

Graphing Quadratic Relationships (Parabolas)

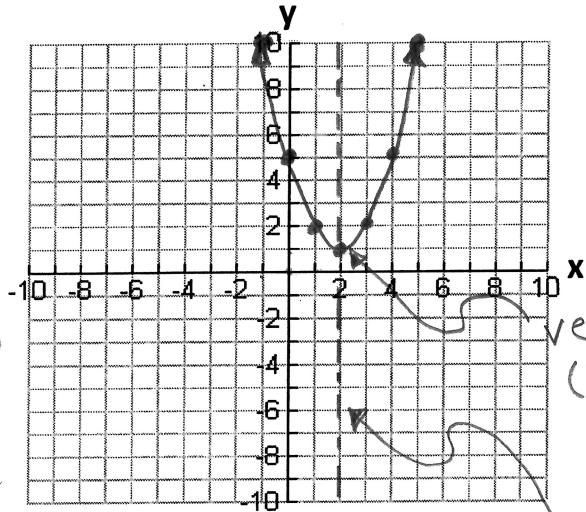
Complete the table of values, graph the relationship, then fill in the chart.

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

x	y
-1	10
0	5
1	2
2	1
3	2
4	5
5	10

Vertex →

$$\begin{aligned}
 Y &= (-1)^2 - 4(-1) + 5 \\
 &= 1 + 4 + 5 \\
 &= 10 \\
 Y &= (0)^2 - 4(0) + 5 \\
 &= 0 - 0 + 5 \\
 &= 5 \\
 Y &= (1)^2 - 4(1) + 5 \\
 &= 1 - 4 + 5 \\
 &= 2
 \end{aligned}$$



vertex (2, 1)

axis of symmetry
 $x = 2$

coordinates of the vertex	(2, 1)
maximum or minimum at the vertex	minimum
direction of opening	up
x-intercept(s)	None
y-intercept	5
Equation for the axis of symmetry	$x = 2$

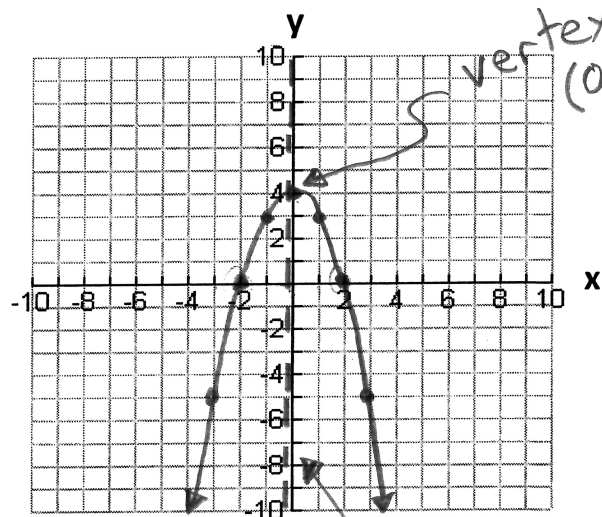
b) $y = -x^2 + 4$

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

parabola opens down



$$\begin{aligned}
 Y &= -(-3)^2 + 4 \\
 &= -(9) + 4 \\
 &= -5 \\
 Y &= -(-2)^2 + 4 \\
 &= -(4) + 4 \\
 &= 0 \\
 Y &= -(-1)^2 + 4 \\
 &= -(1) + 4 \\
 &= 3
 \end{aligned}$$



vertex (0, 4)

axis of symmetry
 $x = 0$

coordinates of the vertex	(0, 4)
maximum or minimum at the vertex	maximum
direction of opening	down
x-intercept(s)	-2 & 2
y-intercept	4
Equation for the axis of symmetry	$x = 0$

Homework

For each equation below:

1. Complete the table of values and graph the parabola.
2. Determine the coordinates of the vertex.
3. Identify the vertex as either a minimum or maximum.
4. Write the equation of the axis of symmetry.
5. Determine the y-intercept.

a) $y = x^2 + 1$

x	y
-2	5
-1	2
0	1
1	2
2	5

Vertex: (0, 1)
 Max/Min: Min
 Axis of S.: $x = 0$
 y-int: 1

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

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

Vertex: (2, -3)
 Max/Min: Min
 Axis of S.: $x = 2$
 y-int: 1

c) $y = x^2 - 2x + 3$

x	y
-1	6
0	3
1	2
2	3
3	6

Vertex: (1, 2)
 Max/Min: Min
 Axis of S.: $x = 1$
 y-int: 3

d) $y = x^2 + 2x + 4$

x	y
-3	7
-2	4
-1	3
0	4
1	7

Vertex: (-1, 3)
 Max/Min: Min
 Axis of S.: $x = -1$
 y-int: 4

e) $y = 2x^2 - 5$

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

Vertex: (0, -5)
 Max/Min: Min
 Axis of S.: $x = 0$
 y-int: -5

$$y = 2(-2)^2 - 5$$

$$= 2(4) - 5$$

$$= 8 - 5$$

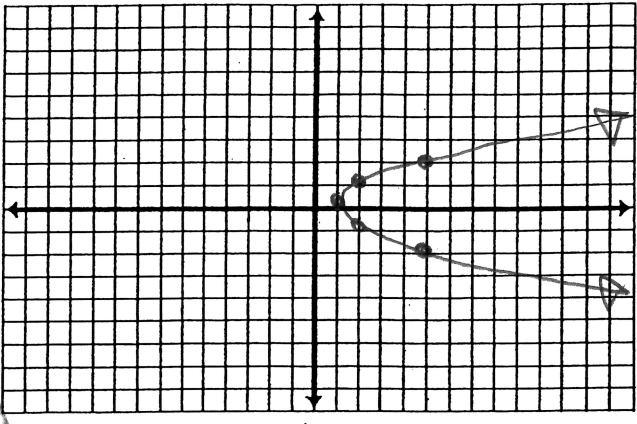
$$= 3$$

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

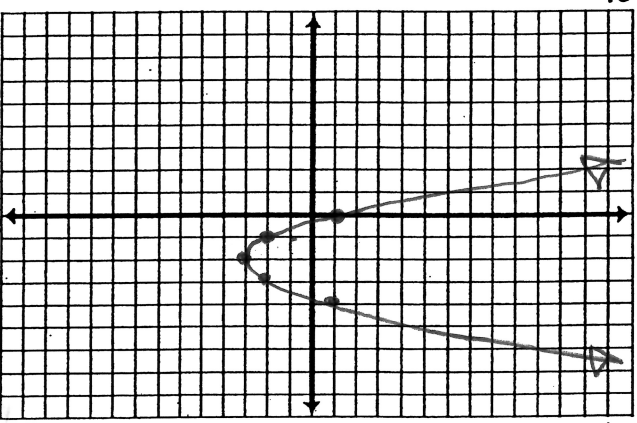
x	y
-4	1
-3	4
-2	5
-1	4
0	1

Vertex: (-2, 5)
 Max/Min: Max
 Axis of S.: $x = -2$
 y-int: 1

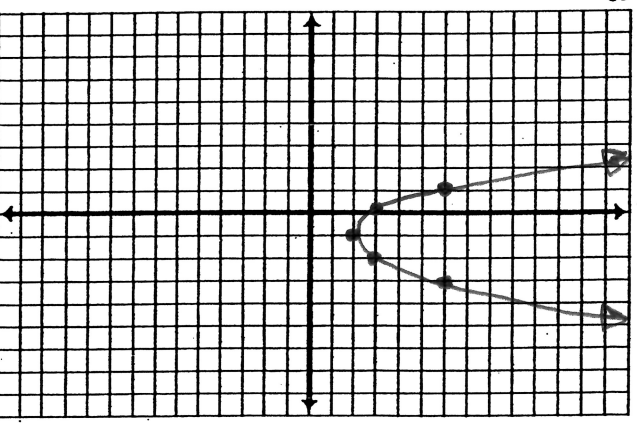
a



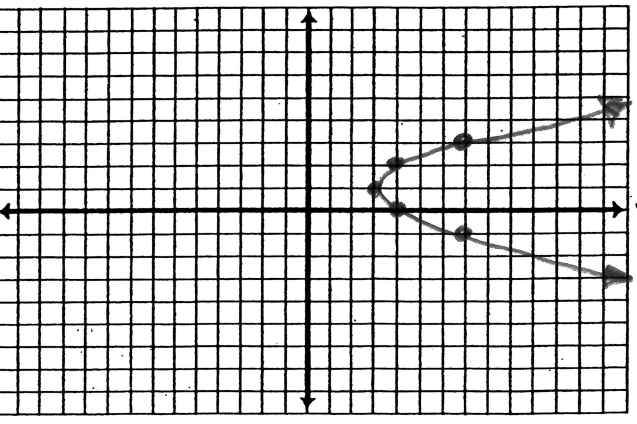
b



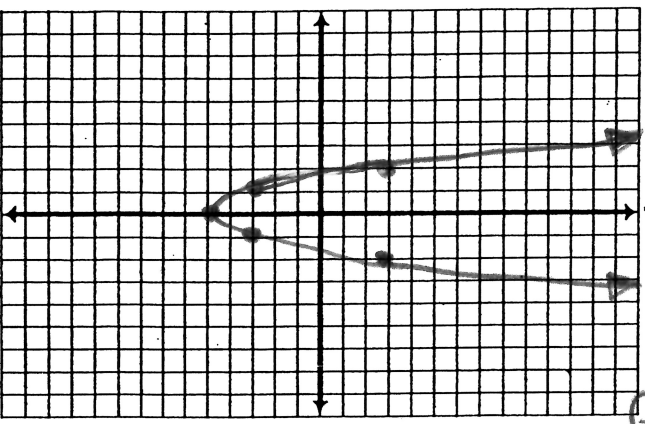
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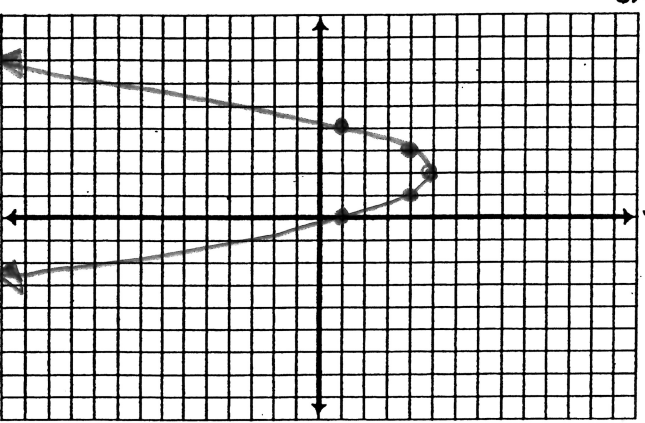
d



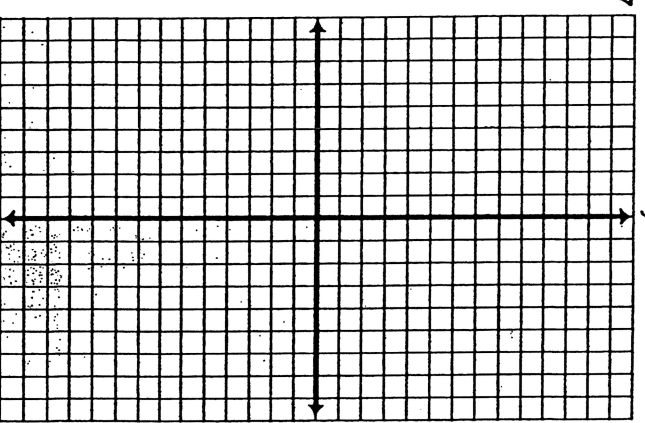
e



f



7



8

