Quiz: Graph of Function type 2

and Sketching Graph of Quadratic Functions

Section:Quadratic Function

Sub-section: Graph of Function type 2 and Sketching Graph of Quadratic Functions

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Choose the correct answer.

1. Which of the following equations has a vertex of (4, -2)?

   (understand, MA 1.2 G.9/2)

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

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

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

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

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

   $y = 3(x - 4)^2 - 2$ because the quadratic equation is $f(x) = y = a(x - h)^2 + k$, the vertex is (h, k).

   Consider $y = 3(x + 4)^2 - 2$, then the vertex is $(-4, -2)$.

   Consider $y = -3(x + 4)^2 + 2$, then the vertex is $(-4, 2)$.

   Consider $y = 3(x - 4)^2 - 2$, then the vertex is $(4, -2)$.

   Consider $y = -3(x - 4)^2 + 2$, then the vertex is $(4, 2)$.

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2. Which of the following equations has a vertex of (-5, 6) ?
(understand, MA 1.2 G.9/2)

A. $y = 2(x + 5)^2 + 6$

B. $y = -2(x + 5)^2 - 6$

C. $y = 2(x - 5)^2 + 6$

D. $y = -2(x - 5)^2 - 6$

Solution $y = 2(x + 5)^2 + 6$

$y = 2(x + 5)^2 + 6$ because the quadratic equation is $f(x) = y = a(x - h)^2 + k$, the vertex is (h, k).

Consider $y = 2(x + 5)^2 + 6$, then the vertex is $(-5, 6)$.

Consider $y = -2(x + 5)^2 - 6$, then the vertex is $(-5, -6)$.

Consider $y = 2(x - 5)^2 + 6$, then the vertex is $(5, 6)$.

Consider $y = -2(x - 5)^2 - 6$, then the vertex is $(5, -6)$.

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3. Find the x-intercepts of the parabola $y = -4(x-3)^2 + 5$

   (understand, MA 1.2 G.9/2)

   A. $(\frac{3-\sqrt{5}}{2}, 0)$ and $(\frac{3+\sqrt{5}}{2}, 0)$

   B. $(\frac{-3-\sqrt{5}}{2}, 0)$ and $(\frac{-3+\sqrt{5}}{2}, 0)$

   C. $(3-\frac{\sqrt{5}}{2}, 0)$ and $(3+\frac{\sqrt{5}}{2}, 0)$

   D. $(-3-\frac{\sqrt{5}}{2}, 0)$ and $(-3+\frac{\sqrt{5}}{2}, 0)$

   Solution $(3-\frac{\sqrt{5}}{2}, 0)$ and $(3+\frac{\sqrt{5}}{2}, 0)$

   For x-intercepts $0 = -4(x-3)^2 + 5$

   $$4(x-3)^2 = 5$$

   $$x - 3 = \pm\frac{\sqrt{5}}{2}$$

   So, $x = 3 \pm \frac{\sqrt{5}}{2}$

   Hence, x-intercepts are $(3-\frac{\sqrt{5}}{2}, 0)$ and $(3+\frac{\sqrt{5}}{2}, 0)$

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4. Find the x-intercepts of the parabola $y = 9(x + 2)^2 - 7$

   (understand, MA 1.2 G.9/2)

   A. $(\frac{2-\sqrt{7}}{3}, 0)$ and $(\frac{2+\sqrt{7}}{3}, 0)$

   B. $(\frac{-2-\sqrt{7}}{3}, 0)$ and $(\frac{-2+\sqrt{7}}{3}, 0)$

   C. $(2 - \frac{\sqrt{7}}{3}, 0)$ and $(2 + \frac{\sqrt{7}}{3}, 0)$

   D. $(-2 - \frac{\sqrt{7}}{3}, 0)$ and $(-2 + \frac{\sqrt{7}}{3}, 0)$

   Solution $(-2 - \frac{\sqrt{7}}{3}, 0)$ and $(-2 + \frac{\sqrt{7}}{3}, 0)$

   For x-intercepts $0 = 9(x + 2)^2 - 7$

   $$9(x + 2)^2 = 7$$

   $$x + 2 = \pm \frac{\sqrt{7}}{3}$$

   So, $x = -2 \pm \frac{\sqrt{7}}{3}$

   Hence, x-intercepts are $(-2 - \frac{\sqrt{7}}{3}, 0)$ and $(-2 + \frac{\sqrt{7}}{3}, 0)$

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5. For the parabola $y = 3x^2 - 12x + 17$, find the vertex.

   (understand, MA 1.2 G.9/2)

   A. (5, 2)
   B. (2, 5)
   C. (-2, 5)
   D. (-2, -5)

   Solution (2, 5)

   (2, 5) because $y = 3x^2 - 12x + 17$

   $$y = 3(x^2 - 4x) + 17$$
   $$y = 3(x^2 - 2(2)x + 2^2) - 3(2)^2 + 17$$
   $$y = 3(x - 2)^2 + 5$$

   From the form of graph $y = a(x - h)^2 + k$

   Thus, the vertex is $(h, k) = (2, 5)$

6. For the parabola $y = 4x^2 + 8x + 1$, find the vertex.

   (understand, MA 1.2 G.9/2)

   A. (3, 1)
   B. (1, 3)
   C. (-1, 3)
   D. (-1, -3)

   Solution (-1, -3)

   (-1, -3) because $y = 4x^2 + 8x + 1$

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

   From the form of graph $y = a(x - h)^2 + k$

   Thus, the vertex is $(h, k) = (-1, -3)$

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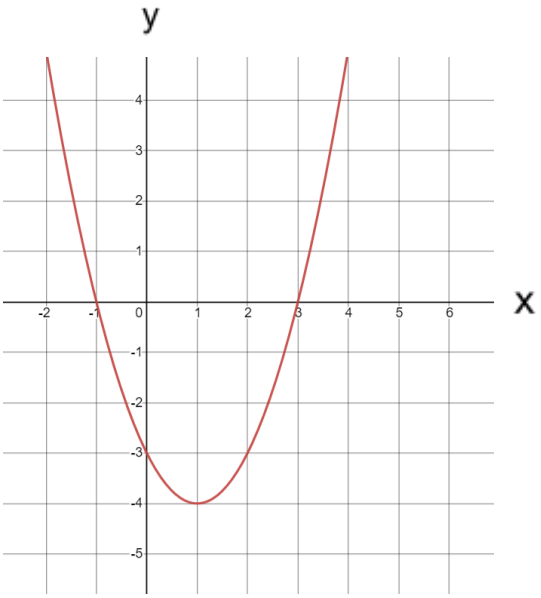
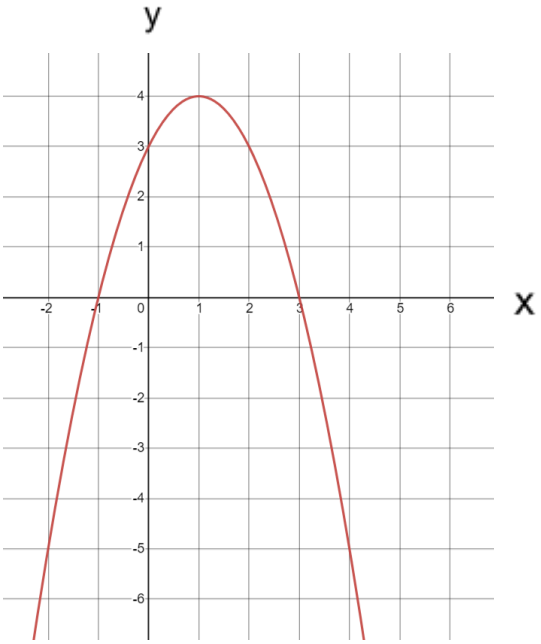
7. Which of the following could be the graph of $y = -x^2 + 6x - 5$?

   (apply, MA 1.2 G.9/2)

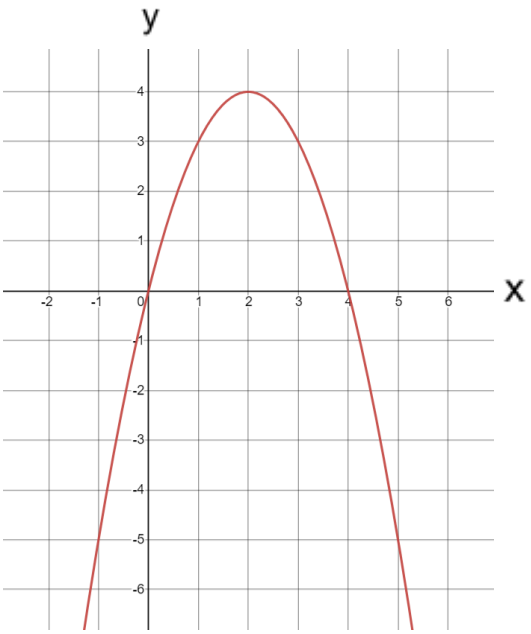
   A.



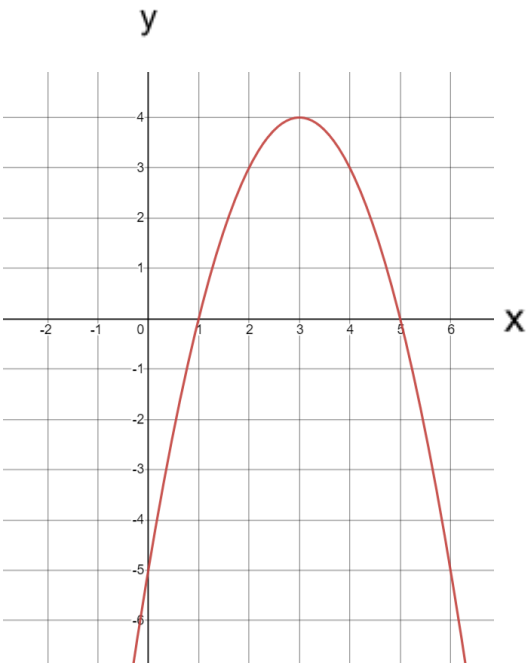
   B.



C.



D.



Solution D

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

Then $y = -(x^2 - 6x) - 5$

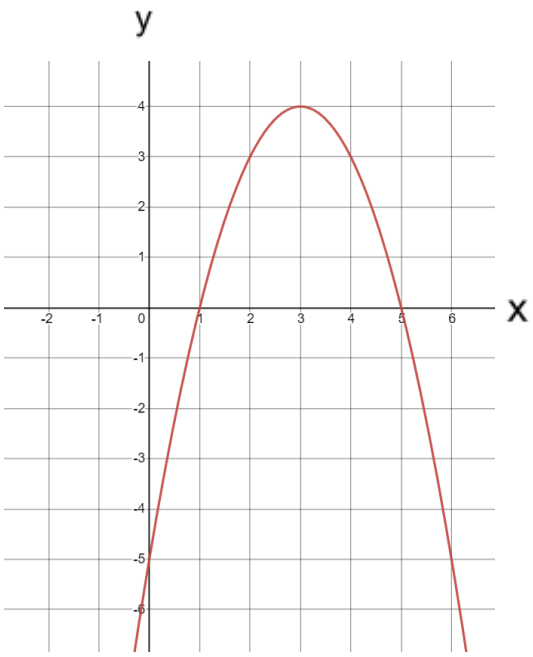
$y = -(x^2 - 2(3)x + 3^2) + 1(3)^2 - 5$

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

From the form of graph $y = a(x - h)^2 + k$

Thus, the vertex is $(h, k) = (3, 4)$ and $a = -1 < 0$ (open-down)

Sketch the graph from $y = -x^2 + 6x - 5$



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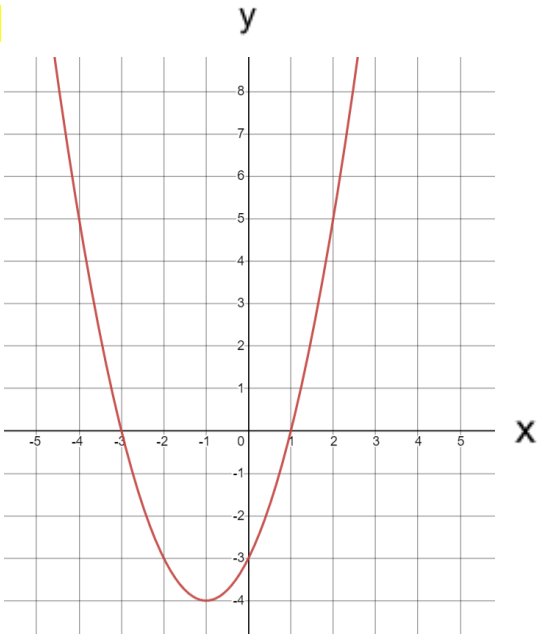
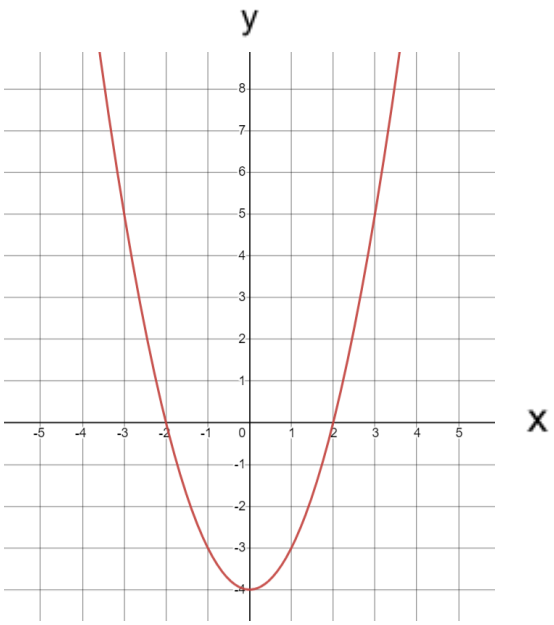
8. Which of the following could be the graph of $y = x^2 + 2x - 3$?

   (apply, MA 1.2 G.9/2)

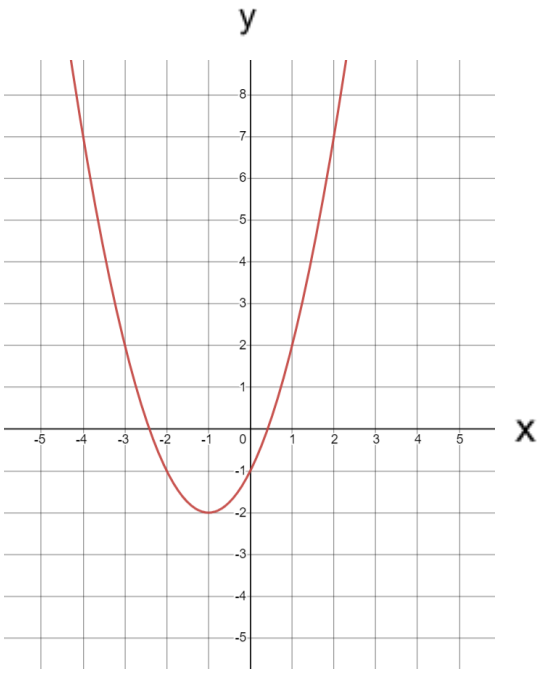
A.



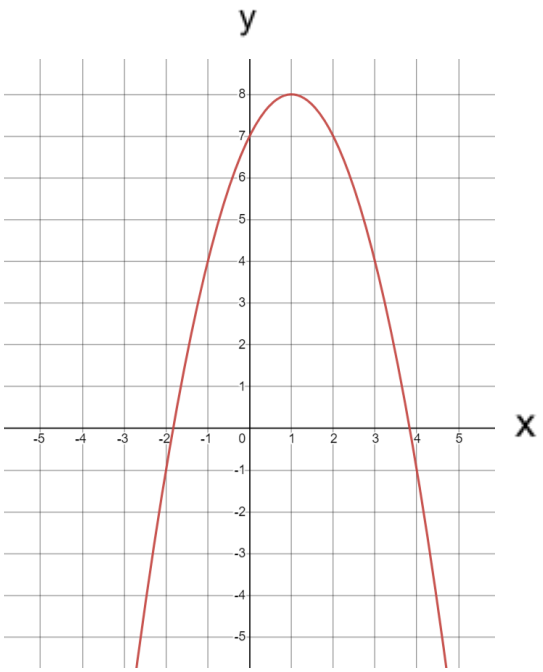
B.



C.


y
x
8
7
6
5
4
3
2
1
-1
-2
-3
-4
-5
-5
-4
-3
-2
-1
0
1
2
3
4
5

D.


y
x
8
7
6
5
4
3
2
1
-1
-2
-3
-4
-5
-5
-4
-3
-2
-1
0
1
2
3
4
5

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Solution A

Consider $y = x^2 + 2x - 3$

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

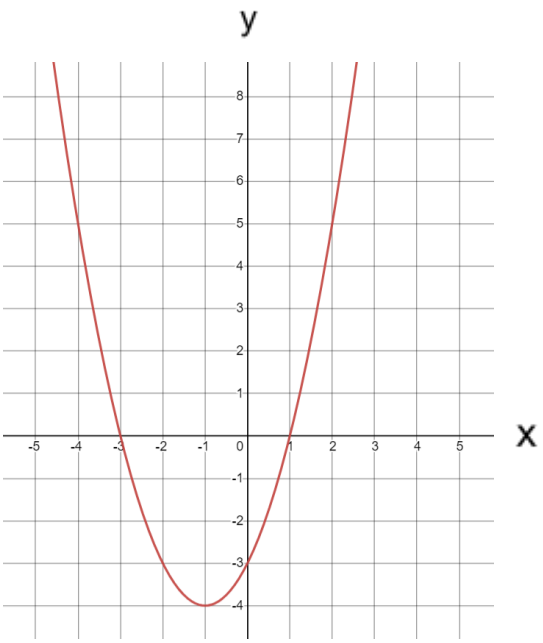
$y = (x^2 + 2(1)x + 1^2) - 1^2 - 3$

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

From the form of graph $y = a(x - h)^2 + k$

Thus, the vertex is $(h,\ k) = (-1,\ -4)$ and $a = 1 > 0$ (open-up)

Sketch the graph from $y = x^2 + 2x - 3$



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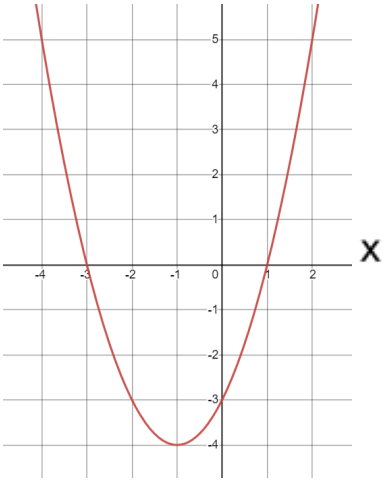
9.



In the figure above, the graph of $y = f(x)$ is shown.

Which of the following could be the equation of $y = f(x)$?

(apply, MA 1.2 G.9/2)

A. $y = x^2 - 2x + 3$ B. $y = x^2 + 2x - 3$

C. $y = -x^2 - 2x + 3$ D. $y = -x^2 + 2x + 3$

Solution $y = x^2 + 2x - 3$

Consider the graph, we have a vertex of $(-1, -4)$,

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

y-intercepts is $(0, -3)$,

and the parabola is open-up.

From the form of graph $y = a(x - h)^2 + k$

So, we have a vertex of $(h, k) = (-1, -4)$ and $a > 0$

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

Since the graph passes $(1, 0)$, then $0 = a(1 + 1)^2 - 4$

$$a(2)^2 = 4$$

So, $a = 1$, then $y = (x + 1)^2 - 4 = (x^2 + 2x + 1) - 4 = x^2 + 2x - 3$

Thus, the equation could be $y = x^2 + 2x - 3$.

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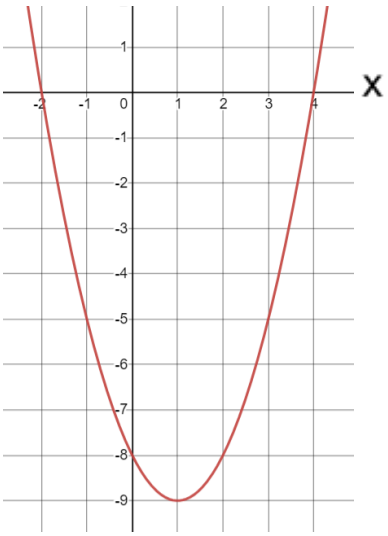
10.



In the figure above, the graph of $y = f(x)$ is shown.

Which of the following could be the equation of $y = f(x)$?

(apply, MA 1.2 G.9/2)

A. $y = -x^2 - 2x + 8$

B. $y = -x^2 - 2x - 8$

C. $y = x^2 - 2x - 8$

D. $y = x^2 - 2x + 8$

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

Consider the graph, we have a vertex of $(1, -9)$,

x-intercepts are $(-2, 0)$ and $(4, 0)$, y-intercepts is $(0, -8)$,

and the parabola is open-up.

From the form of graph $y = a(x - h)^2 + k$

So, we have a vertex of $(h, k) = (1, -9)$ and $a > 0$

Then, $y = a(x - 1)^2 - 9$

Since the graph passes $(-2, 0)$, then $0 = a(-2 - 1)^2 - 9$

$$a(-3)^2 = 9$$

So, $a = 1$, then $y = (x - 1)^2 - 9 = (x^2 - 2x + 1) - 9 = x^2 - 2x - 8$

Thus, the equation could be $y = x^2 - 2x - 8$.