Name: Blank.... literally !! Per: ________ Date: ______________
Serafino · Algebra 2E

Let r stand for "roots". $(r_1, 0)$ and $(r_2, 0)$ are the x-intercepts. This form should look a little familiar to you.
In fact, you'll spend quite some time getting quadratics and polynomials to look like this

To understand why this form works so well, all you have to understand is what an x-intercept is and how multiplication works.

Because intercept form is basically a product of two lines, The Zero Produce Property comes in handy.

The Zero Product Property says "Something times zero is zero"

Let's say there's a jumping competition between Hannah, George and Felix, so see who's got the best ups.

They start the stopwatch at x = 0 and all they all jump on "________!". They are all in the air for ______ seconds.

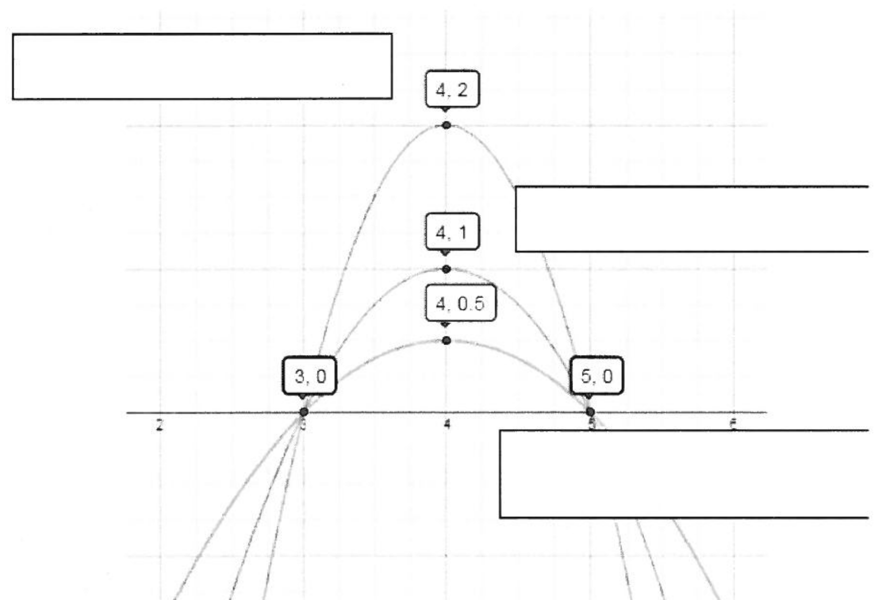
George jumps _____ as high as high as Hannah. Function notation: g(x) =
Felix jumps _______ times as high as George. f(x) =
Hannah jumps ______ as high as Felix. h(x) =

A few things to notice...

1. How can we get the intercepts from the factors?

2. Where, location wise, is the AOS and Vertex?

3. How do you find where the actual vertex is?



Note that in the graph shown above, f(x), g(x) and h(x) all have the same x-intercepts and different leading coefficients.
The "a" does not affect your intercepts; it only affects vertical stretch and growth.

a. Rewrite f(x), g(x) and h(x) in vertex form.

$f(x) =$ $g(x) =$ $h(x) =$

1. Find the roots (x–intercepts) and vertex of the following functions:

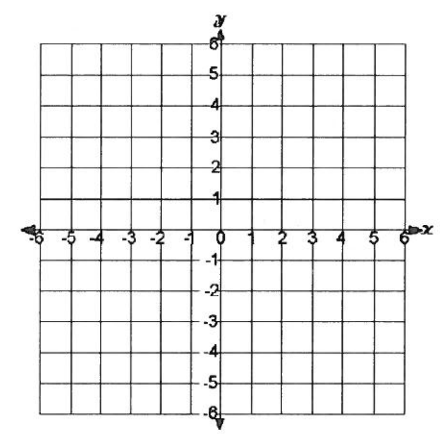
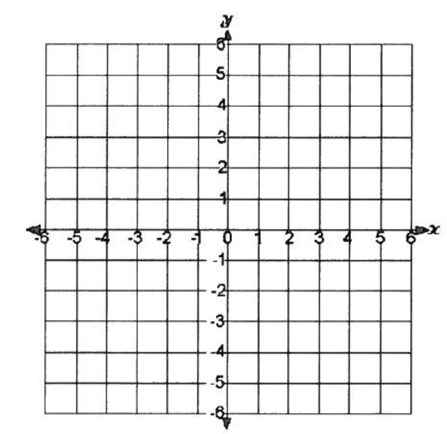
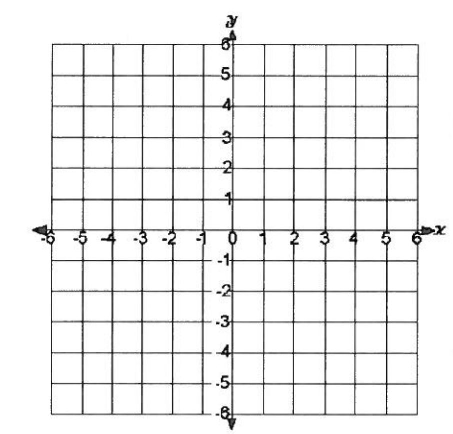
$f(x) = (x-4)(x-9)$ $\qquad$ $f(x) = -2(x-3)(x+3)$ $\qquad$ $f(x) = x(x-26)$

$f(x) = 2x(x-8)$ $\qquad$ $f(x) = -\frac{1}{2}(5x+6)(2x-9)$ $\qquad$ $f(x) = \frac{2}{3}(2x-4)(3x+3)$

$f(x) = (2x-3)(5x-1)$ $\qquad$ $f(x) = -0.6(x+2.7)(x-5.4)$ $\qquad$ $f(x) = \frac{2}{3}(2x+4)(3x+3)$

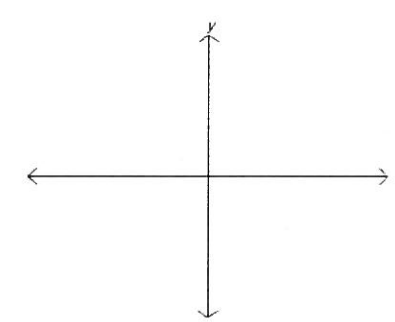
2. Graph the following:

a. $f(x) = \frac{1}{4}(x+2)(x-6)$ $\qquad$ b. $f(x) = -x(x-4)$ $\qquad$ *c. $f(x) = 5.5(5-x)(x+3)$

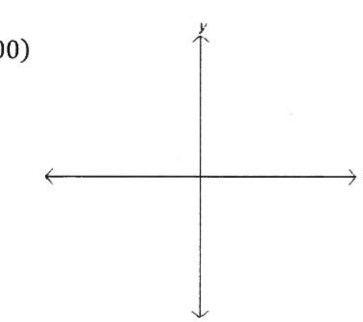
3. As we deal with real–world situations, your graphs will rarely be to scale. Just make sure your intercepts, AOS and vertex are in the correct quadrant and label your sketches whenever you can.

$y = 6(5x - 10)(x+8)$



Vertex:

$y = -\frac{1}{1000}(x-2)(x+100)$



Vertex:

Name: key Per: ________ Date: ______________

Serafino · Algebra 2E

3B Quadratics in Intercept Form $f(x)=a(x-r_1)(x-r_2)$

(aka Factored Form

Let r stand for "roots". $(r_1, 0)$ and $(r_2, 0)$ are the x–intercepts. This form should look a little familiar to you. In fact, you'll spend quite some time getting quadratics and polynomials to look like this

To understand why this form works so well, all you have to understand is what an x–intercept is and how multiplication works.

Because intercept form is basically a product of two lines, The Zero Produce Property comes in handy.

The Zero Product Property says "Something times zero is zero"

Let's say there's a jumping competition between Hannah, George and Felix, so see who's got the best ups.

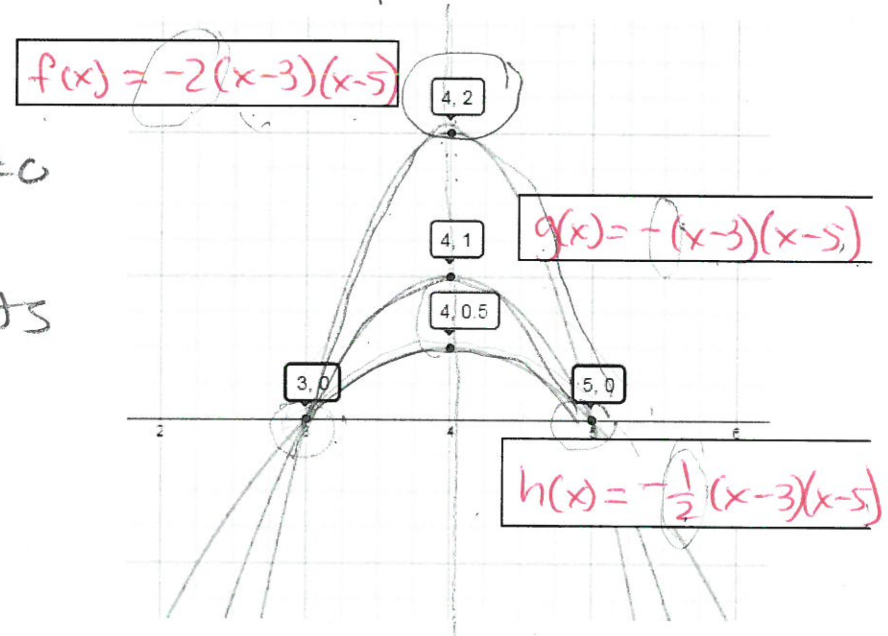
They start the stopwatch at x = 0 and all they all jump on "_3_!". They are all in the air for _2_ seconds.

George jumps _2_ as high as high as Hannah. Function notation: $g(x) = 2h(x)$

Felix jumps _2_ times as high as George. $f(x) = 2g(x)$

Hannah jumps _1/4_ as high as Felix. $h(x) = \frac{1}{4}f(x)$

A few things to notice…



1. How can we get the intercepts from the factors?

Set each linear factor = 0

2. Where, location wise, is the AOS and Vertex?

AOS = average of intercepts $\frac{r_1+r_2}{2}$

3. How do you find where the actual vertex is?

Plug in AOS

Note that in the graph shown above, f(x), g(x) and h(x) all have the same x–intercepts and different leading coefficients. The "a" does not affect your intercepts; it only affects vertical stretch and growth.

a. Rewrite f(x), g(x) and h(x) in vertex form.

$f(x) = -2(x-4)^2+2$ $g(x) = -(x-4)^2+1$ $h(x) = -\frac{1}{2}(x-4)+\frac{1}{2}$

1. Find the roots (x–intercepts) and vertex of the following functions:

$f(x) = (x-4)(x-9)$

X: (4,0) (9,0)
V: (6.5, −6.25)

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

X: (3,0)(−3,0)
V: (0, 18)

$f(x) = x(x-26)$

X: (0,0) (26,0)
V: (13, −169)

$f(x) = 2x(x-8)$

X: (0,0)(8,0)
V: (4, −32)

$f(x) = -\frac{1}{2}(5x+6)(2x-9)$

X: $(\frac{-6}{5}, 0)(\frac{9}{2}, 0)$
V: (1.65, 40.6125)

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

X: (2,0)(−1,0)
V: (1/2, −9)

$f(x) = (2x-3)(5x-1)$

X: (3/2, 0)(1/5, 0)
V: (.85, −4.225)

$f(x) = -0.6(x+2.7)(x-5.4)$

X: (−2.7, 0)(5.4, 0)
V: (1.35, 9.8415)

$f(x) = \frac{2}{3}(2x+4)(3x+3)$

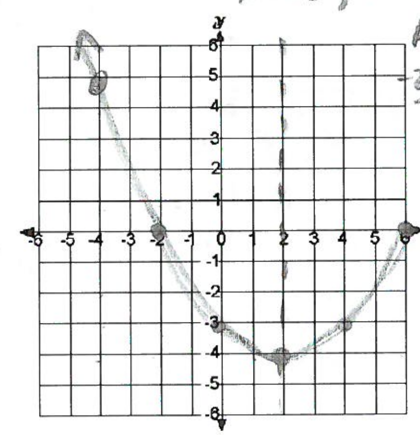
X: (−2,0)(−1,0)
V: (−1.5, −1)

2. Graph the following:

a. $f(x) = \frac{1}{4}(x+2)(x-6)$

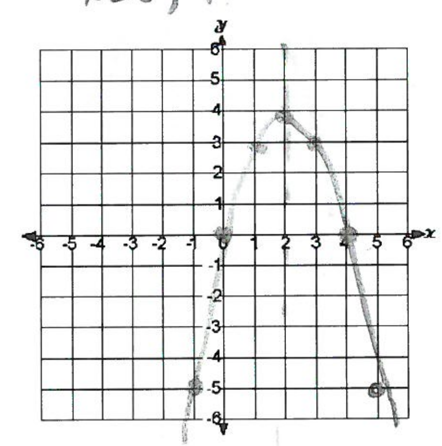
x = −2, 6

AOS
$\frac{-2+6}{2}$
$\frac{4}{2}$



b. $f(x) = -x(x-4)$

x = 0, 4

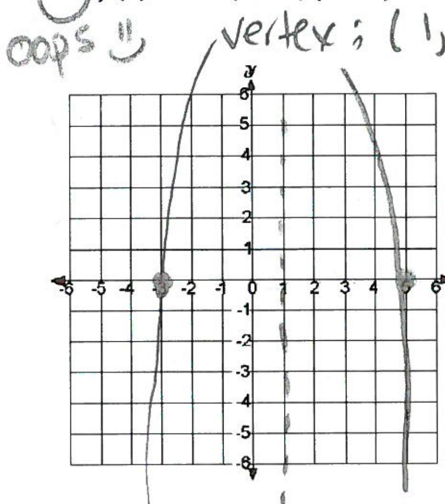


*c. $f(x) = 5.5(5-x)(x+3)$

(−x+5) → −(x−5)

oops !!

vertex: (1, 88)

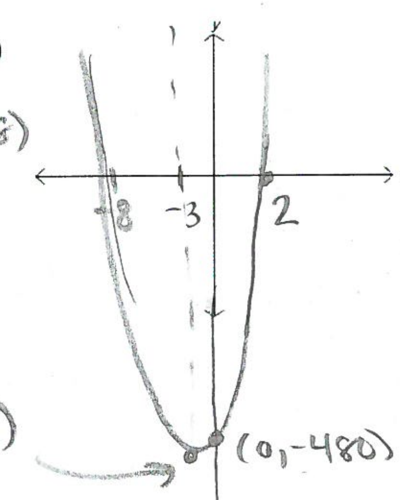


3. As we deal with real–world situations, your graphs will rarely be to scale. Just make sure your intercepts, AOS and vertex are in the correct quadrant and label your sketches whenever you can.

$y = 6(5x - 10)(x+8)$

5

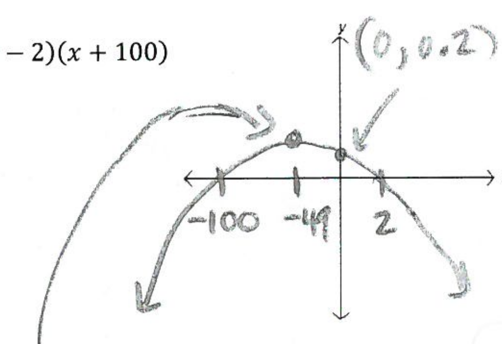
30(x−2)(x+8)



Vertex:

(−3, −750)

$y = -\frac{1}{1000}(x-2)(x+100)$



Vertex:

(−49, 2.601)