Algebra 1 Workbook Solutions

Simple equations

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SIMPLE EQUATIONS WITH SUBSCRIPTS

1. Give three different examples of the variable Y with a subscript.

Solution:

There are many correct answers. For example, Y_2, Y_x, and Y_{100} all work, but $Y3$ does not. Subscripts must be written as small numbers just after the variable.

2. It takes Peter 6 hours to paint a room and Laura 8 hours to paint that same room. Use the equation below to determine how long it would take for Peter and Laura to paint the room together, where R_1 is the number of hours it takes Peter, R_2 is the number of hours it takes Laura, and T is the number of hours it takes them together.

$$\frac{R_1 R_2}{R_1 + R_2} = T$$

Solution:

$$\frac{(6)(8)}{6+8} = T$$

$$3.43 = T$$

3. Solve for P_2 in the following equation.

$$P_1R + \frac{P_2}{V} = d$$

Solution:

$$P_1R + \frac{P_2}{V} = d$$

$$\frac{P_2}{V} = d - P_1R$$

$$P_2 = V(d - P_1R)$$

4. The profit function for a The Coat Company is given by $P = Rx - C_1 - C_2x$, where P is the profit, R is the selling price, C_1 is the fixed cost, C_2 is the variable cost, and x is the total number of coats sold. What is the selling price R when $P = 114$, $C_1 = 550$, $C_2 = 3.50$, and $x = 16$?

Solution:

$$114 = R(16) - 550 - 3.50(16)$$

$$114 = 16R - 606$$

$$720 = 16R$$

$$45 = R$$

5. Give an example of a subject besides math that uses variables with subscripts.

Solution:

There are many correct answers. For example, chemistry, physics, biology, and even business courses use variables with subscripts.

6. The volume of the medium size box at the post office is given by

$$V = x_1 \times \frac{x_2}{2} \times \frac{x_3}{9}$$

where V is the volume of the box, x_1 is the length, $x_2/2$ is the width, and $x_3/9$ is the height. Find the height of the box that has a volume of 120 in^3, a length of 4 in, and a width of 5 in.

Solution:

The width of the box is $x_2/2$, and also 5 in, so we'll solve for x_2.

$$\frac{x_2}{2} = 5$$

$$x_2 = 10$$

Now we can solve for x_3.

$$120 = 4 \times \frac{10}{2} \times \frac{x_3}{9}$$

$$120 = \frac{20x_3}{9}$$

$$1{,}080 = 20x_3$$

$$x_3 = 54$$

The height of the box is $x_3/9$, which means the height of the box is

$$\frac{54}{9} = 6 \text{ inches}$$

7. Solve for x_1 in the following equation.

$$\frac{3V}{x_1} = td_0 + 2x_2d_1$$

Solution:

$$\frac{3V}{x_1} = td_0 + 2x_2d_1$$

$$3V = x_1(td_0 + 2x_2d_1)$$

$$\frac{3V}{td_0 + 2x_2d_1} = x_1$$

8. Solve the following equation for Y_2 when $t_1 = 2$, $t_2 = 11$, $D = 1/3$, and $Y_1 = 25$.

$$3t_1 + \frac{15t_2D}{Y_2} = Y_1 - 5$$

Solution:

$$3(2) + \frac{15(11)(1/3)}{Y_2} = 25 - 5$$

$$6 + \frac{55}{Y_2} = 20$$

$$55 = 14Y_2$$

$$\frac{55}{14} = Y_2$$

EQUATIONS WITH PARENTHESES

1. Simplify the following expression.

$$-(2x^0 + 3^0y) - 3y + x$$

Solution:

$$-(2 + y) - 3y + x$$

$$-2 - 4y + x$$

2. Solve for x in the given equation.

$$2(x - 1) - 5(7 + 2x) = -(6 - x)$$

Solution:

$$2(x - 1) - 5(7 + 2x) = -(6 - x)$$

$$2x - 2 - 35 - 10x = -6 + x$$

$$-8x - 37 = x - 6$$

$$-9x = 31$$

$$x = -\frac{31}{9}$$

■ 3. Simplify $-(2x^2y)^0$.

Solution:

$$-(2x^2y)^0 = -1$$

■ 4. Simplify $-2x^2y^0$.

Solution:

$$-2x^2y^0 = -2x^2$$

■ 5. Solve for a in the given equation.

$$-2(3^0 - a) + 3(a + 7) = -(a^0 + 1)$$

Solution:

$$-2(3^0 - a) + 3(a + 7) = -(a^0 + 1)$$

$$-2(1-a)+3(a+7)=-(1+1)$$

$$-2+2a+3a+21=-2$$

$$5a+19=-2$$

$$5a=-21$$

$$a=-\frac{21}{5}$$

6. What missing number would make the following true?

$$-3(4^0x-5)=2x-(3-x)$$

$$??x+15=3x-3$$

Solution:

-3

7. Write out the equation of the first step in solving the following for x.

$$6(1-x)-3(2x+4)=-(5x+7)-10$$

Solution:

$$6 - 6x - 6x - 12 = -5x - 7 - 10$$

8. What went wrong in the following set of steps?

$$-(6 - 2x) - 3x = 7(x - 1)$$

$$-6 - 2x - 3x = 7x - 7$$

Solution:

The negative was not distributed to the $-2x$ in the first term. It should be

$$-6 + 2x - 3x = 7x - 7$$

9. Solve of y in the given equation.

$$-2^0(9 - y) + 3(3y - 1) = 4y^0 + 1$$

Solution:

$$-2^0(9 - y) + 3(3y - 1) = 4y^0 + 1$$

$$-9 + y + 9y - 3 = 4 + 1$$

$$-12 + 10y = 5$$

$$10y = 17$$

$$y = \frac{17}{10}$$

WORD PROBLEMS INTO EQUATIONS

1. Give three different words that mean “addition”.

Solution:

There are many answers. Some of them are sum, total, more than, added, increased, and plus.

2. Write 2×5 as a phrase using the word “product”.

Solution:

“The product of 2 and 5.”

3. Write the phrase as an algebraic expression.

Six more than three times a number

Solution:

$$3x + 6$$

4. Find the value of the expression.

The quotient of 150 and 5

Solution:

$\frac{150}{5}$, which reduces to 30.

5. Write the phrase as an algebraic expression.

Half of five times a number

Solution:

$\frac{1}{2}(5x)$, which can also be written as $\frac{5x}{2}$ or $\frac{5}{2}x$.

6. Write $8 - 3$ as a phrase using the word "less".

Solution:

"3 less than 8."

7. Find the value of the expression.

3 less than the product of 2 and 7

Solution:

$(2 \times 7) - 3$, which is equal to 11.

8. Give three different words that mean “subtraction.”

Solution:

There are many different answers. Some of them include less, minus, decreased by, difference, and less than.

9. Find the value of the expression.

$\frac{1}{3}$ of 2 more than 7

Solution:

$\frac{1}{3}(7+2)$, which is $\frac{9}{3}$, which is 3.

CONSECUTIVE INTEGERS

1. Write the next five consecutive integers following -4.

Solution:

$$-4,\ -3,\ -2,\ -1,\ 0,\ 1$$

2. Give an example of three consecutive negative integers.

Solution:

There are many correct answers. Some examples include

$$-11,\ -10,\ -9$$

$$-23,\ -22,\ -21$$

$$-3,\ -2,\ -1$$

But $-5,\ -3,\ -1$ is not an example, because those integers are not one number apart from each other.

3. Write the inequality sign that relates the two integers.

$-6 \qquad -10$

Solution:

$-6 > -10$

4. Write the previous four consecutive integers before -3.

Solution:

$-7, \ -6, \ -5, \ -4$

5. Write the following numbers in ascending order (smallest to largest).

$-1 \qquad 0 \qquad -4 \qquad 2 \qquad -3$

Solution:

$-4 < -3 < -1 < 0 < 2$

6. Circle the numbers that are not integers.

$$-10 \qquad \frac{6}{7} \qquad 3 \qquad 7.34 \qquad \frac{8}{4} \qquad 9.0$$

Solution:

The numbers that should be circled are $6/7$ and 7.34. Notice that $8/4 = 2$ and $9.0 = 9$, which are both integers.

7. Write the following in descending order (largest to smallest).

$$-11 \qquad -13 \qquad -5 \qquad 11 \qquad 3$$

Solution:

$$11 > 3 > -5 > -11 > -13$$

8. Give an example of two types of numbers that are not integers.

Solution:

There are many correct answers. Some examples include

$$\frac{1}{3}, \quad -2.56, \quad -\frac{7}{4}, \quad 10.567$$


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