direct variation, inverse variation, or neither?

Explain your reasoning.

Direct, As l increases, S would increase

- b. Calculate the surface area of a cube with side length 3 cm. Show your work.

$$S = 6(3)^2 = 6(9) = \boxed{54 \text{ cm}^2}$$

- c. What happens to the Surface Area, S , if the length is increased?

It increases as a square of the length, l .

17. If you are receiving radiation therapy for a tumor, the intensity of the radiation R and your distance from the source d are related by the rule $R = \frac{320}{d^2}$, where d is measured in meters and R is measured in mr/hr (milliroentgens per hour).

a. Is this relationship an example of direct variation, inverse variation, or neither?

Explain your reasoning.

Inverse, As distance increases, the Radiation decreases

b. What is the intensity of the radiation 4 meters from the source? Show your work.

$$R = \frac{320}{4^2} = \boxed{20 \text{ mr/hr}}$$

c. What happens to the Radiation, R , if the distance is increased?

As distance increases, Radiation decreases as a square of the distance.

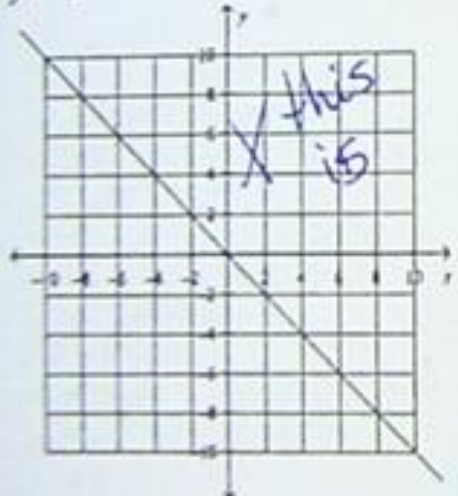
$$y = \frac{k}{x} \quad k = x \cdot y$$

$$k = 4 \cdot 4 = -16 \quad \text{ID}$$

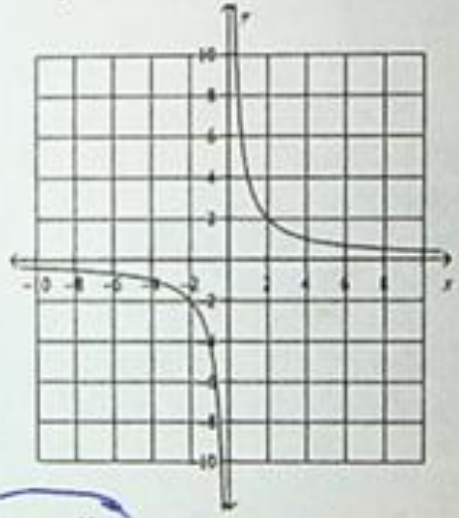
me: _____

18. Given y varies inversely as x , and $y = 4$ when $x = -4$. Write and graph the inverse variation function.

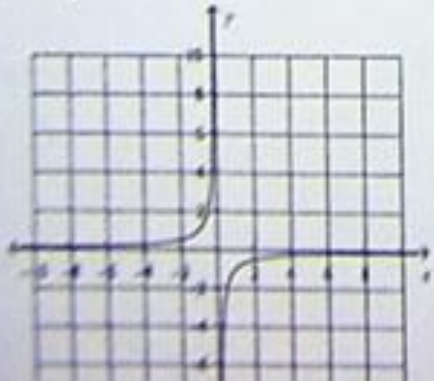
a. $y = -x$



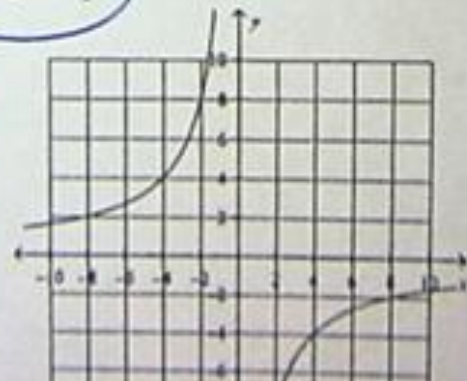
c. $y = \frac{4}{x}$



b. $y = \frac{1}{x}$



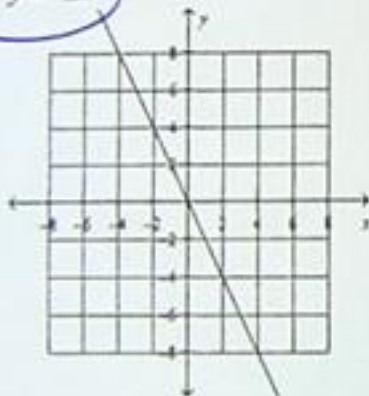
d. $y = \frac{-16}{x}$



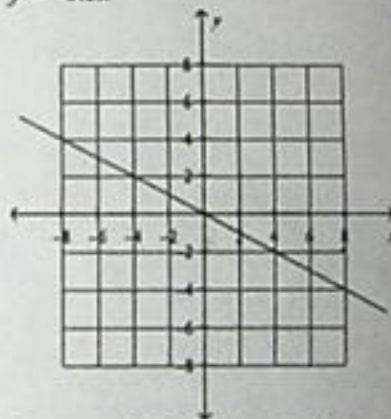
$$y = kx \quad k = \frac{y}{x} = \frac{-5}{2.5} = -2$$

A 19. Given: y varies directly as x, and $y = -5$ when $x = 2.5$. Write and graph the direct variation function.

a. $y = -2x$

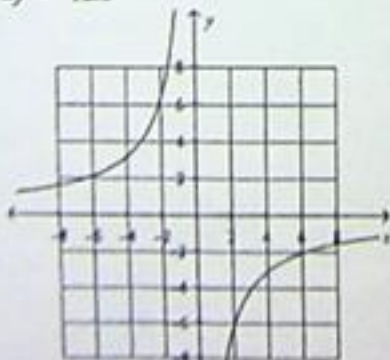


c. $y = -0.5x$



$$y = -2x$$

b. $xy = -12.5$



d. Not enough information. It takes two points to determine a line.

20. Refer to the following equation: $R = \frac{ST}{V}$

A. R is (directly or inversely) proportion to V.

B. R is (directly or inversely) proportion to S.

C. R is (directly or inversely) proportion to T.

D. If T is doubled and all other variables stay the same, by how much is R affected? doubled

E. If S is tripled and all other variables stay the same, by how much is R affected? tripled.

F. If V is doubled and all other variables stay the same, by how much is R affected? half

G. If S and T are both doubled and V stays the same, by how much is R affected? quadrupled (x4)

H. If S is doubled, T is tripled and V is quadrupled, by how much is R affected? $\frac{3}{2}$ or 1.5

(Hint: answer is a fraction in reduced form)

$$G. R = \frac{ST}{V} = \frac{(2)(2)}{1} = 4$$

factor of 4

Ignore all but T + R

$$D. R = \frac{ST(2)}{V}$$
$$E. R = \frac{S(3)T}{V} \quad R = \frac{3ST}{V} \text{ factor of 3}$$

$$F. R = \frac{ST}{V} \quad R = \frac{ST}{2} = \frac{1}{2}$$

$$H. R = \frac{ST}{V} = \frac{(2)(3)}{(4)} = \frac{6}{4} = \frac{3}{2}$$

factor of $\frac{3}{2}$ or 1.5

factor of $\frac{1}{2}$ or 2x smaller