PAPAAT

Name_____

Date_____ Period_____

Unit 1 -- Intro to functions (exploring through quadratics)

Day 2 -- Notes & In-class Activities

Learning Goal Today:

I can find the 'key' or 'important' points of a quadratic when given in standard form

Skill 1: convert these standard for quadratics into the equivalent factored form

$f(x)=2x^2-6x-20$	$f(x)=x^2+7x+10$	$f(x)=2x^2-14x-36$	$f(x)=5x^2+40x+75$
$f(x)=2(x-5)(x+2)$	$f(x)=(x+5)(x+2)$	$f(x)=2(x^2-7x-18)$ $f(x)=2(x-9)(x+2)$	$f(x)=5(x^2+8x+15)$ $f(x)=5(x+5)(x+3)$

Skill 1: (circle one)	SOLID GOLD	WILL GET IT FOR CERTAIN	JUST NEED MORE PRACTICE PROBS	NEED HELP

Skill 2: Find the X-intercepts for the quadratic (in standard form) by using the 'zero product property'

ZERO PRODUCT PROPERTY

State the value for x

$(19)(0)=x$ $\quad x=0$

$(7)(x)=0$ $\quad x=0$

$(-3)(x-2)=0$

$x-2=0$

$x=2$

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

$x^2+6x+8=0$

Finding the X-intercepts

Example:

$f(x)=4x^2-20x+24$

step 1:

$f(x)=4(x^2-5x+6)$

$f(x)=4(x-3)(x-2)$

step 2:

$0=4(x-3)(x-2)$

step 3: $x=3$ $x=2$

step 4: $(3,0)$; $(2,0)$

Notes:

step 1: Factor the quadratic

step 2: Finding x-intercepts…this means y = 0

$f(x)=0$

step 3: Use the zero product property

step 4: Write the x-intercepts as a coordinate pair (i.e. -- (, 0) and (, 0)

$5(2x+3)=0$

$5(2(-3)+3)\neq 0$

$x=-3$

$2x+3=0$

$2x=-3$

$x=-3/2$

$y=2x^2-9x+7$

$y=(x-1)(2x-7)$ $\quad (1,0)$

$0=(x-1)(2x-7)$ $\quad (\frac{7}{2},0)$

$x=1$ $\quad x=\frac{7}{2}$ $\rightarrow 2x-7=0$

Skill 2 Practice: Write the coordinates for the x-intercepts for these 2nd degree functions (quadratics)

1) $f(x) = x^2 - 10x - 39$ 2) $f(x) = 2x^2 + 4x - 48$ 3) $f(x) = 3x^2 + 30x + 63$

$f(x) = 2(x^2 + 2x - 24)$ $f(x) = 3(x^2 + 10x + 21)$

(13, 0)
(-3, 0)

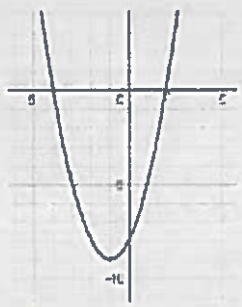
(-6, 0)
(4, 0)

(-7, 0)
(-3, 0)

LT 2: (circle one)	SOLID GOLD	WILL GET IT FOR CERTAIN	JUST NEED MORE PRACTICE PROBS	NEED HELP

Skill 3: Use the X-intercepts to find the coordinates of the vertex

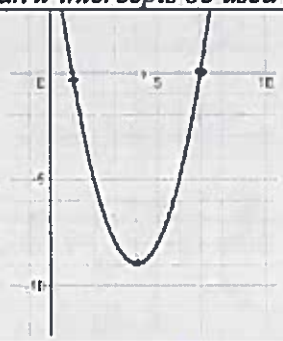
Initial Concept needed—how can x-intercepts be used to find the x-coordinate of the vertex?



1.1)

x-intercepts
(-4, 0) (2, 0)

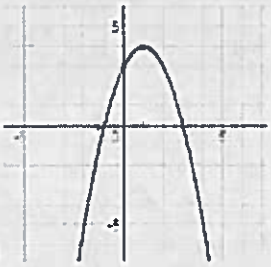
vertex
(-1, -9)



1.2)

x-intercepts
(1, 0) (7, 0)

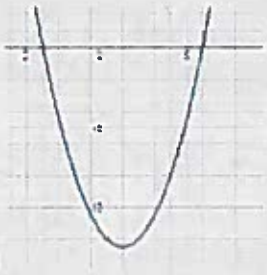
vertex
(4, -9)



1.3)

x-intercepts
(-1, 0) (3, 0)

vertex
(1, 4)



1.4)

x-intercepts
(-4, 0) (6, 0)

vertex
(1, 13)

Finish this sentence:

To find the x-coordinate of the vertex I can use the x-intercepts by ....

<u>Apply your rule to write the x-coordinate of the vertex for a quadratic (2nd degree polynomial) with given x-intercepts</u>

x-intercepts
(1 ,) (9 ,)

vertex
(5,)

x-intercepts
(–3 ,) (5 ,)

vertex
(1,)

x-intercepts
(2 ,) (-4,)

vertex
(–1 ,)

x-intercepts
(4 ,) (14,)

vertex
(9 ,)

(0.731, 0)
(0.516, 0)

$\frac{2+b}{2} = -1$

Skill 3 continued:
Use your quadratic skills to write the coordinates for all the 'key' or 'important' points of a quadratic

Example:

$$f(x) = 5x^2 - 20x - 105$$

step 1:

$f(x) = 5(x^2 - 4x - 21)$

$f(x) = 5(x-7)(x+3)$

step 2:

$(7,0)$ $(-3,0)$

$0 = 5(x-7)(x+3)$

step 3:

$\frac{7+-3}{2}$

$(2,-125)$

$f(2) = 5(2-7)(2+3)$

$5(-5)(5)$

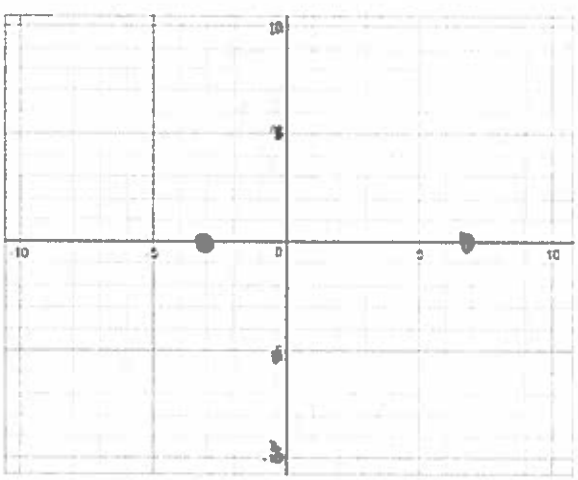
step 4:

$(0,-105)$

$f(0) = 5(0)^2 - 20(0) - 105$

OR $f(0) = 5(0-7)(0+3)$

step 5:



Notes:

step 1: Factor the quadratic

step 2: Finding <u>x-intercepts</u>…
a) Set y = 0
b) Use zero product property

step 3: Finding the <u>vertex</u>….
a) Use the x-intercepts to find the x-coordinate of the vertex
b) Plug the vertex x-coordinate into the function to solve for the y-coordinate of the vertex

step 4: Find the coordinates of the <u>y-intercept</u>
a) y-intercepts have x-coordinate of 0
(0,)
b) Plug 0 in for x…solve…this will be the y-coordinate of the y-intercept

step 5: Use the 4 critical points to sketch an accurate(ish) graph

y-intercept
$(0,-105)$
x-intercepts
$(7,0)$ $(-3,0)$
vertex
$(2,-125)$

Skill 3 Practice: Find the 'key' or 'important' points for each and sketch the graph for each quadratic

1) $f(x) = x^2 - 6x + 8$

factored form $f(x) = (x-4)(x-2)$

x-int (4,0) (2,0)

vertex $\frac{4+2}{2} \rightarrow (3,-1)$

$f(3) = (3-4)(3-2)$

y-int (0,8)

2) $f(x) = 2x^2 + 4x - 16$

$f(x) = 2(x+4)(x-2)$

x-int (-4,0) (2,0)

vertex $\frac{-4+2}{2}$ (-1,-18)

$f(-1) = 2(-1+4)(-1-2)$

y-int (0,-16)

3) $f(x) = 3x^2 + 30x + 27$

$f(x) = 3(x^2 + 10x + 9)$

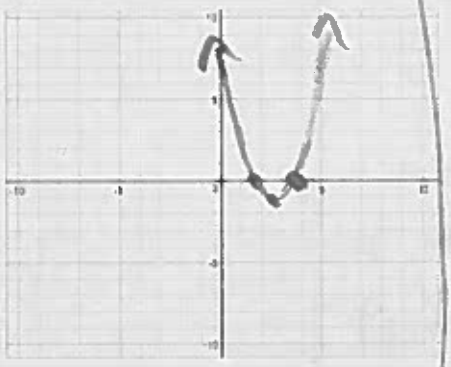
$f(x) = 3(x+9)(x+1)$

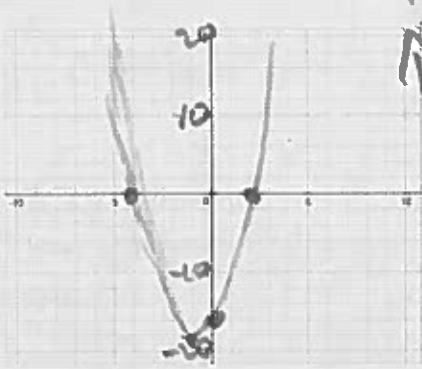
x-int (-9,0) (-1,0)

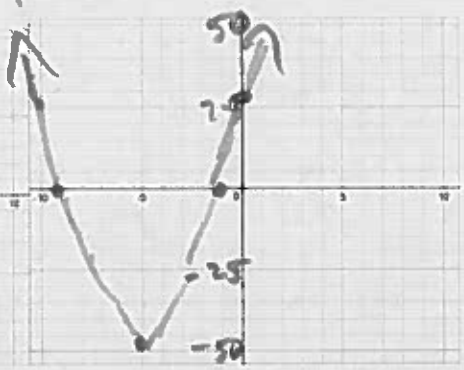
vertex (-5,-48)

y-int (0,27)

y-intercept (,) ***x-intercepts*** (,)(,) ***vertex*** (,)	***y-intercept*** (,) ***x-intercepts*** (,)(,) ***vertex*** (,)	***y-intercept*** (,) ***x-intercepts*** (,)(,) ***vertex*** (,)







Skill 3: SOLID GOLD WILL GET IT FOR CERTAIN JUST NEED MORE PRACTICE PROBS NEED HELP
(circle one)

ASSIGNMENT on BACK

ASSIGNMENT

Find the key points for each & use to sketch the function's graph.

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

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

x-int

$(-6,0)(1,0)$

vertex

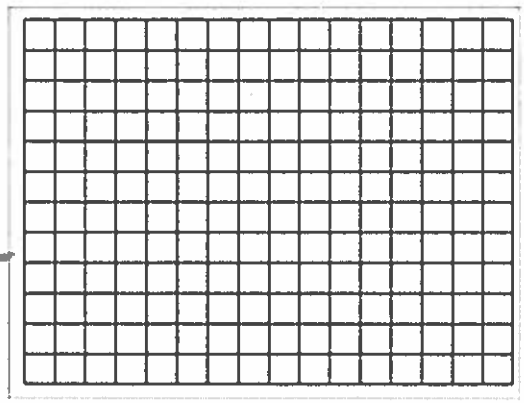
$\frac{-6+1}{2} = -\frac{5}{2}$

vertex

$(-\frac{5}{2}, -12.25)$

y-int

$(0,-6)$



b) $y = -2x^2 - 4x + 16$

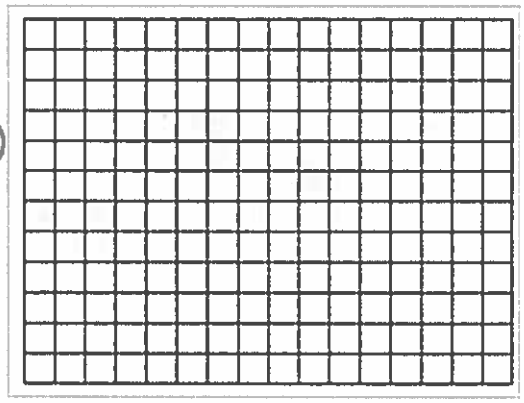
$y = -2(x^2 + 2x - 8)$

$-2(x-4)(x+2)$

$(4,0)(-2,0)$

$(1,18)$

$(0,16)$



c) $y = -5x^2 + 17x - 6$

$y = -(5x^2 - 17x + 6)$

$y = -(5x-2)(x-3)$

$(\frac{2}{5}, 0)$

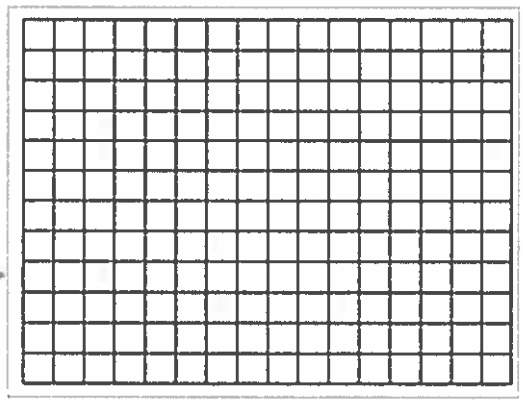
$(3,0)$

vertex

$(1.7, 8.45)$

y-int

$(0,-6)$



d) $y = 4x^2 - 10x - 6$

$y = 2(2x^2 - 5x - 3)$

$y = 2(2x+1)(x-3)$

$(-\frac{1}{2}, 0)(3,0)$

$(1.25, -12.25)$

$(0,-6)$