Chapter 9: Quadratic Equations

9.6 USING THE QUADRATIC FORMULA

6/page to print

Quadratic formula

- Method to solve quadratic equations
- Slowest method, but works if other methods fail
- Factoring: integer solutions
- Square Root Property: if it is a perfect square on the variable side
- Can make it a perfect square by 'completing the square'

Quadratic formula

- There is a song "Pop Goes the Weasel"
- Can use it to remember the formula
- Negative B plus or minus
- the square root of the quantity
- B squared minus four A C
- ALL over two A

$$x = [-B \pm \sqrt{(B^2 - 4\,A\,C)}] / 2A$$

- Equation needs to be written in standard form
- $0 = Ax^2 + Bx + C$
- Use A, B and C from standard form in the formula above
- Be sure to pay attention to negative signs!

$0 = x^2 - 14x + 49$

- A = 1, B = -14, C = 49

$$\frac{-(-14) \pm \sqrt{(-14)^2 - 4(1)(49)}}{2(1)}$$

$$\frac{(+14) \pm \sqrt{(196) - (196)}}{2}$$

$$\frac{14}{2} = 7$$

$5x^2 - x = 2$

- $0 = 5x^2 - x - 2$
- $A = 5, B = -1, C = -2$

$$\frac{-(-1) \pm \sqrt{(-1)^2 - 4(5)(-2)}}{2(5)}$$

$$\frac{(+1) \pm \sqrt{(1) + (40)}}{10}$$

$$\frac{1 \pm \sqrt{41}}{10}$$

$-3x^2 + 5x - 4 = 0$

- $3x^2 - 5x + 4 = 0$
- $A = 3, B = -5, C = 4$

$$\frac{-(-5) \pm \sqrt{(-5)^2 - 4(3)(4)}}{2(3)}$$

$$\frac{(+5) \pm \sqrt{(25) - (48)}}{6}$$

$$= \frac{5 \pm \sqrt{-23}}{6}$$

$$= \frac{5 \pm i\sqrt{23}}{6}$$

Number of real solutions

- Radical goes away
- One real solution

$$\frac{(+14) \pm \sqrt{(196) - (196)}}{2}$$

- Plus or minus a value
- Two real solutions

$$\frac{1 \pm \sqrt{41}}{10}$$

- Plus or minus imaginary
- Two imaginary solutions

$$= \frac{5 \pm i\sqrt{23}}{6}$$

Under the radical sign

- The "Discriminant"
- Value > 0: two real solutions
- Value = 0: one real solution
- Value < 0: two imaginary solutions

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- $x^2 + 5x + 6 = 0$
- Factor
- Complete the square
- Quadratic formula
- Which is easier?

Group exploration page 535

- $x^2 + 4x - 7 = 0$
- Factor
- Complete the square
- Quadratic formula
- Which is easier?