Algebra 2 Workbook

Advanced equations

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DIRECT VARIATION

■ 1. If $2k = 12$ and $kx = 48$, find x.

■ 2. If $10k = 5$ and $kx = 3$, find x.

■ 3. If x and y vary directly and the constant of variation, k, equals 4, what is the value of y when $x = 13$?

■ 4. If x and y vary directly and the constant of variation, k, equals $1/3$, what is the value of y when $x = 54$?

■ 5. If x varies directly with y and $y = 32$ when $x = 2$, what is the value of the constant of variation, k?

■ 6. If x varies directly with y and $y = 4$ when $x = 20$, what is the value of the constant of variation, k?

■ 7. If x varies directly with y and $y = 15$ when $x = 5$, what is the value of x when $y = 36$?

■ 8. If x varies directly with y and $y = 7$ when $x = 42$, what is the value of y when $x = 54$?

INVERSE VARIATION

■ 1. If $k/3 = 6$ and $k/x = 2$, find x.

■ 2. If $k/5 = 4$ and $k/x = 10$, find x.

■ 3. If x and y vary inversely and the constant of variation, k, equals 12, what is the value of y when $x = 4$?

■ 4. If x and y vary inversely and the constant of variation, k, equals $1/3$, what is the value of y when $x = 8$?

■ 5. If x varies inversely with y and $y = 5$ when $x = 6$, what is the value of the constant of variation, k?

■ 6. If x varies inversely with y and $y = 7$ when $x = 3$, what is the value of the constant of variation, k?

■ 7. If x varies inversely with y and $y = 4$ when $x = 2$, what is the value of x when $y = 1/2$?

■ 8. 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.

$$0.2x + 4 = 10$$

■ 2. Solve the decimal equation.

$$0.34x - 0.62 = 1.25$$

■ 3. Solve the decimal equation.

$$2.1a - 1.4a = 2.8$$

■ 4. Solve the decimal equation.

$$4a + 6a = 1.7$$

■ 5. Solve the decimal equation.

$$0.12n + 3.6 = 4.8$$

■ 6. Solve the decimal equation.

$$5n - 6.1 = -2.9$$

7. Solve the decimal equation.

$$3.2x + 2.6 = 1.8x - 4.4$$

FRACTIONAL EQUATIONS

■ 1. Solve for the variable.

$$\frac{2}{5}x = 6$$

■ 2. Solve for the variable.

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

■ 3. Solve for the variable.

$$\frac{1}{3}x + 3 = 12$$

■ 4. Solve for the variable.

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

RATIONAL EQUATIONS

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

$$\frac{2m}{n} + xy - 3ab = z$$

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

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

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

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

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

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

5. Solve the abstract equation for x, if $x \neq 0$ and $y \neq 0$.

$$\frac{a}{x} - \frac{b}{y} = c$$

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

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

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

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

■ 8. Solve the abstract equation for x, if $x \neq 0$ and $y + z \neq 0$.

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

RADICAL EQUATIONS

■ 1. Solve the radical equation for the variable.

$$\sqrt{x} - 4 = 5$$

■ 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.

$$\sqrt{x-5} + 4 = 6$$

■ 5. Solve the radical equation for the variable.

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

6. Solve the radical equation for the variable.

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

7. Solve the radical equation for the variable.

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

MULTIVARIABLE EQUATIONS

1. Solve for b if $xy = -2abc$.

2. Solve for x if $y = z/x$.

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

4. Solve for z if $2x - 3y + 4z = 10$.

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

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

7. Solve for u if $u + 5v - 3w = 4$.

8. Solve for y if $2x - y + z = 3x$.

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

DISTANCE, RATE, AND TIME

■ 1. The car traveled 124 miles in 2 hours. What was the car's average rate in m/hr?

■ 2. A train travels at an average rate of 35 mph for 45 minutes. How many miles did the train travel?

■ 3. Alan runs an average rate of 5 mph for 3 miles. How many minutes did Alan run?

■ 4. The train traveled 420 miles at 48 mph and arrived 1 hour and 45 minutes late. How fast should the train have traveled to have arrived on time?

■ 5. Brittany ran for 2 hours at 4 mph, but ended up 5 miles short of her goal. If she tried the next day and increased her speed by 2 mph, how long would it take her to reach her goal?

■ 6. Adeline and Ellie live 10 miles away from each other. Adeline started walking towards Ellie at 1:00 p.m. Ellie left 1 hour later and walked 4 mph. If they met at 3:00 p.m., how fast did Adeline walk?

■ 7. Sophia and Cooper live 20 miles away from each other. Sophia started walking towards Cooper at a rate of 3 mph at 8:00 a.m. Cooper left 2 hours later and they met at 12:00 p.m. How fast did Cooper walk?

■ 8. Eric and Evan live 35 miles away from each other. Eric started walking towards Evan at a rate of 5 mph at 9:00 a.m. If Evan walks at a rate of 3 mph, what time does he need to leave in order for them to meet at 1:00 p.m.?

■ 9. Clay and Beth live 32 miles away from each other. Clay started walking towards Beth at a rate of 4 mph. Beth starts walking at 2:00 p.m., and she also walks at a rate of 4 mph. What time does Clay need to leave in order for them to meet at 5:00 p.m.?

■ 10. Brian starts walking towards Diane at 8:30 a.m. at 5 mph. Diane starts walking towards Brian at 10:30 a.m. at a rate of 3 mph. If they meet at 1:00 p.m., how far apart do they live?

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