**Unit 2: Quadratics Part 2**

**By the end of the unit students will be able to:**

1) Factor quadratic binomial, trinomial, and polynomials of 4 terms.

2) Solve quadratic equations by factoring.

3) Solve quadratic equations by graphing.

4) Graph quadratic functions using vertex, axis of symmetry, y-intercept, and zeros.

5) Use technology to solve quadratic equations and identify vertices.

6) Use properties of quadratics to answer application problems.

7) Solve quadratic inequalities

8) Solve systems of non-linear inequalities

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| --- | --- | --- | --- |
| **Day** | **Date** |  **Lesson** | **Assignment** |
| 1 | ThursdayFebruary 4 | Solving with the Quadratic Formula w/discriminant | 2-1 |
| 2 | FridayFeb. 5 | Quadratic Inequalities | 2-2 |
| 3 | MondayFeb. 8 | Solving Systems: Line and Parabola | 2-3 |
| 4 | TuesdayFeb. 9 | **Quiz on Days 1-3**Solving Systems: Line and Circle | 2-4 |
| 5 | Wed.Feb. 10 | Solving Systems of Inequalities | 2-5 |
| 6 | ThursdayFeb. 11 | Review for Unit 2 Test | REVIEW WORKSHEET |
| 7 | FridayFeb. 12 | Superhero Project | STUDY!!!! |
| 8 | MondayFeb. 15 | Test on Unit 2 |  |

***Unit 2 Day 1 Notes: Quadratic Formula***

How many solutions are there for each of each parabolas graphed below.

 2

-5

-2

1. 2. 3. 4.

-1.5

1.5

|  |
| --- |
| **The Quadratic Formula**For ax2 + bx + c = 0,  |

**Using the Quadratic Formula: Steps**

3x2 – 5x – 2 =0

1. 3x2 – x = 4 2. 6x+1= -9x2

3. x2 + 3x – 5 = 0 4. 2x2 = - 4x – 3

**You Try!! Use the quadratic formula to solve:**

1. $x^{2}-6x=-1 2. x^{2}=-x-1 3. x^{2}-2x+3=0$

**Discriminant:**

* Where does it come from?
* Why do we need it?
* Remember…



**Find the discriminant of the quadratic equation and use it to find the number and type of solutions.**

1. $9x^{2}+6x+1=0 b) 9x^{2}+6x-4=0 c) 9x^{2}+6x+5=0$

**Now think about what you have learned……**

**Day 2: Graphing a Quadratic Inequality Math 2**

1. **** 2. 

3. 4. *y* ≤ *x*2 + 3*x* - 4

5. *y* >  6. 

Inequality Applications:

7. The amount of money that a freshman class fundraiser can raise can be modeled by the inequality $y\leq -2x^{2}+16x-24$, where x represents the number of days into the sale and y represents the amount of money raised **in hundreds**.

1. Graph the inequality.
2. What is the maximum and what does it represent?
3. When will the fundraiser start to raise money?
4. How many days should the fundraiser last? Defend your answer.
5. On which days will the sale make more than $400?

8. The profits of Julie’s new company can be modeled by the equation$ y \leq -x^{2}+8x,$ where x is the number of months and y is the profit in thousands of dollars.

1. Graph the inequality.
2. What is the maximum? What does it represent?
3. How long is Julie’s company profitable?
4. Julie wants to know when her company made $12,000 or more.

Write the inequality that represents this situation and graph.

1. According to the graph, when did Julie make more than $12,000?

**Day 3: Quadratic and Linear Systems Math 2**

Solve and Check: Steps

y= x2 + 4

y = 4x

2. y = x2 +2x + 4 3. y = 5x – 20

 y = 6x + 1 y = x2 – 5x + 5

4. y = -x – 7 5. y = x2 + 7x + 10

 y = x2 – 4x – 5 y = -10x + 30

6. y=x2-4x+9 7. y=x2-6x+8

 Y = 2x + 1 y = - ½ x + 2

8. A rocket is launched from the ground and follows a parabolic path represented by the equation

y= - x2 + 10x. At the same time, a flare is launched from a height of 10 feet and follows a straight path represented by the equation y = -x + 10. When and at what height do the flare and the rocket meet?

9. A pelican flying in the air over water drops a crab from a height of 30 feet. The distance the crab is from the water as it falls can be represented by the function h(t) = -16t2 + 30, where t is time, in seconds. To catch the crab as it falls, a gull flies along a path represented by the function g(t) = -8t + 15. Can the gull catch the crab before the crab hits the water? Justify your answer.

**Day 4: Circles and Lines Math 2**

A circle and a line can intersect in two points, one point, or no points.

**1. x2 + y2 = 98 and y = x Steps**

**2. x2 + y2 = 45 and y = 2x 3. x2 + y2 = 25 and y = x - 1**

**4. 5. 6.**

 **x2+y2 = 10 x2+y2 = 10 x2+y2 = 8**

**y=-3x+10 2x+y = 1 3x+ y = 4**

**A (5,1) A (-1, 3 A (2, -2) (4, 28)**

**B (3, 1) B (3,-1) B (0.4, 2.8) (2, -2)**

**C (5,1) (3,-1) C (3, -2.6), (-1, 1.8) C (2, 0.4) (-2, 2.8)**

**D (5,-1) (3, 1) D (-1, 3), (1.8, -2.6) D (-2, 2) (2.8, 0.4)**

**Day 5: System of Inequalities:**

*Solve Graphically:*

1. ** y $\geq $ x2- 4x+4 2. y$\leq $ -x2+2x-1

 y < -2x + 4 y $<$ x – 4

**Application Questions:**

 1. A ball thrown is modeled by the function: 3 + 22x – 16x2.

Given the context of the problem, what is an window for x value? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Why is only the first quadrant of the coordinate plane given for you to graph? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Write an equation to show when the ball will be exactly 10 feet in the air, then solve. \_\_\_\_\_\_\_\_\_\_\_\_\_



Using this information, write and inequality that explains when the ball will be at a height that is less than 10 feet in the air. Graph the ball and the inequality.

Explain how you could use shading to show this solution on the graph?

Write an inequality to show when the ball will be higher than 10 feet in the air.

2. The student council decides to put on a concert to raise money for an after school program. The price of the ticket will affect their profit. The functions shown below represent their potential income and cost of putting on the concert, where t represents ticket price.

Income: I(t) = 330t – 30t2 Cost: C(t) = 330 – 30t

Using colored pencils graph each function on the graph

1. Show where the break-even point is.
2. Show where the cost is greater than the income.
3. Show where the income is greater than the cost.
4. Which ticket price would you use in order to maximize your profit?
5. Where is this on the graph?

**HW 2-1 Quadratic Formula**

Part 1: Use the quadratic Formula to solve the following:

1. 4x2 + 11x – 20 = 0 2. x2 – 5x – 24 = 0

3. x2 - 3x – 3=0 4. x2 + 5x + 5 = 0

5. 4x2 +8x – 1 = 0 6. 2x2 -14x + 23 = 0

**HW 2-2 Graphing Quadratic Inequalities**

Graph each quadratic inequality.

1.  2.  3. 

4.  5.  6. 

7. The number of people that attend an sale can be modeled by the inequality $y\leq -4x^{2}+24x$, where x represents the number of days into the sale and y represents the people attending **in hundreds**.

1. Graph the inequality.
2. What is the maximum and what does it represent?
3. How long does the sale last for?
4. The store has to have extra staff when the attendance

is 2000 people of more. Write the inequality for this situation,

and graph.

1. According to your graph, on what days does the

company need to have extra staff working?

**Hw 2-3 – Intersection of lines and Parabolas**

**Graph each of the following**

**1.**  and y = -2x + 4 **2.** x2 + 3x + 2 and y = x + 2

Solve the system of equations Algebraically:

3. y = x2 – 4x + 9 4. y = -x2 + 2x - 4

 y = 2x + 1 y =-x -4

5. Each year, Heritage’s Homecoming committee organizes a dance. 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 – 40t2. Cost* C(t) of operating the dance is also related to ticket price *t* by the equation *C(t) = 400 – 40t.*

* 1. 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) \_\_\_\_\_\_\_\_\_\_\_\_\_\_ Income \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

**HW 2-4 Intersection of Circles and Lines**

**On separate paper Solve Algebraically**

1. x2 + y2 = 50 and y = x 2. x2 + y2 = 26 and 5y = x

**Circle the correct answer.**

3. x2 + y2 = 2 and y = x – 2 4. x2 + y2 = 25 and 2x – y = 5 5. y = 2x2 + 2x + 3 and y – x = 3

 a) (2, -2) and (1, -1) a) (4, 3) a) (0, 3) and (3, 0)

 b) (-1, 1) and (1, -1) b) (-5, 0) and (4, 3) b) (0, 3) and (-0.5, 2.5)

 c) (-1, 1) c) (0, -5) and (4, 3) c) (0.5, 2.5) and (3, 0)

 d) (1, -1) d) (0, -5) d) (-0.5, 2.5) and (-3, 0)

Common Core 2 Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**HW 2-5**

Graph the following systems:

1.  2. 

3.  4. 

5. Heritage Band Boosters is having a tulip fundraiser so the band can make the trip to NYC to march in the Macy’s Thanksgiving Day Parade. From previous fundraisers they know that their profit is modeled by the equation P(x) = -2x2 + 20x, where x represents the number of days and P(x) represents the profit in hundreds of dollars.

1. What is the maximum amount that they can raise in a day?
2. When the boosters know that they will need extra people working on days were they sell $200 or more in tulips. Write the inequality that would show when they sell $200 or more in tulips.
3. During what interval of days would they need to have extra people working?
4. A rock is dropped from a 600 foot tower. The height of the rock as a function of time can be modeled by the equation: h(t) = -16t2 + 600. During what period of time will the height of the rock be greater than 300 feet above the ground?
5. A penny is tossed off the top of a 1000 ft skyscraper. The path of the penny can be modeled by the equation: h(t) = -16x2 – 50x + 1000. For what period of time will the penny be between 1000 and 500 feet?

8. A probe is thrown downward into a crater on Mars. The lip of the crater is 1000 feet above the crater floor. The path of the probe can be modeled by the equation: h(t) = -6.5x2 – 50x + 100. When will the probe be at least 500 feet below the lip of the crater?