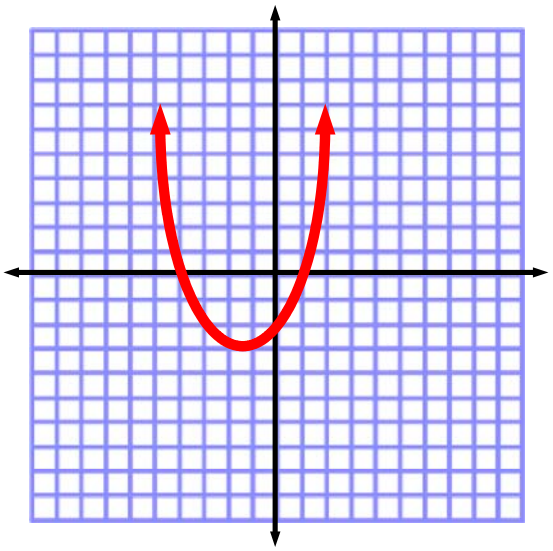
Warm-up 4/4

Find the max or min, zeros, and domain and range for the following quadratics.

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

2.



3. $(x + 2)^2 = 4$

Warm-up 4/4

Find the max or min, zeros, and domain and range for the following quadratics.

$x = \frac{-b}{2a}$

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

$a = 1$, $b = -2$, $c = 4$

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

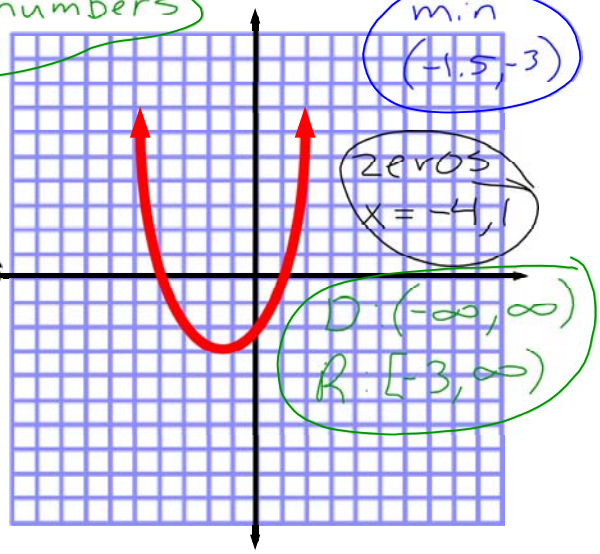
$(1)^2 - 2(1) + 4$

$1 - 2 + 4 = 3$

min (1, 3)

no real zeros

2.



D: all ℝ numbers

R: $y \geq 3$

min (-1.5, -3)

zeros $x = -4, 1$

D $(-\infty, \infty)$

R $[-3, \infty)$

3. $(x + 2)^2 = 4$

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

	x	2
x	x^2	2x
2	2x	4

$x^2 + 4x + 4 = 4$

$-4 \quad -4$

$x^2 + 4x = 0$

$a = 1$, $b = 4$, $c = 0$

$x = \frac{-4}{2(1)} = -2$

$(-2)^2 + 4(-2)$

$4 - 8 = -4$

min (-2, -4)

zeros $x = -4, 0$

D: $x \in \mathbb{R}$

R: $y \geq -4$

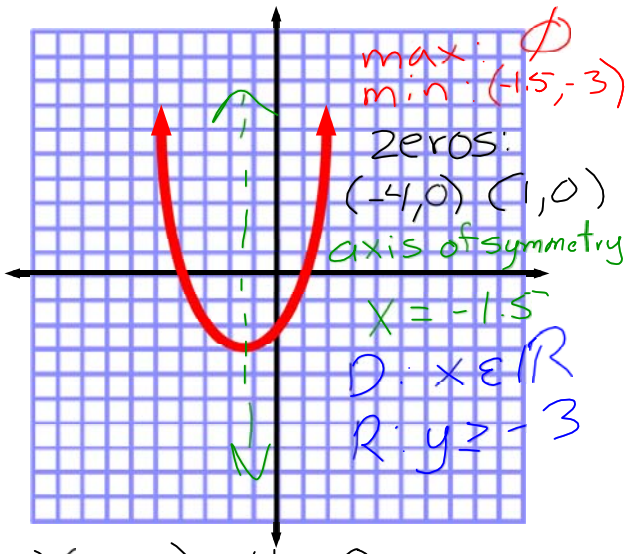
Warm-up 4/4

Find the max or min, zeros, axis of symmetry, and domain and range for the following quadratics. $x = \frac{-b}{2a}$

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

max: ∅
min: (1, 3)
zeros: ∅
axis of symmetry: $x = \frac{-(-2)}{2(1)} = 1$
$D: x \in \mathbb{R}$
$R: y \geq 3$

2.



3. $(x + 2)^2 = 4$

$-4 \quad -4$

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

max: ∅
min: (-2, -4)
zeros:
(-4, 0) (0, 0)
axis of symmetry
$x = -2$ $x = \frac{-(4)}{2(1)} = -2$
$D: x \in \mathbb{R}$
$R: y \geq -4$

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

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

$x^2 + 4x = 0$

$x^2 + 2x + 2x + 4$

Homework Questions?

#11 $y = 2x^2 + 3x - 4$ $x = \frac{-b}{2a}$

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

Project:

- Each unit should be on a new 1/2 page (front and back)
  - > each unit should have definitions, examples, and process steps if needed
  - > there are 9 units
- Be sure to have all major concepts from each unit
- Be creative and show your style on your project

Project Due Dates

April 11th: units 6-8

April 18th: units 4-5

April 25th: units 1-3

May 2nd: unit 9

Final Project Due May 9th

Today's Goals

I can...

- solve quadratic equations by graphing
- solve quadratic equations by factoring

Try These!!

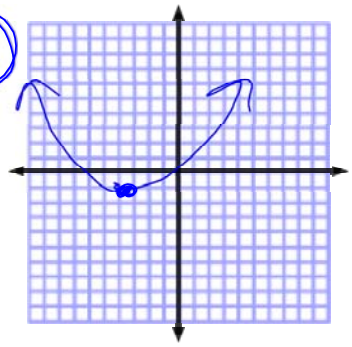
$X = \frac{-b}{2a}$

Find the vertex of the graph of the following:

$y = 0.25x^2 + 2x + 3$ (-4, -1)

$X = \frac{-(2)}{2(0.25)} = -4$

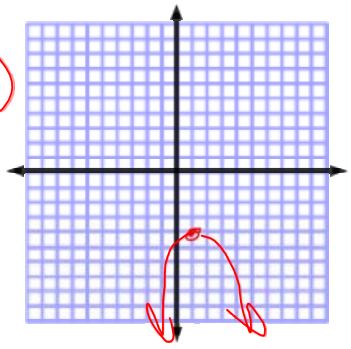
$y = 0.25(-4)^2 + 2(-4) + 3$
$= 4 + -8 + 3 = -1$



$y = -3x^2 + 6x - 7$

$X = \frac{-(6)}{2(-3)} = 1$ (1, -4)

$y = -3(1)^2 + 6(1) - 7$
$= -3 + 6 - 7 = -4$



Think and Discuss...

1. How do you find the zeros of a function from its graph?

2. Describe how to find the axis of symmetry of a quadratic function if its graph does not cross the x -axis

3. Sketch a graph that fits the given description.

   a. Opens upward, has 2 zeros

   b. Opens downward, has no zeros

Today's Goals

I can...

- solve quadratic equations by graphing
- solve quadratic equations by factoring

Section 10.2: Characteristics of a Quadratic Function

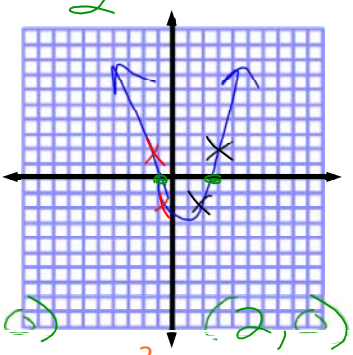
Think back.....

x-intercept -where the graph crosses the x-axis (the y-value is always 0; (x, 0)

Zero of a function:

Zeros: x-intercepts; where the graph (parabola) crosses the x-axis

2



(-1, 0) (2, 0)

$y = x^2 - x - 2$

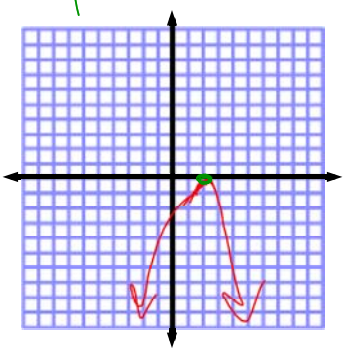
$y = (-1)^2 - (-1) - 2$

$= 1 + 1 - 2 = 0$ ✓

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

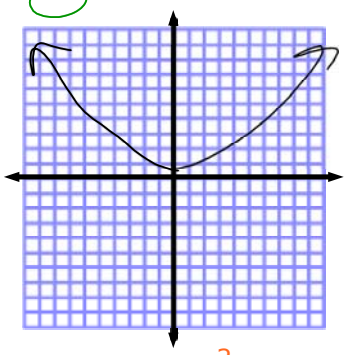
$= 4 - 2 - 2 = 0$ ✓

1



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

0



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

Section 10.5: Solving by Graphing and Factoring

Quadratic Equations:

Functions- $y = ax^2 + bx + c$ or $f(x) = ax^2 + bx + c$

Equations-specific solutions;

zeros of the quadratic-$ax^2 + bx + c = 0$ *must be set = 0

Solve each equation by graphing the related function using your graphing calculator.

$x^2 + 5 = 4x$

Try These:

CHECK WITH YOUR NEIGHBOR

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

$6x + 10 = x^2$

Try These:

CHECK WITH YOUR NEIGHBOR

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

$-2x^2 \quad -2x^2$

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

$6x + 10 = x^2$

$-x^2 \quad -x^2$

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

Log into Desmos and use the following code.

2B: ZBE3V8

3B: PN388R

4B: UJJWXB

Solving Quadratics by factoring

The Zero Product Property

If the product is 0, then one or more of the factors must be zero.

If ab = 0, then a=0 and/or b=0

(0)b = 0 a(0) = 0 (0)(0) = 0

Using the zero product property

(x)(x + 4) = 0

x = 0 or x + 4 = 0
- 4 - 4
x = -4

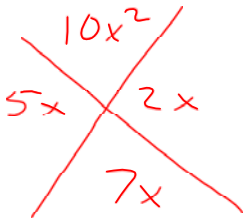
(x + 4)(x - 3) = 0

x + 4 = 0 or x - 3 = 0
- 4 - 4 + 3 + 3
x = -4 x = 3

If an equation is written in standard form, you may need to factor before using the property to solve the equation.

Example:

$x^2 + 7x + 10 = 0$



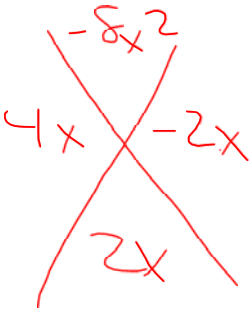
	x	2
x	x^2	2x
5	5x	+10

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

$x+2=0$
$-2 \quad -2$
$x=-2$

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

$x^2 + 2x = 8$
$-8 \quad -8$
x^2+2x-8



	x	-2
x	x^2	-2x
4	4x	-8

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

$x-2=0$
$x=2$

$x+4=0$
$x=-4$

$x^2 + 2x + 1 = 0$

Try These:

$x^2 - 6x + 9 = 0$

$30x = -9x^2 - 25$

$3x^2 - 4x + 1 = 0$

Try These:

$x^2 - 6x + 9 = 0$

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

$x = 3$

$30x = -9x^2 - 25$

$9x^2 + 30x + 25 = 0$

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

$x = -5/3$

$3x + 5 = 0$

$-5 \quad -5$

$\frac{3x}{3} = \frac{-5}{3}$

$x = -5/3$

$3x^2 - 4x + 1 = 0$

$(3x-1)(x-1) = 0$

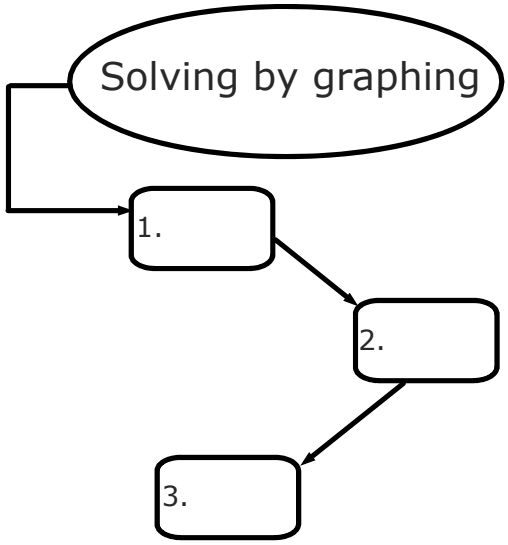
$x = 1/3, 1$

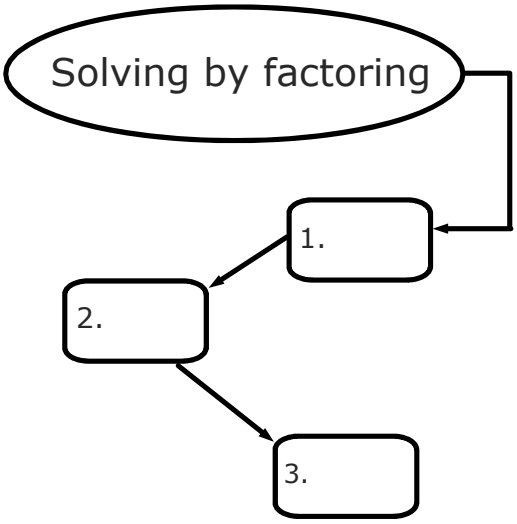
3

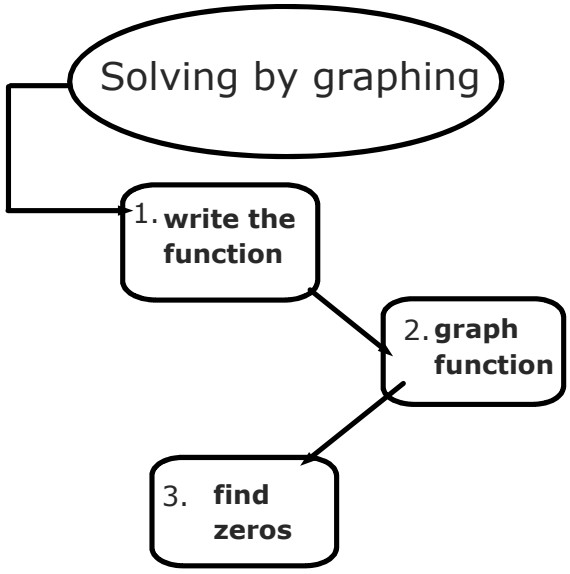
-1 -3

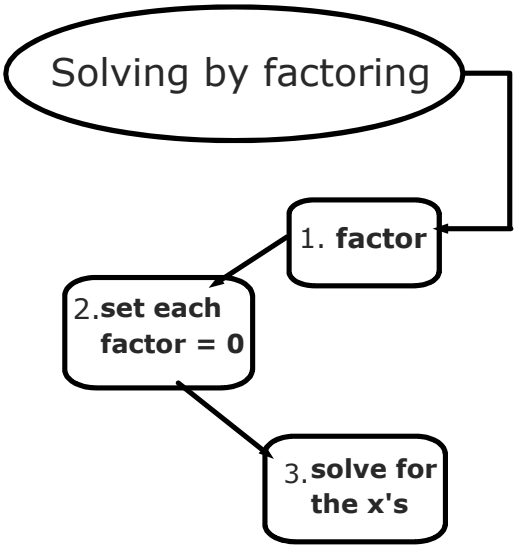
$3 \quad 3 = -1$

-4


Solving by graphing
1.
2.
3.


Solving by factoring
1.
2.
3.


Solving by graphing
1. write the function
2. graph function
3. find zeros


Solving by factoring
1. factor
2. set each factor = 0
3. solve for the x's

Homework

pg. 557 #3-5, 14

pg. 565 # 1-11 (odd), 19

8-5 Exercises

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Homework Help Online
Parent Resources Online

pg. 557

GUIDED PRACTICE

1. **Vocabulary** Write two words related to the graph of a quadratic function that can be used to find the solution of the related *quadratic equation*.

SEE EXAMPLE 1

Solve each equation by graphing the related function.

2. $x^2 - 4 = 0$
3. $x^2 = 16$
4. $-2x^2 - 6 = 0$
5. $-x^2 + 12x - 36 = 0$
6. $-x^2 = -9$
7. $2x^2 = 3x^2 - 2x - 8$
8. $x^2 - 6x + 9 = 0$
9. $8x = -4x^2 - 4$
10. $x^2 + 5x + 4 = 0$
11. $x^2 + 2 = 0$
12. $x^2 - 6x = 7$
13. $x^2 + 5x = -8$

SEE EXAMPLE 2

14. **Sports** A baseball coach uses a pitching machine to simulate pop flies during practice. The quadratic function $y = -16x^2 + 80x$ models the height of the baseball after x seconds. How long is the baseball in the air?

8-6 Exercises

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Homework Help Online
Parent Resources Online

pg. 565

GUIDED PRACTICE

SEE EXAMPLE 1

Use the Zero Product Property to solve each equation. Check your answer.

1. $(x + 2)(x - 8) = 0$
2. $(x - 6)(x - 5) = 0$
3. $(x + 7)(x + 9) = 0$
4. $(x)(x - 1) = 0$
5. $(x)(x + 11) = 0$
6. $(3x + 2)(4x - 1) = 0$

SEE EXAMPLE 2

Solve each quadratic equation by factoring. Check your answer.

7. $x^2 + 4x - 12 = 0$
8. $x^2 - 8x - 9 = 0$
9. $x^2 - 5x + 6 = 0$
10. $x^2 - 3x = 10$
11. $x^2 + 10x = -16$
12. $x^2 + 2x = 15$
13. $x^2 - 8x + 16 = 0$
14. $-3x^2 = 18x + 27$
15. $x^2 + 36 = 12x$
16. $2x^2 + 5x - 3 = 0$
17. $2x^2 + 7x + 6 = 0$
18. $2x^2 + 6x = -18$

SEE EXAMPLE 3

19. **Games** A group of friends tries to keep a beanbag from touching the ground. On one kick, the beanbag's height can be modeled by $h = -16t^2 + 14t + 2$, where h is the height in feet above the ground and t is the time in seconds. Find the time it takes the beanbag to reach the ground.