Checkpoint 1: Assess Your Understanding, pages 272–275

4.1

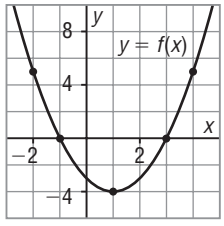
1. Multiple Choice Which equations, graph, and table of values represent quadratic functions?

I. $y = 2(x - 3) + 1$ **II.** $y = 2x^2 - 4x + 1$

III.

x	y
0	13
1	8
2	5
3	4

IV.

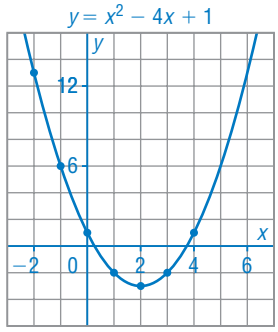


A. IV only **B.** II only **C.** II, III, and IV **D.** all parts

2. Use a table of values to graph each quadratic function. From each graph, identify the characteristic indicated.

a) $y = x^2 - 4x + 1$; the coordinates of the vertex

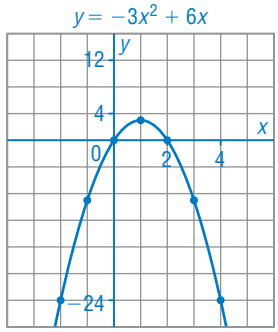
x	−2	−1	0	1	2	3	4
y	13	6	1	−2	−3	−2	1



From the graph, the coordinates of the vertex are (2, −3).

b) $y = -3x^2 + 6x$; the x-intercepts

x	−2	−1	0	1	2	3	4
y	−24	−9	0	3	0	−9	−24

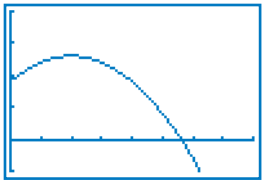


From the graph, the x-intercepts are 0 and 2.

3. Stephanie jumps to head a soccer ball. The path of the ball is modelled by the equation $h = -0.2d^2 + 0.8d + 1.8$, where h metres is the height of the ball after it has travelled d metres horizontally. Use a graphing calculator or graphing software.

a) Graph the quadratic function, then sketch it below.

I graphed the function $y = -0.2x^2 + 0.8x + 1.8$.



b) Identify and explain the significance of:

i) the horizontal and vertical intercepts

ii) the coordinates of the vertex

iii) the domain **iv)** the range

i) To the nearest hundredth, the positive *d*-intercept is 5.61. The ball travels a horizontal distance of about 5.61 m before it hits the ground. The *h*-intercept is 1.8. The ball is at a height of 1.8 m when Stephanie heads it. There is a negative intercept, but it makes no sense in this situation.

ii) The coordinates of the vertex are (2, 2.6). The greatest height that the ball reaches is 2.6 m after travelling a horizontal distance of 2 m.

iii) The domain is the set of possible *d*-values. To the nearest hundredth of a second, the domain is: $0 \leq d \leq 5.61$, $d \in \mathbb{R}$. The ball travels a horizontal distance of about 5.61 m.

iv) The range is the set of possible *h*-values. The range is: $0 \leq h \leq 2.6$, $h \in \mathbb{R}$. The ball has a maximum height of 2.6 m.

4. Use a graphing calculator to graph each quadratic function. Identify the characteristic indicated.

a) $y = 2.5x^2 + 5x - 20$; the x-intercepts

I used the CALC feature to determine the *x*-intercepts are −4 and 2.

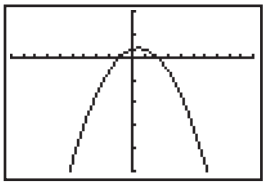
b) $y = -1.5x^2 + 4.5x + 6$; the y-intercept

I used the CALC feature to determine the *y*-intercept is 6.

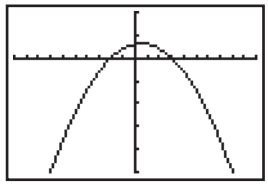
4.2

5. Multiple Choice Which quadratic function corresponds to a quadratic equation with exactly one root?

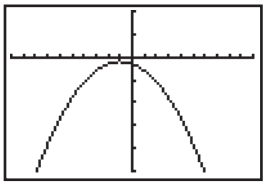
A.



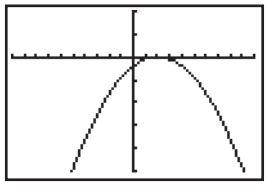
B.



C.



(D.)



6. Use graphing technology to determine or approximate the roots of each equation.

a) $2x - x^2 + 5 = 0$

Graph $y = -x^2 + 2x + 5$. Use the CALC feature to display $X = -1.44949$ and $X = 3.4494897$. The roots are approximately $x = -1.4$ and $x = 3.4$.

b) $-4x^2 - 49 = -28x$

Graph $y = -4x^2 + 28x - 49$. The graph touches the x-axis at 1 point. Use the CALC feature to display $X = 3.5$. The root is $x = 3.5$.

4.3

7. Match each equation to the description of how its graph could be determined from the graph of $y = x^2$.

i) translate 2 units up

ii) translate 2 units left

iii) translate 2 units down

iv) translate 2 units right

a) $y = (x - 2)^2$

Compare the equations $y = (x - 2)^2$ and $y = (x - p)^2$. Since p is $+2$, the graph moves 2 units to the right. This matches part iv.

b) $y = x^2 - 2$

Compare the equations $y = x^2 - 2$ and $y = x^2 + q$. Since q is -2, the graph moves 2 units down. This matches part iii.

c) $y = (x + 2)^2$

Compare the equations $y = (x + 2)^2$ and $y = (x - p)^2$. Since p is -2, the graph moves 2 units to the left. This matches part ii.

d) $y = x^2 + 2$

Compare the equations $y = x^2 + 2$ and $y = x^2 + q$. Since q is $+2$, the graph moves 2 units up. This matches part i.