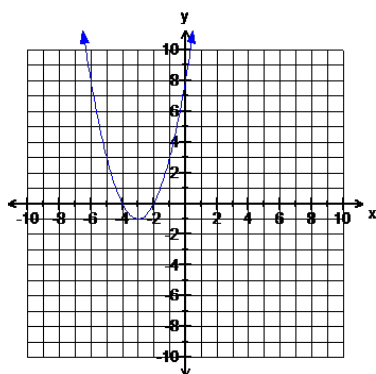


Section 7.3 Solving Quadratic Equations Using the Quadratic Formula

We can solve $x^2 + 6x + 8 = 0$

by graphing:



$$x = -4 \quad x = -2$$

by factoring:

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

$$x = -4 \quad x = -2$$

Notice that we get the same answer with each method.

Factoring works well if there are integer coefficients, but not all equations can be factored easily - if at all.

Example 1:

Solve $2x^2 + 8x - 5 = 0$. State the exact answers.



To find the roots of a quadratic equation in standard form,

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

THE QUADRATIC FORMULA

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

<http://www.bing.com/videos/search?q=Quadratic+Formula+Song&view=detail&mid=20C2A0A14D51DC36D64F20C2A0A14D51DC36D64F&first=0&FORM=NVPFVR>



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

use desmos to verify!!

Example 2:

Solve using the quadratic formula: $x^2 - 4x = 77$

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

Example 3:

Determine the EXACT ROOTS for:

(a) $x^2 - 2x = 17$

(b) $4x(x - 3) = -7$

Example 4:

Solve for x : $3x(x+2) = -4(x-2)$

The Nature of the Roots

When are the exact roots rational numbers?
(terminating decimals, integers, or fractions)



Each equation so far has had two different real roots and would cross the x-axis in two different places.

But a quadratic function/equation can have one or no real zeros/roots as well.

Example 5:

Solve:

a) $-3x^2 - 2x = 2$

b) $(x + 7)^2 = 0$

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



What does the value under the square root sign tell us about the roots?

If $b^2 - 4ac$ is a positive perfect square?



If $b^2 - 4ac$ is not a positive perfect square?



If $b^2 - 4ac$ is negative?



If $b^2 - 4ac$ is zero?



In Summary

Key Idea

- The roots of a quadratic equation in the form $ax^2 + bx + c = 0$, where $a \neq 0$, can be determined by using the quadratic formula:

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

Need to Know

- The quadratic formula can be used to solve any quadratic equation, even if the equation is not factorable.
- If the radicand in the quadratic formula simplifies to a perfect square, then the equation can be solved by factoring.
- If the radicand in the quadratic formula simplifies to a negative number, then there is no real solution for the quadratic equation.

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Attachments

7s3e2 finalt.mp4

7s3e3 finalt.mp4

7s3e4 finalt.mp4