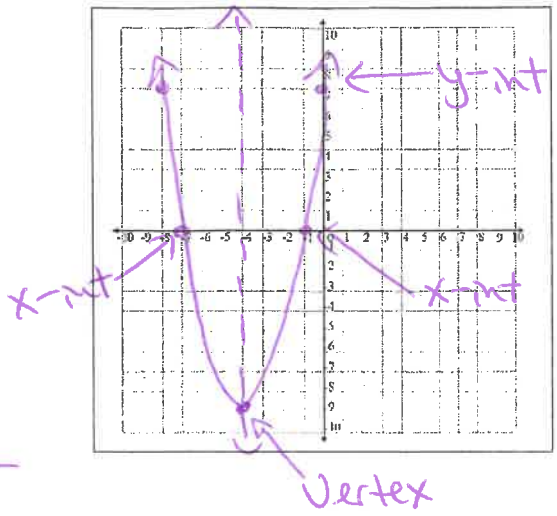
Changing Vertex Form to Standard Form Assignment

Name: Key

1.) $y = (x+4)^2 - 9$ ← Left 4, ↑ down 9



Transformation(s):
Left 4
Down 9

y-intercept: $y=(0+4)^2-9$
$y=7$

Vertex: $(-4,-9)$

Axis of symmetry: $x=-4$

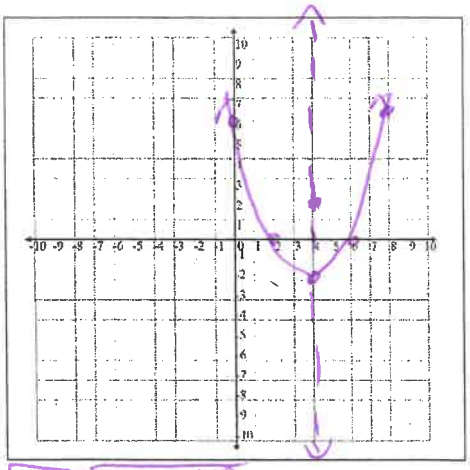
x-intercepts: $0=(x+4)^2-9$
$+9 = +9$
$\sqrt{9} = \sqrt{(x+4)^2}$
$-3 = x+4$ and $3 = x+4$
$-4 = -4$ $-4 = -4$
$-7 = x$ $-1 = x$

Max/Min: -9

Change the equation to standard form $y = ax^2 + bx + c$. Then identify $a, b, and\ c$:

$y=(x+4)^2-9$
$y=(x+4)(x+4)-9$
$y=(x^2+4x+4x+16)-9$
$y=x^2+8x+16-9$
$y=x^2+8x+7$
$a=1 \quad b=8 \quad c=7$

2.) $y = \frac{1}{2}(x-4)^2 - 2$ ← Shrink, ← Down 2, → Right 4



Transformation(s):
Shrink
Right 4
Down 2

y-intercept: $y=\frac{1}{2}(0-4)^2-2$
$y=6$

Vertex: $(4,-2)$

Axis of symmetry: $x=4$

x-intercepts: $0=\frac{1}{2}(x-4)^2-2$
$+2 = +2$
$\frac{2}{\frac{1}{2}} = \frac{\frac{1}{2}(x-4)^2}{\frac{1}{2}}$
$\sqrt{4} = \sqrt{(x-4)^2}$
$2 = x-4$ and $-2 = x-4$
$+4 = +4$ $+4 = +4$
$6 = x$ $2 = x$

Max/Min: -2

Change the equation to standard form $y = ax^2 + bx + c$. Then identify $a, b, and\ c$:

$y=\frac{1}{2}(x-4)^2-2$
$y=\frac{1}{2}(x-4)(x-4)-2$
$y=\frac{1}{2}(x^2-4x-4x+16)-2$
$y=\frac{1}{2}(x^2-8x+16)-2$
$y=\frac{1}{2}x^2-4x+8-2$
$y=\frac{1}{2}x^2-4x+6$
$a=\frac{1}{2} \quad b=-4 \quad c=6$

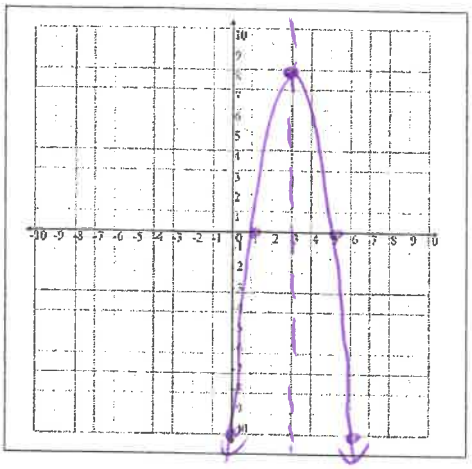
3.) $y = -2(x-3)^2 + 8$ ← Reflect, ← up 8, stretch, ↑ right 3

Transformation(s):

Reflect
Stretch
Right 3
up 8

y-intercept: $y = -2(0-3)^2 + 8$

$y = -10$



Vertex: (3, 8)

Axis of symmetry: $x = 3$

x-intercepts: $0 = -2(x-3)^2 + 8$

$-8 = -8$

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

$\sqrt{4} = \sqrt{(x-3)^2}$

$2 = x-3$ → $+3 = +3$ → $5 = x$

$-2 = x-3$ → $+3 = +3$ → $1 = x$

Max/Min: 8

Change the equation to standard form $y = ax^2 + bx + c$. Then identify $a, b, and\ c$:

$y = -2(x-3)^2 + 8$

$y = -2(x-3)(x-3) + 8$

$y = -2(x^2 - 3x - 3x + 9) + 8$

$y = -2(x^2 - 6x + 9) + 8$

$y = -2x^2 + 12x - 18 + 8$

$y = -2x^2 + 12x - 10$

$a = -2 \quad b = 12 \quad c = -10$

4.) $y = \frac{1}{4}(x-2)^2 - 4$ ← Down 4

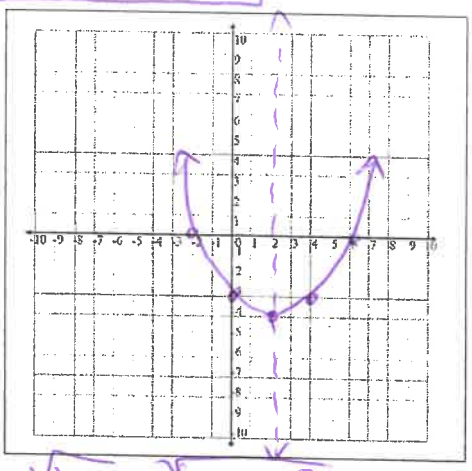
Compression, ↑ right 2

Transformation(s):

Compression
Right 2
Down 4

y-intercept: $y = \frac{1}{4}(0-2)^2 - 4$

$y = -3$



Vertex: (2, −4)

Axis of symmetry: $x = 2$

x-intercepts: $0 = \frac{1}{4}(x-2)^2 - 4$

$+4 = +4$

$\frac{4}{\frac{1}{4}} = \frac{\frac{1}{4}(x-2)^2}{\frac{1}{4}}$

$\sqrt{16} = \sqrt{(x-2)^2}$

$4 = x-2$ → $+2 = +2$ → $6 = x$

$-4 = x-2$ → $+2 = +2$ → $-2 = x$

Max/Min: −4

Change the equation to standard form $y = ax^2 + bx + c$. Then identify $a, b, and\ c$:

$y = \frac{1}{4}(x-2)^2 - 4$

$y = \frac{1}{4}(x-2)(x-2) - 4$

$y = \frac{1}{4}(x^2 - 2x - 2x + 4) - 4$

$y = \frac{1}{4}(x^2 - 4x + 4) - 4$

$y = \frac{1}{4}x^2 - 1x + 1 - 4$

$y = \frac{1}{4}x^2 - 1x - 3$

$a = \frac{1}{4} \quad b = -1 \quad c = -3$

5.) $y = (x+2)^2 - 9$ ← Down 9, ↑ left 2

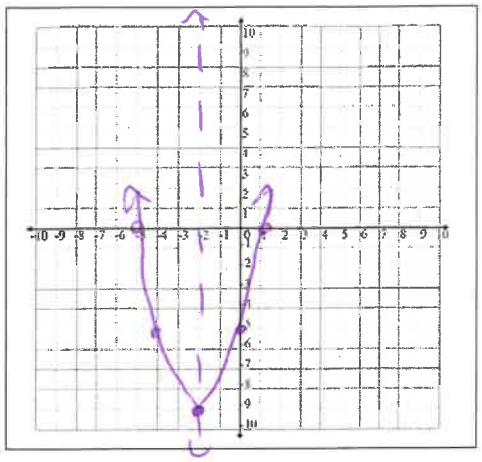
Transformation(s):

left 2

Down 9

y-intercept: $y=(0+2)^2-9$

$y=-5$



Vertex: $(-2,-9)$

Axis of symmetry: $x=-2$

x-intercepts: $0=(x+2)^2-9$

$+9 = +9$

$\sqrt{9}=\sqrt{(x+2)^2}$

$3=x+2$ $\quad -3=x+2$

$-2=-2$ $\quad -2=-2$

$1=x$ $\quad -5=x$

Max/Min: -9

Change the equation to standard form $y = ax^2 + bx + c$. Then identify $a, b, and\ c$:

$y=(x+2)^2-9$

$y=(x+2)(x+2)-9$

$y=x^2+2x+2x+4-9$

$y=x^2+4x+4-9$

$y=x^2+4x-5$

$a=1 \quad b=4 \quad c=-5$

6.) $y = -4(x+1)^2 + 4$ ← up 4

Reflect ↑ Stretch ← left 1

Transformation(s):

Reflect

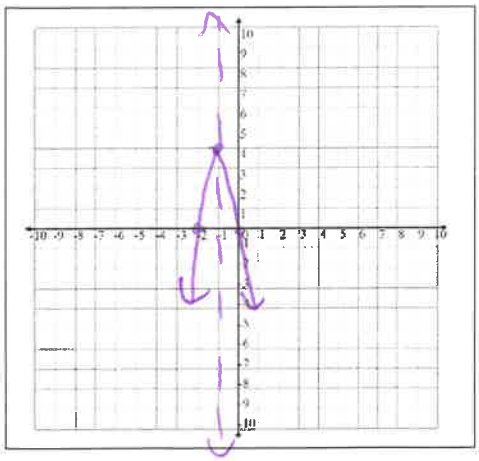
Stretch

up 4

left 1

y-intercept: $y=-4(0+1)^2+4$

$y=0$



Vertex: $(-1,4)$

Axis of symmetry: $x=-1$

x-intercepts: $0=-4(x+1)^2+4$

$-4 = -4$

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

$\sqrt{1}=\sqrt{(x+1)^2}$

$1=x+1$ $\quad -1=x+1$

$-1=-1$ $\quad -1=-1$

$0=x$ $\quad -2=x$

Max/Min: 4

Change the equation to standard form $y = ax^2 + bx + c$. Then identify $a, b, and\ c$:

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

$y=-4[(x+1)(x+1)]+4$

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

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

$y=-4x^2-8x-4+4$

$y=-4x^2-8x$

$a=-4 \quad b=-8 \quad c=0$

7.) $y = -(x-3)^2 + 1$ « up 1

Reflect ↑ Right 3

Transformation(s):

Reflect

up 1

Right 3

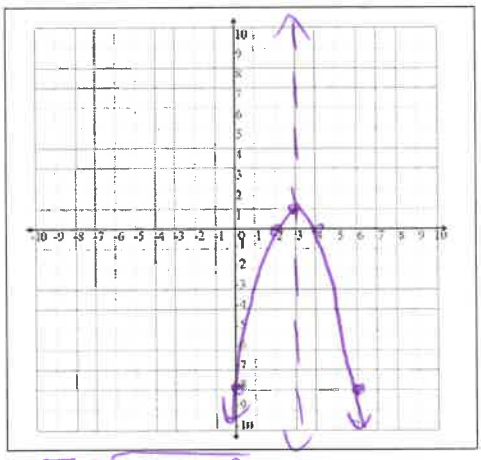
Vertex: (3, 1)

Axis of symmetry: $x = 3$

Max/Min: 1

y-intercept: $y = -(0-3)^2 + 1$

$y = -8$



x-intercepts: $0 = -(x-3)^2 + 1$

$-1 = -1$

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

$\frac{-1}{-1} = \frac{-(x-3)^2}{-1}$

$\sqrt{1} = \sqrt{(x-3)^2}$

$1 = x-3$ $\quad +3 = +3$

$4 = x$

$-1 = x-3$ $\quad +3 = +3$

$2 = x$

Change the equation to standard form $y = ax^2 + bx + c$. Then identify $a, b, and\ c$:

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

$y = -[(x-3)(x-3)] + 1$

$y = -(x^2 - 3x - 3x + 9) + 1$

$y = -(x^2 - 6x + 9) + 1$

$y = -x^2 + 6x - 9 + 1$

$y = -x^2 + 6x - 8$

$a = -1 \quad b = 6 \quad c = -8$

8.) $y = (x+3)^2 - 4$

left 3 ↑ down 4

Transformation(s):

left 3

Down 4

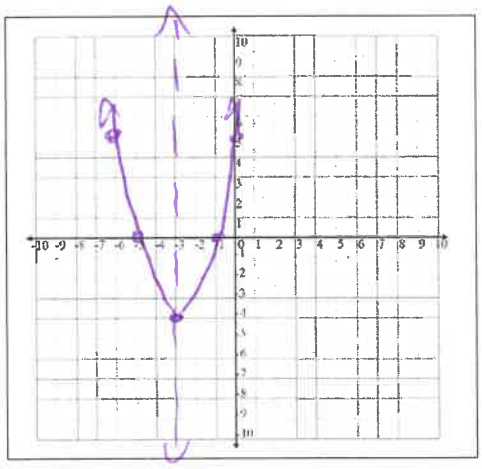
Vertex: (−3, −4)

Axis of symmetry: $x = -3$

Max/Min: −4

y-intercept: $y = (0+3)^2 - 4$

$y = 5$



x-intercepts: $0 = (x+3)^2 - 4$

$+4 = +4$

$\sqrt{4} = \sqrt{(x+3)^2}$

$2 = x+3$ $\quad -3 = -3$

$-1 = x$

$-2 = x+3$ $\quad -3 = -3$

$-5 = x$

Change the equation to standard form $y = ax^2 + bx + c$. Then identify $a, b, and\ c$:

$y = (x+3)^2 - 4$

$y = (x+3)(x+3) - 4$

$y = x^2 + 3x + 3x + 9 - 4$

$y = x^2 + 6x + 9 - 4$

$y = x^2 + 6x + 5$

$a = 1 \quad b = 6 \quad c = 5$