

Section 3.4 Solving Equations with Variables on Both Sides

Examples

1. $6x + 22 = -3x + 31$

$$\begin{aligned} +3x & \quad +3x \\ 9x + 22 & = 31 \\ -22 & \quad -22 \\ 9x & = 9 \\ \frac{9x}{9} & \quad \frac{9}{9} \\ x & = 1 \end{aligned}$$

$6 + 22 = -3 + 31$
 $28 = 28$
yes

2. $64 - 12w = 6w$

$$\begin{aligned} +12w & \quad +12w \\ 64 & = 18w \\ \frac{64}{18} & \quad \frac{18w}{18} \\ \frac{32}{9} & = w \end{aligned}$$

$$\sqrt{64 - 12\left(\frac{32}{9}\right)} = \sqrt{6\left(\frac{32}{9}\right)}$$

$$64 - \frac{128}{3} = \frac{64}{3}$$

$$\frac{64}{3} = \frac{64}{3} \text{ yes!}$$

you must ✓ work

3. $4(x - 5) = 4x - 20$

$$4x - 20 = 4x - 20$$

all R #'s

No ✓

4. $3x - 9 = 3x + 10$

$$-3x \quad -3x$$

$$-9 \neq 10$$

No R

No ✓

$$\sqrt{\frac{2}{5}(12 \cdot 3) + 15} = 18 - 4(3 - 3)$$

$$\frac{2}{5}(45) = 18$$

$$18 = 18 \checkmark$$

6. $\frac{2}{5}(10x + 15) = 18 + 4(x - 3)$

$$\frac{2}{5}(10x) + \frac{2}{5}(15) = 18 - x + 3$$

$$4x + 6 = -x + 21$$

$$+x \quad +x$$

$$5x + 6 = 21 \quad x = 3$$

$$-6 \quad -6$$

$$5x = 15$$

6. A gym offers two packages for yearly membership. The first plan costs \$50 to be a member, then each visit to the gym is \$5. The second plan costs \$200 for a membership fee plus \$2 per visit. Which membership is more economical? *same!*

$x = \#$ of visits

1st: $50 + 5x$

2nd: $200 + 2x$

$$50 + 5x = 200 + 2x$$

$$-2x \quad -2x$$

$$50 + 3x = 200$$

$$-50 \quad -50$$

$$\frac{3x}{3} = \frac{150}{3}$$

$$x = 50 \text{ visits}$$

Not done

When is it more economical?
Choice #1: when $x < 50$ visits
Choice #2: when $x > 50$ visits