Turn in corrections to the inbox.

<u>Book</u> on your desk.

We will use our calculators in class today.

Ten minute timer for students to read Hidden Figures arnd do related work.

Hidden Figures Due Dates

- 17-20 due March 18
- 21-23 due March 25 → Book completed!

When we have finished the novel,
we will watch the movie!

Unit Map - Quadratics

~~Tuesday, 3/12/2019 - Standard Form of Graphing Quadratics~~
~~Wednesday, 3/13/2019 - Half-Day, HF Reading Day with Substitute Ms. Krupski~~
~~Thursday, 3/14/2019 - Quadratic Functions~~
Friday, 3/15/2019 - Solving Quadratic Equations by Graphing with Substitute Ms. Mitchell
Monday, 3/18/2019 - Solving Quadratic Equations by Factoring
Tuesday, 3/19/2019 - Solving Quadratic Equations by Completing the Square
Wednesday, 3/20/2019 - The Quadratic Formula
Thursday, 3/21/2019 - Vertex Form
Friday, 3/22/2019 - Quadratic Word Problems
Monday, 3/25/2019 - Word Problems Continued (NC Check-Ins) with Substitute Ms. Mitchell
Tuesday, 3/26/2019 - Systems of Linear and Quadratic Equations
Wednesday, 3/27/2019 - Review Day
Thursday, 3/28/2019 - Test Day
Friday, 3/29/2019 - Begin watching Hidden Figures

The Quadratics Test will be the first grade of the 4th Quarter.

Students, please access today's lesson at msbarger.weebly.com

This is a self paced lesson.
You will need headphones to watch instructional videos.
You may use a calculator.
You should work independently, but may ask a neighbor for help if you are confused or stuck on a concept.

Solving Quadratic Equations by Graphing

3/15/2019

take note

Key Concept Standard Form of a Quadratic Equation

A **quadratic equation** is an equation that can be written in the form $ax^2 + bx + c = 0$, where $a \neq 0$. This form is called the **standard form of a quadratic equation.**

To Solve Quadratic Equations By Graphing

1. Set the equation = 0

2. Graph the equation.

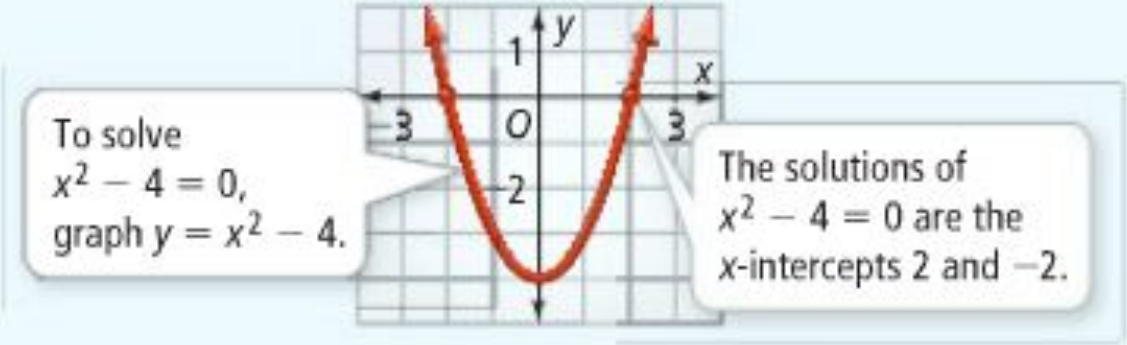
3. Find the x-intercepts.

Ms. Barger made another home made video...

Watch it HERE

Essential Understanding Quadratic equations can be solved by a variety of methods, including graphing and finding square roots.

One way to solve a quadratic equation $ax^2 + bx + c = 0$ is to graph the related quadratic function $y = ax^2 + bx + c$. The solutions of the equation are the x-intercepts of the related function.



A quadratic equation can have two, one, or no real-number solutions. In a future course you will learn about solutions of quadratic equations that are not real numbers. In this course, *solutions* refers to real-number solutions.

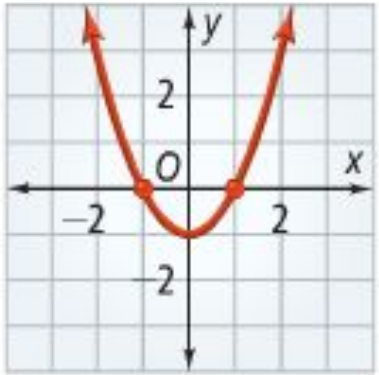
The solutions of a quadratic equation and the x-intercepts of the graph of the related function are often called **roots of the equation** or **zeros of the function.**

Problem 1 Solving by Graphing

What are the solutions of each equation? Use a graph of the related function.

A $x^2 - 1 = 0$

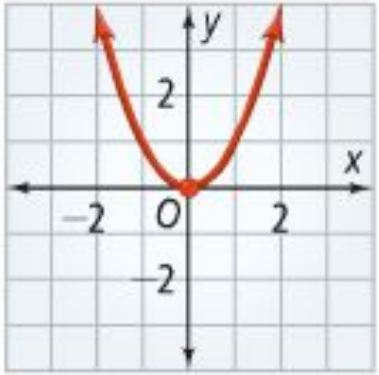
Graph $y = x^2 - 1$.



There are two solutions, ± 1.

B $x^2 = 0$

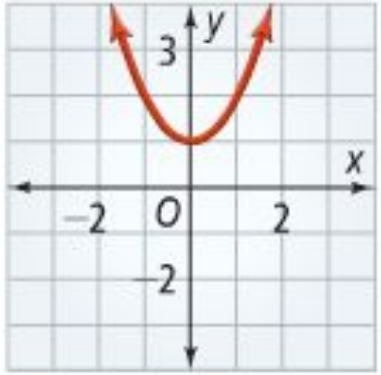
Graph $y = x^2$.



There is one solution, 0.

C $x^2 + 1 = 0$

Graph $y = x^2 + 1$.

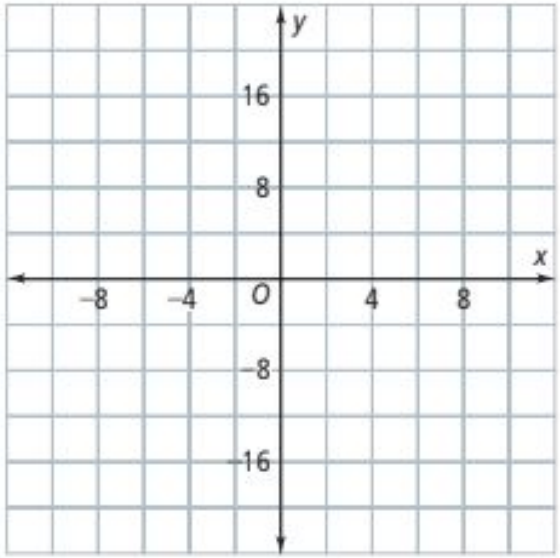


There is no real-number solution.

Problem 1 Solving by Graphing

Got It? **What are the solutions of the equation $x^2 - 16 = 0$? Use a graph of the related function.**

9. Graph the related function, $y = x^2 - 16$.



10. Which part of the graph gives you the solutions of the equation? Circle your answer.

vertex *x*-intercept(s) *y*-intercept(s) axis of symmetry

11. Complete each sentence.

The equation has ____ solutions.

The solutions are ____ and ____, or ± ____.

Problem 1 Solving by Graphing

Got It? What are the solutions of the equation $x^2 - 16 = 0$? Use a graph of the related function.

9. Graph the related function, $y = x^2 - 16$.

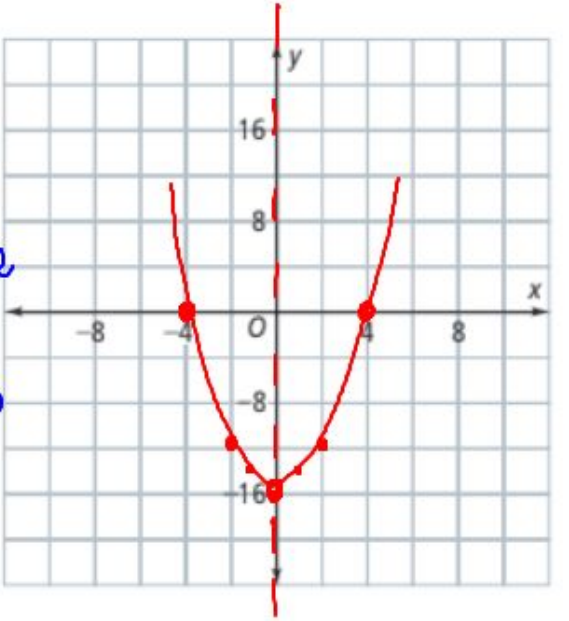
$AOS = \frac{-b}{2a} = \frac{0}{2(1)} = 0 \rightarrow x = 0$

vertex $= (0)^2 - 16 = -16 \rightarrow (0, -16)$

Plug in 1 $\rightarrow 1^2 - 16 = -15$ $(1, -15)$

Plug in 2 $\rightarrow 2^2 - 16 = -12$ $(2, -12)$

Plug in 4 $\rightarrow 4^2 - 16 = 0$ $(4, 0)$



because they are the place where $y = 0$

10. Which part of the graph gives you the solutions of the equation? Circle your answer.

vertex | *x*-intercept(s) | *y*-intercept(s) | axis of symmetry

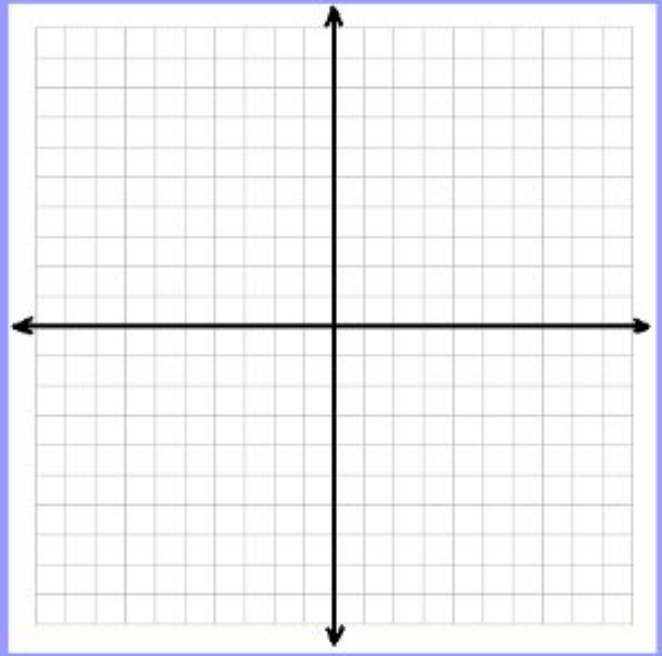
11. Complete each sentence.

The equation has 2 solutions.

The solutions are 4 and -4, or ± 4.

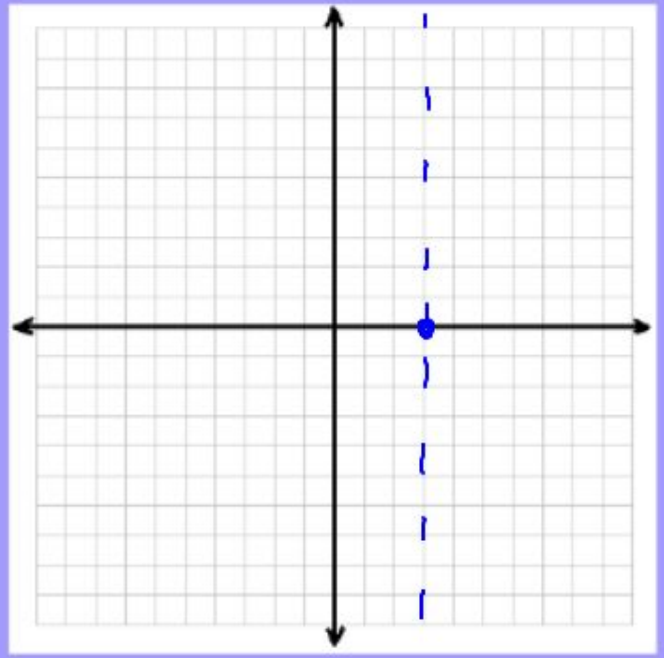
You try

a. $x^2 = 6x - 9$



You try

a. $x^2 = 6x - 9$



$x^2 = 6x - 9$

$0 = -x^2 + 6x - 9$ (set = to 0)

$y = -x^2 + 6x - 9$ (replace 0 w/ y)

AOS $\rightarrow \frac{-b}{2a} = \frac{-6}{2(-1)} = 3$

$-(3)^2 + 6(3) - 9$

$-9 + 18 - 9 = 0$ (3,0) ← oh! looks like my vertex is on the x-axis!

3

check:

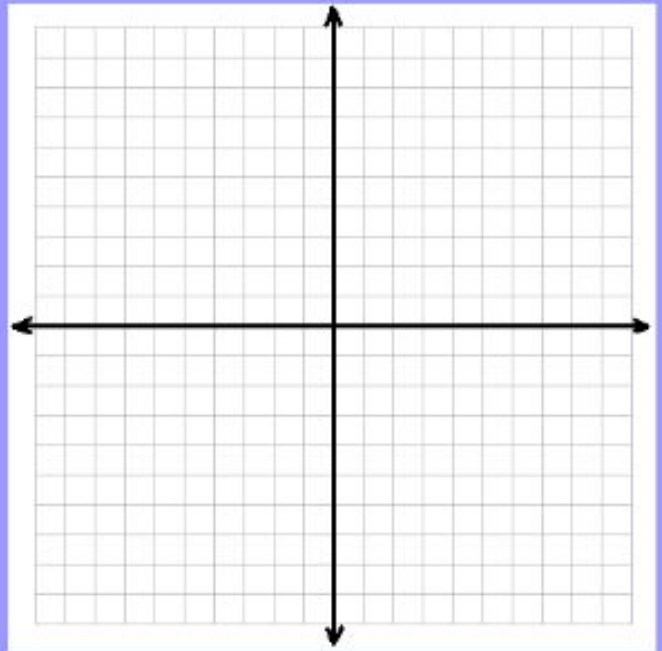
$x^2 = 6x - 9$

$3^2 = 6(3) - 9$

$9 = 18 - 9$ ✓

$9 = 9$ ✓

b. $x^2 + 3 = -2x$



$x^2 + 3 = -2x$

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

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

AOS $\rightarrow \frac{-b}{2a}$ $\frac{2}{2} = 1$ $x = 1$

$1^2 - 2(1) + 3$

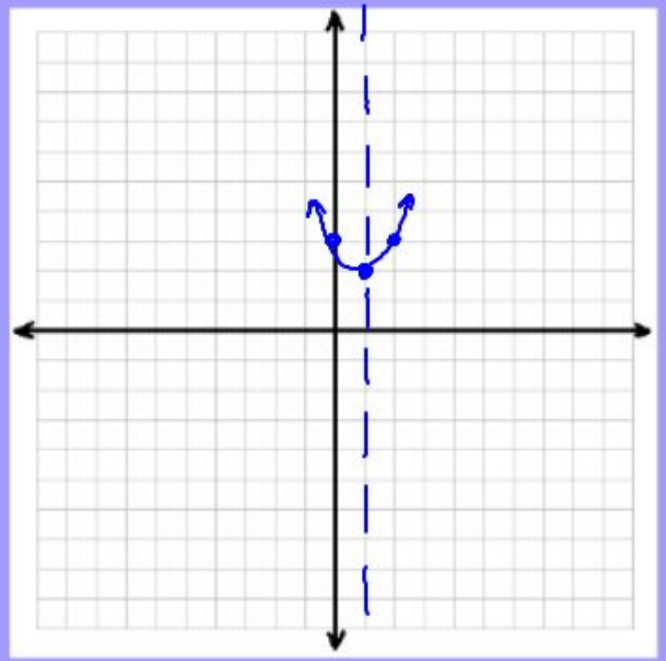
$1 - 2 + 3$ (1, 2) vertex

$0^2 - 2(0) + 3$

(0, 3) $\rightarrow$ Oh! This will never cross the x-axis!

NO solution

b. $x^2 + 3 = -2x$



You can solve equations of the form $x^2 = k$ by finding the square roots of each side. For example, the solutions of $x^2 = 81$ are $\pm\sqrt{81}$, or ± 9.

Problem 2 Solving Using Square Roots

What are the solutions of $3x^2 - 75 = 0$?

Think	Write
Write the original equation.	$3x^2 - 75 = 0$
Isolate x^2 on one side of the equation.	$3x^2 = 75$ $x^2 = 25$
Find the square roots of each side and simplify.	$x = \pm\sqrt{25}$ $x = \pm 5$

Problem 2 Solving Using Square Roots

Got It? What are the solutions of $m^2 - 36 = 0$?

12. Follow the steps to find the solutions of $m^2 - 36 = 0$.

1 Write the original equation. _____

↓

2 Isolate m^2 on one side of the equation.

$m^2 =$ ____

↓

3 Find the square roots of each side and simplify.

$m = \pm\sqrt{} = \pm$ ____

Got It? What are the solutions of $3x^2 + 15 = 0$?

13. Complete the steps to find the solutions of $3x^2 + 15 = 0$.

$3x^2 + 15 = 0$	Write the original equation.
$3x^2 =$ ____	Isolate the x^2 term on one side.
$x^2 =$ ____	Divide each side by 3.
$x = \pm\sqrt{}$ ____	Find the square roots of each side.

14. Does $3x^2 + 15 = 0$ have a real-number solution? Explain.

_____

Problem 2 Solving Using Square Roots

Got It? What are the solutions of $m^2 - 36 = 0$?

12. Follow the steps to find the solutions of $m^2 - 36 = 0$.

1 Write the original equation. $m^2 - 36 = 0$

↓

2 Isolate m^2 on one side of the equation.

$m^2 = 36$

↓

3 Find the square roots of each side and simplify.

$m = \pm\sqrt{36} = \pm 6$

Got It? What are the solutions of $3x^2 + 15 = 0$?

13. Complete the steps to find the solutions of $3x^2 + 15 = 0$.

$3x^2 + 15 = 0$	Write the original equation.
$3x^2 = -15$	Isolate the x^2 term on one side.
$x^2 = -5$	Divide each side by 3.
$x = \pm\sqrt{-5}$	Find the square roots of each side.

14. Does $3x^2 + 15 = 0$ have a real-number solution? Explain.

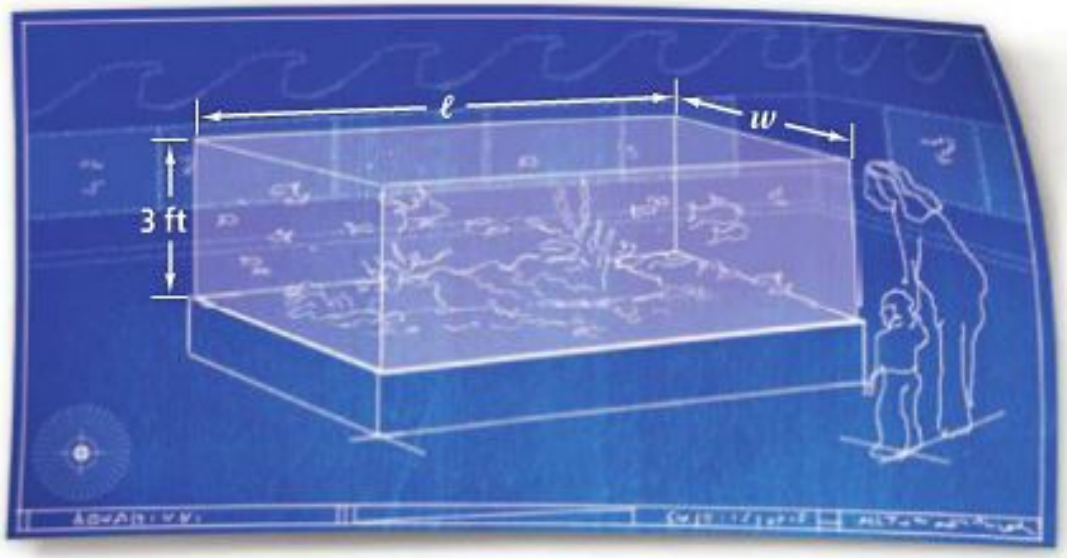
NO! It's impossible to √ a neg. #

You can solve some quadratic equations that model real-world problems by finding square roots. In many cases, the negative square root may not be a reasonable solution.

Problem 3 Choosing a Reasonable Solution

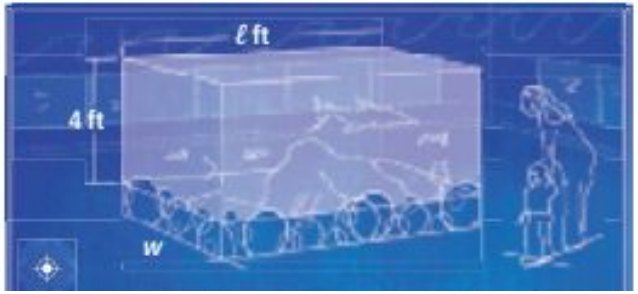
GRIDDED RESPONSE

Aquarium An aquarium is designing a new exhibit to showcase tropical fish. The exhibit will include a tank that is a rectangular prism with a length ℓ that is twice the width w. The volume of the tank is 420 ft^3. What is the width of the tank to the nearest tenth of a foot?



Problem 3 Choosing a Reasonable Solution

Got It? An aquarium is designing a new exhibit to showcase tropical fish. The exhibit will include a tank that is a rectangular prism with a length ℓ that is twice the width w. The height of the tank is 4 ft. The volume of the tank is 500 ft^3. What is the width of the tank to the nearest tenth of a foot?



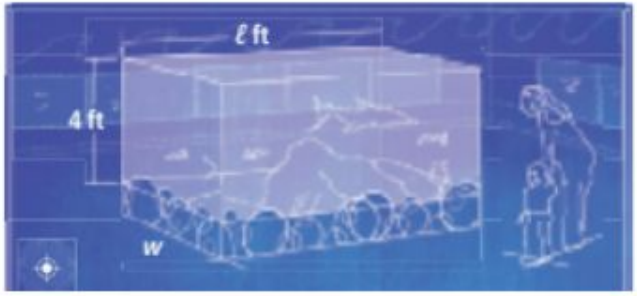
15. Complete the reasoning model below.

Think	Write
I need to use the equation for the volume of a rectangular prism.	$V =$ ☐
I will substitute 500 for V, $2w$ for ℓ, and 4 for h.	$500 = (2w) \cdot$ ☐ $\cdot$ ☐
I need to simplify.	$500 =$ ☐ $\cdot w^2$
Finally, I need to isolate w and find the square roots of each side. I will use a calculator.	$\pm\sqrt{\frac{\square}{8}} = w$ $\pm$ ☐ $\approx w$

16. The width of the tank is about ☐ ft.

Problem 3 Choosing a Reasonable Solution

Got It? An aquarium is designing a new exhibit to showcase tropical fish. The exhibit will include a tank that is a rectangular prism with a length ℓ that is twice the width w. The height of the tank is 4 ft. The volume of the tank is 500 ft^3. What is the width of the tank to the nearest tenth of a foot?



15. Complete the reasoning model below.

Think	Write
I need to use the equation for the volume of a rectangular prism.	$V = \ell wh$
I will substitute 500 for V, $2w$ for ℓ, and 4 for h.	$500 = (2w) \cdot w \cdot 4$
I need to simplify.	$500 = 8 \cdot w^2$
Finally, I need to isolate w and find the square roots of each side. I will use a calculator.	$\pm\sqrt{\frac{500}{8}} = w$ $\pm 7.9 = w$

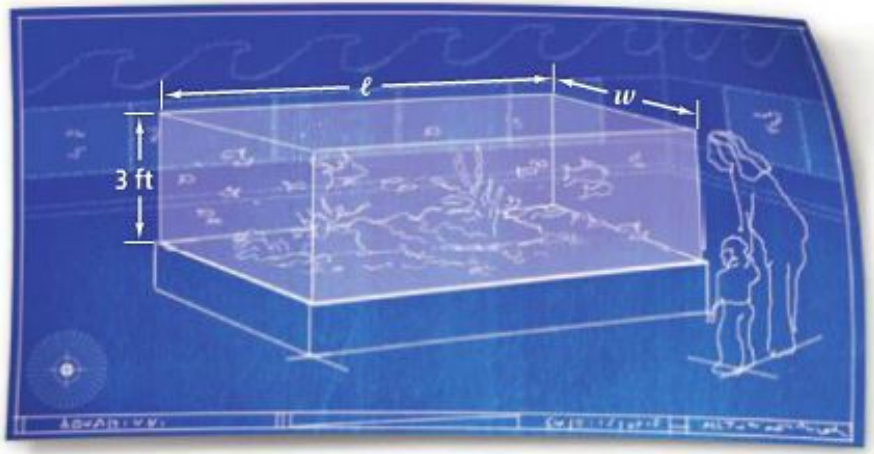
16. The width of the tank is about 7.9 ft.

You can solve some quadratic equations that model real-world problems by finding square roots. In many cases, the negative square root may not be a reasonable solution.

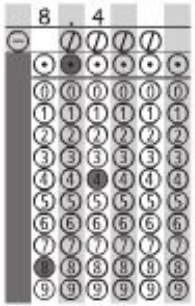
Problem 3 Choosing a Reasonable Solution

GRIDDED RESPONSE

Aquarium An aquarium is designing a new exhibit to showcase tropical fish. The exhibit will include a tank that is a rectangular prism with a length ℓ that is twice the width w. The volume of the tank is 420 ft^3. What is the width of the tank to the nearest tenth of a foot?



$V = \ell wh$		Use the formula for volume of a rectangular prism.
$420 = (2w)w(3)$		Substitute 420 for V, $2w$ for ℓ, and 3 for h.
$420 = 6w^2$		Simplify.
$70 = w^2$		Divide each side by 6.
$\pm\sqrt{70} = w$		Find the square roots of each side.
$\pm 8.366600265 \approx w$		Use a calculator.



A tank cannot have a negative width, so only the positive square root make sense. The tank will have a width of about 8.4 ft.

Check your understanding

Classwork - Complete the 9-3 Additional Problems Worksheet found HERE

Homework

Hidden Figures through Chapter 20 due Monday

If you did not complete Thursday night's homework, be sure to have it on Monday

Page 551 8, 10, 14, 18, 20, 24, 30, 32, 35, 36, 44, 51