

Day 2 - Solving by Finding Square Roots/Completing the Square

Solving by Finding Square Roots:

Steps for Solving Quadratics by Finding Square Roots

1. Add or Subtract any constants that are on the same side of x^2 .
2. Multiply or Divide any constants from x^2 terms. "Get x^2 by itself"
3. Take square root of both sides and set equal to positive and negative roots (\pm).

Ex: $x^2 = 25$
 $\sqrt{x^2} = \sqrt{25}$
 $x = \pm 5$
 $x = +5$ and $x = -5$

PEMDAS

REMEMBER WHEN SOLVING FOR X YOU GET A negative AND positive ANSWER!

x^2

Solve the following for x:

1) $x^2 = 49$

$x = \pm 7$

4) $10x^2 + 9 = 499$

$\sqrt{x^2} = \sqrt{16}$
 $x = \pm 4$ or $x = 4$
 $x = -4$

2) $x^2 = 20$

$x = \pm \sqrt{20}$

$x = \pm \sqrt{2 \cdot 2 \cdot 5}$

$x = \pm 2\sqrt{5}$

5) $2x^2 + 8 = 170$

3) $7x^2 - 6 = 57$

$7x^2 = 63$

$x^2 = 9$

$x = \pm 3$

~~PEMDAS~~

8) $-2(x+3)^2 - 16 = -48$

9) $3(x-4)^2 + 7 = 67$

$\frac{2}{1} \cdot \frac{1}{2} (x+8)^2 = 14 \cdot \frac{2}{1}$
 $\sqrt{(x+8)^2} = \sqrt{28}$
 $(x+8) = \pm \sqrt{28}$
 $(x+8) = \pm 2\sqrt{7}$
 $x = -8 \pm 2\sqrt{7}$

$\frac{7-7}{3} \cdot \frac{3}{3} (x-4)^2 = \frac{60}{3}$
 $\sqrt{(x-4)^2} = \sqrt{20}$
 $(x-4) = \pm \sqrt{20}$
 $x = 4 \pm \sqrt{20}$
 $x = 4 \pm 2\sqrt{5}$

Algebra 1

Solving Quadratic Equations

Notes

$$ax^2 + bx + c = 0$$

Solving by Completing the Square:

The Equation:

STEP 1: move constant term to the other side ("c")

STEP 2: make the left hand side a perfect square

trinomial by adding $(\frac{b}{2})^2$ to **both** sides

STEP 3: factor the left side, simplify the right side

STEP 4: solve by finding square roots

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

$$x^2 + 6x + \underline{9} = -2 + \underline{9}$$

$$(x+3)(x+3) = 7$$

$$(x+3)^2 = 7$$

$(\frac{b}{2})^2 = 3^2 = 9$

$$x+3 = \pm\sqrt{7}$$

$$\sqrt{(x+3)^2} = \sqrt{7}$$

$$x+3 = \sqrt{7} \text{ and } x+3 = -\sqrt{7}$$

$$x = -3 + \sqrt{7} \text{ and } x = -3 - \sqrt{7}$$

Solve for x.

1. $x^2 - 6x - 72 = 0$

$$x^2 - 6x + \underline{9} = 72 + \underline{9}$$

$$\sqrt{(x-3)^2} = \sqrt{81}$$

$$x-3 = \pm 9$$

$$x = \frac{-3-9}{+3} = -12 \quad x = \frac{-3+9}{+3} = 2$$

2. $x^2 + 80 = (18x) = x^2 - 18x + 80 = 0$

$$x^2 - 18x + \underline{81} = -80 + \underline{81}$$

$$\sqrt{(x-9)^2} = \sqrt{1}$$

$$x-9 = \pm 1$$

$$x-9 = 1 \quad x-9 = -1$$

$$x = 10 \quad x = 8$$

3. $x^2 - 14x - 59 = -20$

$$x^2 - 14x + \underline{49} = 39 + \underline{49}$$

$$\sqrt{(x-7)^2} = \sqrt{88}$$

$$x-7 = \pm\sqrt{88}$$

$$x-7 = \pm 2\sqrt{22}$$

$$x = 7 \pm 2\sqrt{22}$$

