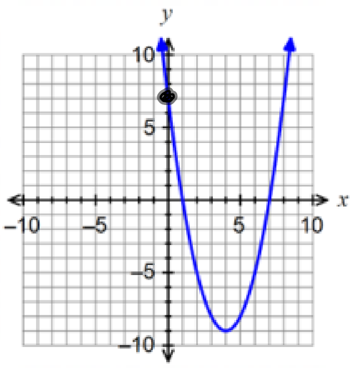
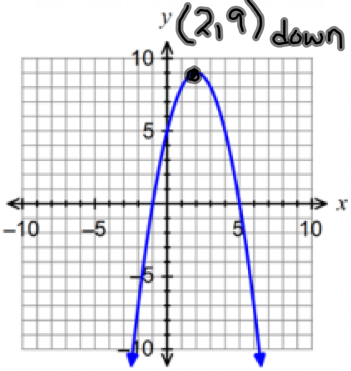
SM2 Quadratic Graphs Test Review

For each equation, fill in at least two boxes in each row AND choose the letter of the graph below the table that matches the equation.

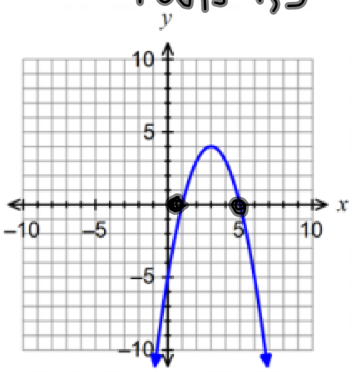
	Direction of Opening	Vertex	y-intercept	Zeros	Letter of Correct Graph
vertex 1. $y=(x+2)^2-9$ h=-2 k=-9	up	(h,k) (-2,-9)			F
vertex 2. $y=-(x-2)^2+9$ h=2 k=9	down	(2,9)			B
p=1 q=5 3. $y=-(x-1)(x-5)$ factored	down			1; 5	C
p=-1 q=-5 4. $y=-(x+1)(x+5)$ factored	down			-1; -5	D
5. $y=x^2-8x+7$ standard	up		(0,7) "c"		A
6. $y=x^2+8x+7$ standard	up		(0,7) "c"		E

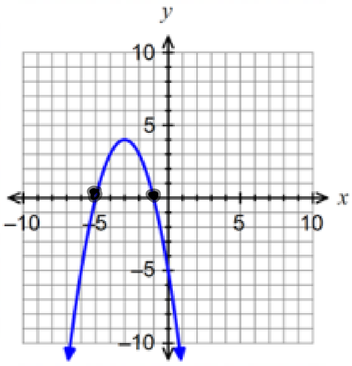


vertex (2,9) down

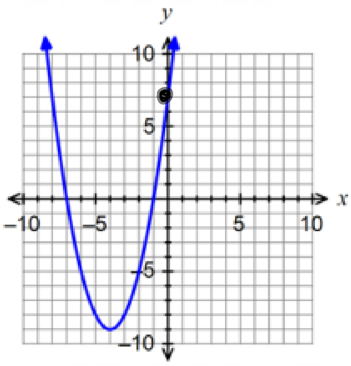


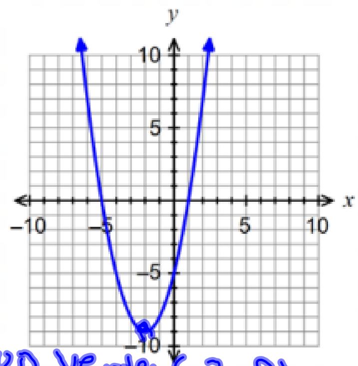
down roots 1,5





E.





up vertex(-2,-9)

For each function, find the vertex and y-intercept of the graph. Show all your work!

7. $y = 2(x+3)^2 - 7$

a=2 h=-3 k=-7

vertex form

yint $y = 2(0+3)^2 - 7$

Let x=0 $y = 11$

(h,k)

Vertex: (-3, -7)

y-intercept: (0, 11)

8. $f(x) = -x^2 + 12x - 33$

Standard

a=-1 b=12 c=-33

* $\frac{-b}{2a} = \frac{-12}{2(-1)} = \frac{-12}{-2} = 6$

$y = -(6)^2 + 12(6) - 33$

Vertex: (6, 3)

y-intercept: (0, -33)

(0, c)

9. $y = \frac{1}{5}(x+8)(x-2)$

factored

p=-8 q=2

vertex

$\frac{(p+q)}{2}$

$\frac{(-8+2)}{2} = -3$

Vertex: (-3, -5)

y-intercept: (0, -3.2)

$y = \frac{1}{5}(-3+8)(-3-2)$

in calculator

$(1 \div 5)(-3+8)(-3-2)$

$= -5$

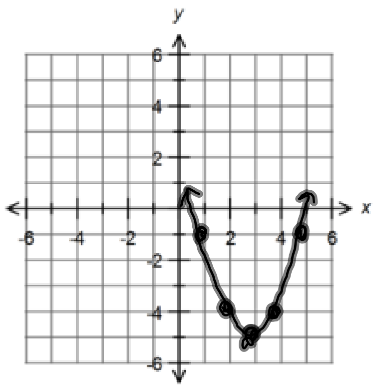
yint let x=0

$(1 \div 5)(0+8)(0-2)$

-3.2

Fill in the requested information. Then graph the function. Plot *at least* five points!

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



$a =$ 1 $b =$ -6 $c =$ 4

Form: Standard

Direction of Opening: up

Vertex: (3, -5) $\frac{-b}{2a}$

Axis of Symmetry: $X = 3$

Is the vertex a maximum or minimum? opens up

Maximum or minimum value: -5 value of y vertex

y-intercept: (0, 4)

(0, "c")

	x	$f(x)$
	1	-1
	2	-4
Vertex	3	-5
	4	-4
	5	-1

Show work here:

$\frac{-b}{2a}$ $\frac{--6}{2(1)} = \frac{6}{2} = 3$

$y = 3^2 - 6(3) + 4 = -5$

Table: 2nd graph
$y_1 = X^2 - 6x + 4$

11. $y = -2(x+2)^2 + 5$

$a =$ -2 $h =$ -2 $k =$ 5

Form: vertex

Direction of Opening: down

Vertex: (-2, 5)

Axis of Symmetry: x = -2

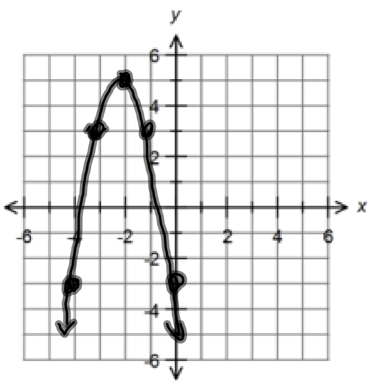
Is the vertex a maximum or minimum? max open

Maximum or minimum value: 5 y coord of vertex

y-intercept: (0, -3)

$-2(0+2)^2+5=-3$

yint Let x=0



	x	y
	-4	-3
	-3	3
Vertex	-2	5
	-1	3
	0	-3

12. $y = \frac{1}{2}(x-2)(x-6)$

$a =$ $\frac{1}{2}$ $p =$ 2 $q =$ 6

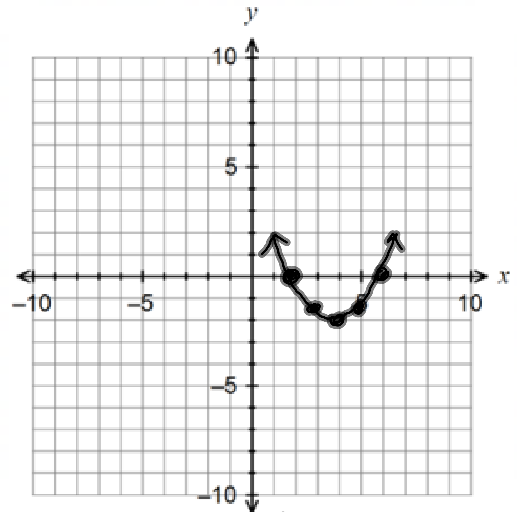
Form: factored

Direction of Opening: up

Zeros: 2 ; 6 zeros p, q

Vertex: (4, -2)

y-intercept: (0, 6)



$y_1 = (1 \div 2)(x-2)(x-6)$

x	y
2	0
3	-1.5
4	-2
5	-1.5
6	0

Vertex

Show work here:

vertex $\frac{(p+q)}{2} = \frac{(2+6)}{2} = 4$

$\frac{1}{2}(4-2)(4-6)$

$(1 \div 2)(4-2)(4-6) = -2$

yint $(1 \div 2)(0-2)(0-6) = 6$

For each function, do the following: 1) state whether the function is in standard, vertex, or factored form, 2) find the zeros (*x*-values), 3) state the *x*-intercepts (as ordered pairs), ~~and 4) find the y-intercept (as an ordered pair)~~.

13. $f(x) = x^2 - 10x + 21$

$a = 1$
$b = -10$
$c = 21$

Form: standard

Zero(s): 3, 7

x-intercept(s): (3,0) (7,0)

ordered pairs

Show work here:

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

$$\frac{10 \pm \sqrt{(-10)^2 - 4(1)(21)}}{2(1)}$$

$$\frac{10 \pm \sqrt{16}}{2}$$

$$\frac{10 \pm 4}{2}$$

$$\frac{(10+4)}{2} = \frac{14}{2} = 7$$

$$\frac{(10-4)}{2} = \frac{6}{2} = 3$$

factor

21	-10
-3·-7	-3+-7

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

$x-3=0 \quad x-7=0$

$x=3 \quad x=7$

14. $y = -6x(x+7)$

Form: factored

Zero(s): -7 ; 0

x-intercept(s): (-7,0) (0,0)

Show work here:

$$\frac{-6x}{-6} = \frac{0}{-6}$$

$x = 0$

$x + 7 = 0$
$-7 \quad -7$

$x = -7$

15. $y = 2x^2 - 4x - 34$

Form: Standard

Zero(s): $\frac{2 \pm 6\sqrt{2}}{2}$ OR $1 \pm 3\sqrt{2}$; OR $\frac{4 \pm 12\sqrt{2}}{4}$

x-intercept(s): $(1 \pm 3\sqrt{2}, 0)$

OR $(1+3\sqrt{2}, 0)(1-3\sqrt{2}, 0)$

Show work here: $a=1$ $b=-2$ $c=-17$

GCF=2

$2(x^2-2x-17)$

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

$$\frac{2 \pm \sqrt{(-2)^2-4(1)(-17)}}{2(1)}$$

$$\frac{2 \pm \sqrt{72}}{2}$$

$$\frac{2 \pm 6\sqrt{2}}{2}$$

16. $f(x) = (x-2)^2 + 25$

Form: vertex

Zero(s): $2 \pm 5i$

x-intercept(s): none

Show work here:

$0 = (x-2)^2 + \cancel{25}$

$-25 \qquad \cancel{-25}$

$-25 = (x-2)^2$

$\pm\sqrt{-25} = \sqrt{(x-2)(x-2)}$

$\pm 5i = x-2$

$\boxed{2 \pm 5i = x}$

Vocabulary

Write the letter of the definition that best describes each word, phrase, or expression in the appropriate blank. <u>One of the definitions will be used three times!</u>

C Axis of Symmetry (What is it?)

I Equation of the Axis of Symmetry

G Factored Form of a Quadratic Function

E Maximum Point

B Minimum Point

K $\frac{-b}{2a}$

J Quadratic Function

F Roots

A Standard Form of a Quadratic Function

H Vertex

D Vertex Form of a Quadratic Function

F x-Intercepts

F Zeros

A. $f(x) = ax^2 + bx + c$, where $a \neq 0$. standard form

B. The vertex of a parabola that opens upward is the min of the graph.

C. The vertical line that divides a parabola in half. axis of symmetry what is it

D. $f(x) = a(x-h)^2 + k$, where $a \neq 0$. vertex form

E. The vertex of a parabola that opens downward is the max of the graph.

F. The set of x-values which make $f(x) = 0$, indicating where the graph will cross the x-axis. x intercepts, zeros roots

G. $f(x) = a(x-p)(x-q)$, where $a \neq 0$. factored form

H. The point where the parabola changes direction – the "tip" of the parabola. (h, k) from the equation $f(x) = a(x-h)^2 + k$, where $a \neq 0$. vertex

I. $x = \frac{-b}{2a}$ for a quadratic function in standard form or $x = h$ for a quadratic function in vertex form. equation of axis of symmetry

J. The type of function whose graph is a parabola. It can be written in standard form, vertex form, or factored form. quadratic

K. This expression gives the x-coordinate of the vertex of a parabola when the equation is written in standard form. $\frac{-b}{2a}$