Name: _____ Date: _____ Hour: ____Alg 1____

Unit 7C Day 26: Intercept form of a quadratic

Focus Question: How do I graph a quadratic in intercept form?

A. Review

We know two forms of quadratics so far…

1. The function $f(x) = 3(x-4)^2 + 7$ is in vertex form because we can immediately tell the vertex which is at (4, 7). All quadratics have a real vertex, so all quadratics can be written in this form.

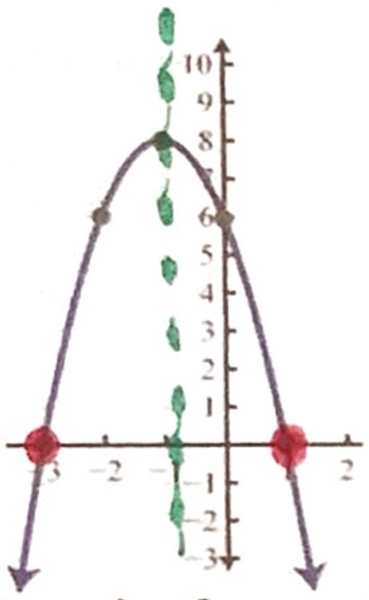
2. The function $f(x) = \frac{2}{3}x^2 - 3x + 6$ is in standard form because it is from highest to low degree. We can immediately tell the y int. which is at (0, 6). All quadratics have real y-intercepts so all quadratics can be written in this form.

3. What is/are the other important points of a quadratic? x-intercept

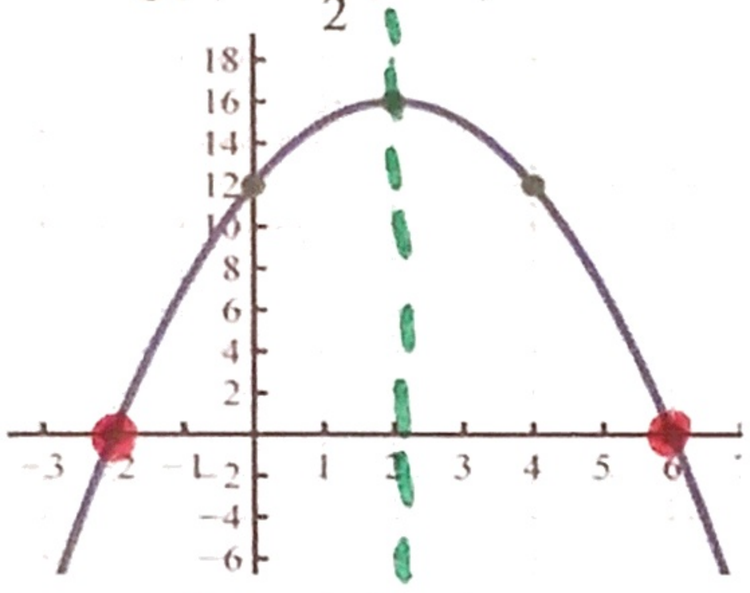
B. New Form

1. Each of the following quadratics in vertex form has been graphed.

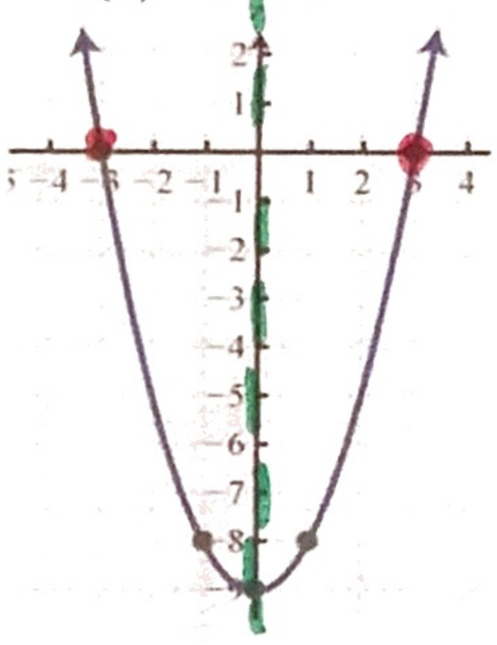
$f(x) = -2(x+1)^2 + 8$



$g(x) = -\frac{1}{2}(x-2)^2 + 16$



$h(x) = x^2 - 9$



Give the axis of symmetry and x intercepts for each function.

Axis of symmetry: x = -1

X Intercepts: (-3, 0) and (1, 0)

Axis of symmetry: x = 2

X Intercepts: (-2, 0) and (6, 0)

Axis of symmetry: x = 0

X Intercepts: (-3, 0) and (3, 0)

2. Each of the following equations is a different way to write the quadratic. Match it to the graph.

when in ( ) with x still think opp.

a. $j(x) = -\frac{1}{2}(x+2)(x-6)$ matches g(x) because… started with a = -½

b. $k(x) = -2(x+3)(x-1)$ matches f(x) because… started with a = -2

c. $m(x) = (x+3)(x-3)$ matches h(x) because… a = 1

3. How are the axis of symmetry and the x intercepts related? (In other words, if you knew the x-intercepts, how could you find the axis of symmetry?)

the a.o.s. is exactly halfway btwn the x int's

4. What form would you call $j(x)$, $k(x)$, and $m(x)$? Explain.

Intercept form b/c you can immediately see the x-int.

C. Intercept form of a quadratic is $f(x) = a(x-p)(x-q)$.

1. The x intercepts are found at (p, 0) and (q, 0) (Just like in vertex form, if it is in the parenthesis with x you should think opposite

2. The axis of symmetry is found at $x = \frac{p+q}{2}$

3. To find the *y* value of the vertex, substitute the *x* value of the a.o.s. into the function.

4. If a < 0, the parabola open down.

   If $|a| > 1$ the parabola is skinny. If $0 < |a| < 1$, the parabola is wider.

D. Use the function $f(x) = (x+1)(x-5)$ to answer each question.

1. Prove it is a quadratic.

$x(x-5)+1(x-5)$

$x^2-5x+1x-5$

x^2-4x-5

2. Where are the x- intercepts?

(-1, 0) (5, 0)

3. Where is the axis of symmetry?

$\frac{-1+5}{2} \Rightarrow \frac{4}{2} \Rightarrow 2$ $x = 2$

4. Where is the vertex?

$f(2) = (2+1)(2-5)$

$= 3(-3)$

$= -9$ (2, -9)

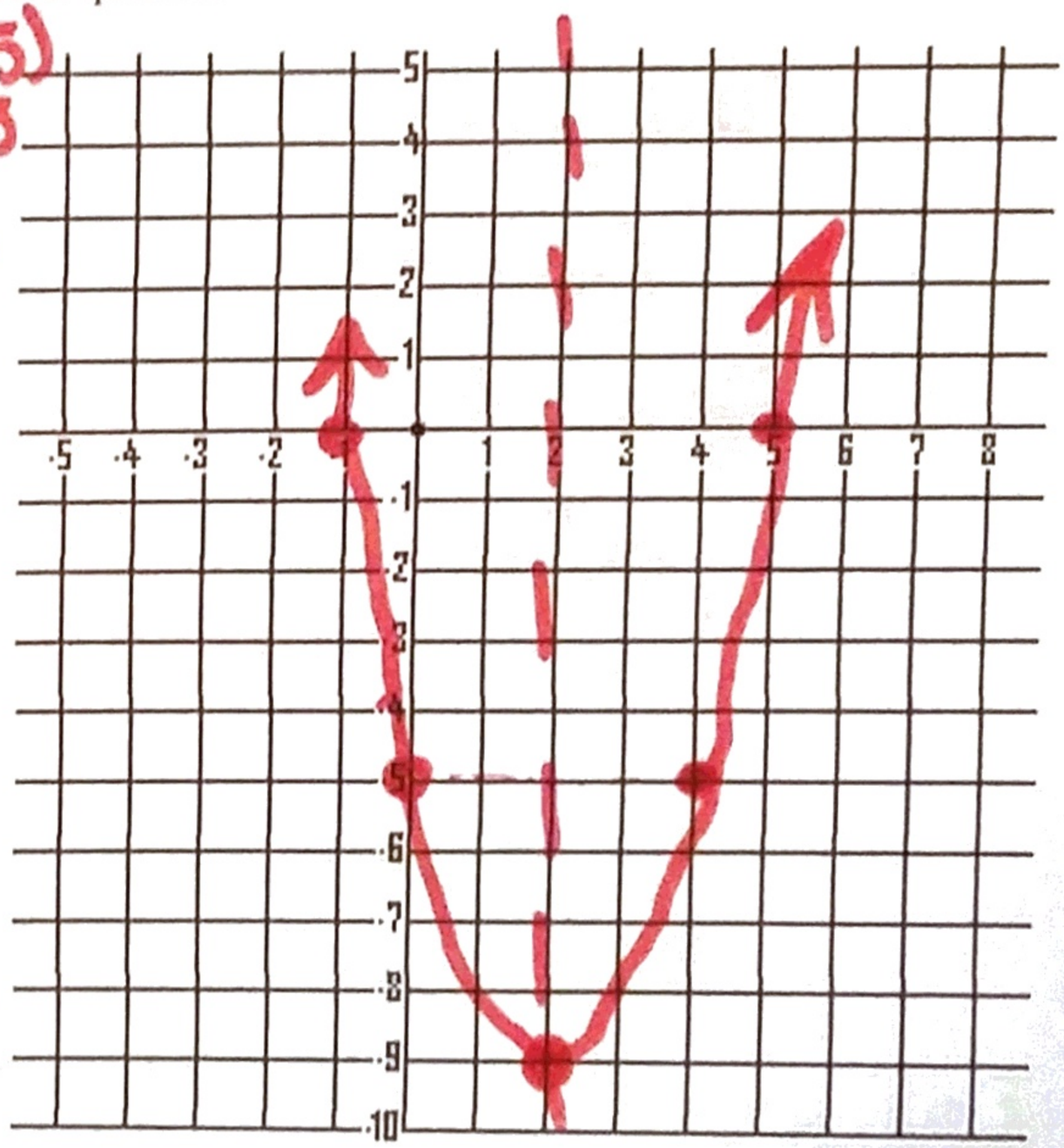
5. Where is the y-intercept?

$f(0) = (0+1)(0-5)$

$= 1(-5)$

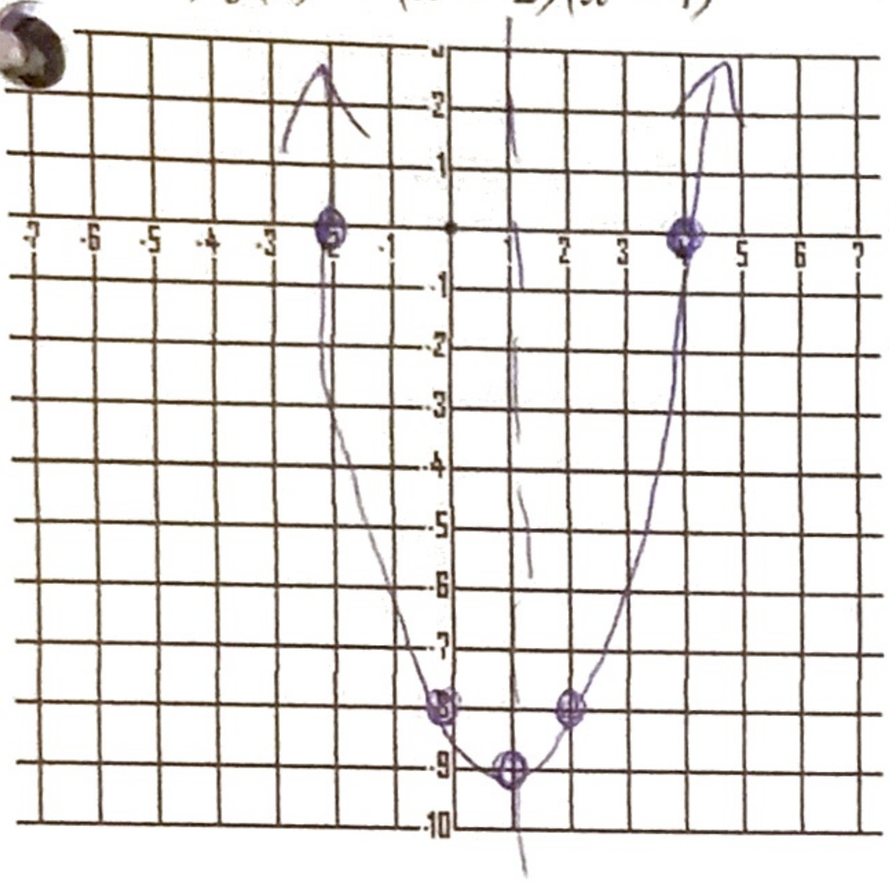
$= -5$ (0, -5)

6. Graph the function.



E. Graph each function given in intercept form.

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



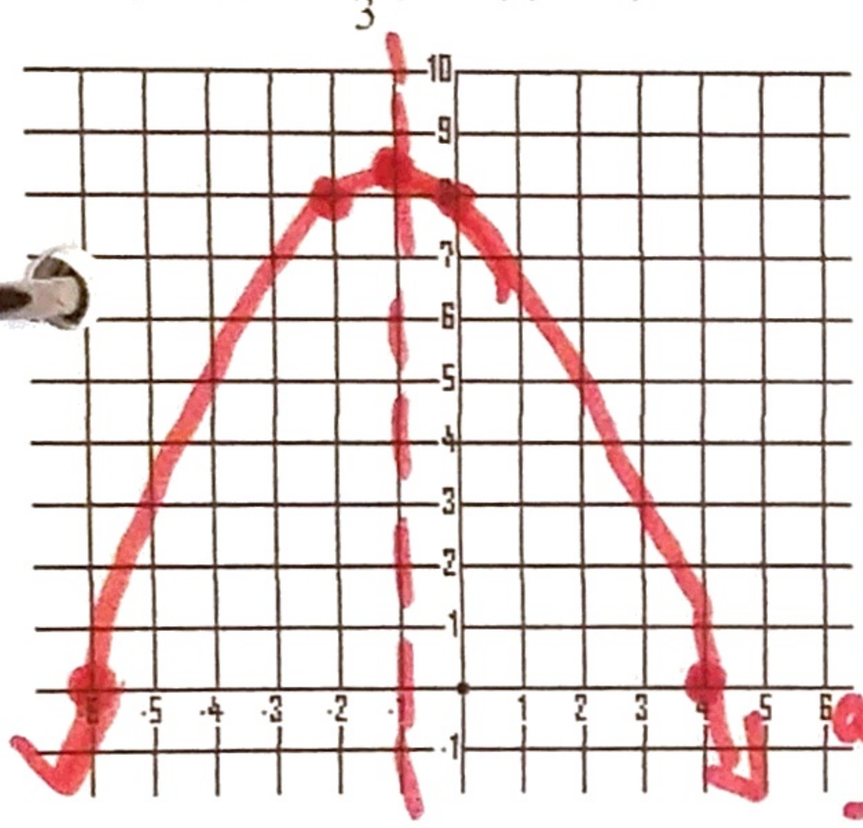
x int (-2,0) (4,0)

a.o.s. $x = \frac{-2+4}{2} \Rightarrow \frac{2}{2} \Rightarrow 1$ $x = 1$

Vertex $f(1) = (1+2)(1-4)$
$= (3)(-3)$ (1, -9)
$= -9$

addpt. $x = 0$ $f(0) = (0+2)(0-4)$
$= 2(-4)$ (0, -8)
$= -8$

3) $h(x) = -\frac{1}{3}(x+6)(x-4)$



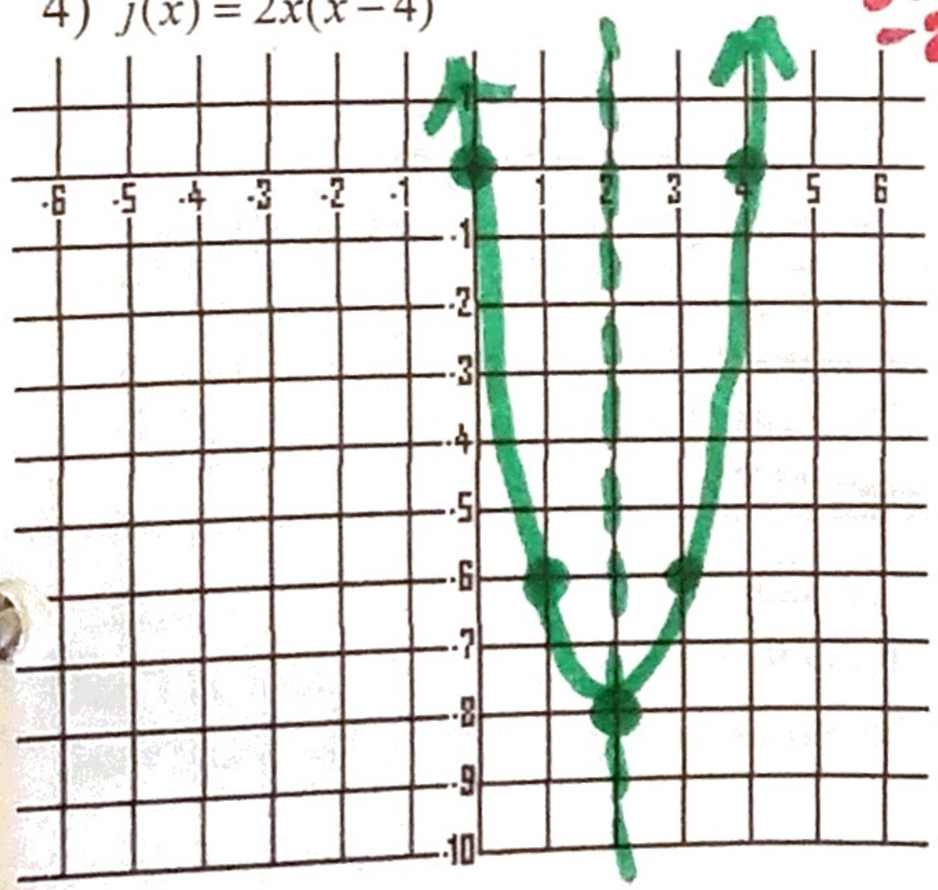
x int (-6,0) (4,0)

$x = \frac{-6+4}{2} \Rightarrow \frac{-2}{2} \Rightarrow -1$ $x = -1$

Vertex $h(-1) = -\frac{1}{3}(-1+6)(-1-4)$
$= -\frac{1}{3}(5)(-5)$
$= -\frac{1}{3}(-25) \Rightarrow \frac{25}{3}$
$(-1, 25/3)$

add.pt. $h(0) =$
$-\frac{1}{3}(0+6)(0-4)$
$-\frac{1}{3}(6)(-4)$
$-2(-4)$
8 (0, 8)

4) $j(x) = 2x(x-4)$



x int (0,0) (4,0)

$x = \frac{0+4}{2} \Rightarrow \frac{4}{2} \Rightarrow 2$ $x = 2$

vertex $j(2) = 2(2)(2-4)$
$= 4(-2)$ (2, -8)
$= -8$

addpt: $x = 1$
$j(1) = 2(1)(1-4)$ (1, -6)
$= 2(-3)$