

Name: \_\_\_\_\_

Date: \_\_\_\_\_

## 2-8 COMPLETING THE SQUARE

1. Each of the following trinomials is a perfect square. Write it in factored form, i.e.  $(x+a)^2$  or  $(x-a)^2$ .

(a)  $x^2 + 6x + 9$

(b)  $x^2 - 22x + 121$

(c)  $x^2 + 10x + 25$

(d)  $x^2 + 30x + 225$

(e)  $x^2 - 2x + 1$

(f)  $x^2 - 18x + 81$

2. Place each of the following quadratic functions, written in standard form, into vertex form by completing the square. Then, identify the coordinates of its turning point.

(a)  $y = x^2 - 12x + 40$

(b)  $y = x^2 + 4x + 14$

(c)  $y = x^2 - 24x + 146$

3. Use the method completing the square to write each of the following quadratic functions in the form  $y = a(x-h)^2 + k$ . Then, identify the turning point and whether it is a maximum or minimum.

(a)  $y = 3x^2 - 12x + 17$

(b)  $y = -5x^2 + 40x - 70$

## APPLICATIONS

4. A cable is attached at the same height from two poles and hangs between them such that its height above the ground,  $y$ , in inches, can be modeled using the equation:

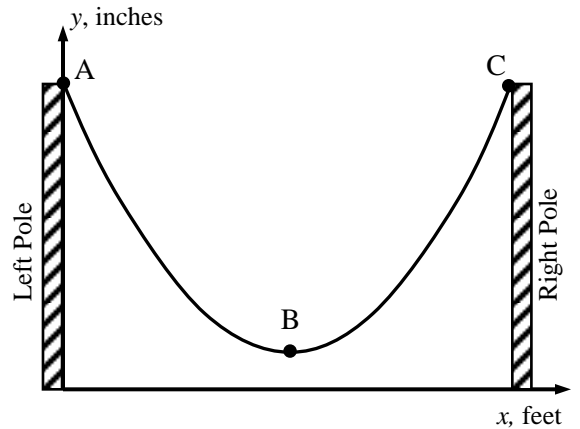
$$y = x^2 - 16x + 67$$

where  $x$  represents the horizontal distance from the left pole, in feet.

- (a) What height is point A above the ground? Show your work and use proper units.

- (b) Write the equation in vertex form.

- (c) What is the difference in the heights of points A and B? Show your analysis and include units.



- (d) What is the horizontal distance that separates points A and C? Explain your reasoning.

## REASONING

5. Use the vertex form of each of the following quadratic functions to determine which has the lowest  $y$ -value.

$$y = x^2 - 8x + 6$$

$$y = x^2 + 6x + 1$$

6. Two quadratic functions are shown below,  $f(x)$  and  $g(x)$ . Determine which has the lower minimum value. Explain how you arrived at your answer.

$$f(x) = x^2 + 10x$$

|        |    |     |     |     |     |     |    |
|--------|----|-----|-----|-----|-----|-----|----|
| $x$    | 3  | 4   | 5   | 6   | 7   | 8   | 9  |
| $g(x)$ | -9 | -14 | -17 | -18 | -17 | -14 | -9 |