2-1 Reteaching

Solving One-Step Equations

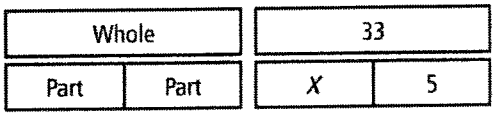
You can use the properties of equality to solve equations. Subtraction is the inverse of addition.

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	$x + 5 = 33$	
	$x + 5 - 5 = 33 - 5$	Undo adding 5 by subtracting 5.
	$x = 28$	Simplify. This isolates x.
Check	$x + 5 = 33$	Check your solution in the original equation.
	$28 + 5 \stackrel{?}{=} 33$	Substitute 28 for x.
	$33 = 33$ ✓	

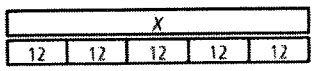
The solution to $x + 5 = 33$ is 28.

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. $-3 = n + 9$

$-9 \quad -9$

$-12 = n$

$n = -12$

2. $f + 6 = -6$

$-6 \quad -6$

$f = -12$

3. $m + 12 = 22$

$-12 \quad -12$

$m = 10$

4. $r + 2 = 7$

$-2 \quad -2$

$r = 5$

5. $b + 1.1 = -11$

$-1.1 \quad -1.1$

$b = -12.1$

6. $t + 9 = 4$

$-9 \quad -9$

$t = -5$

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?

Let q = # of questions left

$37 + q = 78$

$-37 \quad -37$

$q = 41$

The student still has 41 questions left.

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? Let r = # of roses in the bouquet

$9 + r = 15$

$-9 \quad -9$

$r = 6$

There are 6 roses in the bouquet.

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

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

$z = 16$

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

$c = -78$

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

$q = -66$

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

$a = -54$

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

$g = -75$

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

$s = 51$

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.

68 words per min

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 $5x - 8 = 32$?

$5x - 8 + 8 = 32 + 8$	To get the variable term alone on the left side, add 8 to each side.
$5x = 40$	Simplify.
$\frac{5x}{5} = \frac{40}{5}$	Divide each side by 5 since x is being multiplied by 5 on the left side. This isolates x.
$x = 8$	Simplify.
Check $5x - 8 = 32$	Check your solution in the original equation.
$5(8) - 8 = 32$	Substitute 8 for x.
$32 = 32$ ✓	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 $-16 = \frac{x}{3} + 5$?

$-16 - 5 = \frac{x}{3} + 5 - 5$	To get the variable term alone on the right, subtract 5 from each side.
$-21 = \frac{x}{3}$	Simplify.
$3(-21) = 3\left(\frac{x}{3}\right)$	Since x is being divided by 3, multiply each side by 3 to undo the division. This isolates x.
$-63 = x$	Simplify.

Exercises

Solve each equation. Check your answer.

1. $4f - 8 = 20$

f = 7

2. $25 - 6b = 55$

b = -5

3. $-z + 7 = -8$

$z = 15$

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

$w = -27$

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

$n = 34$

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

$y = -13$

Solve each equation. Justify each step.

7. $6d - 5 = 31$

$d = 6$

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

$p = -3$

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? $24 = 8 + 4j$ $j = 4$ days

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

$205 = 2k - 15$ $k = 110$ lbs

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? $17 + 0.08m = 31.80$ $m = 185$ min

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.)

$5.50 = 3 + 0.25e$ $e =$ 1 lb 10 oz

Lessons 2-1 & 2-2

Solve each equation.

1. $8p - 3 = 13$

   p = 2

2. $-n + 8.5 = 14.2$

   n = -5.7

3. $m - 9 = 11$

   m = 20

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

   x = 8

5. $3r - 8 = -32$

   r = -8

6. $8g - 10g = 4$

   g = -2

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

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

   a = allowance

   $\frac{1}{2}a = 5(1.25)$

   a = \$12.50

Write an equation to model each situation. Then solve.

8. 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?

   $4.95 + 11.95d = 64.70$

   d = 5 DVDs

9. 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?

   $100 + 75h = 625$

   h = 7 hrs

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