A1 w4d2 2-5 Solve Literal Equations
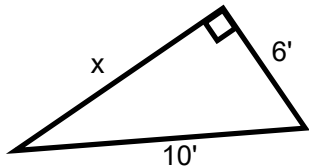
Skill 1: Solve. Show your work!

1. $2c + 3(c - 5) = -2 - (6c - 20)$

2. $3 + 2(3x - 4) = 7x - (4x + 11)$

3. Find the missing side of the triangle using the Pythagorean Theorem:

4. A 25-foot ladder is leaning against a cylinder. The base of the ladder is 7 feet away from the base of the cylinder. How tall is the cylinder if the ladder just reaches the top?

Algebra 1   Why Solve for "Y"?   Name: _____

Т he process of taking an equation with two or more variables in it and solving so that one of the variables is by itself is called **isolating a variable**. Instead of getting a number, which often happens when solving equations, we get a new formula. The formula expresses the value of one variable <u>in terms of</u> the others. That is, it tells us how to get the value of one variable when we know the others.

One common use of this skill is to help graph lines. For example, $3x - 2y = 6$ is the equation of a line given in **standard form**. When graphing, we commonly use the slope-intercept form ($y = mx + b$), since the slope m and the y-intercept b are clearly visible in the equation. **In order to change the equation from *standard form* to *slope-intercept form*, we must *isolate the variable* y**. In other words, we must solve the equation for y in terms of x.

Let's investigate this idea and develop a process for *isolating a variable*.

1.   We will begin our investigation with the equation $3x - 2y = 6$.
   a.   Substitute the value $x = 4$ into the equation $3x - 2y = 6$. Isolate the variable y. (Solve the equation for y.)   Show each step clearly.

   b.   Substitute the value $x = -6$ into the equation $3x - 2y = 6$. Isolate the variable y. (Solve the equation for y.) Show each step clearly.

   c.   Now solve the equation $3x - 2y = 6$ for y without knowing a value for x. Leave your answer in terms of x. (Leave the variable x in the final answer). Show each step clearly.

Isolating a variable works exactly like solving a normal equation in one variable, except that occasionally you need to add or subtract a variable or an expression rather than just a number.

Use this principle to solve each of the following for the variable y.

2. $3x + y = 1$ 3. $3x + 2y = 6$

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4. $x - 5y = 10$

5. $3x - 4y = 12$

6. $5x - 2y = 8$

7. $-7x - y = 6$

8. $2x + 5y = 8$

9. $4x - 7y = 11$

Solve each equation for the indicated variable. Show all your work.

10. Solve $C = \pi d$ for d.

11. Solve $A = s^2$ for s.

12. Solve $V = lwh$ for h.

13. Solve $P = 2l + 2w$ for w.

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Solve each equation for *y*. Then find the value of *y* for each value of *x*.

11. $y + 2x = 5$; $x = -1, 0, 3$ (This is 3 problems in one!)

Solve each equation for *x*.

19. $mx + nx = p$
(Hint: factor out the x)

26. $4(x - b) = x$ (Hint: distribute first)

Solve each problem. Round to the nearest tenth, if necessary. Use 3.14 for π.

29. What is the length of a rectangle with width 10 in. and area 45 in.^{2}?   (A= l·w)

Solve each problem. Round to the nearest tenth, if necessary.

33. **Travel** A vehicle travels on a highway at a rate of 65 mi/h. How long does it take the vehicle to travel 25 mi?
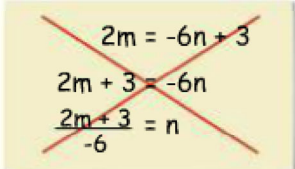
Solve each equation for the given variable.

39. $V = \frac{1}{3}\pi r^2 h$ for *h*

41. $2(x + a) = 4b$ for *a*

ⓒ 45. **Error Analysis** Describe and correct the error made in solving the literal equation at the right for *n*.

$2m = -6n + 3$
$2m + 3 = -6n$
$\frac{2m + 3}{-6} = n$