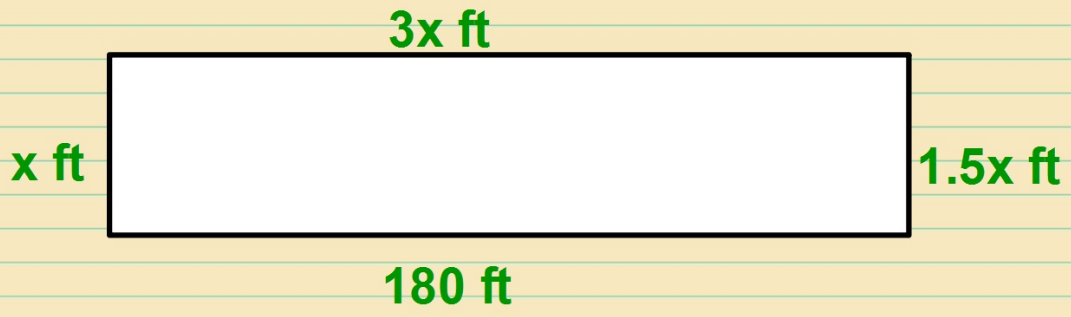
Skill check:

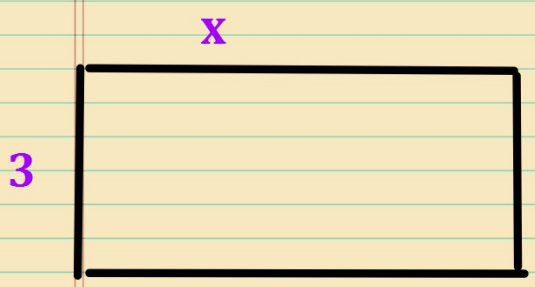
$-3(2n + 1) + 7 = -5$

Skill check:

A 455-foot fence encloses a pasture. What is the lenth of each side of the pasture?



1-3 solving equations with variables on both sides



Set the perimeter = to the area

Describe surface area and volume

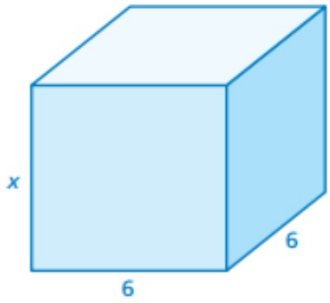
S.A. Formula of a prism:

2 ACTIVITY: Surface Area and Volume

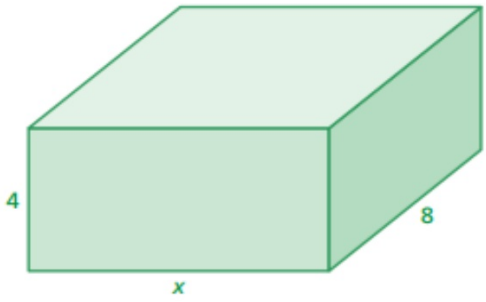
Work with a partner.

- **Each solid has the unusual property that the value of its surface area (in square inches) is equal to the value of its volume (in cubic inches). Write an equation for each solid.**
- **Solve each equation for x.**
- **Use the value of x to find the surface area and the volume of each solid.**
- **Describe how you can check your solution.**

a.



b.



EXAMPLE 1 Solving an Equation with Variables on Both Sides

Solve $15 - 2x = -7x$. Check your solution.

	$15 - 2x = -7x$	Write the equation.
Undo the subtraction. →	$+2x \quad +2x$	Addition Property of Equality
	$15 = -5x$	Simplify.
Undo the multiplication. →	$\frac{15}{-5} = \frac{-5x}{-5}$	Division Property of Equality
	$-3 = x$	Simplify.

∴ The solution is $x = -3$.

Check

$15 - 2x = -7x$

$15 - 2(-3) \stackrel{?}{=} -7(-3)$

$21 = 21$ ✓

EXAMPLE 2 Using the Distributive Property to Solve an Equation

Solve $-2(x-5) = 6\left(2-\frac{1}{2}x\right)$.

	$-2(x-5) = 6\left(2-\frac{1}{2}x\right)$	Write the equation.
	$-2x+10= 12-3x$	Distributive Property
Undo the subtraction. →	$+3x \quad +3x$	Addition Property of Equality
	$x+10 = 12$	Simplify.
Undo the addition. →	$-10 \quad -10$	Subtraction Property of Equality
	$x = 2$	Simplify.

∴ The solution is $x = 2$.

Practice:

1.) $-3x = 2x + 19$

2.) $2.5y + 6 = 4.5y - 1$

3.) $6(4 - z) = 2z$

Skill Check:

1.) $m - 4 = 2m$

2.) $3k - 1 = 7k + 2$

1 question Formative assessment

$$-4(2x + 9) + 3x = 6 - 4(x - 3)$$

EXAMPLE 3 Solving Equations with No Solution

Solve $3 - 4x = -7 - 4x$.

$3 - 4x = -7 - 4x$ Write the equation.

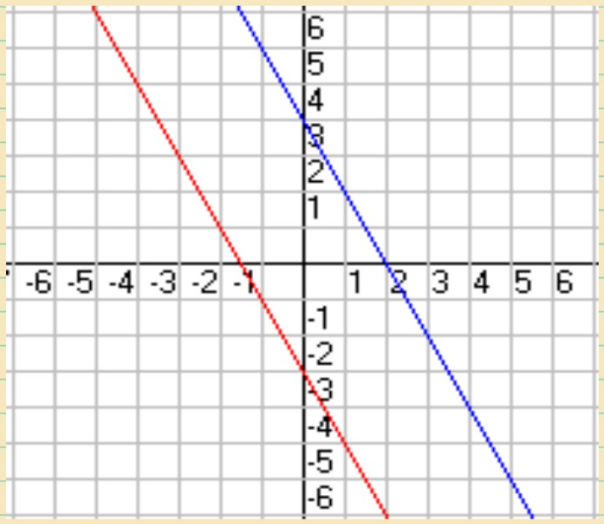
Undo the subtraction. → $+ 4x \quad + 4x$ Addition Property of Equality

$3 = -7$ ✗ Simplify.

∴ The equation $3 = -7$ is never true. So, the equation has no solution.

When solving an equation that has infinitely many solutions, you will obtain an equivalent equation that is true for all values of the variable, such as $-5 = -5$.

What do you think the equation would look like graphed????



EXAMPLE 4 Solving Equations with Infinitely Many Solutions

Solve $6x + 4 = 4\left(\frac{3}{2}x + 1\right)$.

$6x + 4 = 4\left(\frac{3}{2}x + 1\right)$ Write the equation.

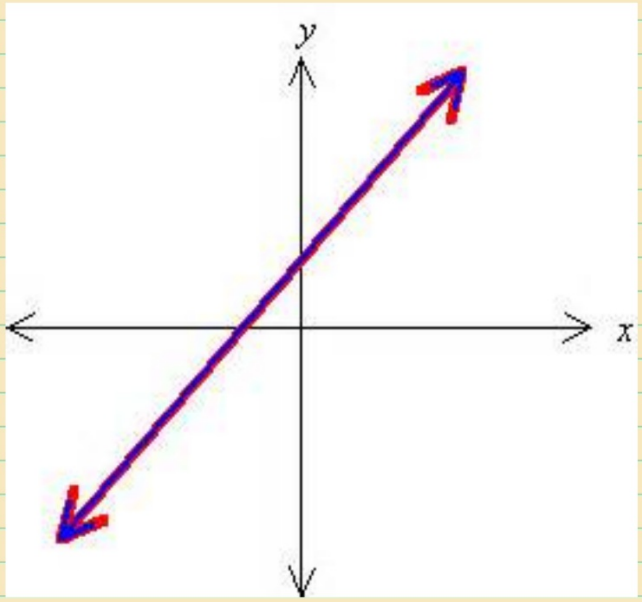
$6x + 4 = 6x + 4$ Distributive Property

Undo the addition. → $-6x \quad -6x$ Subtraction Property of Equality

$4 = 4$ Simplify.

∴ The equation $4 = 4$ is always true. So, the equation has infinitely many solutions.

What do you think the equation would look like on a graph??



On Your Own

Solve the equation.

4. $2x + 1 = 2x - 1$

5. $\frac{1}{2}(6t - 4) = 3t - 2$

6. $\frac{1}{3}(2b + 9) = \frac{2}{3}\left(b + \frac{9}{2}\right)$

7. $6(5 - 2v) = -4(3v + 1)$

EXAMPLE 5 Writing and Solving an Equation

The circles are identical. What is the area of each circle?

Ⓐ 2 Ⓑ 4 Ⓒ 16π Ⓓ 64π

The circles are identical, so the radius of each circle is the same.

$x + 2 = 2x$ Write an equation. The radius of the purple circle is $\frac{4x}{2} = 2x$.

$-x \quad -x$ Subtraction Property of Equality

$2 = x$ Simplify.

Because the radius of each circle is 4, the area of each circle is $\pi r^2 = \pi(4)^2 = 16\pi$.

∴ So, the correct answer is Ⓒ.

Practice continued

3.) $\frac{1}{3}(2b + 9) = \frac{2}{3}(b + \frac{9}{2})$

4.) $6(5 - 2v) = -4(3v + 1)$

Formative assessment review

$5x + 5 = 3(5x - 4) - 10x$

$3(2b - 1) - 7 = 6b - 10$

$2k + 2 + 3k = 3(k - 2)$

$6(y + 5) = 10 - (y - 20)$

Warm-Up! (KEY)

What are the 4 steps to solving an equation? (as per your notes)

1. Distribute

2. Simplify (combine like terms on both sides)

3. Move all variables to one side (using the inverse property)

4. Solve for missing variable

$5x + 5 = 3(5x - 4) - 10x$ $5x + 5 = 15x - 12 - 10x$ $5x + 5 = 5x - 12$ $5 = -12$ No Solution	$3(2b - 1) - 7 = 6b - 10$ $6b - 3 - 7 = 6b - 10$ $6b - 10 = 6b - 10$ $-10 = -10$ Infinite Solutions
$2k + 2 + 3k = 3(k - 2)$ $5k + 2 = 3k - 6$ $2k + 2 = -6$ $2k = -8$ $k = -4$	$6(y + 5) = 10 - (y - 20)$ $6y + 30 = 10 - y + 20$ $6y + 30 = -y + 30$ $7y + 30 = 30$ $7y = 0$ $y = 0$

EXAMPLE 6 Real-Life Application

A boat travels x miles per hour upstream on the Mississippi River. On the return trip, the boat travels 2 miles per hour faster. How far does the boat travel upstream?

The speed of the boat on the return trip is $(x + 2)$ miles per hour.

Distance upstream = Distance of return trip

$$3x = 2.5(x + 2) \quad \text{Write an equation.}$$

$$3x = 2.5x + 5 \quad \text{Distributive Property}$$

$$-2.5x \quad -2.5x \quad \text{Subtraction Property of Equality}$$

$$0.5x = 5 \quad \text{Simplify.}$$

$$\frac{0.5x}{0.5} = \frac{5}{0.5} \quad \text{Division Property of Equality}$$

$$x = 10 \quad \text{Simplify.}$$

∴ The boat travels 10 miles per hour for 3 hours upstream.
So, it travels 30 miles upstream.