

Direct & Inverse Variation

Example: The time it takes to travel a fixed distance varies inversely with the speed traveled. It takes Stacie 40 minutes to bike to the secret fishing spot at 9 mph.

a. Write an equation to model this situation.

b. How long will it take if she rides 12 mph?

Find the missing variables. **Show all work.**

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

$$y = -2x \qquad y = 12$$

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

$$y = \frac{640}{x} \qquad x = -128$$

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

$$y = \frac{-28}{x} \qquad y = -5.6$$

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

$$y = \frac{5}{6}x \qquad y = 4/3$$

Classify the following as direct, inverse, or neither.

6) $m = -5p$ **D**

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

12) $c = 3v$ **D**

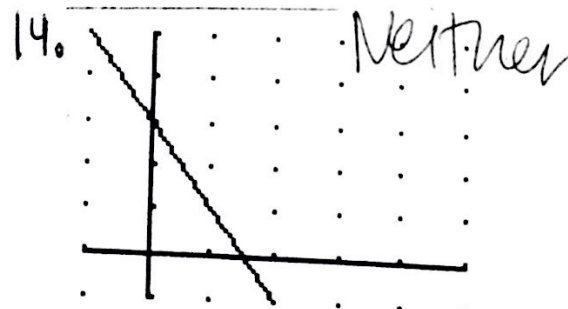
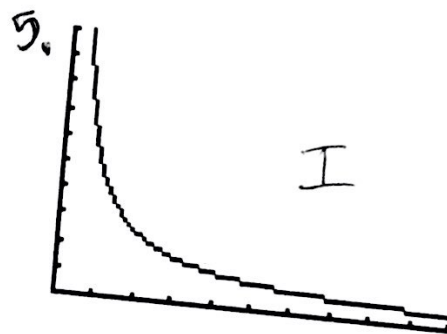
7) $r = \frac{9}{t}$ **I**

10) $n = \frac{1}{2}f$ **D**

13) $u = \frac{i}{18}$ **D**

8) $d = 4t$ **D**

11) $z = \frac{-2}{r}$ **I**



Write an equation of variation to represent each situation. Then solve for the missing information.

13. The electric current I in amperes, in a circuit varies directly as the voltage V . When 12 volts are applied, the current is 4 amperes. What is the current when 18 volts is applied?

$$Y = \frac{1}{3}X \rightarrow I = \frac{1}{3}V$$

$$I = 6 \text{ amps}$$

14. The volume V of gas varies inversely to the pressure P . The volume of a gas is 200 cm^3 under pressure of 32 kg/cm^2 . What will be its volume under pressure of 40 kg/cm^2 ?

$$V = \frac{6400}{P}$$

$$V = 100 \text{ cm}^3$$

15. On a map, distance in km and distance in cm varies directly, and 25 km are represented by 2 cm. If two cities are 7 cm apart on the map, what is the actual distance between them?

$$Y = \frac{25}{2}X$$

$$87.5 \text{ km}$$

16. The time it takes to fly from Los Angeles to New York varies inversely as the speed of the plane. If the trip takes 6 hours at 900 km/h , how long would it take at 800 km/h ?

$$T = \frac{5400}{S}$$

$$T = 6.75 \text{ hours}$$

17. The frequency of a vibrating string is inversely proportional to its length. A violin string 12 inches long vibrates at a frequency of 510 cycles per second. Find the frequency of an 8 inch string.

$$F = \frac{6120}{L}$$

$$F = 765 \text{ cycles/second}$$

18. The number of plastic straws produced by a machine varies directly as the amount of time the machine is operating. The machine produces 20,000 straws in 8 hours. How many straws will be produced in 50 hours?

$$Y = \frac{2500X}{\cancel{8}}$$

$$Y = 125,000 \text{ straws}$$

19. If it takes four people six hours to completely clean the gym, then how long will it take 5 people?

$$Y = \frac{24}{X}$$

$$4.8 \text{ hours}$$

20. The number of revolutions made by a tire traveling over a fixed distance varies inversely to the radius of tire. A 12 inch radius tire makes 100 revolutions to travel a certain distance. How many revolutions would a 16 inch radius tire require to travel the same distance?

$$R = \frac{1200}{r}$$

$$R_{16S} = 75 \text{ revolutions}$$