

Date:

KEY

10.4 Solving Two Step Equations $a(x+b)=c$

Solving equations is done in reverse order of operations

BEDMAS
① ② ③ ④

- ① BRACKETS
(NESTED: COMPLETE ALL OPERATIONS, FOLLOWING BEDMAS)
- ② EXPONENTS
- ③ DIVISION & MULTIPLICATION, LEFT-TO-RIGHT
- ④ ADDITION & SUBTRACTION, LEFT-TO-RIGHT.

What steps do you think were done to x to turn it in $4(x+3)$?

- ① ADD 3 → FIRST!
- ② MULTIPLY BY 4

* IF YOU MULTIPLIED BY 4, THEN ADDED 3, YOU'D GET $4x+3$, NOT $4(x+3)$ ← THINK!

Solve the following:

$\frac{4(x+2) = -12}{4 \quad 4}$ $x+2 = -3$ $\quad -2 \quad -2$ <div style="border: 1px solid red; padding: 2px; display: inline-block;">$x = -5$</div>	$\frac{-2(x-3) = -18}{-2 \quad -2}$ $x-3 = 9$ $\quad +3 \quad +3$ <div style="border: 1px solid red; padding: 2px; display: inline-block;">$x = 12$</div>	$\frac{5(x+3) = 10}{5 \quad 5}$ $x+3 = 2$ $\quad -3 \quad -3$ <div style="border: 1px solid red; padding: 2px; display: inline-block;">$x = -1$</div>
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How Would you verify that $x = -1$ is the solution for $5(x+3)=10$?

PLUG (-1) IN FOR x :

$5(x+3) = 10$	$5[(-1)+3] = 10$
$5[(-1)+3] = 10$	$5[2] = 10$
	$10 = 10$ ✓

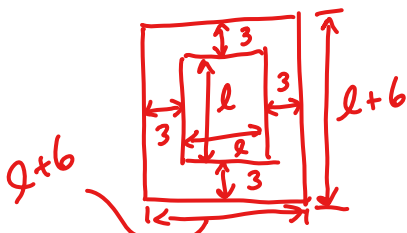
✓ VERIFIED.

A square picture is framed with a border that is 3cm wide. If the total perimeter of the picture and frame is 480cm, what is the length of one side of the picture?

LET l BE THE LENGTH OF ONE SIDE OF THE PICTURE.

NOW THINK!

DRAW A DIAGRAM:



- ① PERIMETER IS DISTANCE AROUND. FROM OUR DIAGRAM, WE CAN SEE THAT $P = (l+6) + (l+6) + (l+6) + (l+6) = 4(l+6)$
- ② FROM THE QUESTION, WE SEE THAT $P = 480$.

SO:

$$\frac{4(l+6) = 480}{4 \quad 4}$$

$$l+6 = 120$$

$$\quad -6 \quad -6$$

$l = 114$

THE LENGTH OF ONE SIDE OF THE PICTURE IS 114 cm.

The Distributive Property

* IT'S "THE PARTY" RULE. "ANYONE" IN THE BRACKETS IS ALREADY AT THE PARTY.

↑ "ANYONE" OUTSIDE IS ARRIVING AT THE PARTY.

What is the distributive property?

* IF YOU ARRIVE AT THE PARTY, YOU MUST MINGLE WITH EVERYONE

The distributive property is another way to find the product of a number and a sum:

$$a(b+c) = ab + ac$$

$$\begin{aligned} & a(b+c) \\ & (a \times b) + (a \times c) \\ & ab + ac \end{aligned}$$

$$\begin{aligned} & \underline{2x} \quad 4(10+5) \\ & = 40 + 20 \\ & = 60 \end{aligned}$$

NOT VERY USEFUL COMPARED TO STANDARD ARITHMETIC (BEDMAS) BUT VERY USEFUL FOR MENTAL MATH & ALGEBRA

Use the distributive property to rewrite the expressions without brackets:

$$9(x+2)$$

$$9x + 18$$

BECAUSE

$$9 \cdot x = 9x$$

AND

$$9 \cdot 2 = 18$$

$$-4(x+1)$$

$$-4x - 4$$

BECAUSE

$$(-4) \cdot x = -4x$$

AND

$$(-4) \cdot (1) = -4$$

$$3(x+4)$$

$$3x + 12$$

BECAUSE

$$3 \cdot x = 3x$$

AND

$$3 \cdot 4 = 12$$

It often helps to think of subtraction as being "adding a negative"

$$\begin{aligned} & 3(a+b-3) \\ & = 3[a+b+(-3)] \\ & = 3a + 3b + (-9) \\ & = \boxed{3a + 3b - 9} \end{aligned}$$

$$\begin{aligned} & -5(x-y-2) \\ & = (-5)[x+(-y)+(-2)] \\ & = -5x + (5y) + (10) \\ & = \boxed{-5x + 5y + 10} \end{aligned}$$

$$\begin{aligned} & -(x-2) \\ & = (-1)[x+(-2)] \\ & = -x + (2) \\ & = \boxed{-x + 2} \end{aligned}$$

Solve the equations using reverse order of operations:

$$\frac{3(x-4)}{3} = \frac{12}{3}$$

$$x-4 = 4$$

$$+4 \quad +4$$

$$x = 8$$

$$\frac{-2(x+1)}{-2} = \frac{10}{-2}$$

$$x+1 = -5$$

$$-1 \quad -1$$

$$x = -6$$

$$\frac{2(x+1)}{2} = \frac{14}{2}$$

$$x+1 = 7$$

$$-1 \quad -1$$

$$x = 6$$

$$\frac{3(x+5)}{3} = \frac{-15}{3}$$

$$x+5 = -5$$

$$-5 \quad -5$$

$$x = -10$$

Solve each equation using the distributive property:

$$3(x-4) = 6$$

$$3x - 12 = 6$$

$$+12 \quad +12$$

$$\frac{3x}{3} = \frac{18}{3}$$

$$x = 6$$

$$-2(x+3) = 12$$

$$-2x - 6 = 12$$

$$+6 \quad +6$$

$$\frac{-2x}{-2} = \frac{18}{-2}$$

$$x = -9$$

$$2(x-2) = 14$$

$$2x - 4 = 14$$

$$+4 \quad +4$$

$$\frac{2x}{2} = \frac{18}{2}$$

$$x = 9$$

$$3(2x+5) = -18$$

$$6x + 15 = -18$$

$$-15 \quad -15$$

$$\frac{6x}{6} = \frac{-33}{6}$$

$$x = \frac{-33}{6}$$

$$x = -5\frac{1}{2}$$

$$\frac{-33}{6}$$

$$= \frac{-30}{6} + \left(\frac{-3}{6}\right)$$

$$= -5 + \left(-\frac{1}{2}\right)$$

$$= -5\frac{1}{2}$$