

HAT  
Quadratic Functions and Equations

9/18/17

## Talk a Mile a Minute Round 1

parabola

quadratic formula

complete the square

maximum

exponent

zero product property

polynomial

## Talk a Mile a Minute Round 2

axis of symmetry

x intercepts

discriminant

factor

degree

quadratic

zero

# VOCABULARY REVIEW

Ex#1: Consider the function  $f(x) = x^2 - 2x - 8$

quadratic term

constant term

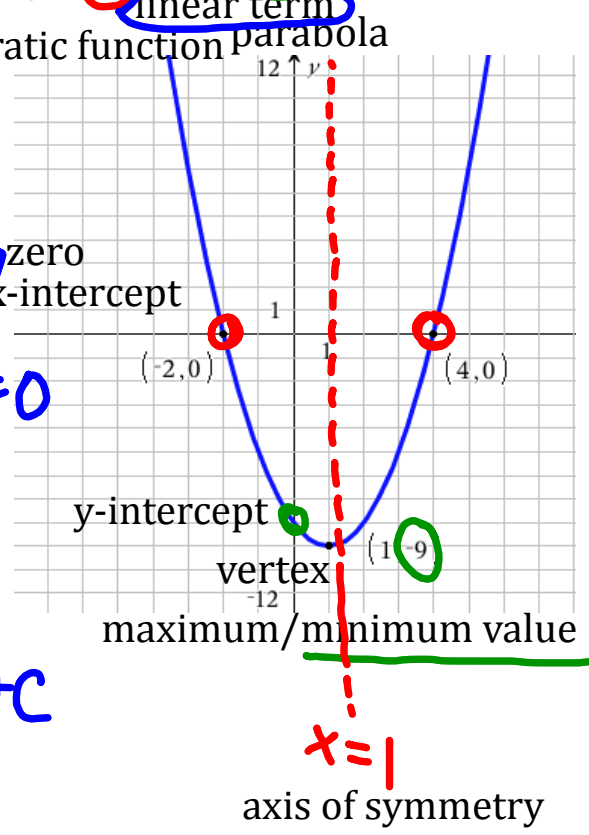
linear term

domain  $\{x | x \in \mathbb{R}\}$

range  $\{y | y \in [-9, \infty)\}$

root  
 $x^2 - 2x = 8$      $x^2 - 2x - 8 = 0$   
 solutions = roots

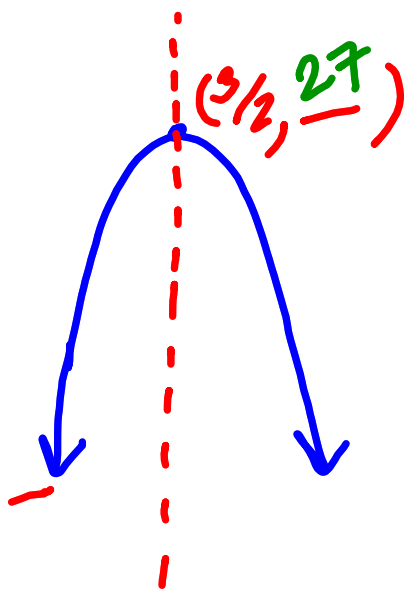
standard form  
 $y = ax^2 + bx + c$



$x = 1$   
 axis of symmetry

Ex#2: Find the ~~minimum~~ maximum value of the function

$$f(x) = -4x^2 + 12x + 18 \quad 0 = -4x^2 + 12x + 18$$



leading  
Coefficient  
negative  
positive

Q.F.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Axis of  
Symmetry

Axis of Symmetry

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

$$x = \frac{-12}{2(-4)} = \frac{3}{2}$$

$$f\left(\frac{3}{2}\right) = -4\left(\frac{3}{2}\right)^2 + 12\left(\frac{3}{2}\right) + 18$$

$$f\left(\frac{3}{2}\right) = -4\left(\frac{9}{4}\right) + 18 + 18$$

$$f\left(\frac{3}{2}\right) = 27$$

Maximum value = 27

Ex#3: Consider the function  $f(x) = x^2 - 2x - 8$

quadratic equation

$$x^2 - 2x - 8 = 7$$

$$x = -3, x = 5$$

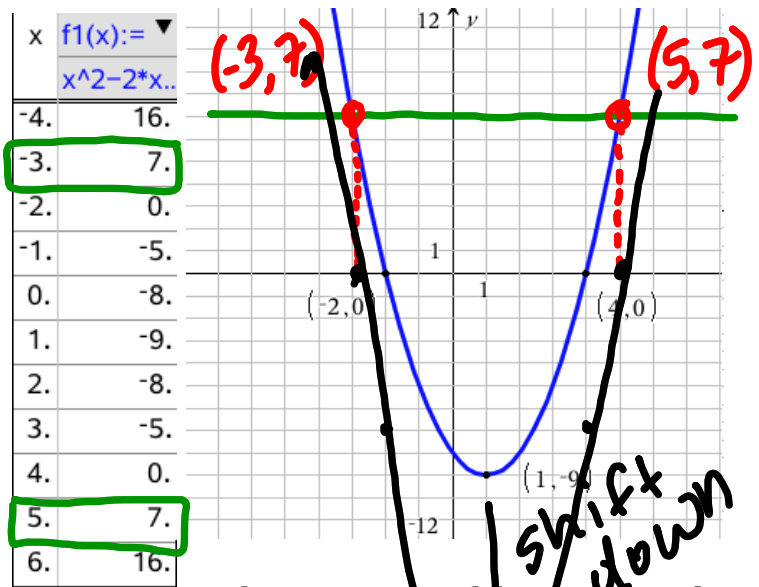
Algebraically

$$x^2 - 2x - 15 = 0$$

$$(x-5)(x+3) = 0$$

$$x-5=0 \quad x+3=0$$

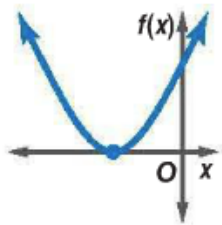
$$x=5 \quad x=-3$$



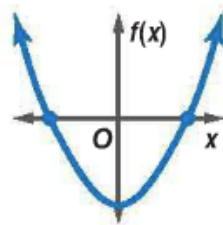
solve using a table and graph

$$x = -3 \text{ or } x = 5$$

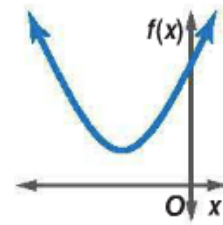
A quadratic equation can have one real solution, two real solutions, or no real solutions.



one real solution



two real solutions



no real solution

Ex#4: Find the equation of a curve that matches the data shown in the table.

x	f(x)
-4.	16.
-3.	7.
-2.	0.
-1.	-5.
0.	-8.
1.	-9.
2.	-8.
3.	-5.
4.	0.
5.	7.
6.	16.

→ vertex ←

$$y = ax^2 + bx + c$$

$$y = ax^2 + bx - 8$$

$$y = x^2 + bx - 8$$

$$0 = (-2)^2 + b(-2) - 8$$

$$0 = 4 - 2b - 8$$

$$0 = -2b - 4$$

$$4 = -2b$$

$$-2 = b$$

finite difference  
create a system

$$y = x^2 - 2x - 8$$



Assignment: page 224 #26, 34, 39, 42  
page 234 #23, 24, 25, 34, 55

September 18, 2017

