

2-3 Reteaching

Solving Multi-Step Equations

To solve multi-step equations, use properties of equality, inverse operations, the Distributive Property, and properties of real numbers to isolate the variable. Like terms on either side of the equation should be combined first.

Problem

a) What is the solution of $-3y + 8 + 13y = -52$?

$$-3y + 13y + 8 = -52$$

Group the terms with y together so that the like terms are grouped together.

$$10y + 8 = -52$$

Add the coefficients to combine like terms.

$$10y + 8 - 8 = -52 - 8$$

To get the variable term by itself on the left side, subtract 8 from each side.

$$10y = -60$$

Simplify.

$$\frac{10y}{10} = \frac{-60}{10}$$

Divide each side by 10 since y is being multiplied by 10 on the left side. This isolates y .

$$y = -6$$

Simplify.

b) What is the solution of $-2(3n - 4) = -10$?

$$26n + 8 = -10$$

Distribute the -2 into the parentheses by multiplying each term inside by -2 .

$$-6n + 8 - 8 = -10 - 8$$

To get the variable term by itself on the left side, subtract 8 from each side.

$$-6n = -18$$

Simplify.

$$\frac{-6n}{-6} = \frac{-18}{-6}$$

Divide each side by -6 since n is being multiplied by -6 on the left side. This isolates n .

$$n = 3$$

Simplify.

Solve each equation. Check your answer.

1. $4 - 6h - 8h = 60$

2. $-32 = -7n - 12 + 3n$

3. $14 + 12 = -15x + 2x$

4. $8(-3d + 2) = 88$

5. $-22 = -(x - 4)$

6. $35 = -5(2k + 5)$

7. $3m + 6 - 2m = -22$

8. $4(3r + 2) - 3r = -10$

9. $-18 = 15 - 3(6t + 5)$

10. $-5 + 2(10b - 2) = 31$

11. $7 = 5x + 3(x - 2) + 5$

12. $-18 = 3(-z + 6) + 2z$

13. Reasoning Solve the equation $14 = 7(2x - 4)$ using two different methods. Show your work. Which method do you prefer? Explain.

Equations with fractions can be solved by using a common denominator or by eliminating the fractions altogether.

Problem

What is the solution of $\frac{x}{4} - \frac{2}{3} = \frac{7}{12}$?

Method 1

Get a common denominator first.

Method 2

Multiply by the common denominator first.

$\frac{3}{3}\left(\frac{x}{4}\right) - \frac{4}{4}\left(\frac{2}{3}\right) = \frac{7}{12}$	$12\left(\frac{x}{4} - \frac{2}{3}\right) = 12\left(\frac{7}{12}\right)$
$\frac{3x}{12} - \frac{8}{12} = \frac{7}{12}$	$^3\cancel{12}\left(\frac{x}{\cancel{4}}\right) - ^4\cancel{12}\left(\frac{2}{\cancel{3}}\right) = \cancel{12}\left(\frac{7}{\cancel{12}}\right)$
$\frac{3x}{12} = \frac{15}{12}$	$3x - 8 = 7$
$\frac{3x}{12} \cdot \frac{12}{3} = \frac{15}{12} \cdot \frac{12}{3}$	$3x = 15$
$x = 5$	$x = 5$

Decimals can be cleared from the equation by multiplying by a power of ten with the same number of zeros as the number of digits to the right of the decimal. For instance, if the greatest number of digits after the decimal is 3, like 4.586, you multiply by 1000.

Problem

What is the solution of $2.8x - 4.25 = 5.55$?

$$100(2.8x - 4.25 = 5.55)$$

Multiply by 100 because the most number of digits after the decimal is two.

$$280x - 425 = 555$$

Simplify by moving the decimal point to the right 2 places in each term.

$$280x = 980$$

Add 425 to each side to get the term with the variable by itself on the left side.

$$x = 3.5$$

Divide each side by 280 to isolate the variable.

Solve each equation. Check your answer.

14. $\frac{x}{16} - \frac{1}{2} = \frac{3}{8}$

15. $\frac{2a}{3} + \frac{8}{9} = 4$

16. $\frac{3n}{7} - 1 = \frac{1}{8}$

17. $-1.68j + 1.24 = 13$

18. $4.6 = 3.5w - 6.6$

19. $5.23y + 3.02 = -2.21$

Lesson 2-3

Solve each equation.

1. $8j - 5 + j = 67$

2. $6(t + 5) = -36$

3. $\frac{1}{2}(s + 5) = 7.5$

4. $7h + 2h - 3 = 15$

5. $-3(5 - t) = 18$

6. $3(c - 4) = -9$

Define a variable and write an equation for each situation. Then solve.

7. Your test scores for the semester are 87, 84, and 85. What score do you need on your next test to raise your test average to 90?

Write an equation to model each situation. Then solve.

8. A rectangular pool is twice as long as it is wide. What are the dimensions of the pool if the perimeter is 42 yd?
9. Two friends rent an apartment together. They agree that one person will pay 1.5 times what the other person pays. If the rent is \$850, how much will each friend pay?
10. A shopper's discount club charges a monthly fee of \$15 and sells gasoline for \$2.05 per gallon. The gas station across the street sells gasoline for \$2.35 per gallon and charges no fee. How many gallons of gasoline would you have to buy in one month to spend the same amount at either store?
11. Michael and Kevin are taking a bicycle trip. Kevin gets a 3-mile head start and rides at a rate of 5.5 mi/h. Michael rides at a rate of 7 mi/h. How many hours will it take Michael to catch up with Kevin?

Answers: 8, -11, 10, 2, 11, 1, 104, 7 yd by 14 yd, \$340 and \$510, 50 gal, 14 hr