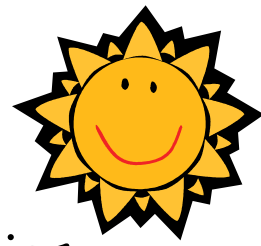# Unit 2 Day 6

# Characteristics Of Quadratic, Even, And Odd Functions

Warm Up

1.) Jenna is trying to invest money into the stock exchange. After some research, she has narrowed it down to two companies. Company A shows a portfolio value of $v(t) = 800 - 28t + .25t^2$, and Company B shows a portfolio value of $v(t) = 700 - 65t + .3t^2$, where v is the value of the portfolio in hundreds of dollars and t is the time in months. Which company will allow her the peace of mind of having the higher value, even if the stock prices drop to their lowest?

Company A has a min of (56, 16).
Company B has a min of (108, -2820). So Jenna should choose Company A because it has the higher min value of 16.

2.) Using the following quadratic, find zeros, y-intercept, vertex, one other point and the Axis of Symmetry, then sketch the graph.

$y = x^2 + 4x - 5$

zeros: (1, 0) (-5, 0)
y-int: (0, -5)
vertex: (-2, -9)
A.o.S: x = -2

2
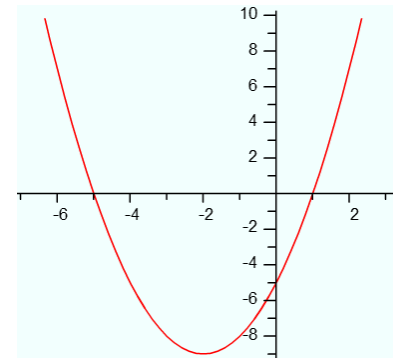
Homework Answers Packet p. 7

Write the equation for a quadratic function that has the following properties:

1. X intercepts at (4.5,0) and (1,0) and y-intercept at (0,9)

$$y = 2x^2 - 11x + 9$$

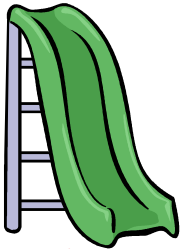2. X intercepts at (7,0) and (1,0) opening upward

$$y = x^2 - 8x + 7$$

3. X intercepts at (0,0) and (6,0) with a maximum at (3,15)

$$y = -5/3 \, x^2 + 10x$$

Homework Answers Packet p. 7

4. A town is planning a child care facility. The town wants to fence in a playground area using one of the walls of the building. What is the largest playground area that can be fenced in using 100 feet of fencing?

Area = xz
Perimeter: x + z + x = 100
$\qquad$ 2x + z = 100 → z = 100 – 2x (plug into the area)
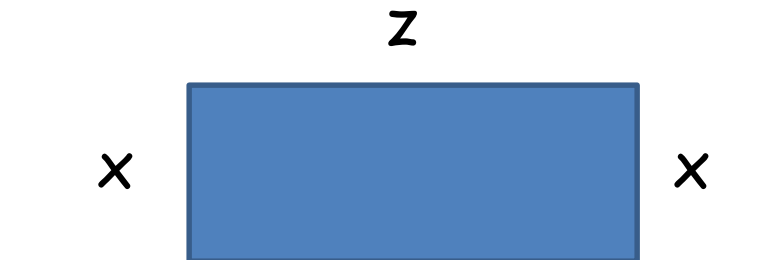$\qquad$ x(100 – 2x)
multiplies to $100x - 2x^2$ (a quadratic… with a max!)

Find the max of $y = 100x - 2x^2$
(25, 1250)

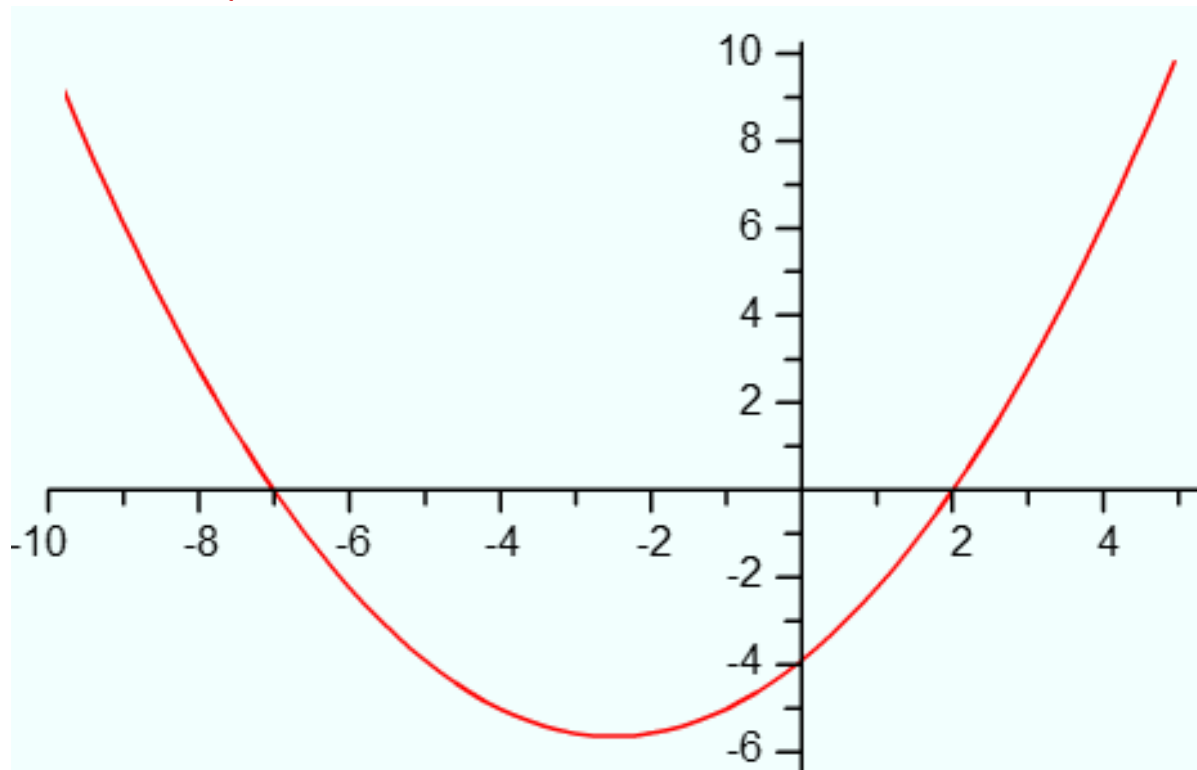x = 25, z = 50
Largest Area = 1250 ft^2

Homework Answers

5. Find the equation of the quadratic, in standard form, given the graph and the fact that the graph goes through the point (4.5, 8). Show all you work for writing the equation by hand.

$$y = 32/115x^2 + 32/23x - 448/115$$
Use steps in the Day 4 and 5 Notes

You MUST be able to write the equation Algebraically for the quiz and test!!

Homework Answers

6. An electronics company has a new line of portable radios with CD players. Their research suggests that the daily sales s for the new product can be modeled by s = -p^2 + 120p + 1400, where p is the price of each unit.

   a. Find the vertex of the function.

(60, 5000)

   a. What is the maximum daily sales total for the new product?

$5000

   a. What price should the company charge to make this profit?

$60

Homework Answers
Puzzle

Why didn't Krok like to go sailing with the baseball uniform designer??

She always talked about cap sizes!

Heads Up:
For tonight's homework, you are comparing three bridges:
Brooklyn
Tappan Zee
Verrazano

Remember to use your vocabulary and show your work in your responses!

Tonight's HW:

Packet p. 8 – 9

AND

Print Packet and Notes for Part 2 of Unit 2 (Days 7 – 12)

More Angry Birds
Notes p. 23-24

Show Investigation Notes pages on document camera when reviewing with class.

More Angry Birds:

Slingshot A

Distance the bird is from the slings hot (in meters)	Height of the bird (in meters)
10	20
20	30
30	30
40	20

$$y = -.05x^2 + 2.5x$$

Slingshot B

Height

Distance

Slingshot C

$$y = -0.015x^2 + 0.975x$$

Where x is the distance the bird is from the slingshot and y is the height of the bird.

1. How "far" will each slingshot launch each bird?

Slingshot A Launch - 50 meters

Slingshot B Launch - 31 meters

Slingshot C Launch - 65 meters

Far-away Castle:

Slingshot C

Near-by Castle:

Slingshot B

More Angry Birds:

2. Analyze the slingshot data and compare to determine which slingshot shoots the birds the highest. Explain how you know.

Slingshot B shoots birds the highest because it's vertex y-value is around 46 meters high. Slingshot C only goes to 15.844 meters and A goes to about 30 meters.

3. If the castle walls are 30 feet tall, which slingshot should you use and why?

Slingshot B because it goes well above 30 meters high, so it should go over the height of the wall.
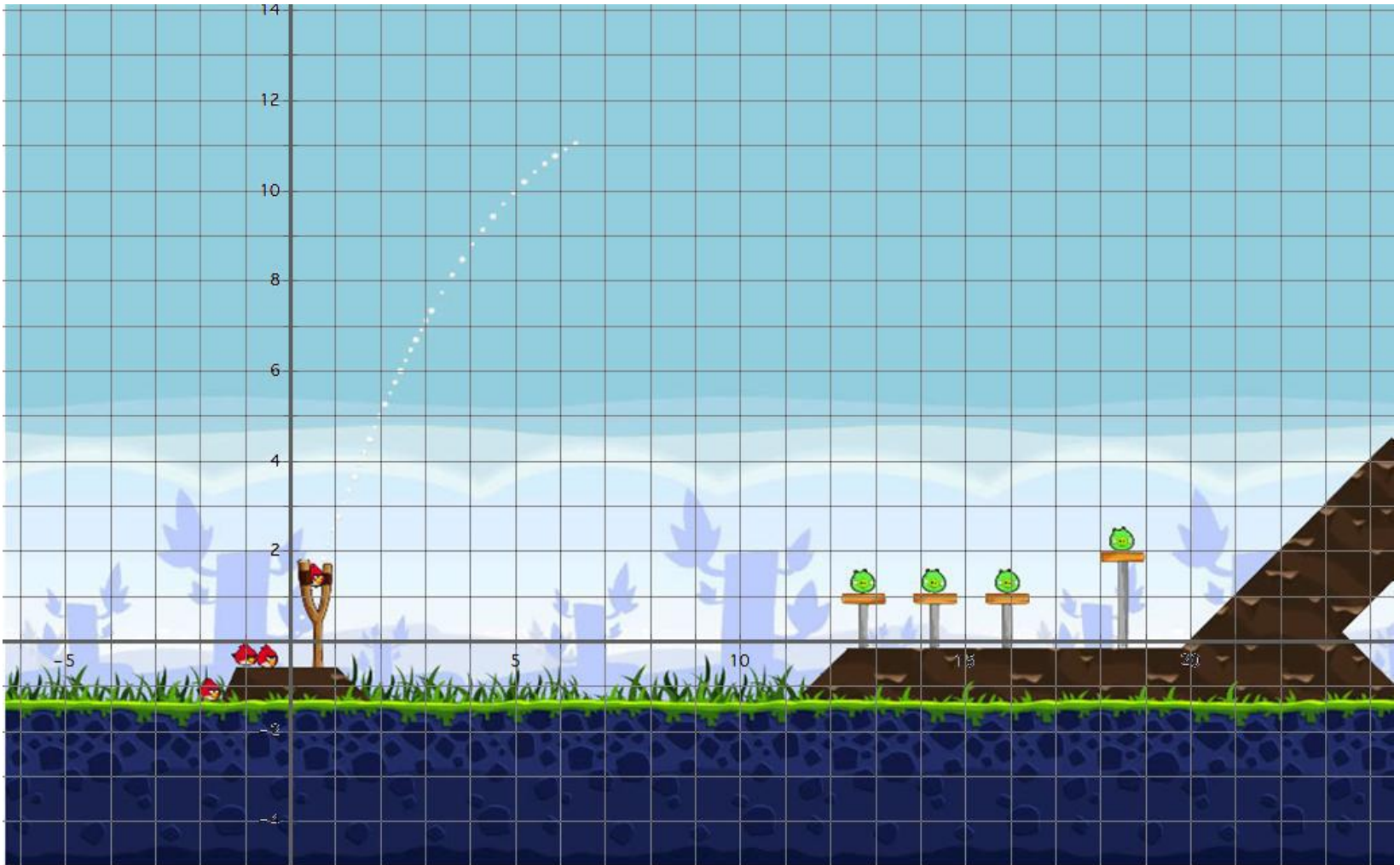
4. What are the pros and cons of using each Slingshot A, B, or C?

Practice Discussion – Notes p. 24

Explanation on next slide.

Show Investigation Notes pages on document camera when reviewing with class.

Practice Notes p. 24

X-intercepts (0, 0), (15, 0)

Points on graph (3, 7) or (12, 7)

1. Write x-intercepts as factors

$$y = a(x-0)(x-15)$$

$$y = a(x)(x-15)$$

2. Substitute in a point from the graph to solve for "a"

$$7 = a(3)(3-15)$$

$$7 = a(3)(-12)$$

$$7 = -36a$$

$$a = -\frac{7}{36}$$
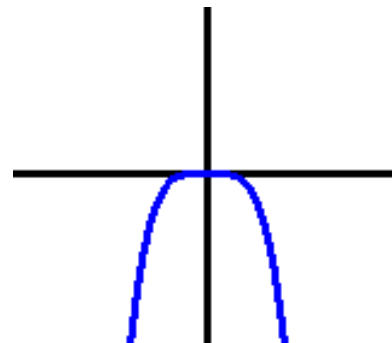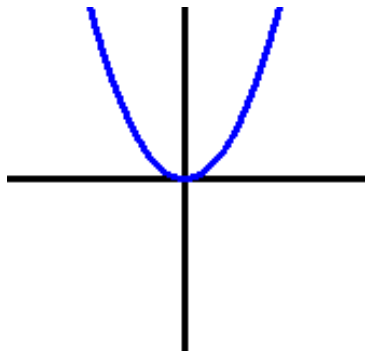
3. Substitute in "a" and write in Standard Form

$$y = \frac{-7}{36}x(x-15)$$
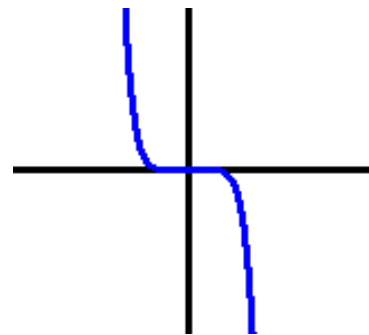
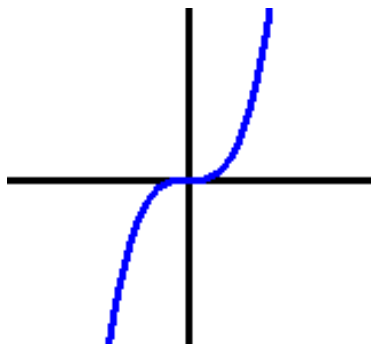$$y = \frac{-7}{36}x^2 + \frac{35}{12}x$$

14

Even & Odd Functions Notes p. 25

Even functions are symmetric across the y-axis.

Odd functions are symmetric across the origin.

Functions are **neither even nor odd** if they do not exhibit one of these types of symmetry.

Even & Odd Functions Notes p. 25

Graph each function on your calculator. Use your graph to fill in the chart.

Let's do # 1 together!

Even VS. ODD Functions

Graph each function on your calculator. Use your graph to fill in the chart.

Graph	Is the Function even, odd, or neither?	Is the leading coefficient positive or negative?	Does the function rise or fall to the left?	Does the function rise or fall to the right?
1. $y = x^2$	**Even**	**Positive**	**rises**	**rises**

Even & Odd Functions Notes p. 25

Graph each function on your calculator. Use your graph to fill in the chart.

Graph each function on your calculator. Use your graph to fill in the chart.

Graph	Is the Function even, odd, or neither?	Is the leading coefficient positive or negative?	Does the function rise or fall to the left?	Does the function rise or fall to the right?
1. $y = x^2$	**Even**	**Positive**	**rises**	**rises**
2. $y = x^4$	**Even**	**Positive**	**rises**	**rises**
3. $y = x^2 + 3$	**Even**	**Positive**	**rises**	**rises**
4. $y = (x - 4)^2$	**Neither**	**Positive**	**rises**	**rises**
5. $y = -x^2$	**Even**	**Negative**	**falls**	**falls**
6. $y = -x^4$	**Even**	**Negative**	**falls**	**falls**
7. $y = -x^2 + 3$	**Even**	**Negative**	**falls**	**falls**
8. $y = x^3$	**Odd**	**Positive**	**falls**	**rises**
9. $y = x^5$	**Odd**	**Positive**	**falls**	**rises**

Even & Odd Functions Notes p. 25

Graph each function on your calculator. Use your graph to fill in the chart.

9. $y = x^5$	**Odd**	**Positive**	**falls**	**rises**
10. $y = x^3 + 4$	**Neither**	**Positive**	**falls**	**rises**
11. $y = -x^3$	**Odd**	**Negative**	**rises**	**falls**
12. $y = -x^5$	**Odd**	**Negative**	**rises**	**falls**
13. $y = -x^5 - 2$	**Neither**	**Negative**	**rises**	**falls**

End Behavior

The **Degree** of a polynomial is the highest exponent, when the polynomial is **in standard form**.

SUMMARY: The end behavior of a polynomial depends on:

1. Whether the degree of the polynomial is __**Even number**__ or __**Odd number**__.

2. Whether the leading coefficient is __**Positive**__ or __**Negative**__.

Characteristics of End Behavior based on Degree

End Behavior of Polynomial Functions				
Leading coefficient is **Positive**			Leading coefficient is **Negative**	
	Left	Right	Left	Right
Function is **odd degree**	**falls**	**rises**	**rises**	**falls**
Function is **even degree**	**rises**	**rises**	**falls**	**falls**

Check Point:

Even functions are symmetric ___**over the y-axis**___

Odd functions are symmetric ___**about the origin**___

Tonight's HW:

Packet p. 8 - 9

AND

Print next section of Notes & Homework Packet Days 7 - 12