

2-1 **Reteaching**

Solving One-Step Equations

You can use the properties of equality to solve equations. Subtraction is the inverse of addition.

Problem

What is the solution of $x + 5 = 33$?

In the equation, $x + 5 = 33$, 5 is added to the variable. To solve the equation, you need to isolate the variable, or get it alone on one side of the equal sign. Undo adding 5 by subtracting 5 from each side of the equation.

Drawing a diagram can help you write an equation to solve the problem.



Solve

$$x + 5 = 33$$

$$x + 5 - 5 = 33 - 5$$

$$x = 28$$

Undo adding 5 by subtracting 5.

Simplify. This isolates x.

Check

$$x + 5 = 33$$

$$28 + 5 \stackrel{?}{=} 33$$

$$33 = 33 \checkmark$$

Check your solution in the original equation.
Substitute 28 for x.

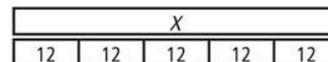
The solution to $x + 5 = 33$ is 28.

Division is the inverse of multiplication.

Problem

What is the solution of $\frac{x}{5} = 12$?

In the equation, $\frac{x}{5} = 12$, the variable is divided by 5. Undo dividing by 5 by multiplying by 5 on each side of the equation.



| | | |
|--------------|------------------------------------|---|
| Solve | $\frac{x}{5} = 12$ | |
| | $\frac{x}{5} \cdot 5 = 12 \cdot 5$ | Undo dividing by 5 by multiplying by 5. |
| | $x = 60$ | Simplify. This isolates x. |

The solution to $\frac{x}{5} = 12$ is 60.

Exercises

Solve each equation using addition or subtraction. Check your answer.

1. $-3 = n + 9$

2. $f + 6 = -6$

3. $m + 12 = 22$

4. $r + 2 = 7$

5. $b + 1.1 = -11$

6. $t + 9 = 4$

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

7. A student is taking a test. He has 37 questions left. If the test has 78 questions, how many questions has he finished?
8. A friend bought a bouquet of flowers. The bouquet had nine daisies and some roses. There were a total of 15 flowers in the bouquet. How many roses were in the bouquet?

Solve each equation using multiplication or division. Check your answer.

9. $\frac{z}{8} = 2$

10. $-26 = \frac{c}{3}$

11. $\frac{q}{11} = -6$

12. $-\frac{a}{3} = 18$

13. $-25 = \frac{g}{5}$

14. $20.4 = \frac{s}{2.5}$

15. A student has been typing for 22 minutes and has typed a total of 1496 words. Write and solve an equation to determine the average number of words she can type per minute.

2-2 Reteaching

Properties of equality and inverse operations can be used to solve equations that involve more than one step to solve. To solve a two-step equation, identify the operations and undo them using inverse operations. Undo the operations in the reverse order of the order of operations.

Problem

What is the solution of $5x - 8 = 32$?

$$5x - 8 + 8 = 32 + 8$$

$$5x = 40$$

$$\frac{5x}{5} = \frac{40}{5}$$

$$x = 8$$

Check $5x - 8 = 32$

$$5(8) - 8 = 32$$

$$32 = 32 \checkmark$$

To get the variable term alone on the left side, add 8 to each side.

Simplify.

Divide each side by 5 since x is being multiplied by 5 on the left side. This isolates x .

Simplify.

Check your solution in the original equation.

Substitute 8 for x .

Simplify.

To solve $-16 = \frac{x}{3} + 5$ you can use subtraction first to undo the addition, and then use multiplication to undo the division.

Problem

What is the solution of $-16 = \frac{x}{3} + 5$?

$$-16 - 5 = \frac{x}{3} + 5 - 5$$

$$-21 = \frac{x}{3}$$

$$3(-21) = 3\left(\frac{x}{3}\right)$$

$$-63 = x$$

To get the variable term alone on the right, subtract 5 from each side.

Simplify.

Since x is being divided by 3, multiply each side by 3 to undo the division. This isolates x .

Simplify.

Exercises

Solve each equation. Check your answer.

1. $4f - 8 = 20$

2. $25 - 6b = 55$

3. $-z + 7 = -8$

4. $\frac{w}{-9} + 7 = 10$

5. $25 = 8 + \frac{n}{2}$

6. $\frac{y-8}{3} = -7$

Solve each equation. Justify each step.

7. $6d - 5 = 31$

8. $\frac{p-7}{-2} = 5$

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

9. Ray's birthday is 8 more than four times the number of days away from today than Jane's birthday. If Ray's birthday is 24 days from today, how many days until Jane's birthday?

10. Jerud weighs 15 pounds less than twice Kate's weight. How much does Kate weigh if Jerud weighs 205 pounds?

11. A phone company charges a flat fee of \$17 per month, which includes free local calling plus \$0.08 per minute for long distance calls. The Taylor's phone bill for the month is \$31.80. How many minutes of long distance calling did they use during the month?

12. A delivery company charges a flat rate of \$3 for a large envelope plus an additional \$0.25 per ounce for every ounce over a pound the package weighs. The postage for the package is \$5.50. How much does the package weigh? (Hint: remember the first pound is included in the \$3.)

Lessons 2-1 & 2-2

Solve each equation.

1. $8p - 3 = 13$

2. $-n + 8.5 = 14.2$

3. $m - 9 = 11$

4. $\frac{7}{12}x = \frac{14}{3}$

5. $3r - 8 = -32$

6. $8g - 10g = 4$

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

13. You spend $\frac{1}{2}$ of your allowance each week on school lunches. Each lunch costs \$1.25. How much is your weekly allowance?

Write an equation to model each situation. Then solve.

24. A DVD club charges a monthly membership fee of \$4.95 and \$11.95 for each DVD purchased. If a customer's bill for the month was \$64.70, how many DVDs did the customer purchase?
25. A lawyer charges \$100 per month to be put on retainer for a client. The lawyer also charges an hourly rate of \$75 for work done. How many hours does the lawyer have to work for a client, in one month, to charge \$625?

Answers: 2, -5.7, 20, 8, -8, -2, \$12.50, 5, 7