

Literal Equations

Essential Question: How is solving a literal equation different from solving a regular equation? Answer on your response card.

Equations with several variables are called literal equations. At times you will need to solve a literal equation for one of their variables. To do this, isolate the terms with the variable(s) you need and move everything else to the other side.

Solve each for x.

$$\frac{r}{4} = \frac{4x}{4}$$

$$\frac{r}{4} = x$$

$$c = -d - x$$

$$x + c = -d$$

$$x = -d - c$$

$$cx + 3 = d$$

$$cx = d - 3$$

$$x = \frac{d - 3}{c}$$

Solve $5b + 12c = 10$ for b.

$$5b = 10 - 12c$$

$$b = 2 - \frac{12c}{5}$$

Solve $4m - 3n = 8$ for m.

$$4m = 8 + 3n$$

$$m = 2 + \frac{3n}{4}$$

Solve $p + qx = r$ for x.

$$qx = r - p$$

$$x = \frac{r - p}{q} \text{ or } \frac{r}{q} - \frac{p}{q}$$

Some questions ask you to write an equation in function form, this means to isolate the y-variable.

Write each of the following in function form (y is a function of x)

$$2x + 2y = 10$$

$$2y = 10 - 2x$$

$$y = 5 - x$$

or

$$y = -x + 5$$

$$3 + 3y = 9 - 6x$$

$$3y = 6 - 6x$$

$$y = 2 - 2x$$

$$30 = 9x - 5y$$

$$5y = 9x - 30$$

$$y = \frac{9x}{5} - 6$$

(isolate "y")

Function Form

Challenge

Solve $xy + 7 = n$ for y .

A $y = xn - 7$

B $y = \frac{n-7}{x}$

$\cancel{xy} = \frac{n-7}{\cancel{x}}$

C $y = x(n-7)$

D $y = \frac{1}{x}(n+7)$

Application

Forensicists and archaeologists both use the following equation to find the height, h , of a female depending on the length of their humerus, H , in centimeters.

height \swarrow $h = 3.14H + 64.98$ \nwarrow Humerus
 -64.98 -64.98

How can the equation be rewritten to solve for the length of their humerus, H ? (isolate H)

$\frac{h - 64.98}{3.14} = \frac{3.14H}{3.14}$

$\frac{h - 64.98}{3.14} = H$

If a woman has a height of 66.55, what is the length of their humerus?

plug in for h .

$\frac{66.55 - 64.98}{3.14} = H$

$0.5 \text{ cm.} = H$