

NAME \_\_\_\_\_

DATE \_\_\_\_\_

**Module 14** Graphing Quadratic Relations  
**Lesson 1** Graphing Simple Quadratic Relations



**independent  
practice**

**Find the equation of the axis of symmetry.**

1.  $y = x^2 + 4x + 1$  \_\_\_\_\_

2.  $y = x^2 - 2x - 3$  \_\_\_\_\_

3.  $y = -4x^2 + 8x - 2$  \_\_\_\_\_

4.  $y = 2x^2 - 12x + 7$  \_\_\_\_\_

5.  $y = 3x^2 - 9x + 2$  \_\_\_\_\_

6.  $y = 5x^2 - 2$  \_\_\_\_\_

**Identify the vertex.**

7.  $y = x^2 - 6x - 9$  \_\_\_\_\_

8.  $y = -3x^2 + 6x + 2$  \_\_\_\_\_

9.  $y = 2x^2 - 8x + 7$  \_\_\_\_\_

10.  $y = 2x^2 + 4$  \_\_\_\_\_

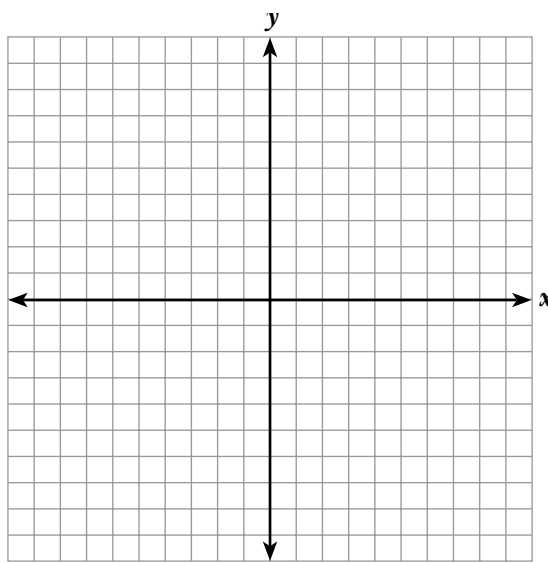
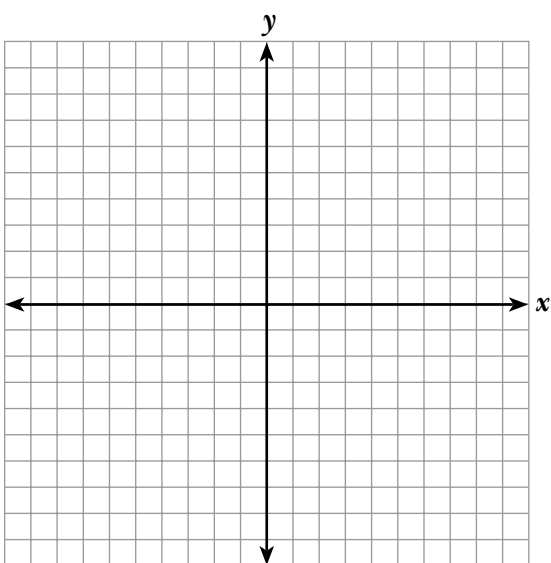
11.  $y = -x^2 - 2x$  \_\_\_\_\_

12.  $y = x^2 + x + 1$  \_\_\_\_\_

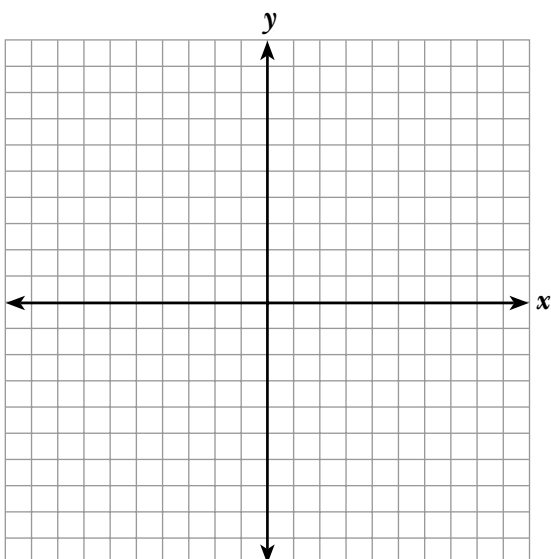
**Graph.**

13.  $y = x^2 + 2x + 3$

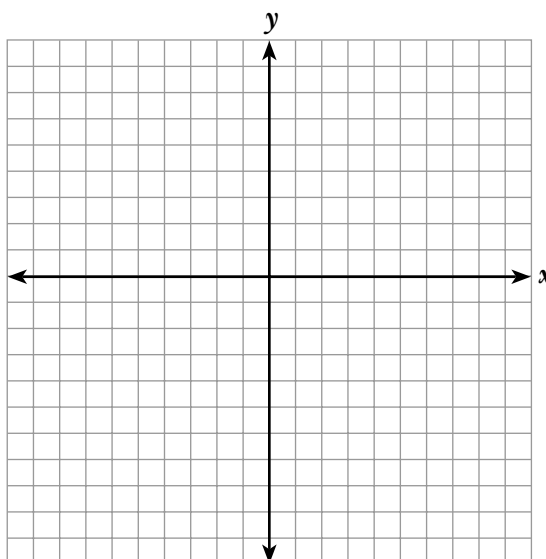
14.  $y = 2x^2 + 4x + 3$



15.  $y = -x^2 + 6x - 3$



16.  $y = -x^2 + 4x + 1$



## Journal

1. What is the axis of symmetry of a graph?
2. Joe says that the axis of symmetry of  $y = 3x^2 - 6x + 2$  is  $x = -1$ , but Jenny says that it is  $x = 1$ . Who is correct and why?
3. Explain how to find the vertex of  $y = 3x^2 - 6x + 2$ .
4. Explain how to graph the equation  $y = 3x^2 - 6x + 2$ .
5. Explain in words as many properties of the graph of  $y = 3x^2 - 6x + 2$  as you can.

## Cumulative Review

Solve the equations by evaluating square roots, factoring, completing the square, or using the quadratic formula.

- |                              |                             |
|------------------------------|-----------------------------|
| 1. $x^2 + 3x - 4 = 0$ _____  | 2. $x^2 = 12$ _____         |
| 3. $x^2 + 4x = 12$ _____     | 4. $2x^2 - x - 3 = 0$ _____ |
| 5. $3x^2 - 5x - 2 = 0$ _____ | 6. $2x^2 + x - 4 = 0$ _____ |

## Calculator Problem

Consider the equation  $y = 2x^2 - 5x + 1$ .

1. Press  $\boxed{\text{Y=}}$  and enter  $2x^2 - 5x + 1$  into  $Y_1=$ . See Figure 1.
2. Press  $\boxed{\text{GRAPH}}$ . See Figure 2. (You may want to set your window measurements as in Figure 3.)
3. From the **CALC** menu, select **3:minimum**. **Left Bound?** will appear in the lower left hand corner of the screen. Use the arrow keys to move the cursor to the left of what appears to be the vertex, press  $\boxed{\text{ENTER}}$ . **Right Bound?** will appear in the lower left hand corner of the screen. Use the arrow keys to move the cursor to the right of what appears to be the vertex; press  $\boxed{\text{ENTER}}$ . **Guess?** will appear in the lower left hand corner of the screen; press  $\boxed{\text{ENTER}}$ . See Figure 4. The  $x$  and  $y$  values of the minimum point of the graph are in the lower left hand corner of the screen. These values are the  $x$ - and  $y$ -coordinates of the vertex.
4. The axis of symmetry is determined by the equation  $x = -\frac{b}{2a}$ . The axis of symmetry also may be determined by the  $x$ -coordinate of the vertex.  
 $x = -\frac{b}{2a} = -\frac{-5}{2 \cdot 2} = \frac{5}{4} = 1.25$ . The value given by the equation and  $x$ -coordinate of the vertex correspond.

```

Plot1 Plot2 Plot3
Y1=2X^2-5X+1
Y2=
Y3=
Y4=
Y5=
Y6=
Y7=

```

Figure 1

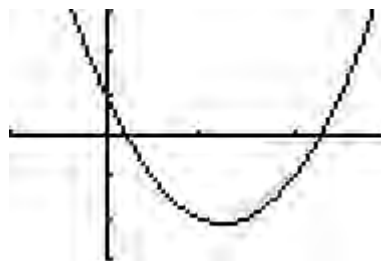


Figure 2

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WINDOW
Xmin=-1
Xmax=3
Xscl=1
Ymin=-3
Ymax=3
Yscl=1
Xres=1

```

Figure 3

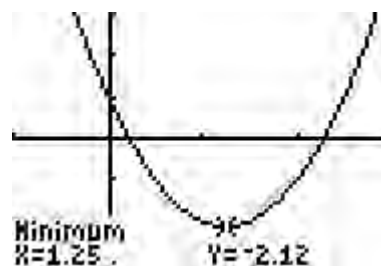


Figure 4

Graph the equations and determine the  $x$ - and  $y$ -coordinates of the vertex.

1.  $y = 3x^2 - 4$  \_\_\_\_\_

2.  $y = x^2 + 2x$  \_\_\_\_\_

3.  $y = -2x^2 + x + 1$  \_\_\_\_\_

4.  $y = -x^2 - 3x + 4$  \_\_\_\_\_

