4-1 Graphing Quadratic Functions

Complete parts *a*–*c* for each quadratic function.

a. Find the *y*-intercept, the equation of the axis of symmetry, and the *x*-coordinate of the vertex.

b. Make a table of values that includes the vertex.

c. Use this information to graph the function.

12. $f(x) = 4x^2$

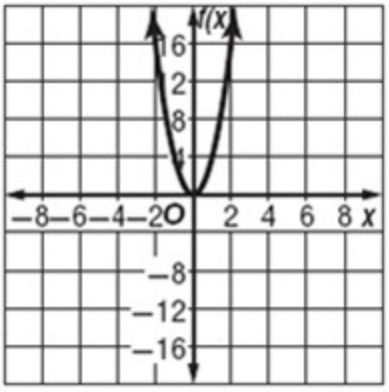
ANSWER:

a. *y*-int = 0; axis of symmetry: $x = 0$; *x*-coordinate = 0

b.

x	f(x)
–2	16
–1	4
0	0
1	4
2	16

c.



14. $f(x) = x^2 - 5$

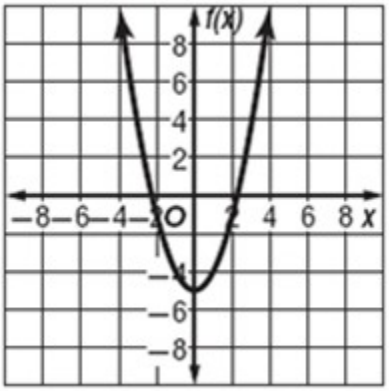
ANSWER:

a. *y*-int = –5; axis of symmetry: $x = 0$; *x*-coordinate = 0

b.

x	f(x)
–2	–1
–1	–4
0	–5
1	–4
2	–1

c.



16. $f(x) = x^2 + 3$

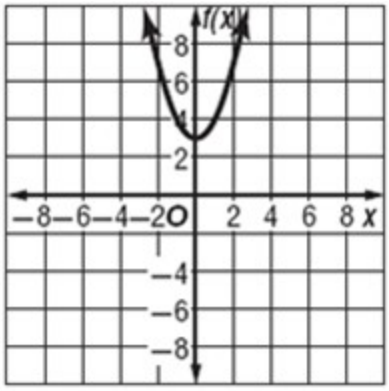
ANSWER:

a. y-int = 3; axis of symmetry: $x = 0$; x-coordinate = 0

b.

x	f(x)
–2	7
–1	4
0	3
1	4
2	7

c.



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

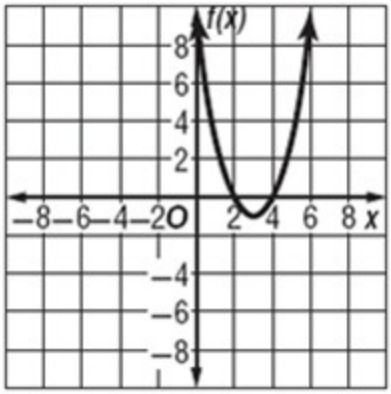
ANSWER:

a. y-int = 8; axis of symmetry: $x = 3$; x-coordinate = 3

b.

x	f(x)
1	3
2	0
3	–1
4	0
5	3

c.



20. $f(x) = -x^2 + 4x - 6$

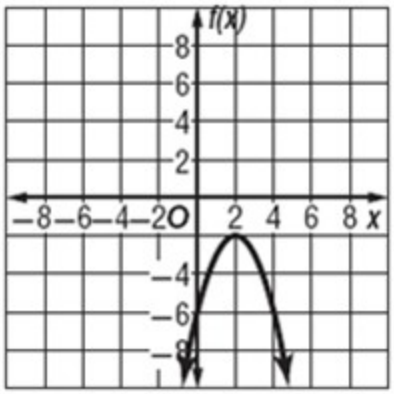
ANSWER:

a. y-int = –6; axis of symmetry: $x = 2$; x-coordinate = 2

b.

x	f(x)
0	–6
1	–3
2	–2
3	–3
4	–6

c.



Determine whether each function has a *maximum* or *minimum* value, and find that value. Then state the domain and range of the function.

22. $f(x) = 5x^2$

ANSWER:

min = 0; D = {all real numbers},
$R = \{f(x) \mid f(x) \geq 0\}$

24. $f(x) = x^2 - 6x + 9$

ANSWER:

min = 0; D = {all real numbers},
$R = \{f(x) \mid f(x) \geq 0\}$

26. $f(x) = 8x - 3x^2 + 2$

ANSWER:

max = $\frac{22}{3}$; D = {all real numbers},
$R = \left\{f(x) \mid f(x) \leq \frac{22}{3}\right\}$

28. $f(x) = 15 - 5x^2$

ANSWER:

max = 15; D = {all real numbers},
$R = \{f(x) \mid f(x) \leq 15\}$

30. $f(x) = -x^2 + 10x + 30$

ANSWER:

max = 55; D = {all real numbers},
$R = \{f(x) \mid f(x) \leq 55\}$

32. **CCSS MODELING** A financial analyst determined that the cost, in thousands of dollars, of producing bicycle frames is $C = 0.000025f^2 - 0.04f + 40$, where f is the number of frames produced.

a. Find the number of frames that minimizes cost.

b. What is the total cost for that number of frames?

ANSWER:

a. 800
b. $24,000