Solving Quadratic Equations

In This Unit:

1. Using Square Roots
2. Solving by Factoring
3. Quadratic Formula

Bellwork
04/09/12

Factor.

1. x^2-100

2. $x^2-13x-14$

Lesson 13.1
Solving by Factoring

What You Need to Know:

To solve an equation by factoring, write the equation in standard form and set it equal to zero.

Factor the polynomial,set each term with a variable equal to zero, and solve like an equation.

$$(x+3)(x-4)=0$$
$$x+3=0 \qquad x-4=0$$
$$x=-3 \qquad x=4$$

Solving by Factoring

Solve the equation by factoring.

$y^2-4y-5=0$

$3w^3-75w=0$

$2x^3+12x^2+18x=0$

$x^2+12x=-36$

$25x^2+50x+25=0$

Homework Assignment

Worksheet
"Solving by Factoring"

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Solve by factoring.

1. $x^2-81=0$

2. $x^2-6x+8=0$

Lesson 13.2
Using Square Roots

What You Need to Know:

First step is to isolate the squared term. Move *everything* away from it!

To undo a squared term, take the square root of it.

If you take the square root of one side, you have to take the square root of the other side!

The square root of a positive number has a $\pm$ in front of it.

The square root of a negative number is not possible!

Using Square Roots

Solve the equation using square roots.

$x^2=16$

$x^2=-4$

$12x^2-60=0$

$120-6x^2=-30$

$6x^2-12=0$

$7x^2+30=9$

Homework Assignment

Worksheet
"Using Square Roots"

Bellwork
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Solve by square roots.

1. $3x^2-12=42$

$+12 \quad +12$

$\frac{3x^2}{3}=\frac{54}{3}$

$\sqrt{x^2}=\sqrt{18}$

$x=\pm\sqrt{9\cdot 2}$

$x=\pm\sqrt{9}\cdot\sqrt{2}$

$x=\pm 3\sqrt{2}$

18

1 | 18

2 | 9

3 | 6

Lesson 13.3
Quadratic Formula

What You Need to Know:

Quadratic formula gives the same results as when you solve by factoring.

But what makes it special is that it can be used when you *cannot* factor!

NOTE: The Quadratic Formula gives two answers $\pm$.

Remember: You CANNOT take the square root of a negative number!

The Quadratic Formula:

given a quadratic equation $ax^2+bx+c=0$, the solutions can be found using

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

$2x^2 - 6x + 7$

$a=2 \quad b=-6 \quad c=7$

Quadratic Formula

Solve the equation using the quadratic formula.

$1x^2-11x+24=0$

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

$a=1 \quad b=-11 \quad c=24$

$x=\frac{11\pm\sqrt{(-11)^2-4(1)(24)}}{2(1)}$

$x=\frac{11\pm\sqrt{121-96}}{2}$

$x=\frac{11\pm\sqrt{25}}{2}$

$x=\frac{11\pm5}{2}$

$x=\frac{11+5}{2} \qquad x=\frac{11-5}{2}$

$x=8,3$

$5x^2+8x-8=0$

$a=5 \quad b=8 \quad c=-8$

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

$x=\frac{-8\pm\sqrt{(8)^2-4(5)(-8)}}{2(5)}$

$x=\frac{-8\pm\sqrt{64+160}}{10}$

$x=\frac{-8\pm\sqrt{224}}{10}$

224 = 2 · 112 = 4 · 56 = 16 · 14

$\sqrt{16\cdot14}=\sqrt{16}\cdot\sqrt{14}=4\sqrt{14}$

$x=\frac{-8+4\sqrt{14}}{10} \qquad x=\frac{-8-4\sqrt{14}}{10}$

$2x^2=-x+6$

$+x-6$

$2x^2+1x-6=0$

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

$a=2 \quad b=1 \quad c=-6$

$x=\frac{-1\pm\sqrt{(1)^2-4(2)(-6)}}{2(2)}$

$x=\frac{-1\pm\sqrt{1+48}}{4}$

$x=\frac{-1\pm\sqrt{49}}{4}$

$x=\frac{-1\pm7}{4}$

$x=\frac{-1+7}{4} \qquad x=\frac{-1-7}{4}$

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

$x^2-2x-15=0$

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

$a=1 \quad b=-2 \quad c=-15$

$x=\frac{2\pm\sqrt{(-2)^2-4(1)(-15)}}{2(1)}$

$x=\frac{2\pm\sqrt{4+60}}{2}$

$x=\frac{2\pm\sqrt{64}}{2}$

$x=\frac{2\pm8}{2}$

$x=\frac{2+8}{2} \qquad x=\frac{2-8}{2}$

$x=5,-3$

Quadratic Formula

The height (h) of a certain insect, in ft., that jumps straight up into the air is modeled by the equation $h=-16t^2+vt$, where t is the time in seconds after the insect jumps, and v is the initial upward velocity of the insect.

Write an equation that can be used to find the height of the insect, in feet after t seconds, if the insect's initial upward velocity is 4 feet per second. How long, in seconds, will it take for the insect to hit the ground after it jumps?

Homework Assignment

Worksheet
"Solving by Quadratic Formula"