

1.3/1.4 Solving Quadratic Equations by Factoring



*See printout.

Recall that Quadratic Equations Come in 3 Forms...

- Standard Form: $y = ax^2 + bx + c$
- Vertex Form: $y = a(x-h)^2 + k$
- Intercept Form: $y = a(x-p)(x-q)$

4 Methods of Solving Quadratic Equations

1. Factoring
2. CTS
3. Quadratic formula
4. Square roots

Solving By Factoring

*Use solving by factoring when given a factorable standard form equation.

ex: Solve. (Find the roots of the equation.)

a) $x^2 - x - 30 = 0$

$$(x-6)(x+5) = 0$$

$$\boxed{x = 6, -5}$$

$$x - 6 = 0$$

$$x = 6$$

$$b) -2x^2 + 34x = 0$$

$$-2x(x - 17) = 0$$

$$x = 0, 17$$

$$c) x^2 = 64$$

$$x^2 - 64 = 0$$

$$(x + 8)(x - 8) = 0$$

$$x = -8, 8$$

$$d) 4x^2 + 4x + 1 = 0$$

$$(2x+1)^2 = 0 \text{ or } (2x+1)(2x+1) = 0$$

$$\begin{array}{l} 2x+1=0 \\ x=-1/2 \end{array} \quad x = -1/2 ; \text{ multiplicity of } 2 \\ \text{(mult. of } 2)$$

$$e) 4x^2 - 17x - 15 = 0$$

$$(4x+3)(x-5) = 0$$

$$4x+3=0 \quad x-5=0$$

$$x = 5, -3/4$$

$$f) 7x^2 - 42 = -35x$$

$$7x^2 + 35x - 42 = 0$$

$$7(x^2 + 5x - 6) = 0$$

$$7(x+6)(x-1) = 0$$

$$x = -6, 1$$

$$g) x(x-4) = -4$$

$$x^2 - 4x = -4$$

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

$$(x-2)^2 = 0$$

$$x = 2$$

mult. of 2

Real Zeros

ex: Find the real zeros of the function.

$$\begin{aligned} \text{a) } f(x) &= 14x^2 - 21x \\ 0 &= 7x(2x - 3) \\ x &= 0, \frac{3}{2} \end{aligned}$$

$$\begin{aligned} \text{b) } y &= 16x^2 - 2x - 5 \\ 0 &= (8x - 5)(2x + 1) \\ x &= \frac{5}{8}, -\frac{1}{2} \end{aligned}$$

ex: What is the difference between zeros, roots and solutions?



When a quadratic function is equal to zero, the x -coordinates of the intercepts are the solutions (roots).

When solving a quadratic equation, the solutions are also called roots.

Zeros are the solutions when a function is equal to zero.

ex: Write a quadratic function in standard form with integral coefficients given the zeros.

\curvearrowright integers

a) (9,0) & (-3,0)

$$(x-9)(x+3) = y$$

$$y = x^2 - 6x - 27$$

$$(2x-1)^2 = 4x^2 - 4x + 1$$

b) $x=0.5$ multiplicity of 2

$$x = \frac{1}{2}$$

$$(2x-1)^2 = y$$

$$y = 4x^2 - 4x + 1$$