

Quadratics Graphing and Functions Test Review

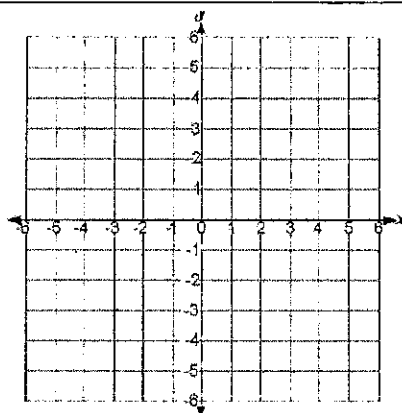
Fill in the blanks.

1. The standard form of a quadratic function is $y = \underline{\hspace{2cm}}$
2. The vertex form of a quadratic function is $y = \underline{\hspace{2cm}}$
3. What is the formula for the axis of symmetry from a quadratic function in standard form? $\underline{\hspace{2cm}}$
4. If the vertex is the highest point on the graph, it is called a $\underline{\hspace{2cm}}$
5. If the vertex is the lowest point on the graph, it is called a $\underline{\hspace{2cm}}$

For #6-7, graph the quadratic functions to find the zeros.

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

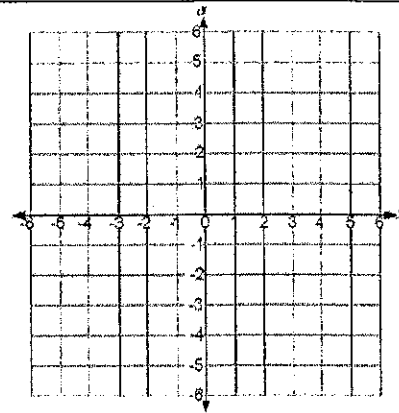
x	y



Solutions (zeros)

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

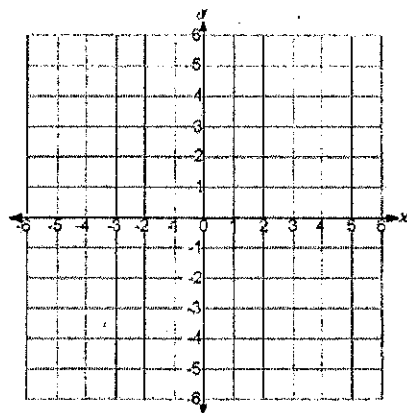
x	y



Solutions (zeros)

8. Graph using a table of values. Identify all key characteristics. $y = x^2 + 8x + 17$

x	y



Axis of symmetry: $\underline{\hspace{2cm}}$

Vertex: $\underline{\hspace{2cm}}$

Domain: $\underline{\hspace{2cm}}$

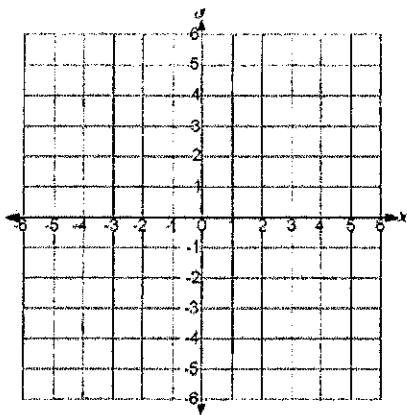
Range: $\underline{\hspace{2cm}}$

End Behavior: As $x \rightarrow +\infty$, $y \rightarrow \underline{\hspace{2cm}}$

As $x \rightarrow -\infty$, $y \rightarrow \underline{\hspace{2cm}}$

9. Graph using a table of values. Identify all key characteristics. $y = -2x^2 + 12x - 16$

x	y



Axis of symmetry: $\underline{\hspace{2cm}}$

Vertex: $\underline{\hspace{2cm}}$

Domain: $\underline{\hspace{2cm}}$

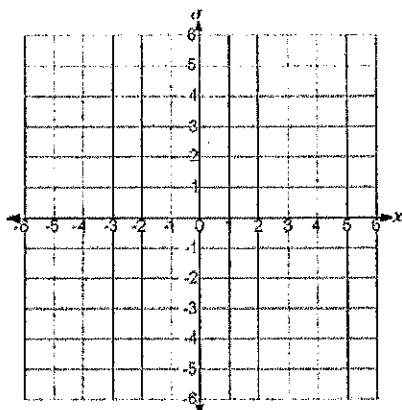
Range: $\underline{\hspace{2cm}}$

End Behavior: As $x \rightarrow +\infty$, $y \rightarrow \underline{\hspace{2cm}}$

As $x \rightarrow -\infty$, $y \rightarrow \underline{\hspace{2cm}}$

10. Graph using a table of values. Identify all key characteristics. $y = x^2 + 6x + 9$

x	y



Axis of symmetry: _____

Vertex: _____

Domain: _____

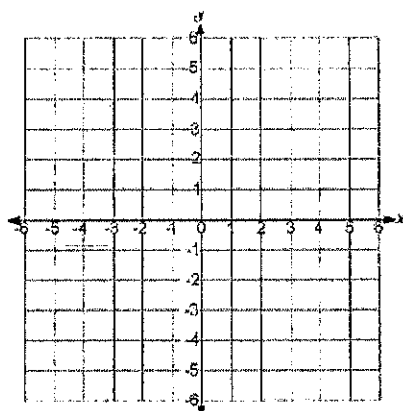
Range: _____

End Behavior: As $x \rightarrow +\infty$, $y \rightarrow$ _____

As $x \rightarrow -\infty$, $y \rightarrow$ _____

11. Graph using a table of values. Identify all key characteristics. $y = (x - 3)^2 - 4$

x	y



Axis of symmetry: _____

Vertex: _____

Domain: _____

Range: _____

Transformations: _____

Without graphing, describe the transformations of $g(x)$ from the parent function, $f(x)$.

12. $f(x) = x^2$; $g(x) = (x + 4)^2 + 5$

13. $f(x) = x^2$; $g(x) = -\frac{1}{3}(x + 7)^2 - 1$

14. Parent function: $f(x)$; $g(x - 2) + 6$

15. Parent function: $f(x)$; $5g(x) - 8$

Write an equation that shows the transformations from the parent function: $y = x^2$.

16. Translated 5 units left and 3 units up.

17. Reflected over the x-axis and 7 units right.

18. Vertical stretch by a factor of 4 and 3 units down.

19. Vertical compression by a factor of $\frac{1}{2}$, reflected over the x-axis, 8 units right and 2 units up.

Even/odd functions, Average rate of change, and Quadratics Review problems

<p>20. Decide if the following functions are even, odd, or neither.</p> <p>a) $f(x) = 5x^3 + 2x^2$</p> <p>b) $f(x) = 8x$</p> <p>c) $f(x) = 6x^2 + 5$</p>	<p>21. Find the average rate of change of the function $f(x) = x^2 + 3$, over the interval $[-2, 5]$</p>
<p>22. Rewrite the function below from standard form to vertex form.</p> $y = x^2 - 22x + 5$	<p>23. A square is altered so that one dimension is increased by 2 inches and the other dimension is increased by 3 inches. If the area of the resulting rectangle is 90 square inches, find the area of the original square.</p>
<p>24. A rock is dropped from a bridge 300 feet above a river. The pathway that the rock takes can be modeled by the function $h(t) = -16t^2 + 300$. How long will it take the rock to reach the river?</p>	<p>25. Pam shoots an arrow upward at a speed of 60 feet per second, from a platform 20 feet high. The path of the arrow can be modeled by the function: $h(t) = -16t^2 + 60t + 20$, where h is the height and t is the time in seconds. What is the maximum height of the arrow?</p>

Quadratics Graphing and Functions Test Review

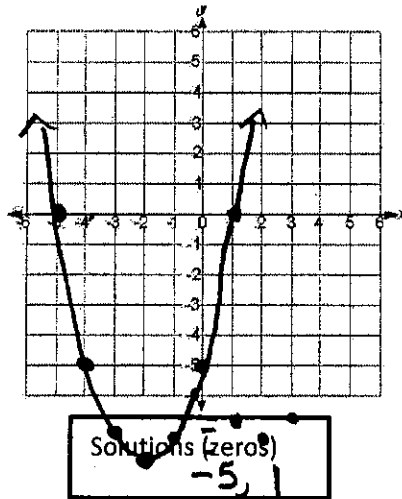
Fill in the blanks.

- The standard form of a quadratic function is $y = ax^2 + bx + c$
- The vertex form of a quadratic function is $y = a(x-h)^2 + k$
- What is the formula for the axis of symmetry from a quadratic function in standard form? $x = -\frac{b}{2a}$
- If the vertex is the highest point on the graph, it is called a maximum
- If the vertex is the lowest point on the graph, it is called a minimum

For #6-7, graph the quadratic functions to find the zeros.

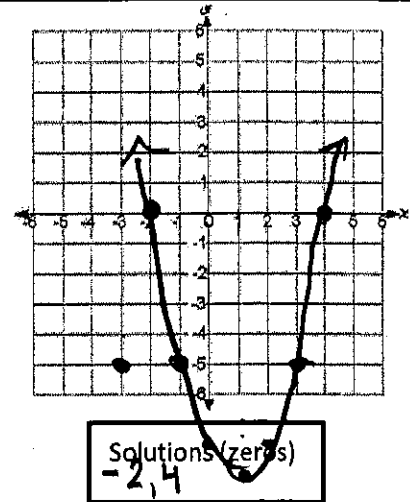
6. $y = x^2 + 4x - 5$

x	y
-4	-5
-3	-8
-2	-9
-1	-8
0	-5



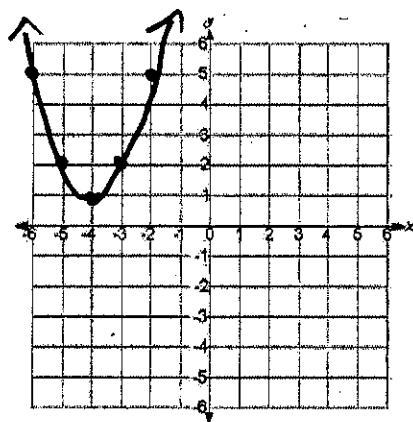
7. $y = x^2 - 2x - 8$

x	y
-1	-5
0	-8
1	-9
2	-8
3	-5



8. Graph using a table of values. Identify all key characteristics. $y = x^2 + 8x + 17$

x	y
-6	5
-5	2
-4	1
-3	2
-2	5



Axis of symmetry: $x = -4$

Vertex: $(-4, 1)$

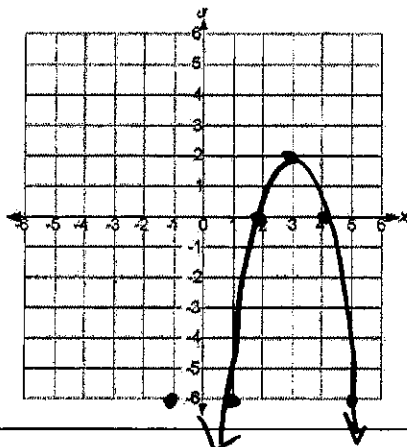
Domain: \mathbb{R}

Range: $y \geq 1$

End Behavior: As $x \rightarrow +\infty$, $y \rightarrow +\infty$
As $x \rightarrow -\infty$, $y \rightarrow +\infty$

9. Graph using a table of values. Identify all key characteristics. $y = -2x^2 + 12x - 16$

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



Axis of symmetry: $x = 3$

Vertex: $(3, 2)$

Domain: \mathbb{R}

Range: $y \leq 2$

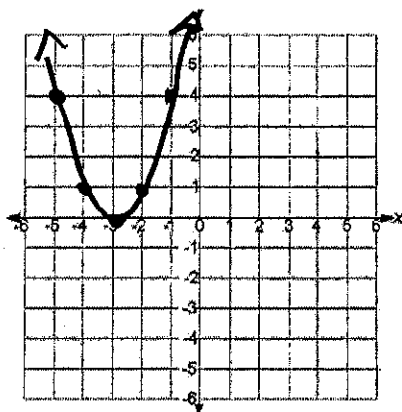
End Behavior: As $x \rightarrow +\infty$, $y \rightarrow -\infty$
As $x \rightarrow -\infty$, $y \rightarrow -\infty$

$$\frac{-12}{2(-2)} = \frac{-12}{-4} = 3$$

$$-18 + 36 - 16$$

10. Graph using a table of values. Identify all key characteristics. $y = x^2 + 6x + 9$

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



Axis of symmetry: $x = -3$

Vertex: $(-3, 0)$

Domain: \mathbb{R}

Range: $y \geq 0$

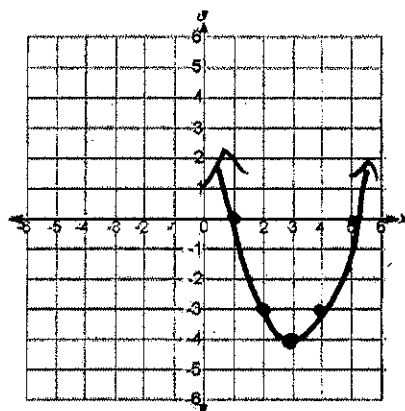
End Behavior: As $x \rightarrow +\infty$, $y \rightarrow +\infty$

As $x \rightarrow -\infty$, $y \rightarrow +\infty$

$$\frac{-6}{2} = -3$$

11. Graph using a table of values. Identify all key characteristics. $y = (x - 3)^2 - 4$

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



Axis of symmetry: $x = 3$

Vertex: $(3, -4)$

Domain: \mathbb{R}

Range: $y \geq -4$

Transformations: 3 Right
4 down

Without graphing, describe the transformations of $g(x)$ from the parent function, $f(x)$.

12. $f(x) = x^2$; $g(x) = (x + 4)^2 + 5$

Left 4
up 5

13. $f(x) = x^2$; $g(x) = -\frac{1}{3}(x + 7)^2 - 1$

reflected over x-axis
compressed by factor $\frac{1}{3}$
Left 7 down 1

14. Parent function: $f(x)$; $g(x) = (x - 2)^2 + 6$

Right 2
up 6

15. Parent function: $f(x)$; $g(x) = 5(x - 8)^2 - 2$

Stretch by Factor of 5
down 2

Write an equation that shows the transformations from the parent function: $y = x^2$.

16. Translated 5 units left and 3 units up.

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

17. Reflected over the x-axis and 7 units right.

$$y = -(x - 7)^2$$

18. Vertical stretch by a factor of 4 and 3 units down.

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

19. Vertical compression by a factor of $\frac{1}{2}$, reflected over the x-axis, 8 units right and 2 units up.

$$y = -\frac{1}{2}(x - 8)^2 + 2$$

Even/odd functions, Average rate of change, and Quadratics Review problems

20. Decide if the following functions are even, odd, or neither.

a) $f(x) = 5x^3 + 2x^2$ - neither

b) $f(x) = 8x^1$ \rightarrow odd

c) $f(x) = 6x^2 + 5$ even ($5x^0$)

21. Find the average rate of change of the function

$f(x) = x^2 + 3$, over the interval $[-2, 5]$

$f(-2) = (-2)^2 + 3$
 $4 + 3$
 7

$(-2, 7)$ $(5, 28)$

$f(5) = 25 + 3$
 28

$\frac{28 - 7}{5 - (-2)} = \frac{21}{7} = 3$

22. Rewrite the function below from standard form to vertex form.

$y = x^2 - 22x + 5$

$\frac{22}{2} = 11^2$

$y - 5 + 121 = x^2 - 22x + 121$

$y + 116 = (x - 11)^2$

$y = (x - 11)^2 - 116$

23. A square is altered so that one dimension is increased by 2 inches and the other dimension is increased by 3 inches. If the area of the resulting rectangle is 90 square inches, find the area of the original square.

$(x+3)(x+2) = 90$

$\begin{matrix} x+3 \\ 90 \end{matrix} \times x+2$

$x^2 + 3x + 2x + 6 = 90$

$x^2 + 5x + 6 = 90$

$x^2 + 5x - 84 = 0$

$(x+12)(x-7) = 0$

$x = -12$ $x = 7$

$\frac{-84}{+12} = -7$

$\begin{matrix} 49 \\ 7 \end{matrix}$

Area: 49 in^2

24. A rock is dropped from a bridge 300 feet above a river. The pathway that the rock takes can be modeled by the function $h(t) = -16t^2 + 300$. How long will it take the rock to reach the river?

$-16t^2 + 300 = 0$

$\frac{-16t^2}{-16} = \frac{-300}{-16}$

$t^2 = 18.75$

$\sqrt{t^2} = \sqrt{18.75}$

$t = \pm 4.33$

4.33 sec.

25. Pam shoots an arrow upward at a speed of 60 feet per second, from a platform 20 feet high. The path of the arrow can be modeled by the function: $h(t) = -16t^2 + 60t + 20$, where h is the height and t is the time in seconds. What is the maximum height of the arrow?

maximum \rightarrow vertex

$x = \frac{-b}{2a} = \frac{-60}{-32} =$

$x = 1.875$

plug it in.

$-16t^2 + 60t + 20$

$-16(1.875)^2 + 60(1.875) + 20$

$-56.25 + 112.5 + 20$

$56.25 + 20$

76.25

Vertex: $(1.875, 76.25)$

Maximum height:

76.25 ft