

Addition Prop of Equal

$$x - 3 = 5$$

$$\begin{array}{r} * +3 +3 * \\ \hline x = 8 \end{array}$$

Subt Prop of Equal

$$x + 10 = -14$$

$$\begin{array}{r} * -10 -10 * \\ \hline x = -24 \end{array}$$

Mult. Prop of Equal

$$(6) \frac{x}{6} = 12 (6)$$

$$\begin{array}{r} \swarrow \searrow \\ x = 72 \end{array}$$

Div Prop of Equal

$$\frac{6x}{6} = \frac{72}{6}$$

$$x = 12$$

CH 2-2 Solving Two-step Equations

Solving Two-Step Equations

Remember a 2-step equation is simply an equation that involves 2 operations to solve.

eg. (1) $3x - 4 = 8$

1st: $3x - 4 + 4 = 8 + 4$ Add 4 to each side.

$$3x = 12$$

Simplify

2nd: $\frac{3x}{3} = \frac{12}{3}$ Divide each side by 3

$$x = 4$$

Simplify

(2) $\frac{x}{5} - 5 = 13$

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Solve and check your solution.

1. $5x + 2 = 27$

2. $0.6x - 1.5 = 1.8$

3. $16 = \frac{d - 12}{14}$

4. $-4 = \frac{7x - (-1)}{-8}$

Solve and check your solution.

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Write an equation and solve each problem.

Patterns

Consecutive integers

$$x + x + 1 + x + 2 = 96$$

$$3x + 3 = 96$$

$$\frac{-3 \quad -3}{3x = 93}$$

$$x = 31$$

Consecutive even and odd integers

$$x + x + 2 + x + 4 = -12$$

$$3x + 6 = -12$$

$$\frac{-6 \quad -6}{3x = -18}$$

$$3x = -18$$

$$\frac{3 \quad 3}{x = -6}$$

$$x = -6$$

2-3 Solving Multi-Step Equations

To solve multi-step equations, you form a series of simpler equivalent equations.

You use the properties of equality, inverse operations and properties of real numbers.

Use these properties until you isolate the variable

Combining Like Terms

What is the solution of $5 = 5m - 23 + 2m$?

$$5 = 5m - 23 + 2m$$

$$5 = 5m + 2m - 23$$

$$5 = 7m - 23$$

$$5 + 23 = 7m - 23 + 23$$

$$28 = 7m$$

$$\frac{28}{7} = \frac{7m}{7}$$

$$4 = m$$

Got It?

1. a. 6

b. 3

2. \$14



Got It? 1. What is the solution of each equation? Check each answer.

a. $11m - 8 - 6m = 22$

b. $-2y + 5 + 5y = 14$

Practice Problems Pg. 98 Complete with your group

7. $y - y = -1$

11. $72 + 4 - 14d = 36$

12. $13 = 5 + 3b$

10. 4

12. 7

11. $2\frac{6}{7}$

6. $-6 - 6t = 6$

17. $17 = p - 3 - 3p$

18. $-23 = -2a -$

16. 4

18. 13

17. -10

Solving a Multi-Step Equation

Concert Merchandise Martha takes her niece and nephew to a concert. She buys T-shirts and bumper stickers for them. The bumper stickers cost \$1 each. Martha's niece wants 1 shirt and 4 bumper stickers, and her nephew wants 2 shirts but no bumper stickers. If Martha's total is \$67, what is the cost of one shirt?

<p>Know</p> <ul style="list-style-type: none"> Bumper stickers cost \$1 Niece's items: 1 shirt, 4 bumper stickers Nephew's items: 2 shirts Total spent: \$67 	<p>Need</p> <p>The cost of one shirt</p>	<p>Plan</p> <p>Write and solve an equation that models the situation.</p>
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Relate cost of niece's items (1 shirt and 4 stickers) plus cost of nephew's items (2 shirts) is total Martha spent

Define Let s = the cost of one shirt.

Write $(s + 4) + 2s = 67$

$$\begin{aligned} (s + 4) + 2s &= 67 \\ s + 2s + 4 &= 67 \\ 3s + 4 &= 67 \\ 3s + 4 - 4 &= 67 - 4 \\ 3s &= 63 \\ \frac{3s}{3} &= \frac{63}{3} \\ s &= 21 \end{aligned}$$

One shirt costs \$21.

Solve with your group

John and Kate are shopping for new guitar strings in a store. John buys 2 packs of strings. Kate buys 2 packs of strings and a music book. The book costs \$16. Their total cost is \$72. How much does one pack of strings cost?

2. \$14

Problem 3 Solving an Equation Using the Distributive Property

What is the solution of $-8(2x - 1) = 36$?

$$\begin{aligned} -8(2x - 1) &= 36 \\ -16x + 8 &= 36 \\ -16x + 8 - 8 &= 36 - 8 \\ -16x &= 28 \\ \frac{-16x}{-16} &= \frac{28}{-16} \\ x &= -\frac{7}{4} \end{aligned}$$

Got It? 3. a. What is the solution of $18 = 3(2x - 6)$? Check your answer.

3. a. 6

Solve each equation. Check your answer.

See Problem 3.

- | | | |
|----------------------|------------------------|-----------------------|
| 21. $64 = 8(r + 2)$ | 22. $5(2x - 3) = 15$ | 23. $5(2 + 4z) = 85$ |
| 24. $2(8 + 4c) = 32$ | 25. $7(f - 1) = 45$ | 26. $15 = -2(2t - 1)$ |
| 27. $26 = 6(5 - 4f)$ | 28. $n + 5(n - 1) = 7$ | 29. $-4(r + 6) = -63$ |

Problem 4 Solving an Equation That Contains Fractions

What is the solution of $\frac{3x}{4} - \frac{x}{3} = 10$?

Method 1 Write the like terms using a common denominator and solve.

$$\frac{3}{4}x - \frac{1}{3}x = 10 \quad \text{Rewrite the fractions.}$$

$$\frac{9}{12}x - \frac{4}{12}x = 10 \quad \text{Write the fractions using a common denominator, 12.}$$

$$\frac{5}{12}x = 10 \quad \text{Combine like terms.}$$

$$\frac{12}{5} \left(\frac{5}{12}x \right) = \frac{12}{5}(10) \quad \text{Multiply each side by } \frac{12}{5}, \text{ the reciprocal of } \frac{5}{12}.$$

$$x = 24 \quad \text{Simplify.}$$

Method 2 Clear the fractions from the equation.

$$12 \left(\frac{3x}{4} - \frac{x}{3} \right) = 12(10) \quad \text{Multiply each side by a common denominator, 12.}$$

$$12 \left(\frac{3x}{4} \right) - 12 \left(\frac{x}{3} \right) = 12(10) \quad \text{Distributive Property}$$

$$9x - 4x = 120 \quad \text{Multiply.}$$

$$5x = 120 \quad \text{Combine like terms.}$$

$$x = 24 \quad \text{Divide each side by 5 and simplify.}$$

blem 4.

Problem 5 Solving an Equation That Contains Decimals

What is the solution of $3.5 - 0.02x = 1.24$?

Plan

The equation contains tenths (3.5) and hundredths (0.02 and 1.24). The greatest number of digits to the right of any decimal point is 2. So, multiply each side of the equation by 10^2 , or 100, to clear the decimals.

$$3.5 - 0.02x = 1.24$$

$$100(3.5 - 0.02x) = 100(1.24) \quad \text{Multiply each side by } 10^2, \text{ or 100.}$$

$$350 - 2x = 124 \quad \text{Distributive Property}$$

$$350 - 2x - 350 = 124 - 350 \quad \text{Subtract 350 from each side.}$$

$$-2x = -226 \quad \text{Simplify.}$$

$$\frac{-2x}{-2} = \frac{-226}{-2} \quad \text{Divide each side by } -2.$$

$$x = 113 \quad \text{Simplify.}$$

Multiply by 100 to get rid of the decimals.

Exit Ticket



Lesson Check

Do you know HOW?

Solve each equation. Check your answer.

1. $7p + 8p - 12 = 59$ 2. $-2(3x + 9) = 24$

3. $\frac{2m}{7} + \frac{3m}{14} = 1$ 4. $1.2 = 2.4 - 0.6x$

5. **Gardening** There is a 12-ft fence on one side of a rectangular garden. The gardener has 44 ft of fencing to enclose the other three sides. What is the length of the garden's longer dimension?

Warm Up CH 2-3 Solving Multi-Step Equations

FINANCE For Exercises 25–27, use the following information.

The table shows activity in Ben's checking account. The balance before the activity was \$200.00. Deposits are added to an account and checks are subtracted.

Number	Date	Transaction	Amount	Balance
	5/2	deposit	52.50	252.50
101	5/10	check to Castle Music	25.50	?
102	6/1	check to Comp U Save	235.40	?

25. What is the account balance after writing check number 101?
26. What is the account balance after writing check number 102?
27. Realizing that he has just written a check for more than is in the account, Ben immediately deposits \$425. What will this make his new account balance?
28. **CHEMISTRY** The melting points of krypton, radon, and sulfur in degrees Celsius are -156.6 , -61.8 , and 112.8 , respectively. What is the difference in melting points between radon and krypton and between sulfur and krypton?