

Methods to Solve Quadratic Equations

- Always work!
- 1) Completing the Square
 - 2) Quadratic Formula
 - 3) Factoring
 - 4) Finding zeros (calc)
 - 5 Taking square roots of each side

Today we will focus in Method #5

Sep 18-8:35 PM

$$x^2 = 25$$

Take square root for both sides

$$\sqrt{x^2} = \sqrt{25}$$

$$x = \pm 5$$

$$x = 5$$

$$x = -5$$

$$x^2 = 5^2 = 25$$

$$x^2 = (-5)^2$$

$$x^2 = 25$$

Mar 9-10:21 AM

$$\begin{array}{l} x^2 = 49 \\ \sqrt{x^2} = \sqrt{49} \\ (x^2)^{\frac{1}{2}} = \pm 7 \\ x^{2(\frac{1}{2})} = \pm 7 \\ x = \pm 7 \rightarrow x = 7 \quad x = -7 \end{array} \quad \begin{array}{l} s^2 = 64 \\ \sqrt{s^2} = \sqrt{64} \\ s = \pm 8 \\ s = 8 \\ s = -8 \end{array}$$

$$\begin{array}{l} 3x^2 + 12 = 0 \\ -12 - 12 \\ 3x^2 = -12 \\ x^2 = -4 \\ x = \pm 2i \end{array}$$

$$x = \pm 2i \\ x = 2i \text{ or } x = -2i$$

Mar 9-10:23 AM

Warm-up

Solve by completing the square

$$1) x^2 - 14x = -101$$

$$x^2 - 14x + 49 = -101 + 49$$

$$\sqrt{(x-7)^2} = \sqrt{-52}$$

$$x-7 = \pm 2i\sqrt{13}$$

$$x = 7 \pm 2i\sqrt{13}$$

$$x = 7 + 2i\sqrt{13}$$

$$x = 7 - 2i\sqrt{13}$$

2) Write an equation of a line through points $(-1, 5)$ and $(7, -10)$

$$m = \frac{-10-5}{7+(-1)}$$

$$m = \frac{-15}{8}$$

$$y - y_1 = m(x - x_1)$$

$$y - 5 = -\frac{15}{8}(x + 1)$$

$$y - 5 = -\frac{15}{8}x - \frac{15}{8}$$

$$y = -\frac{15}{8}x + \frac{25}{8}$$

Sep 27-7:10 AM

8)

$$a=3 \quad b=-4 \quad c=-4$$

$$3a^2 - 4a - 4 = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(3)(-4)}}{2(3)}$$

$$x = \frac{4 \pm \sqrt{64}}{6}$$

$$x = \frac{4 \pm 8}{6}$$

$$x = \frac{4+8}{6}$$

$$x = 2$$

$$x = \frac{4-8}{6}$$

$$x = -\frac{2}{3}$$

$$x = -0.67$$

Sep 27-8:01 AM

Method 3: Solve by Factoring

Works as long as the quadratic expression is **factorable**

zero product property:

If $ab = 0$, then $a = 0$ or $b = 0$

$$(3x+1)(x-4) = 0$$

$$3x+1 = 0 \quad x-4 = 0$$

$$3x = -1$$

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

$$x = 4$$

Sep 26-3:32 PM

Solve by Factoring : Move to one side first!

1) $6x^2 = 12x$
 $-12x \quad -12x$
 $6x^2 - 12x = 0$
 $6x(x-2) = 0$
 $6x = 0 \quad x-2 = 0$
 $x = 0 \quad x = 2$

2) $6n^2 - 11n = 2$
 $-2 \quad -2$
 $6n^2 - 11n - 2 = 0$
 $6n^2 + n - 12n - 2 = 0$
 $n(6n+1) - 2(6n+1) = 0$
 $(6n+1)(n-2) = 0$
 $6n+1 = 0 \quad n-2 = 0$
 $n = -1/6 \quad n = 2$

3) $6x^2 - 12x = 0$
 $6(x^2 - 2x) = 0$
 $x^2 - 2x = 0$
 $x(x-2) = 0$
 $x = 0 \quad x = 2$

4) $x^2 - 2x + 1 = 1$
 $(x-1)^2 = 1$
 $x-1 = \pm 1$
 $x = 2 \quad x = 0$

5) $x^2 - 12x + 11 = 0$
 $p = -12 \quad s = 11$
 $1, -11$

Mar 11-8:03 AM

3) $4x^2 = 4x + 15$
 $-4x-15 \quad -4x-15$
 $4x^2 - 4x - 15 = 0$
 $4x^2 + 6x - 10x - 15 = 0$
 $2x(2x+3) - 5(2x+3) = 0$
 $(2x+3)(2x-5) = 0$
 $2x+3 = 0 \quad 2x-5 = 0$
 $x = -3/2 \quad x = 5/2$

Sum & Product Method

5) $4x^2 - 25 = 0$

6) $x^2 - 6x + 5 = 0$
 $p = -6 \quad s = 5$
 $1, -5$
 $2, -4$
 $3, -2$
 $4, -1$
 $5, -1$
 $6, -1$
 $7, -1$
 $8, -1$
 $9, -1$
 $10, -1$
 $11, -1$
 $12, -1$
 $13, -1$
 $14, -1$
 $15, -1$
 $16, -1$
 $17, -1$
 $18, -1$
 $19, -1$
 $20, -1$
 $21, -1$
 $22, -1$
 $23, -1$
 $24, -1$
 $25, -1$
 $26, -1$
 $27, -1$
 $28, -1$
 $29, -1$
 $30, -1$
 $31, -1$
 $32, -1$
 $33, -1$
 $34, -1$
 $35, -1$
 $36, -1$
 $37, -1$
 $38, -1$
 $39, -1$
 $40, -1$
 $41, -1$
 $42, -1$
 $43, -1$
 $44, -1$
 $45, -1$
 $46, -1$
 $47, -1$
 $48, -1$
 $49, -1$
 $50, -1$
 $51, -1$
 $52, -1$
 $53, -1$
 $54, -1$
 $55, -1$
 $56, -1$
 $57, -1$
 $58, -1$
 $59, -1$
 $60, -1$
 $61, -1$
 $62, -1$
 $63, -1$
 $64, -1$
 $65, -1$
 $66, -1$
 $67, -1$
 $68, -1$
 $69, -1$
 $70, -1$
 $71, -1$
 $72, -1$
 $73, -1$
 $74, -1$
 $75, -1$
 $76, -1$
 $77, -1$
 $78, -1$
 $79, -1$
 $80, -1$
 $81, -1$
 $82, -1$
 $83, -1$
 $84, -1$
 $85, -1$
 $86, -1$
 $87, -1$
 $88, -1$
 $89, -1$
 $90, -1$
 $91, -1$
 $92, -1$
 $93, -1$
 $94, -1$
 $95, -1$
 $96, -1$
 $97, -1$
 $98, -1$
 $99, -1$
 $100, -1$

Feb 10-3:29 PM

4) $x^2 - 12x + 35 = 0$
 $p = -12 \quad s = 35$
 $-1, -35$
 $-5, -7$
 $(x-5)(x-7) = 0$
 $x = 5 \quad x = 7$

When $a = 1$,
 sum + prod has
 a short-cut.

Sep 27-8:25 AM

5) $7m^2 - 14m = 0$
 $7m(m-2) = 0$
 $7m = 0 \quad m-2 = 0$
 $m = 0 \quad m = 2$

6) $x^2 - 4x - 12 = 0$
 $a = 1$, short cut!
 $p = -4 \quad s = -12$
 $1, -12$
 $2, -6$
 $(x+2)(x-6) = 0$
 $x+2 = 0 \quad x-6 = 0$
 $x = -2 \quad x = 6$

Oct 2-8:53 AM

7) $4x^2 = 121$
 $4x^2 - 121 = 0$
 $(2x+11)(2x-11) = 0$
 $2x+11 = 0 \quad 2x-11 = 0$
 $2x = -11 \quad 2x = 11$
 $x = -11/2 \quad x = 11/2$

8) $2x^2 - x - 7 = 0$
 $a = 2 \quad b = -1 \quad c = -7$
 $x = \frac{-(-1) \pm \sqrt{(-1)^2 - 4(2)(-7)}}{2(2)}$
 $x = \frac{1 \pm \sqrt{1+56}}{4}$
 $x = \frac{1 \pm \sqrt{57}}{4}$
 $x = \frac{1+\sqrt{57}}{4} \quad x = \frac{1-\sqrt{57}}{4}$

No short cut!
 $p = -1 \quad s = -14$
 $1, -14$
 $2, -7$
 $3, -14/3$
 $4, -7/2$
 $5, -14/5$
 $6, -7/3$
 $7, -2$
 $8, -14/8$
 $9, -7/4$
 $10, -14/10$
 $11, -7/5$
 $12, -14/12$
 $13, -7/6$
 $14, -1$
 $15, -14/15$
 $16, -7/8$
 $17, -14/17$
 $18, -7/9$
 $19, -14/19$
 $20, -7/10$
 $21, -14/21$
 $22, -7/11$
 $23, -14/23$
 $24, -7/12$
 $25, -14/25$
 $26, -7/13$
 $27, -14/27$
 $28, -7/14$
 $29, -14/29$
 $30, -7/15$
 $31, -14/31$
 $32, -7/16$
 $33, -14/33$
 $34, -7/17$
 $35, -14/35$
 $36, -7/18$
 $37, -14/37$
 $38, -7/19$
 $39, -14/39$
 $40, -7/20$
 $41, -14/41$
 $42, -7/21$
 $43, -14/43$
 $44, -7/22$
 $45, -14/45$
 $46, -7/23$
 $47, -14/47$
 $48, -7/24$
 $49, -14/49$
 $50, -7/25$
 $51, -14/51$
 $52, -7/26$
 $53, -14/53$
 $54, -7/27$
 $55, -14/55$
 $56, -7/28$
 $57, -14/57$
 $58, -7/29$
 $59, -14/59$
 $60, -7/30$
 $61, -14/61$
 $62, -7/31$
 $63, -14/63$
 $64, -7/32$
 $65, -14/65$
 $66, -7/33$
 $67, -14/67$
 $68, -7/34$
 $69, -14/69$
 $70, -7/35$
 $71, -14/71$
 $72, -7/36$
 $73, -14/73$
 $74, -7/37$
 $75, -14/75$
 $76, -7/38$
 $77, -14/77$
 $78, -7/39$
 $79, -14/79$
 $80, -7/40$
 $81, -14/81$
 $82, -7/41$
 $83, -14/83$
 $84, -7/42$
 $85, -14/85$
 $86, -7/43$
 $87, -14/87$
 $88, -7/44$
 $89, -14/89$
 $90, -7/45$
 $91, -14/91$
 $92, -7/46$
 $93, -14/93$
 $94, -7/47$
 $95, -14/95$
 $96, -7/48$
 $97, -14/97$
 $98, -7/49$
 $99, -14/99$
 $100, -7/50$

Sep 26-3:33 PM