

Solve.

1. $x + 4 = -9$ $-4 \quad -4$ $x = -13$	2. $\frac{4}{3}x = -8$ $\cdot \frac{3}{4}$ $x = \frac{-24}{4} = -6$
3. $\frac{1}{2}x = -16$ $\cdot 2$ $x = -32$	4. $x - 2 = 25$ $+2 \quad +2$ $x = 27$
5. $\frac{1}{3}x = 11$ $\cdot 3$ $x = 33$	6. $x - 4 = 8$ $+4 \quad +4$ $x = 12$

Warm Up

* review of solving for a single variable

Solve the inequality. Graph the solution.

1. $-7t > 14$ $\div -7$ $t < -2$	2. $-12 \leq -z$ $\div -1$ $12 \geq z$
3. $\frac{n}{-4} \leq 2$ $\cdot -4$ $n \geq -8$	4. $-10 > -\frac{2}{3}m$ $\cdot \frac{3}{2}$ $15 < m$
5. $12 \geq 6f$ $\div 6$ $2 \geq f$	6. $t - 8 \geq 36$ $+8 \quad +8$ $t \geq 44$

Cumulative Warm Up

* remember rules for multiplying or dividing by negatives when working with inequalities

Essential Question
 How can you solve a polynomial equation?

Essential Question

What you learn:

- Use Zero product property rule

- Factor polynomials using the GCF

- Use Zero product property to solve real life problems.

Core Concept

Zero-Product Property

Words If the product of two real numbers is 0, then at least one of the numbers is 0.

Algebra If a and b are real numbers and $ab = 0$, then $a = 0$ or $b = 0$.

Core Concept

Solutions = roots

Solve each equation.

a. $2x(x - 4) = 0$

b. $(x - 3)(x - 9) = 0$

$2x = 0$ $x - 4 = 0$

$x - 3 = 0$

$x = 0$ $x = 4$

$x = 3$

$x - 9 = 0$

$x = 9$

Example 1

Set each part (factor) equal to zero and solve for x.

Solve the equation. Check your solutions.

1. $x(x - 1) = 0$

2. $3t(t + 2) = 0$

$x = 0$

$3t = 0$

$t + 2 = 0$

$x - 1 = 0$

$t = 0$

$t = -2$

$x = 1$

3. $(z - 4)(z - 6) = 0$

$z - 4 = 0$

$z - 6 = 0$

$+4 +4$

$+6 +6$

$z = 4$

$z = 6$

* Student practice

Solve each equation.

a. $(2x + 7)(2x - 7) = 0$ b. $(x - 1)^2 = 0$ c. $(x + 1)(x - 3)(x - 2) = 0$

$2x + 7 = 0$ $(x - 1) = 0$ $x + 1 = 0$
 $-7 - 7$ $x = 1$ $x = -1$
 $2x = -7$ $x - 3 = 0$
 $x = -\frac{7}{2}$ $x = 3$
 $2x - 7 = 0$ $x - 2 = 0$
 $+7 + 7$ $x = 2$
 $2x = 7$
 $x = \frac{7}{2}$

Example 2

Solve the equation. Check your solutions.

4. $(3s + 5)(5s + 8) = 0$ 5. $(b + 7)^2 = 0$

6. $(d - 2)(d + 6)(d + 8) = 0$

Monitoring Progress 4-6

Factor out the greatest common monomial factor from $4x^4 + 24x^3$.

$4x^4 + 24x^3$
 $4x^3(x + 6)$

Example 3

*Student practice

* factors must be in each term in order to factor out.

7. Factor out the greatest common monomial factor from $8y^2 - 24y$.

$$8y^2 - 24y$$

$$8y(y - 3)$$

Monitoring Progress 7

Solve (a) $2x^2 + 8x = 0$ and (b) $6n^2 = 15n$.

$$2x^2 + 8x = 0$$

$$2x(x + 4) = 0$$

$$2x = 0 \quad x + 4 = 0$$

$$x = 0 \quad x = -4$$

$$6n^2 - 15n = 0$$

$$3n(2n - 5) = 0$$

$$3n = 0$$

$$n = 0$$

$$2n - 5 = 0$$

$$2n = 5$$

$$n = 5/2$$

Example 4

Solve the equation. Check your solutions.

8. $a^2 + 5a = 0$

9. $3s^2 - 9s = 0$

10. $4x^2 = 2x$

Monitoring Progress 8-10

• factor first
• then solve

• always move terms
around so the equation
equals 0.

* Student practice

You can model the arch of a fireplace using the equation $y = -\frac{1}{9}(x+18)(x-18)$, where x and y are measured in inches. The x -axis represents the floor. Find the width of the arch at floor level.

$$y = -\frac{1}{9}(x+18)(x-18)$$

$$0 = -\frac{1}{9}(x+18)(x-18)$$

$$0 = x+18$$

$$-18 = x$$

$$0 = x-18$$

$$18 = x$$

Example 5

11. You can model the entrance to a mine shaft using the equation $y = -\frac{1}{2}(x+4)(x-4)$, where x and y are measured in feet. The x -axis represents the ground. Find the width of the entrance at ground level.

$$y = -\frac{1}{2}(x+4)(x-4)$$

$$0 = -\frac{1}{2}(x+4)(x-4)$$

$$x+4=0$$

$$x=-4$$

$$x-4=0$$

$$x=4$$

Monitoring Progress 11

• Exit Ticket: Write a polynomial equation that has -6 and 4 as solutions.

$$x = -6$$

$$x = 4$$

$$x+6=0$$

$$x-4=0$$

$$(x+6)(x-4) = 0$$

$$x^2 - 4x + 6x - 24 = 0$$

$$x^2 + 2x - 24 = 0$$

Closure

* The width is the distance between the x -coordinates -18 and 18

$$|-18 - 18| = 36 \text{ inches}$$

* Width is the distance between the x -coordinates $-4, 4$

$$|-4 - 4| = 8 \text{ ft.}$$

* go over with students*