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Name: Hour: Date:

Graphing Quadratic Equations from All Forms

Directions: For each of the following equations:
a) Find the y-intercept and x-intercepts by factoring.
b) Create a table of values including all key points and showing how you found the others.
c) Graph using the table of values.
d) Use the graph to write the equation in vertex form $(a(x - h)^2 + k)$ and identify the maximum or minimum value

Function 1

$f(x) = x^2 + 4x + 3$

a=1, b=4, c=3

y-intercept: (0,c) (0,3)

Factored form: $(x+1)(x+3)$

1 × 3 = 3, 1 + 3 = 4

Solutions: x-int
$x+1=0$, $x=-1$; $x+3=0$, $x=-3$

x-intercepts: $(-1,0)$ and $(-3,0)$

Table 1

x	y	
-6		
-5	8	Reflected
-4	3	Reflected
-3	0	x-int
-2	-1	vertex
-1	0	x-int
0	3	y-int
1	8	

$1^2+4(1)+3=8$

Vertex: (h,k) $(-2,-1)$

$h = -\frac{b}{2a} = -\frac{4}{2} = -2$

$k = f(-2) = (-2)^2+4(-2)+3 = -1$

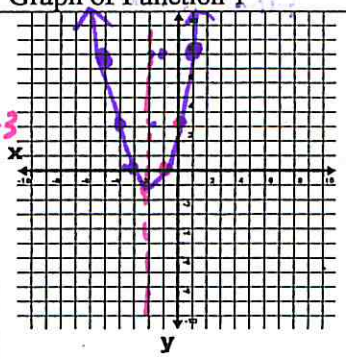
Vertex Form: $a(x-h)^2+k$

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

Min/Max? Value?

-1

Graph of Function 1



Function 2

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

a=1, b=-6, c=8

y-intercept: (0,8)

Factored form: $(x-2)(x-4)$

2 × 4 = 8, 2 + 4 = 6

Solutions:
$x-2=0$, $x=2$; $x-4=0$, $x=4$

x-intercepts: ($y=0$)
$(2,0)$ and $(4,0)$

Table 2

x	y	
-1	15	$(-1)^2-6(-1)+8$
0	8	y-int
1	3	$1^2-6(1)+8$
2	0	x-int
3	-1	vertex
4	0	x-int
5	3	Reflected
6	8	Reflected

Vertex: $(3,-1)$

$h = -\frac{b}{2a} = \frac{6}{2} = 3$

$k = f(3) = 3^2 - 6(3) + 8$

$k = 9 - 18 + 8 = -1$

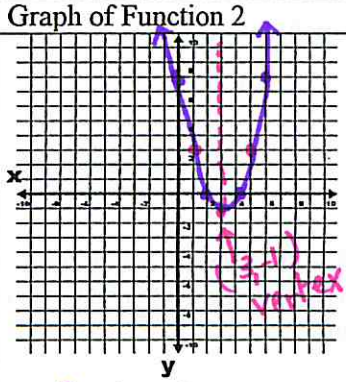
Vertex Form: $a(x-h)^2+k$

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

Min/Max? Value? K

-1

Graph of Function 2



Function 3

$f(x) = x^2 + 8x + 12$

a=1, b=8, c=12

y-intercept: (0,12)

Factored form: $(x+2)(x+6)$

2 × 6 = 12, 2 + 6 = 8

Solutions:
$x+2=0$, $x=-2$; $x+6=0$, $x=-6$

x-intercepts: $(-2,0)$ and $(-6,0)$

Table 3

x	y	
-8	12	Reflected
-7	5	Reflected
-6	0	x-int
-5	-3	Reflected
-4	-4	vertex
-3	-3	$(-3)^2+8(-3)+12$
-2	0	x-int
-1	5	$(-1)^2+8(-1)+12$
0	12	y-int

Vertex: $(-4,-4)$

$h = -\frac{b}{2a} = -\frac{8}{2} = -4$

$f(-4) = (-4)^2+8(-4)+12$

$= 16 - 32 + 12$

$= -4$

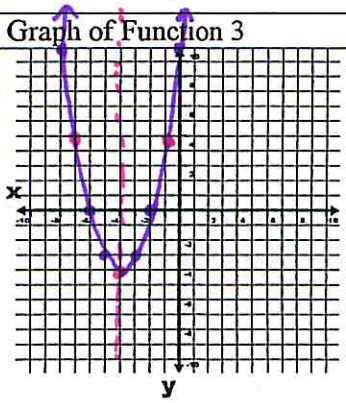
Vertex Form: $a(x-h)^2+k$

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

Min/Max? Value?

-4

Graph of Function 3



Function 4

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

y-intercept: (0,5)

Factored form: $(x+1)(x+5)$

1 × 5 = 5, 1 + 5 = 6

a=1, b=6, c=5

Solutions:
$x+2=0$, $x=-1$; $x+3=0$, $x=-5$

x-intercepts: $(-1,0)$ and $(-5,0)$

Table 4

x	y	
0	5	y-int
-1	0	x-int
-2	-3	Reflected
-3	-4	vertex
-4	-3	$(-4)^2+6(-4)+5$
-5	0	x-int

Vertex: $(-3,-4)$

$h = -\frac{b}{2a} = \frac{-6}{2} = -3$

$k = (-3)^2 + 6(-3) + 5$

$= -4$

Vertex Form: $a(x-h)^2+k$

$f(x) = 1(x+3)^2 - 4$

Min/Max? Value?

-4

Graph of Function 4