

3.5

Date: 10/10/23

Objective: I can use factoring to solve equations and real-life situations.

Example 1: Find the zeros for $10 = 4x^2 - 4x - 5$

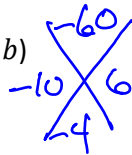
STEPS

1. In standard form and equal to 0

$$4x^2 - 4x - 15 = 0$$

2. Factor (a time c, what adds to b)

★ GCF



$$4x^2 - 10x + 6x - 15 = 0$$

$$2x(2x-5) + 3(2x-5) = 0$$

$$(2x-5)(2x+3) = 0$$

3. Set each factor equal to 0 (zero product property)

$$2x-5=0$$

$$2x+3=0$$

4. Solve each equation for x

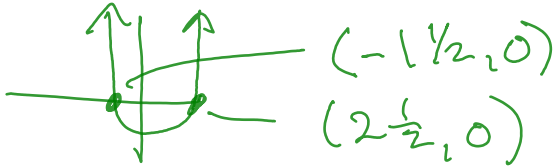
$$\frac{2x}{2} = \frac{5}{2}$$

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

$$x = \frac{5}{2}$$

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

5. Write answers as ordered pairs (x-intercepts)



***Finding the zeros means the same as solving for the variable.

Factor $nx =$
() ()

Factor then solve or find zeros + =
() () keep going $x = ?$

Example 2: Find the zeros for $-10x = 8x^2 - 16x - 5$

$$8x^2 - 16x - 5 = 0$$

$$8x^2 - 10x + 4x - 5 = 0$$

$$2x(4x-5) + 1(4x-5) = 0$$

$$(4x-5)(2x+1) = 0$$

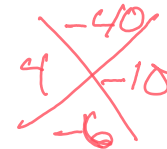
$$4x-5=0 \quad 2x+1=0$$

$$4x=5$$

$$x = \frac{5}{4}$$

$$2x=-1$$

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



★ $x^3 - 27 = 0$
 $(x-3)(x^2+3x-9) = 0$
 +9=0
 doesn't factor so don't do
 $x=3$

Practice: Read and solve the following situations. Be sure to define your variable and show all your work.

1. A toy rocket is launched from the top of a 48-foot hill. The rocket's initial upward velocity is 32 feet per second and its height, h , at any given second, t , is modeled by the equation $h = -16t^2 + 32t + 48$. How long was the rocket in the air?

Where does the initial height go in the equation? *the end or no var or constant*

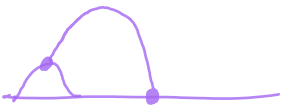
Where does the initial velocity go in the equation?

in middle or on linear term or no exp term

Define your variables.

*$h = \text{height}$
 $t = \text{time}$*

Write the equation that will answer the question in the story.



Solve the equation. Show work.

$$-16t^2 + 32t + 48 = 0$$

factor

$$-16(t^2 - 2t - 3) = 0$$

$$-16(t - 3)(t + 1) = 0$$

$$t = 3, -1$$

Explain your answer in a complete sentence.

It takes 3 seconds for the rocket to hit the ground.

2. The area of a rectangle is 60 square feet. If the length is 17 feet less than the width, what is the width? Remember the formula for area of a rectangle is length times width.

Define width: x

Define length:

Given area: 60 ft^2 Area formula: $A = lw$

Equation:

$$60 = (x - 17)x$$

Solve:

$$60 = x^2 - 17x$$

$$x^2 - 17x - 60 = 0$$

$$(x - 20)(x + 3) = 0$$

$$x = 20, -3$$

$$\begin{array}{r} -60 \\ -20 \times 3 \\ -17 \end{array}$$

The width is 20 feet.