

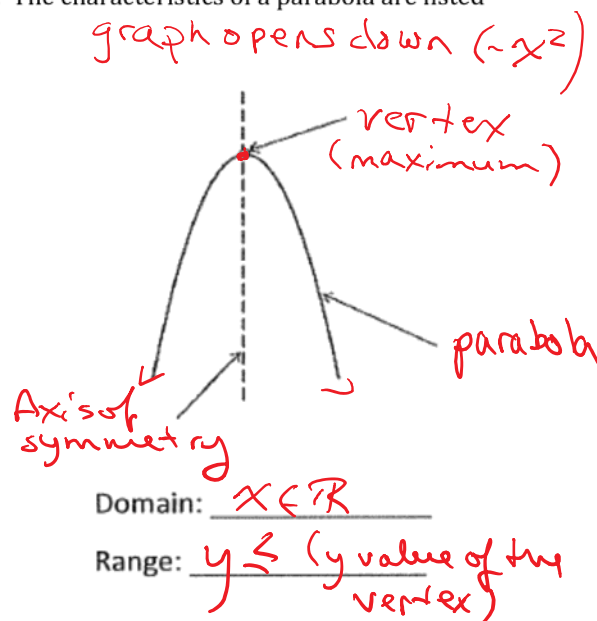
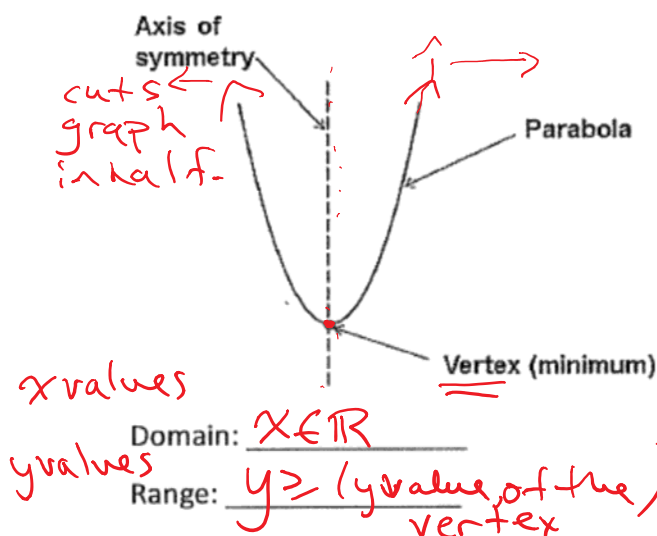
4.1 Properties of Quadratic Functions Notes

Monday, January 4, 2016 8:48 AM

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A quadratic fcn. is any function that can be written in the form $y = ax^2 + bx + c$ where a, b , and $c \in \mathbb{R}$ and $a \neq 0$. This is called the general form of the equation of a quadratic function.

The graph of every quadratic function is a curve called a parabola. The characteristics of a parabola are listed below

Definitions:

Vertex = the maximum or minimum point of a graph; written as a coordinate point:

(x, y)

Equation of the Axis of Symmetry = the equation of the line which intersects the vertex $x = v$ of the graph and divides the graph into two equal halves

y-Intercept = the point at which the graph crosses the y-axis

x-Intercept = the point at which the graph crosses the x-axis

Domain = all possible values of x

Range = all possible values of y

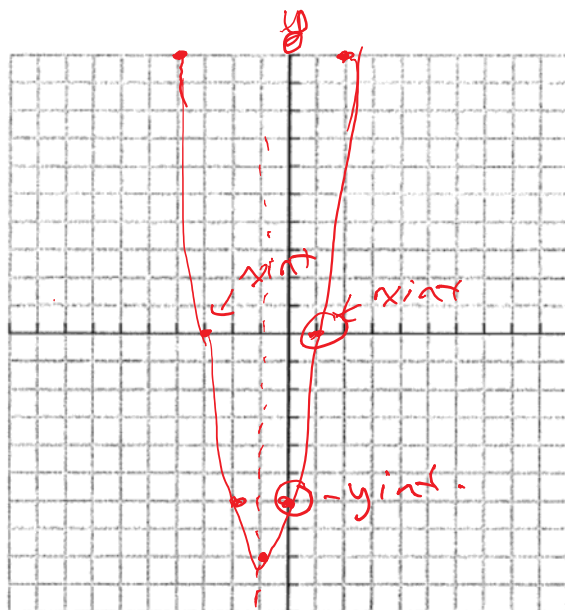
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$$y = 2(-4)^2 + 4(-4) - 6$$

Example 1: Graph $y = 2x^2 + 4x - 6$ for these values

of x : $-4 \leq x \leq 2$ and determine the intercepts,
 coordinates of the vertex, the equation of the axis
 of symmetry, and the domain & range.

x	y
-4	10
-3	0
-2	-6
-1	-8
0	-6
1	0
2	10

x-int: $(1, 0)$; $(-3, 0)$ y-int: $(0, -6)$ Vertex: $(-1, -8)$ equation of the axis of
symmetry: $x = -1$ 

Sometimes the x-intercept cannot be identified from the table or graph, so we need to find them another way. This can be completed by solving the quadratic equation by setting $y = 0$.

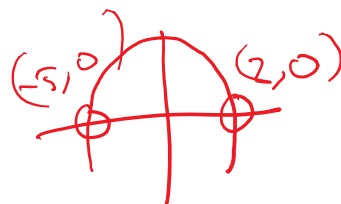
Example 2 Determine the x-intercepts (sometimes called zeros of the function) of the graph $-2x^2 - 6x + 20$ by solving the quadratic equation.

$$-2x^2 - 6x + 20 = 0$$

$$-2(x^2 + 3x - 10) = 0$$

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

$$x = -5, x = 2$$



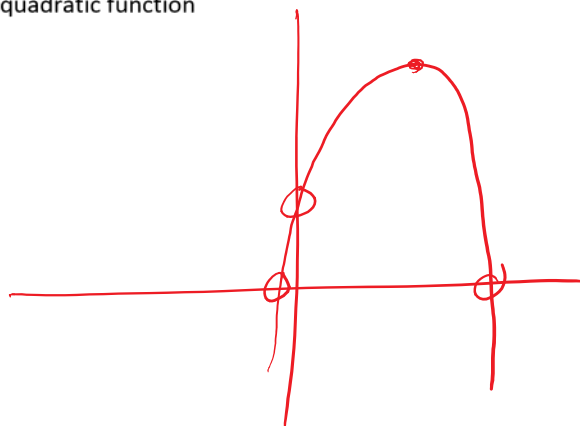
When the coefficient in the equations of the function are fractions or decimals, use graphing calculator technology to graph them.

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Example 3 A projectile is launched upward with a speed of 50 m/s. Its height, h metres, after t seconds is modeled by the equation $h = -4.9t^2 + 50t + 10$.

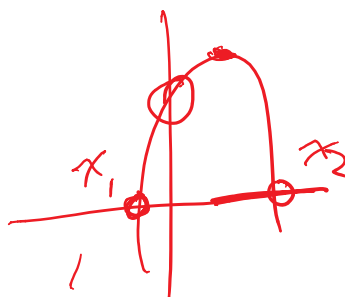
(see pg. 255 for similar example and steps to solve with graphing calculator)

- a. Graph the quadratic function



- b. Identify and explain the significance of the intercepts, the coordinates of the vertex, the domain, the range.

$x_{int}: (-0.196, 0)$
 $(10.400, 0)$
 $y_{int}: (0, 10)$
 vertex: $(5.102, 137.551)$



Explain. $(t, h) \rightarrow (x, y)$

x_1 ignore (neg)

x_2 time the projectile hit the ground

vertex. means the project reached its max height 137.551m @ 5.102 seconds

at $t=0$ it was thrown at 10m

y-int: at $t=0$ it was thrown at 10m.

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c.

