

## 4.2 Solve Multi-Step Equations

### Part 1: Do it Now!

Solve the following equation:

$$-9x + 8 = 23$$

$$-9x = 23 - 8$$

$$\frac{-9x}{-9} = \frac{15}{-9}$$

$$x = -\frac{15}{9}$$

$$x = -\frac{5}{3}$$

## Part 2: Solving Multi-Step Equations

To solve an equation involving multiple terms:

- 1) Get rid of any brackets by expanding
- 2) Collect variable terms on one side of the equation and constant terms on the other.
- 3) Collect like terms
- 4) Isolate the variable

Don't forget you can check your solutions!

1)  $3x + 2 = 2x - 4$

$$3x - 2x + 2 = -4$$

$$x + 2 = -4$$

$$x = -4 - 2$$

$$x = -6$$

Start by moving all the variable terms to one side. Collect the variable terms on the left by subtracting  $2x$  from both sides.

Now isolate the variable terms by moving the constant terms to the right. Do this by subtracting 2 from each side.

2)  $7 - 2x = 8 - 5x$

**Remember:** start by collecting variable terms on to the left side, then move the constant terms to the right. (you can do this in one step with more practise)

$$-2x + 5x = 8 - 7$$

$$\frac{3x}{3} = \frac{1}{3}$$

$$x = \frac{1}{3}$$

### Try on Your Own

3)  $5 - 3m = -2 - 2m$

$$5 + 2 = -2m + 3m$$

$$7 = m$$

$$m = 7$$

$$4) \quad 5(x-3) - 1(x-2) = 19$$

Start by expanding using the distributive property to get rid of the brackets.

$$5x - 15 - 1x + 2 = 19$$

$$5x - 1x = 19 + 15 - 2$$

$$\frac{4x}{4} = \frac{32}{4}$$

$$x = 8$$

Complete the question just like the first three examples. Collect the variable terms on the left and the constant terms on the right.

Check your answer.....

$LS$	$RS$
$= 5(x-3) - 1(x-2)$	$= 19$
$= 5(8-3) - 1(8-2)$	
$= 5(5) - 1(6)$	
$= 25 - 6$	
$= 19$	
$LS = RS$	

$$5) \quad 2(x - 3) = -3(x + 5) - 6$$

$$2x - 6 = -3x - 15 - 6$$

$$2x + 3x = -15 - 6 + 6$$

$$\frac{5x}{5} = \frac{-15}{5}$$

$$x = -3$$

### Try on Your Own

$$6) \quad 5(5x - 13) = 23x - 13$$

$$25x - 65 = 23x - 13$$

$$25x - 23x = -13 + 65$$

$$\frac{2x}{2} = \frac{52}{2}$$

$$x = 26$$

### Part 3: Application

- 7) The perimeter of the given rectangle is 50cm. Determine the length of each side of the rectangle.



$4x + 5$   
w

$3x - 1$   
l

$$P = 2(l) + 2(w)$$

$$50 = 2(3x - 1) + 2(4x + 5)$$

$$50 = 6x - 2 + 8x + 10$$

$$50 + 2 - 10 = 6x + 8x$$

$$\frac{42}{14} = \frac{14x}{14}$$

$$x = 3$$

$$\text{Length} = l = 3x - 1 = 3(3) - 1 = 8 \text{ cm}$$

$$\text{Width} = w = 4x + 5 = 4(3) + 5 = 17 \text{ cm}$$

**Practice Practice Practice!!!!**