Algebra 2 4.5

Solve quadratic equations by using the Square Root property

Solve quadratic equations by completing the square

quadratic $x^2 + 3x - 2 = 0$

"square root property" (SRP)

EWE

perfect square number

perfect square trinomial

completing the square (CTS)

Algebra tiles

9
3 × 3
6

Example 1 Equation with Rational Roots

Solve $x^2 + 6x + 9 = 36$ by using the Square Root Property.**

$(x+3)(x+3)$

$\sqrt{(x+3)^2} = \sqrt{36}$

$x + 3 = \pm 6$

$-3 \quad -3$

$x = -3 \pm 6$

$x = -3+6 = 3$

$x = -3-6 = -9$

**SRP (it's a perfect square already)

(hint hint…)

SRP

Solve each equation by using the Square Root Property.**

1A. $x^2 - 12x + 36 = 25$

1B. $x^2 - 16x + 64 = 49$

$\sqrt{(x-6)^2} = \sqrt{25}$

$x - 6 = \pm 5$

$+6 \quad +6$

$x = 6 \pm 5$

$x = 6 + 5 = 11$

$x = 6 - 5 = 1$

$\sqrt{(x-8)^2} = \sqrt{49}$

$x - 8 = \pm 7$

$+8 \quad +8$

$x = 8 \pm 7$

$x = 8 + 7 = 15$

$x = 8 - 7 = 1$

25
−10

Example 2 Equation with Irrational Roots

Solve $x^2 - 10x + 25 = 27$ by using the Square Root Property.

$\sqrt{(x-5)^2} = \sqrt{27}$

$x - 5 = \pm\sqrt{27}$

$+5 \quad +5$

$x = 5 \pm \sqrt{27}$ →

$x = 5 \pm 5.2 = 10.2$
$= -0.2$

$x = 5 \pm 3\sqrt{3}$

27

3 9

3 3

GuidedPractice

Solve each equation by using the Square Root Property. round to tenth

2A. $x^2 + 8x + 16 = 20$

$\sqrt{(x+4)^2} = \sqrt{20}$

20

4^s

2 2

$x + 4 = \pm\sqrt{20}$

$-4 \quad -4$

$x = -4 \pm 2\sqrt{5}$

2B. $x^2 - 6x + 9 = 32$

$\sqrt{(x-3)^2} = \sqrt{32}$

$x - 3 = \pm 5.7$

$+3 \quad +3$

$x = 3 + 5.7 = 8.7$

$3 - 5.7 = -2.7$

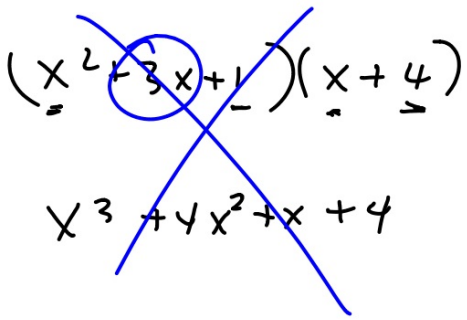
FOIL $\begin{matrix} 15 \\ \times \\ 8 \end{matrix}$ add ↓ must ↓

EWE

(x+3)(x+5) = $x^2+8x+15$

(x+4)(x+4) = $x^2+8x+16$

(x+7)(x+7) = $x^2+14x+49$



What is the pattern?

Predict...

$(x+9)(x+9) = x^2+18x+81$

$(x+10)^2 = x^2+20x+100$

4.5 p. 260 14-25

What does it mean to "complete" something?

↑
finish
do the rest

Build a perfect square...

$x^2 + 4x + ?$

$x^2 + 6x + ?$

Example 3 Complete the Square

Find the value of c that makes $x^2 + 16x + c$ a perfect square. Then write the trinomial as a perfect square.

CTS= build a perfect square...what is missing?

GuidedPractice

3. Find the value of c that makes $x^2 - 14x + c$ a perfect square. Then write the trinomial as a perfect square.

CTS= build a perfect square

2 Complete the Square

All quadratic equations can be solved using the Square Ro
Property by manipulating the equation until one side is a perfect square. This meth
is called **completing the square**.

Consider $x^2 + 16x = 9$. Remember to perform each operation on each side of the equation.

Example 4 Solve an Equation by Completing the Square

Solve $x^2 + 10x - 11 = 0$ by completing the square.

Move constant out of the way (if necessary)
Build a perfect square.
How many more do we need?

GuidedPractice

Solve each equation by completing the square.

4A. $x^2 - 10x + 24 = 0$

4B. $x^2 + 10x + 9 = 0$