

Algebra 2 Workbook

Advanced equations



DIRECT VARIATION

■ 1. If 10k = 5 and kx = 3, find x.

■ 2. If x and y vary directly and the constant of variation, k, equals 1/3, what is the value of y when x = 54, assuming the direct variation relationship between the variables is given by y = kx?

■ 3. A restaurant takes in \$15,000 in a 5 hour period. Write a direct variation equation for the relationship between income and number of hours. Estimate how many hours it would take the restaurant to earn \$35,750.

■ 4. If x varies directly with y and y = 4 when x = 20, what is the value of the constant of variation, k, assuming the direct variation relationship between the variables is given by y = kx?

■ 5. If x varies directly with y and y = 15 when x = 5, what is the value of x when y = 36, assuming the direct variation relationship between the variables is given by y = kx?

■ 6. If x varies directly with y and y = 7 when x = 42, what is the value of y when x = 54, assuming the direct variation relationship between the variables is given by y = kx?



INVERSE VARIATION

- 1. If k/3 = 6 and k/x = 2, find x.
- 2. The length of the base of a triangle with constant area varies inversely with the triangle's height. When the base is 5 cm long, the height is 6 cm. Find the length of the base when the height is 3 cm.
- 3. If x and y vary inversely and the constant of variation, k, equals 1/3, what is the value of y when x = 8?
- 4. If x varies inversely with y and y = 5 when x = 6, what is the value of the constant of variation, k?
- 5. If x varies inversely with y and y = 4 when x = 2, what is the value of x when y = 1/2?
- 6. If x varies inversely with y and y = 3 when x = 9, what is the value of y when x = 1/4?



DECIMAL EQUATIONS

■ 1. Solve the decimal equation.

$$0.34x - 0.62 = 1.25$$

2. Solve the decimal equation.

$$0.1(2.1a - 1.4a) + 3.57 = 2.8$$

■ 3. Solve the decimal equation.

$$4a + 6a = 1.7$$

■ 4. Solve the decimal equation.

$$0.12n + 3.6 = 4.8$$

■ 5. Solve the decimal equation.

$$5n - 6.1 = -2.9$$

■ 6. Solve the decimal equation.

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FRACTIONAL EQUATIONS

■ 1. Solve for the variable.

$$2x - 5 = \frac{4x + 3}{5}$$

■ 2. Solve for the variable.

$$\frac{4}{3}x = 18$$

■ 3. Solve for the variable.

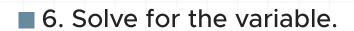
$$\frac{3}{4}x + \frac{5}{4} = \frac{7}{8}$$

■ 4. Solve for the variable.

$$\frac{4}{7}x + \frac{1}{7} = \frac{10}{7}$$

■ 5. Solve for the variable.

$$\frac{1}{2}a - \frac{5}{4}a = -\frac{10}{3} + \frac{5}{2}a$$



$$\frac{1}{2}\left(\frac{1}{2}x - \frac{1}{3}\right) = \frac{7}{3} + \frac{9}{2}$$



RATIONAL EQUATIONS

■ 1. Solve the equation.

$$\frac{x-3}{x+3} = \frac{4}{5}$$

■ 2. Solve the equation.

$$\frac{x}{6} - \frac{5}{3x} = \frac{1}{4}$$

■ 3. Solve the equation.

$$\frac{2}{x+5} = \frac{4}{x-1}$$

■ 4. Solve the equation.

$$2 + \frac{6}{x - 7} = -\frac{8}{x + 3}$$

■ 5. Solve the equation.

$$\frac{5}{a-4} - \frac{3}{a+4} = -\frac{1}{a^2 - 16}$$

■ 6. Solve the equation.

$$\frac{1}{2x^2} + \frac{3}{4x} = \frac{x+7}{x^2}$$



RADICAL EQUATIONS

■ 1. Solve the radical equation for the variable.

$$\sqrt[3]{2x - 1} + 5 = 7$$

■ 2. Solve the radical equation for the variable.

$$2\sqrt{x} = 14$$

■ 3. Solve the radical equation for the variable.

$$\sqrt{x+1} - 3 = 2$$

■ 4. Solve the radical equation for the variable.

$$\sqrt{x-3} + 2 = \sqrt{2x+1}$$

■ 5. Solve the radical equation for the variable.

$$\sqrt{1-x} - x = 5$$

■ 6. Solve the radical equation for the variable.

$$\sqrt{x^2 - 2x + 4} + 4 = x$$



MULTIVARIABLE EQUATIONS

■ 1. Solve for
$$x$$
 if $y = z/x$.

2. Solve for *t* if
$$4s - 3t + u = 5$$
.

■ 3. Solve for *y* if
$$z - x + 4y = 3x + z$$
.

4. Solve for
$$c$$
 if $2a - b + 3c = 2b - 4a + c$.

■ 5. Solve for *y* if
$$2x - y + z = 3x$$
.

■ 6. Solve for
$$a$$
 if $x + y = 3ab + c$.

MULTIVARIABLE RATIONAL EQUATIONS

■ 1. Solve the abstract equation for x, if $x \neq 0$.

$$\frac{1}{x} - z = y$$

■ 2. Solve the abstract equation for y, if $x \neq 0$.

$$\frac{y}{x} + 3x = 2z$$

■ 3. Solve the abstract equation for a, if $a \neq 0$ and $b \neq 0$.

$$\frac{bc}{a} - cxy = \frac{z}{b}$$

■ 4. Solve the abstract equation for y, if $y \neq 0$, $b \neq 0$, and $n \neq 0$.

$$\frac{1}{y} + \frac{a}{b} = \frac{m}{n}$$

■ 5. Solve the abstract equation for x, if $z \neq 0$, $n \neq 0$, and $b \neq 0$.

$$\frac{2x+y}{z} - \frac{m}{n} = \frac{a}{b}$$



$$\frac{1}{x} + \frac{2}{y+z} = 3$$



