



**Book and homework on
your desk.**

**We will use our calculators
in class today.**

Read in your novels.

10:00

Stop

Announcements

Exponents Test 2 Corrections are due tomorrow

HF Chapters 17-20 are due Monday. We are getting close to the end of the book!

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.

Homework Check - Textbook page 538 10 - 18 even,
26 - 30, 34 - 39, 48

Quadratic Functions

3/14/2019

Warm-Up

Using your calculator, work with a partner to find the vertex of the graph
 $y = -4x^2 + 2x + 5$.

Is the vertex a maximum or a minimum? What are the x-intercepts?

Essential Understanding: In the quadratic function $y = ax^2 + bx + c$, the value of b affects the position of the axis of symmetry.

The axis of symmetry changes with each change in the b value. The equation of the axis of symmetry is related to the ratio b/a .

Axis of Symmetry

AOS Formula:

$$\frac{-b}{2a}$$

take note

Key Concept Graph of a Quadratic Function

The graph of $y = ax^2 + bx + c$, where $a \neq 0$, has the line $x = \frac{-b}{2a}$ as its axis of symmetry. The x -coordinate of the vertex is $\frac{-b}{2a}$.

Use the axis of symmetry to graph

What is the graph of the function $y=x^2-6x+4$?

Step 1: Find the axis of symmetry

Step 2: find two other points on the graph

Step 3: Graph the vertex and the points you found in Step 2. Reflect these points across the axis of symmetry

Using the Axis of Symmetry to find the vertex

Does the axis of symmetry always go through the vertex? If so, how can the axis of symmetry help you find the vertex?

Step 1: Solve for the Axis of Symmetry using the AOS Formula

Step 2: Substitute AOS into the equation for x.

Step 3: Solve for y.

Step 4: Write the vertex as an ordered pair (x, y)

Example 1: Find the vertex and the axis of symmetry for each function.

a) $y = -2x^2 + 4x - 9$

b) $y = x^2 - 10$

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

$a = -2$

$b = 4$

$c = -9$

$$\text{AOS} = \frac{-b}{2a} = \frac{-4}{2 \cdot -2}$$

$x = 1$ so x coordinate of
the vertex is 1

$$\begin{aligned} Y &= -2(1^2) + 4(1) - 9 \\ &= -7 \end{aligned}$$

$\therefore (1, -7)$ is the vertex

Example 3: Sketch the graph of $y = -x^2 + 4x - 2$

Opens: _____

AOS: _____

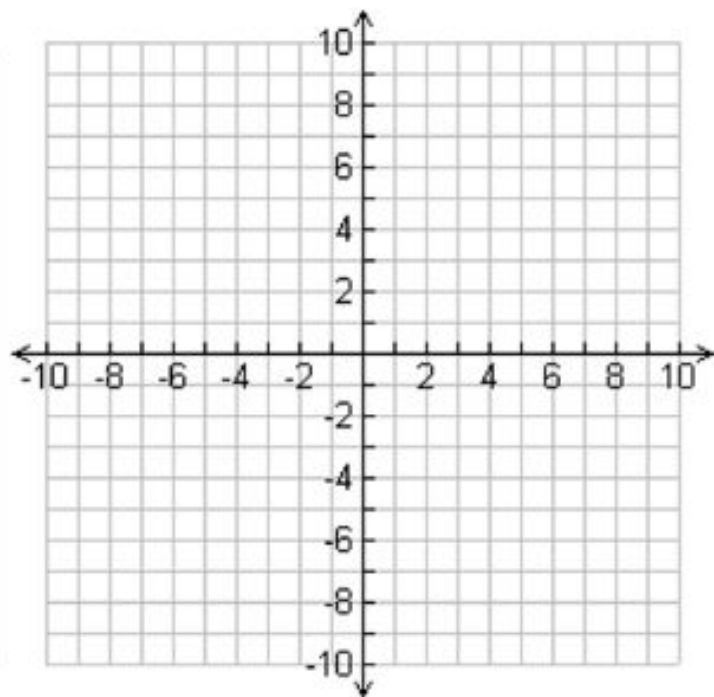
Vertex: _____

Y-Int: _____

Roots: _____

$a =$ _____ $b =$ _____ $c =$ _____

x	y



Example 4: Sketch the graph of $y = x^2 - 1$

Opens: _____

AOS: _____

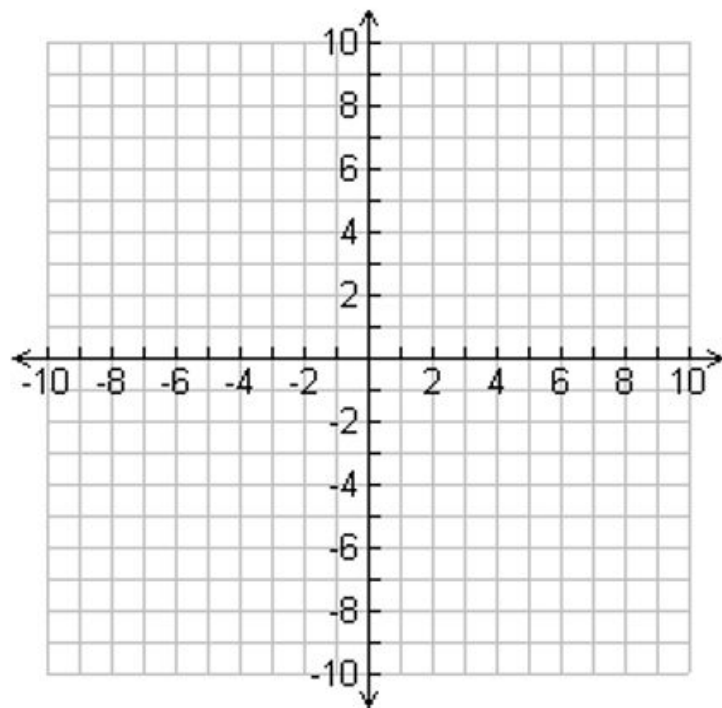
Vertex: _____

Y-Int: _____

Roots: _____

$a =$ _____ $b =$ _____ $c =$ _____

x	y



Example 5: Using the Vertical Motion Model

During halftime of a basketball game, a sling shot launches T-shirts at the crowd. A T-shirt is launched with an initial upward velocity of 72 ft/s . The T-shirt is caught 35 ft . above the court. How long will it take the T-shirt to reach its maximum height? What is its maximum height? What is the range of the function that models the height of the T-shirt over time?



The function $h = -16t^2 + 72t + 5$ gives the T-shirt's height h , in feet, after t seconds. Since the coefficient of t^2 is negative, the parabola opens downward, and the vertex is the maximum point.

Method 1 Use a formula.

$$t = \frac{-b}{2a} = \frac{-72}{2(-16)} = 2.25 \quad \text{Find the } t\text{-coordinate of the vertex.}$$

$$h = -16(2.25)^2 + 72(2.25) + 5 = 86 \quad \text{Find the } h\text{-coordinate of the vertex.}$$

The T-shirt will reach its maximum height of 86 ft after 2.25 s . The range describes the height of the T-shirt during its flight. The T-shirt starts at 5 ft , peaks at 86 ft , and then is caught at 35 ft . The height of the T-shirt at any time is between 5 ft and 86 ft , inclusive, so the range is $5 \leq h \leq 86$.

Example 5: Using the Vertical Motion Model

During halftime of a basketball game, a sling shot launches T-shirts at the crowd. A T-shirt is launched with an initial upward velocity of 72 ft./s . The T-shirt is caught 35 ft. above the court. How long will it take the T-shirt to reach its maximum height? What is its maximum height? What is the range of the function that models the height of the T-shirt over time?

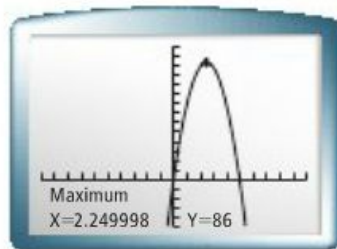


The function $h = -16t^2 + 72t + 5$ gives the T-shirt's height h , in feet, after t seconds. Since the coefficient of t^2 is negative, the parabola opens downward, and the vertex is the maximum point.

Method 2 Use a graphing calculator.

Enter the function $h = -16t^2 + 72t + 5$ as $y = -16x^2 + 72x + 5$ on the **Y=** screen and graph the function.

Use the **CALC** feature and select **MAXIMUM**. Set left and right bounds on the maximum point and calculate the point's coordinates. The coordinates of the maximum point are $(2.25, 86)$.



The T-shirt will reach its maximum height of 86 ft after 2.25 s . The range of the function is $5 \leq h \leq 86$.

Homework

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