

Nov. 6, 2017

Roots of Quadratic Equations

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Roots of quadratic equations have 3 names:

1. Roots
2. Zeros
3. X-Intercepts

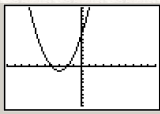
We are looking for the 2 values of 'x' that make the quadratic true when $y = 0$

We can find the roots three ways:

$(a)(r)(s)$

1. Use the **graphing calculator** (graph and find the points where the graph crosses the x-axis)
2. Factor the equation
3. **Quadratic formula**

Method 1: Graphing



$y = x^2 + 6x + 8$

$(x+2)(x+4)$

x-intercepts? $x = -2$ and $x = -4$

-2 & -4 are the roots (or zeros) of $y = x^2 + 6x + 8$

Method 2: Factoring

$y = x^2 + 6x + 8$

$a = 2$

$2(x-4)(x-5)$

$x = 4$

What 2 #'s multiply to give 8 and add to give 6?

$y = 2x^2 + 12x + 16$

$2(x^2 + 6x + 8)$

Once you have the 2 factors, set the y to zero and solve both factors for 'x'.

Example: Find the zeros of $y = x^2 + 2x - 15$

Find the zeros of the following functions:

- 1) $y = x^2 + 5x + 6$ $y = x^2 - 5x - 14$
- 3) $y = x^2 + 4x + 44$ $y = x^2 - 16x - 36$
- 5) $y = x^2 - 7x + 126$ $y = x^2 + 6x + 14$

Mar 1-11:14 AM

Nov. 6, 2017

Method 3: The Quadratic Formula

Must be in standard form

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

***Note the 2a is under everything on the top!*

This formula can be used to find the roots for any quadratic equation in the form of $ax^2 + bx + c = 0$. Note, the equation **MUST** equal zero for the formula to work!

Solve: $x^2 + 3x - 4 = 0$

$a = 1$
 $b = 3$
 $c = -4$

$(x+4)(x-1)$

$$x = \frac{-(-3) \pm \sqrt{(3)^2 - 4(1)(-4)}}{2(1)}$$

$$x = \frac{-3 \pm \sqrt{9 + 16}}{2}$$

$$x = \frac{-3 \pm \sqrt{25}}{2}$$

$x = \frac{-3 + 5}{2} = 1$

$x = \frac{-3 - 5}{2} = -\frac{8}{2} = -4$

Solve $2x^2 - 4x - 3 = 0$

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

$a = 2$
 $b = -4$
 $c = -3$

$$x = \frac{4 \pm \sqrt{16 - (-24)}}{4}$$

$$x = \frac{4 \pm \sqrt{40}}{4}$$

$x = \frac{4 + 6.3}{4} = 2.6$

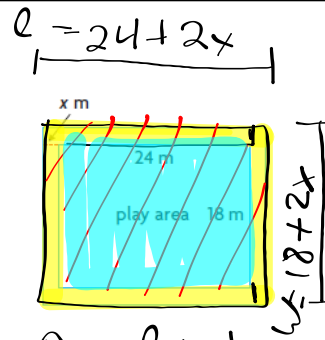
$x = \frac{4 - 6.3}{4} = -0.58$

Mar 2-9:34 AM

LEARN ABOUT the Math

Ian has been hired to lay a path of uniform width around a rectangular play area, using crushed rock. He has enough crushed rock to cover 145 m².

? If Ian uses all the crushed rock, how wide will the path be?



F
O
I
L

$$A = (24 + 2x)(18 + 2x) \quad A = l \times w$$

$$A = 4x^2 + 84x + 432$$

$$145 = 4x^2 + 84x + 432 \quad \rightarrow \quad 145 = 4x^2 + 84x + 432 - 432$$

$$0 = 4x^2 + 84x - 145$$

a
 b
 c

Nov 10-2:27 PM