

DIRECT AND INVERSE VARIATION

HOW TO IDENTIFY A **DIRECT VARIATION** PROBLEM:

- (a) when the problem states a direct variation exists or states that a variable is directly proportional to another variable.
- (b) by observing that if one quantity increases the other quantity increases or if one quantity decreases the other quantity decreases.

HOW TO SOLVE A **DIRECT VARIATION** PROBLEM:

- Write the two words that have numbers associated with them.
- Under these words write two fractions.
Be careful to put the numbers of the first relationship in the numerators and the number from the second relationship in the denominators.
- Set the two fractions equal to each other
- Solve

1. Kim owns five shares of stock and receives \$12 per year in dividends. How many shares of stock would she need to own to receive \$24?

Shares	Dividends
$\frac{5}{x}$	$\frac{12}{24}$

2. W varies directly as k^2 .
If $W = 75$ when $k = 5$, find W when $k = 2$.

HOW TO IDENTIFY AN **INVERSE VARIATION** PROBLEM:

- (a) when the problem states an inverse variation exists or states that one variable is inversely proportional to another.
- (b) by observing that as one quantity increases the second quantity decreases, or vice versa.

HOW TO SOLVE AN **INVERSE VARIATION** PROBLEM:

- Write the two words that have numbers associated with them.
- Under these words write two fractions.
Be careful to put the numbers of the first relationship in the numerators and the number from the second relationship in the denominators.
- Set one fraction equal to the **reciprocal** of the other fraction.
- Solve

1. A certain project can be completed by 5 workers in 24 days. In order to finish the project sooner, the company plans to hire additional workers. How many workers are needed to finish the project in 15 days?

Workers	Days
$\frac{5}{x}$	$\frac{24}{15}$ ← Take Reciprocal

2. If y varies inversely as x, and $y = 39$ when $x = 3$, find y when $x = 11$.

1. Three-fourths of an ounce of a medication are required for a 120 lb adult.
At the same rate, how many ounces of medication are required for a 200 lb adult?
2. If a train travels between two cities in 3 hours at an average speed of 65 miles per hour, how long would it take at an average speed of 80 miles per hour?
3. Neglecting air resistance, the distance (d) that an object falls varies directly as the square of the time (t) it has been falling. If an object falls 64 feet in 2 seconds, determine the distance it will fall in 6 seconds.
4. x varies inversely as y^3 . x is 16 when y is 5. Find x when y is 2.

(To do these, compare "cross products." The answer that produces the same cross product as the equation that you wrote is the correct choice.)

5. A 20-acre field produces 300 bushels of wheat. Let W represent the number of bushels produced by a 50-acre field at the same rate. Select the correct statement of the given condition.

A. $\frac{20}{300} = \frac{50}{W}$

B. $\frac{20}{W} = \frac{50}{300}$

C. $\frac{20}{300} = \frac{W}{50}$

D. $\frac{20}{50} = \frac{W}{300}$

6. W varies inversely as the square of t . If $W = 12$ when $t = 2$, find t when $W = 27$.

A. $27t = 24$

B. $27t^2 = 48$

C. $108 = 12t^2$

D. $12t = 54$

7. The pressure P of a compressed gas is inversely proportional to the volume V . If there is a pressure of 25 pounds per square inch when the volume of gas is 400 cubic inches, find the pressure when the gas is compressed to 200 cubic inches.

A. $200P = 10000$

B. $25P = 80000$

C. $400P = 5000$

D. none of the above

8. An experimental drug is given to 100 people with a certain ailment. Fifty-three of these people were cured by the drug. Select the statement of condition for the expectation of a cure C if 2000 people with the ailment are given the drug.

A. $\frac{C}{53} = \frac{100}{2000}$

B. $\frac{10}{53} = \frac{C}{200}$

C. $\frac{C}{2000} = \frac{53}{100}$

D. $\frac{100}{53} = \frac{C}{2000}$

9. Hooke's law states that the distance d that a spring is stretched by a hanging object varies directly as the mass m of the object. If the distance is 20 cm when the mass is 3 kg, what is the distance when the mass is 8 kg?

10. The time T required to do a job varies inversely as the number of people P working. It takes 5 hours for 7 volunteers to pick up rubbish from 1 mile of roadway. How long would it take 12 volunteers to complete the job?

11. It takes two painters 9 hours to scrape a house. How long would it take three painters to scrape the same house?

12. The Trane air conditioner cooled off 1000 cubic feet in 10 minutes. How long would it take the same unit to cool off 3000 cubic feet?