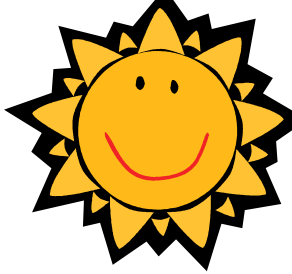
Unit 2 Day 12

Review of Quadratics

Warm Up



13. The cost of an advertisement in a magazine is a function of its size.

- A company wants its advertisement to have a height that is twice its width.
- The magazine charges a flat rate of $60 plus an additional $10 per square inch.
- The company can spend at most $2,060 on the advertisement.

What is the maximum height that the company can afford for its advertisement?

Factor Completely. For #14, then find the solutions.

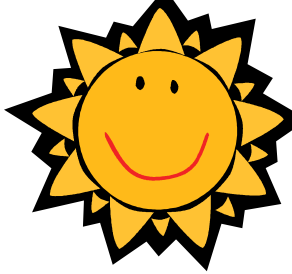
14. $3x^2 - 16x = 12$

15. $48x^8 - 3 = 0$

Done Early? Check your Warm-Up answers with your neighbors.

Then, discuss missed HW problems with your neighbors. ☺

Warm Up ANSWERS



13. The cost of an advertisement in a magazine is a function of its size.

- A company wants its advertisement to have a height that is twice its width.
- The magazine charges a flat rate of $60 plus an additional $10 per square inch.
- The company can spend at most $2,060 on the advertisement.

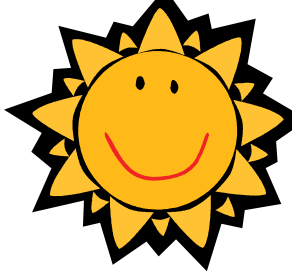
What is the maximum height that the company can afford for its advertisement?

Let x = width so then 2x = height

Set up equation $2060 \geq 60 + 10(x)(2x)$
then solve by your preferred method
(this one can be solved with factoring OR in calculator)
-> x = 10 inches
BUT they asked for the height, which is 2x!!

20 inches

Warm Up ANSWERS



Factor Completely, then find the solutions of

14. $3x^2 - 16x = 12$.

$3x^2 - 16x - 12 = 0$

$3x^2 + 2x - 18x - 12 = 0$

$x(3x + 2) - 6(3x + 2) = 0$

Factored Completely: $(x-6)(3x+2)$

Solutions: $x = 6, -2/3$

15. $48x^8 - 3$

$3(16x^8 - 1)$

$3(4x^4 - 1)(4x^4 + 1)$

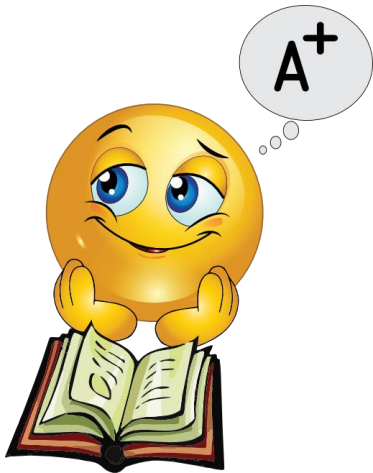
Factors: $3(2x^2 + 1)(2x^2 - 1)(4x^4 + 1)$

Homework For Tonight:

Packet Pages 20-24

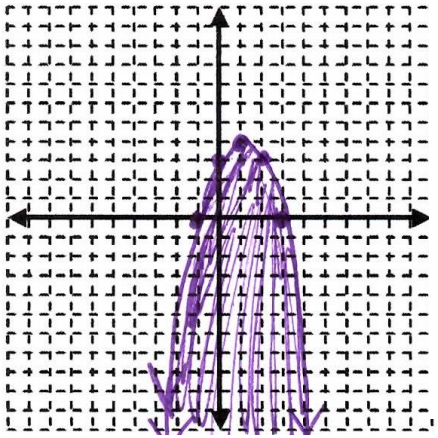
STUDY, STUDY, STUDY FOR UNIT 2 TEST TOMORROW ☺

Tutorials are in the AM!
You can also ask questions during the review game today! Come see me.



Homework Answers Packet p. 17

1.



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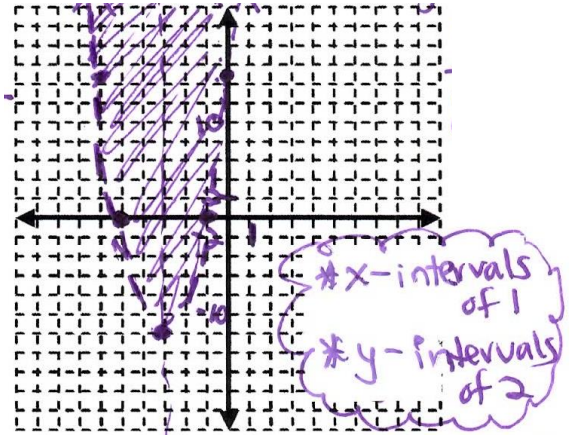

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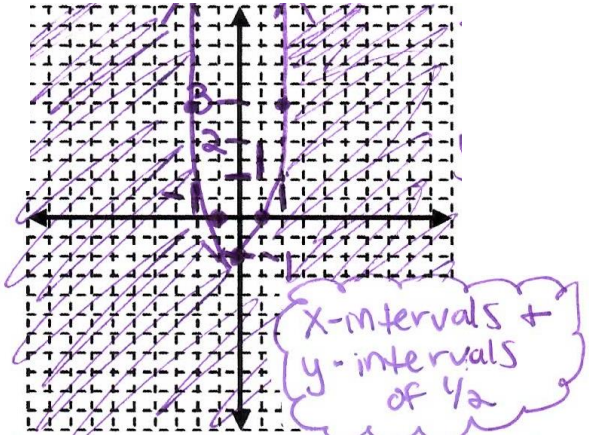


Work for #1-3 is shown on the next slide

4. $x < -4$ or $x > 5$

5. $2 < x < 8$

6. $-3 \leq x \leq -1$

7. $z \leq 0$ or $z \geq \frac{3}{4}$

8. $-3/2 < t < 3/2$

9. $-3 \leq x \leq -4/9$

10. $x < -1/2$ or $x > -1/2$

11. All real #s

Homework Answers Packet p. 17
Work Shown For Questions 1-3

Graph each quadratic inequality. Remember to show your work algebraically to receive full credit!

1. $y \leq -x^2 + 2x + 3$ → solid line

$y \leq -1(x^2 - 2x - 3)$

$y \leq -1(x - 3)(x + 1)$

$x = 3, -1$ zeros

$(3, 0)\ (-1, 0)$ x-intercepts

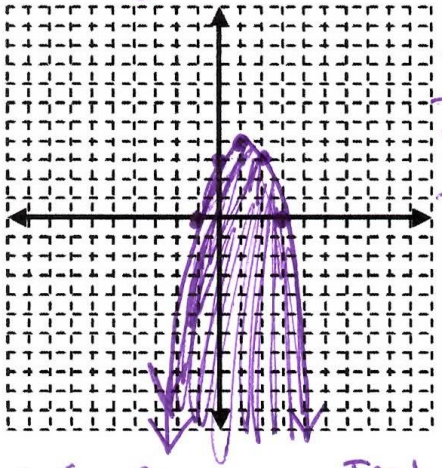
$x = \frac{3 + -1}{2} = \frac{2}{2} = 1$ $\quad y = -(1)^2 + 2(1) + 3$

$y = 4$

$V(1, 4)$

y-int $(0, 3)$

mirror point $(2, 3)$



Test $(0,0)$

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

$0 \leq 3$

true

→ shade to include $(0,0)$

Test $(4,0)$

$0 \leq -4^2 + 2(4) + 3$

$0 \leq -5$

false

2. $y > 3x^2 + 18x + 15$ → dotted line

$y > 3(x^2 + 6x + 5)$

$y > 3(x + 5)(x + 1)$

$x = -5, -1$ zeros

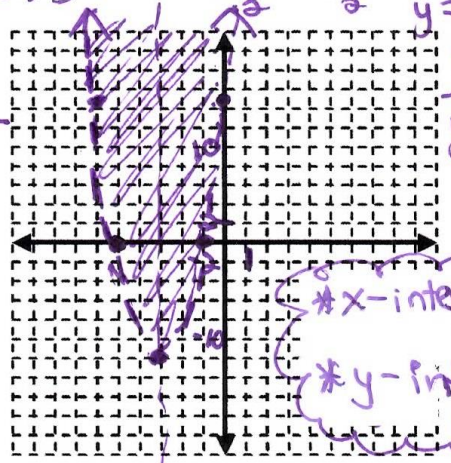
$(-5, 0)\ (-1, 0)$ x-int

$x = \frac{-5 + -1}{2} = \frac{-6}{2} = -3$ $\quad V(-3, -12)$

$y = 3(-3)^2 + 18(-3) + 15$

$y = -12$

y-int $(0, 15)$



Test $(0,0)$

$0 > 3(0)^2 + 18(0) + 15$

$0 > 15$

False

Test $(-4, 4)$

$4 > 3(-4)^2 + 18(-4) + 15$

$4 > -9$

True

3. $y \leq 4x^2 - 1$ → Solid line

$y \leq (2x - 1)(2x + 1)$

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

$(\frac{1}{2}, 0)\ (-\frac{1}{2}, 0)$ x-int

$x = \frac{\frac{1}{2} + -\frac{1}{2}}{2} = 0$

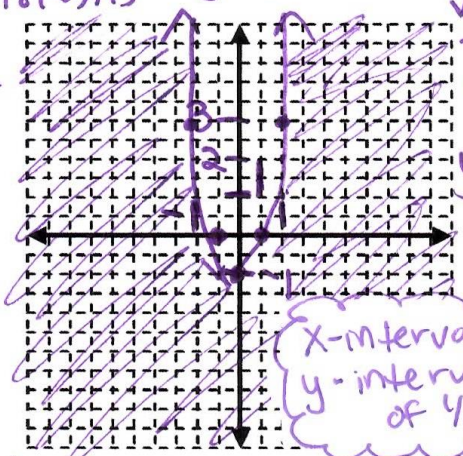
$y = 4(0)^2 - 1$

$(0, -1)$ vertex

other point $y = 4(1)^2 - 1$

$y = 3$

$(1, 3)$



Test $(0,0)$

$0 \leq 4(0)^2 - 1$

$0 \leq -1$

False

Test $(2,2)$

$2 \leq 4(2)^2 - 1$

$2 \leq 15$

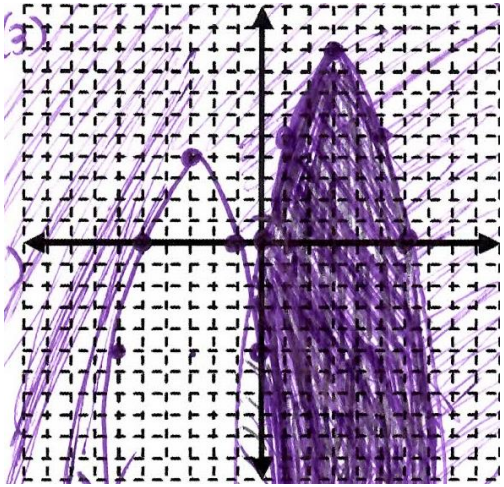
True

Solving Quadratic Inequalities

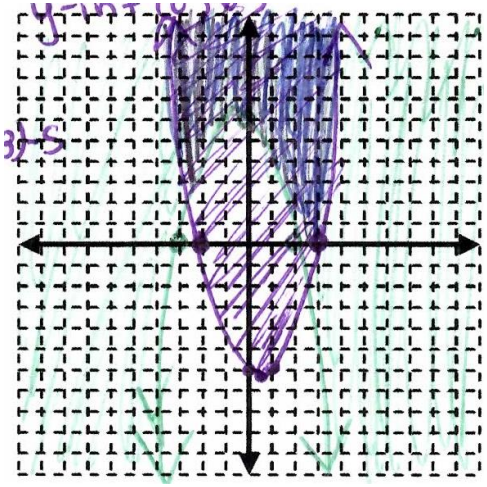
Homework Answers Packet p. 18

Work is shown on the next slides

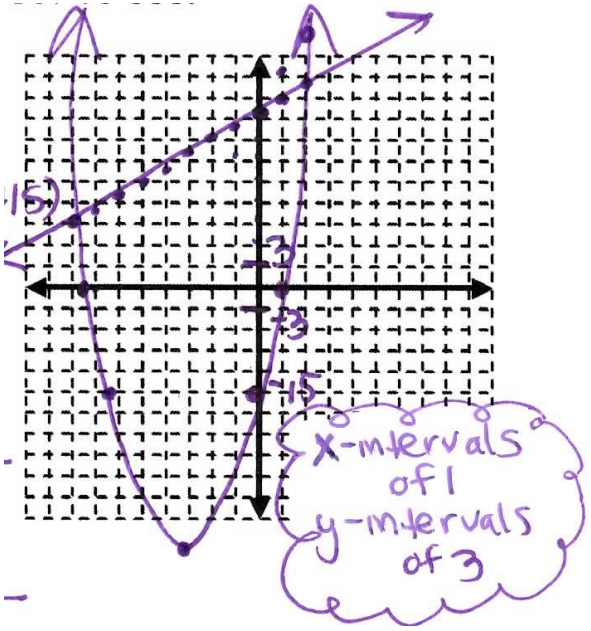
12.



13.

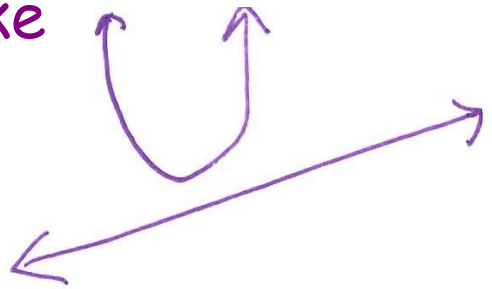


14a.



14b. (5/2, 30) (-8, 9)

15. It is possible for a system with a linear equation and a quadratic equation to have no solution if their graphs do not intersect, like shown in the diagram.



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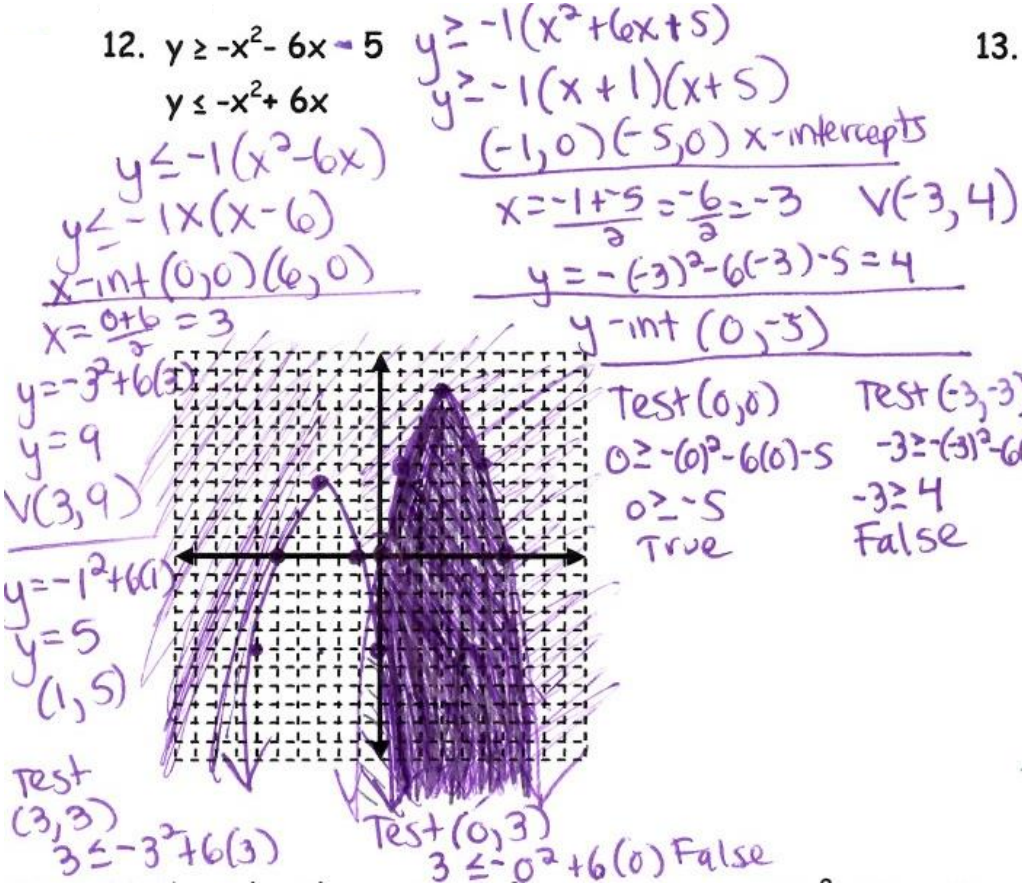
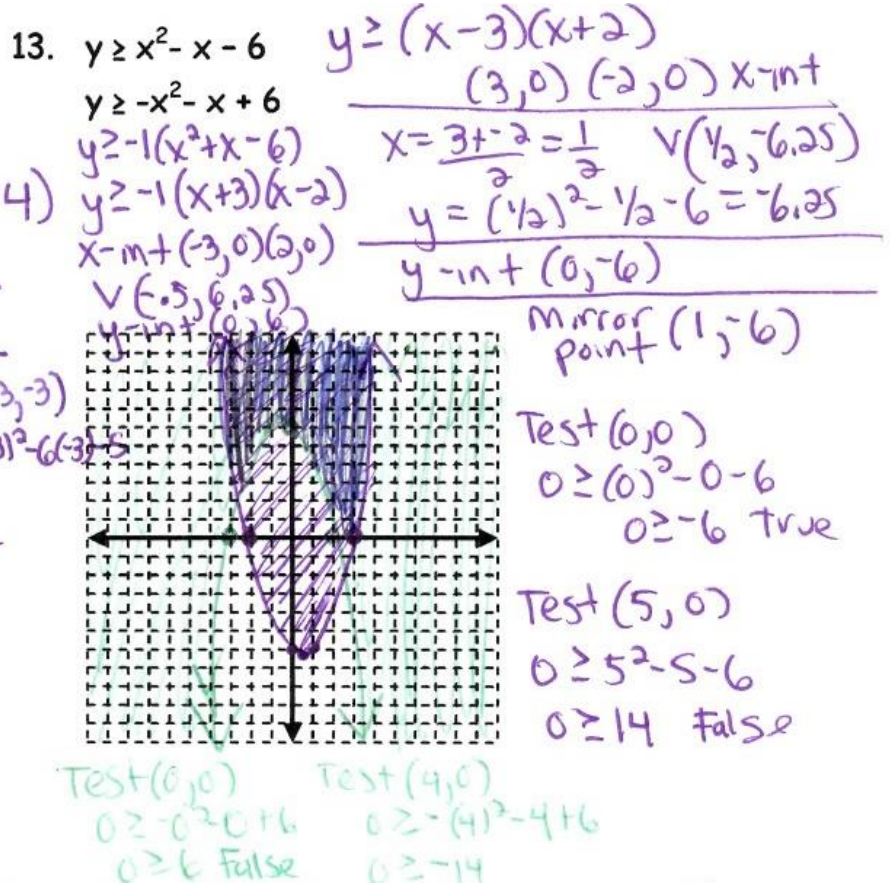
Work Shown For Questions 12-13





Homework Answers Packet p. 18
Work Shown For Questions 14-15

3≤9 true

14. Consider the system of equations: $y = 2x^2 + 14x - 15$ and $y = 3x + 25$ (14x → 13x; 3x → 2x)

a. Illustrate with a graph what you expect to see.

$y = 2x^2 + 13x - 15$

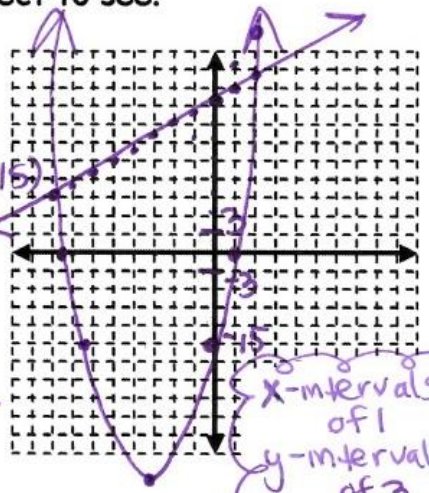
$y = 2x^2 + 15x - 2x - 15$

$y = x(2x+15) - 1(2x+15)$

$y = (x-1)(2x+15)$

x-int (1, 0) (-7.5, 0)

y-int (0, -15)



x-intervals of 1
y-intervals of 3

vertex

$x = \frac{1 + -7.5}{2} = -3.25$

$y = 2(-3.25)^2 + 13(-3.25) - 15$

$y = -36.125$ (-3.25, -36.125)

b. Find a solution to the system of equations algebraically.

set equations = to eachother

$2x^2 + 13x - 15 = 2x + 25$

$-2x \quad -25 \quad -2x \quad -25$

$2x^2 + 11x - 40 = 0$

$16 \cdot -5 = -80 = a \cdot c$

$16 + -5 = 11 = b$

$2x^2 + 16x - 5x - 40 = 0$

$2x(x+8) - 5(x+8) = 0$

$(2x-5)(x+8) = 0$

$x = 5/2$ or 2.5 $\quad -8$

$y = 2x + 25$

$y = 2(\frac{5}{2}) + 25$

$y = 30$

$(5/2, 30)$

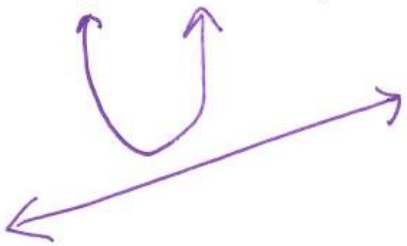
$y = 2x + 25$

$y = 2(-8) + 25$

$y = 9$

$(-8, 9)$

15. Explain how it is possible for a system with a linear equation and a quadratic equation to have no solutions.



If the parabola and the line do not intersect, there would be no solution to the system, like my picture shown.

Homework ANSWERS for Review & Practice...some like released final exam:

1) Which one of these is an even function?

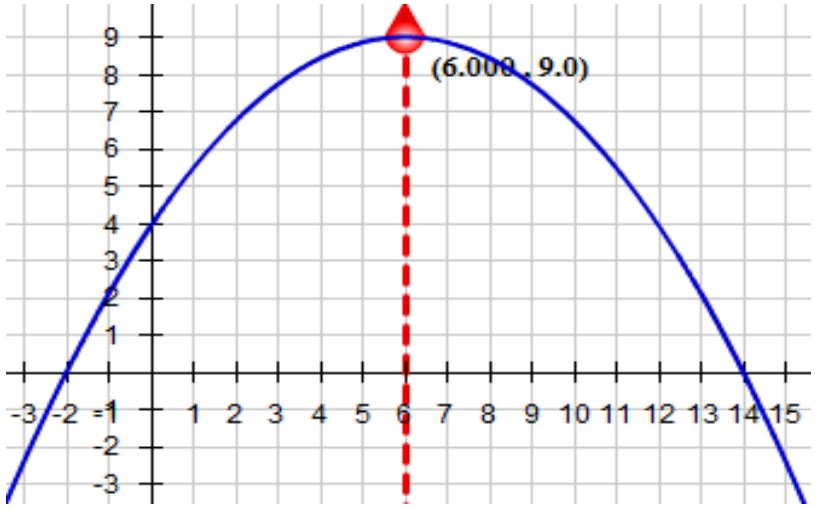
a) $y = x^2 + 4x + 4$ b) $y = x^2 - 4x + 4$ c) $y = x^2 + 7x$ d) $y = x^2$

Remember that even functions are symmetric over the y-axis

2) Write Equation of the Parabola in Standard Form. Show ALL your work with algebra. Leave your coefficients as simplified fractions.

$y = -9/64x^2 + 27/16x + 63/16$

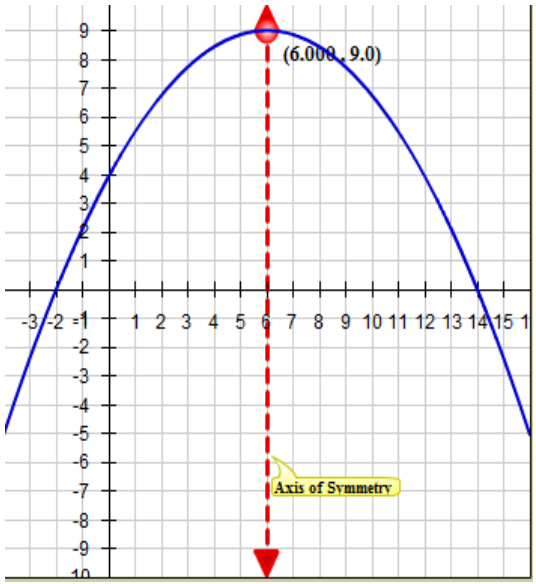
(work for this is on next slide)



3) A rectangular floor has a rectangular rug on it. The floor's width is 5 feet greater than the floor's length, x. The rug's width is 3 feet less than the floor's width. The rug's length is 6 feet less than the rug's width. Write a function, R(x), in simplified form to represent the area of the floor not covered by the rug.

$7x + 8$

2) WORK Shown for Review: Write Equation of the Parabola in Standard Form



Use zeros to start the factored form:

X-intercepts: (-2, 0) and (14, 0)

y = a(x – zero)(x – zero)

y = a (x + 2)(x – 14)

Substitute in another point to find "a":

9 = a (6 + 2)(6 – 14) I used V(6, 9)

Simplify and divide to find "a"

9 = a(8)(-8) 9 = a(-64) a = -9/64

Substitute the "a" into original equation:

Factored Form: y = -9/64(x + 2)(x – 14)

To get the Standard Form Equation of the Parabola

Multiply the factors, then distribute the "a" value.

y = -9/64(x^2 - 12x – 28) use FOIL to multiply the factors

y = -9/64x^2 + 27/16x + 63/16 distribute the "a" value of -9/64

Standard form: y = -9/64x^2 + 27/16x + 63/16

ANSWERS for Review & Practice:

4) A piece of cardboard that is 14 inches by 18 inches is used to form a box with an open top by cutting away congruent squares with side lengths, x, from the corners. Write an equation y, in terms of x, in standard form to model the surface area of the open box after the corners are cut away.

$y = 252 - 4x^2$ **(find total area = 252 then subtract the x^2 area in each corner.)**

5) Each year, a local school's Rock the Vote committee organizes a public rally. Income from ticket sales, $I(t) = 400t - 40t^2$. *Cost* $C(t)$ of operating the public event $C(t) = 400 - 40t$.

a. Ticket price(s) **$5** Greatest Income **$1000**

Find the maximum for I(t) with calculator or by hand

b. For what ticket price(s) would the operating costs be equal to the income from ticket sales? Explain how you obtained the answer.

For $10 Ticket, income = costs = $0. For $1 Ticket, income = costs = $360.

Set I(t) = C(t) then solve by calculator or by hand.

c. Which of the following rules would give the predicted profit $P(t)$ as a function of the ticket price?

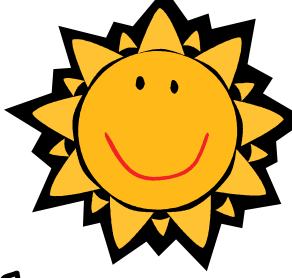
i. $P(t) = -40t^2 + 440t - 400$

Profit = Income – Cost

P(t) = I(t) – C(t)

More details and work for #5 are on the next two slides! ☺

Review Question WORK Shown



5. Each year, a local school's Rock the Vote committee organizes a public rally. Based on previous years, the organizers decided that the Income from ticket sales, I(t) is related to ticket price *t* by the equation $I(t) = 400t - 40t^2$. *Cost* C(t) of operating the public event is also related to ticket price *t* by the equation $C(t) = 400 - 40t$.

   a. What ticket price(s) would generate the greatest income? What is the greatest income possible? Explain how you obtained the value you got. Ticket price(s) $5 Income $1000

Enter the income equation I(t) in the calculator and find the maximum

OR

Factor to find the zeros then average the zeros to find the vertex x-value. Then substitute that x-value into the I(t) equation to find the y.

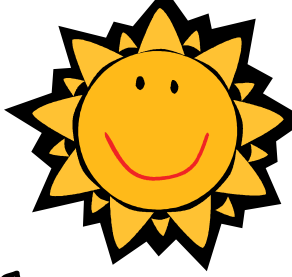
   b.For what ticket price(s) would the operating costs be equal to the income from ticket sales? Explain how you obtained the answer.

For a $10 Ticket, the income and costs are both $0

For a $1 Ticket, the income and costs are both $360.

Set I(t) = C(t) then solve by finding the intersections using our skills from yesterday's lesson! ☺

Review Question WORK Shown



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   c. Which of the following rules would give the predicted profit $P(t)$ as a function of the ticket price?

   i. $P(t) = -40t^2 + 440t - 400$
   ii. $P(t) = -40t^2 - 440t - 400$
   iii. $P(t) = -40t^2 - 360t + 400$
   iv. $P(t) = -40t^2 - 360t - 400$
   v. $P(t) = 40t^2 - 440t + 400$

Profit = Income – Cost

$P(t) = (400t - 40t^2) - (400 - 40t)$

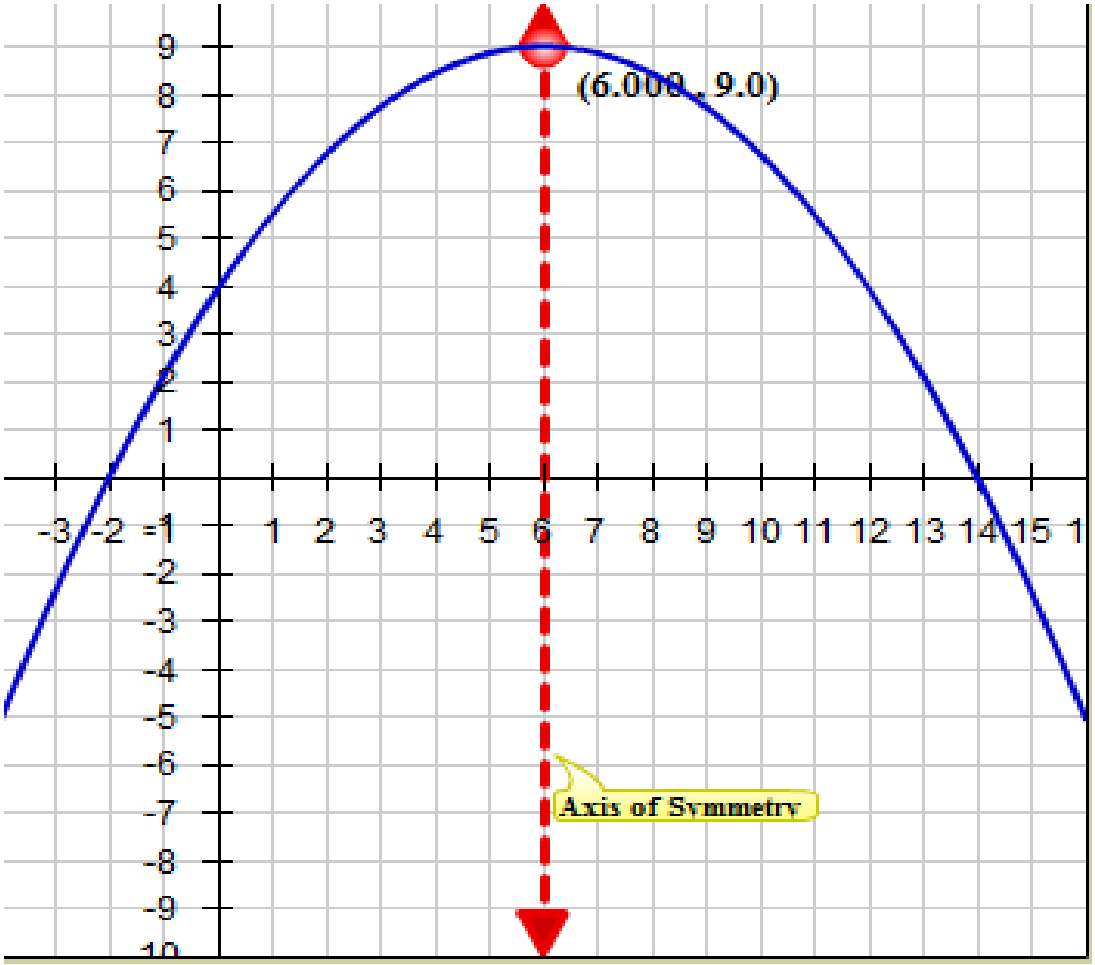
$= 400t - 40t^2 - 400 + 40t$ <- *subtracted polynomials*

$= -40t^2 + (400t + 40t) - 400$ <- *combined like terms*

$= -40t^2 + 440t - 400$ <- *simplified fully* ☺

1) Need help with writing Equation of the Parabola in Standard Form?

- On blackboard there are videos and extra practice for problems concerning these types of questions!
- There are additional resources for test review on Blackboard as well!



Extra Resources on Blackboard, if you're interested…

Application Practice

"Transformations of Functions Foldable"

Review!

On NEW notebook paper....

Quadratics Scavenger Hunt

Letter	Question	Work	Solution(s)

Homework For Tonight:

Packet Pages 20-24

STUDY, STUDY, STUDY FOR UNIT 2 TEST TOMORROW ☺

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