

Quadratics Review

Day 1

Objectives

Multiplying Binomials

Identify key features of a parabola

Describe transformations of quadratic functions

Vocabulary

FOIL

Standard Form

Vertex Form

Vertex

Factored Form

Axis of Symmetry

x and y-intercepts

Transformations

Multiplying Binomials

- Use FOIL or set up the box method

Multiply the following:

a) $(2x - 4)(x - 9)$

b) $(7x + 1)(x - 4)$

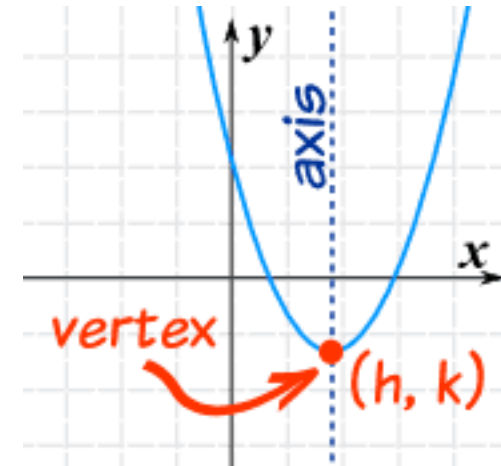
c) $(3x - 1)(2x + 5)$

Quadratic Forms and the Parabola

Standard Form: $y = ax^2 + bx + c$

Vertex Form: $y = a(x - h)^2 + k$

Factored Form: $y = (x + a)(x + b)$



- The graph of a quadratic function is a parabola
- The axis of symmetry divides the parabola into two parts
- The vertex is either the lowest or highest point on the graph- the minimum or maximum
- The “zeros”, “roots”, or “solutions” of a quadratic equations lie at the x-intercepts (where it crosses the x-axis)
- The y-intercept is where the function crosses the y-axis

State whether the parabola opens up or down and whether the vertex is a max. or min, give the approximate coordinates of the vertex, the equation of the line of symmetry, and find the x and y intercepts

a) $y = x^2 + 5x + 6$

b) $y = 4(x - 1)^2 - 3$

c) $y = (x + 6)(2x - 1)$

Transformations

Graph $y = x^2$ in y_1 in your calculator.

Now Graph $y = x^2 + 4$ in y_2
what happened?

Keep y_1 and change y_2 to $y = -(x + 2)^2$
what happened?

Keep y_1 and change y_2 to $y = -\frac{1}{3}x^2$
what happened?

Transformations cont...

$$y = a(x - h)^2 + k$$

Vertical Stretch or Shrink
Reflection across x-axis

Horizontal Translation
(right or left)

Vertical Translation
(up or down)

Describe the following transformations:

a) $y = -2(x + 5)^2 - 6$

b) $y = 0.1x^2 + 10$

c) $y = -(x - 4)^2 - 1$

Quadratics Review

Day 2

Objectives

Factor quadratic binomials and trinomials

Solve Quadratic Equations

Solve vertical motion problems

Vocabulary

Quadratic Formula

Factor

Trinomial

Zero Product Rule

Factoring

- Factor out the Greatest Common Factor (GCF): #s and variables
- Use box, circle method, or “Voodoo”
- Guess and check method

Warm-up

Factor:

a) $2x^2 - 10x$

b) $x^2 - 7x - 30$

c) $6x^2 + 11x + 3$

d) $x^2 - 36$

Solving Quadratics

Ex: Solve the following quadratic equation using the appropriate method below:

$$2x^2 - 3 = 5x$$

1) Solve by Graphing –

(find the zeros (x-intercepts))

2) Solve by factoring –

(zero product property)

3) Solve by Quadratic formula – $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

4) Solve Algebraically – $x = \pm\sqrt{\quad}$

ex: $4x^2 = 64$

Solve the following:

1) $2x^2 + 5 = 11x$

2) $4(x + 2)^2 = 49$

3) $x^2 + 7x = -9$

4) $x^2 + 6x - 27 = 0$

Vertical Motion Problems

A child at a swimming pool jumps off a 12-ft. platform into the pool. The child's height in feet above the water is modeled by

$$h(t) = -16t^2 + 12 \quad \text{where } t \text{ is the time in}$$

seconds after the child jumps. How long will it take the child to reach the water?

(Graph and think about the height when the child reaches the water)

1. A dud missile is fired straight into the air from a military installation. The missile's height is given by the formula; $h(t) = -16t^2 + 400t + 100$

- a. How high is the missile after 4.5 seconds?
- b. At what time will the missile reach its maximum height?
- c. What is the maximum height the missile will reach?
- d. When will the missile be 2,500 feet above the ground?
- e. When will the missile be 100 feet above the ground?

Quadratics Review

Day 3

Objectives

Solve Quadratic Equations with complex solutions

Add, subtract, multiply, and divide complex numbers

Vocabulary

Complex Number

Imaginary Number

Complex Solutions

Discriminant

Warm-up

Ex: Use the Quadratic Formula to solve the following:

$$5x^2 + 6x = -5$$

Complex Numbers

- Review – Imaginary Numbers -

$$i = \sqrt{-1}$$

Ex: Simplify the following:

a) $\sqrt{-16}$

b) $\sqrt{-36} + \sqrt{-100}$

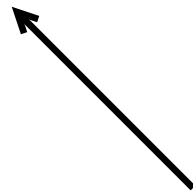
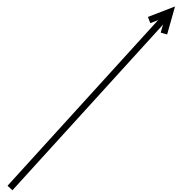
Complex Numbers

- Def: **Complex Number** – is any number of the form...

$$a + bi$$

Real Part

Imaginary Part



Complex Numbers

- Ex: Add the following:

$$(3 + 5i) + (7 + 8i) = 10 + 13i$$

Try the following:

a) $(2 + i) + (3 - 3i)$

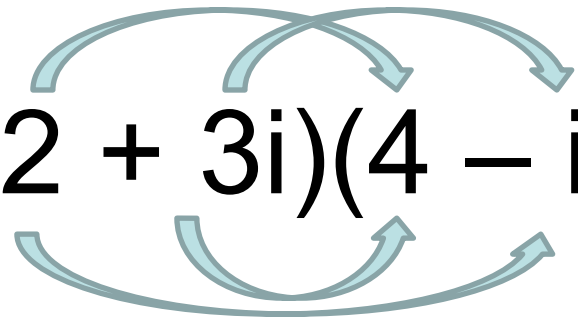
$$5 - 2i$$

b) $(3 + 4i) - (6 - 5i)$

$$-3 + 9i$$

Complex Numbers

• Ex:


$$(2 + 3i)(4 - i)$$

FOIL

$$8 - 2i + 12i - 3i^2$$

$$8 + 10i - 3(-1)$$

$$**11 + 10i**$$

• Try the following:

a) $(1 + i)(4 - 3i)$

$$**7 + i**$$

b) $(2 + 3i)(3 + 5i)$

$$**-9 + 19i**$$

Complex Numbers

• Simplify: $\frac{(3 - 4i)}{(2 + 5i)} \times \frac{(2 - 5i)}{(2 - 5i)}$ **Multiply by the conjugate**

FOIL

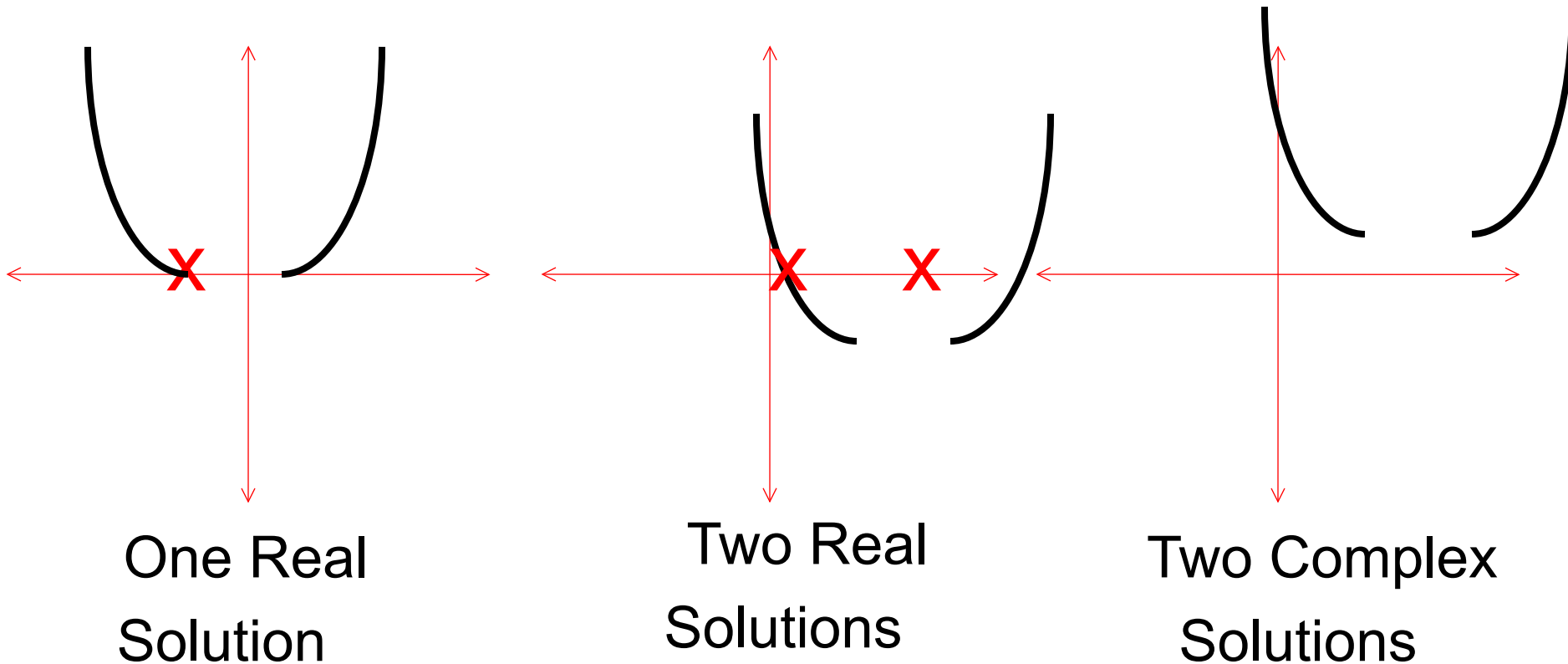
$$\frac{6 - 15i - 8i + 20i^2}{4 - 10i + 10i - 25i^2}$$

$$\frac{-14 - 23i}{29}$$

Complex #'s on the Calc

Analyzing Solutions

- Three possible graphs of $ax^2 + bx + c = 0$



Determine the “Nature of the Solutions”