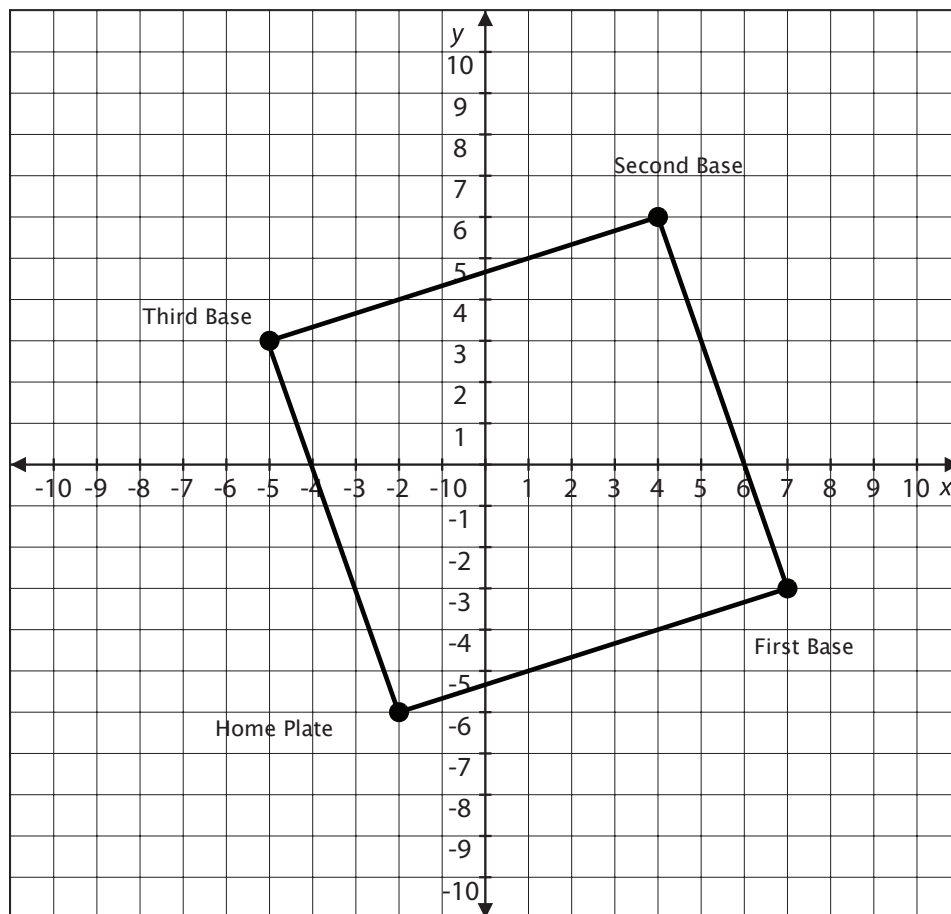


**Problem-Based Task: Field of Dreams****Coaching Sample Responses**

- a. What does the map of the field look like?

Plot each point on a coordinate plane.

Label each of the bases and home plate.



- b. Which sides of the baseball field are opposites?

The line connecting first base and second base is opposite the line connecting home plate and third base.

The line connecting second base and third base is opposite the line connecting home plate and first base.

- c. What is the slope of the line connecting first base and second base?

The slope of the line can be found using the slope formula.

$$\begin{aligned}
 m &= \frac{y_2 - y_1}{x_2 - x_1} && \text{Slope formula} \\
 &= \frac{(-3) - (6)}{(7) - (4)} && \text{Substitute (4, 6) and (7, -3).} \\
 &= \frac{-9}{3} = -3 && \text{Simplify.}
 \end{aligned}$$

The slope of the line connecting first base and home plate is  $-3$ .

- d. What is the slope of the line connecting home plate and third base?

$$\begin{aligned}
 m &= \frac{y_2 - y_1}{x_2 - x_1} && \text{Slope formula} \\
 &= \frac{(3) - (-6)}{(-5) - (-2)} && \text{Substitute (-2, -6) and (-5, 3).} \\
 &= \frac{9}{-3} = -3 && \text{Simplify.}
 \end{aligned}$$

The slope of the line connecting home plate and third base is  $-3$ .

- e. What is the slope of the line connecting home plate and first base?

$$\begin{aligned}
 m &= \frac{y_2 - y_1}{x_2 - x_1} && \text{Slope formula} \\
 &= \frac{(-3) - (-6)}{(7) - (-2)} && \text{Substitute (-2, -6) and (7, -3).} \\
 &= \frac{3}{9} = \frac{1}{3} && \text{Simplify.}
 \end{aligned}$$

The slope of the line connecting home plate and first base is  $\frac{1}{3}$ .

- f. What is the slope of the line connecting third base and second base?

$$m = \frac{y_2 - y_1}{x_2 - x_1} \quad \text{Slope formula}$$

$$= \frac{(6) - (3)}{(4) - (-5)} \quad \text{Substitute } (-5, 3) \text{ and } (4, 6).$$

$$= \frac{3}{9} = \frac{1}{3} \quad \text{Simplify.}$$

The slope of the line connecting third base and second base is  $\frac{1}{3}$ .

- g. Are opposite sides parallel?

Opposite sides have the same slope.

Opposite sides are parallel.

- h. Which sides of the baseball field are consecutive?

The line connecting first base and second base is consecutive to the line connecting second base and third base.

The line connecting second base and third base is consecutive to the line connecting third base and home plate.

The line connecting third base and home plate is consecutive to the line connecting home plate and first base.

The line connecting home plate and first base is consecutive to the line connecting first base and second base.

- i. How is the slope of the line connecting first base and second base related to the line connecting first base and home plate?

The slopes are opposite reciprocals; therefore, they are perpendicular.

- j. How is the slope of the line connecting second base and third base related to the line connecting third base and home?

The slopes are opposite reciprocals; therefore, they are perpendicular.

- k. How is the slope of the line connecting third base and home plate related to the line connecting home plate and first base?

The slopes are opposite reciprocals; therefore, they are perpendicular.

- l. How is the slope of the line connecting first base and second base related to the line connecting second base and third base?

The slopes are opposite reciprocals; therefore, they are perpendicular.

- m. What is the formula used for finding the distance between two points?

The formula for finding the distance between two points is the distance formula.

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

- n. What is the distance between first base and second base?

Use the distance formula to calculate the distance between each base.

$$\begin{aligned} d &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} && \text{Distance formula} \\ &= \sqrt{((4) - (7))^2 + ((6) - (-3))^2} && \text{Substitute (7, -3) and (4, 6).} \\ &= \sqrt{(-3)^2 + (9)^2} && \text{Simplify.} \\ &= \sqrt{9 + 81} && \text{Evaluate squares.} \\ &= \sqrt{90} && \text{Simplify.} \end{aligned}$$

The distance between first base and second base is  $\sqrt{90}$  units.

- o. What is the distance between second base and third base?

$$\begin{aligned} d &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} && \text{Distance formula} \\ &= \sqrt{((-5) - (4))^2 + ((3) - (6))^2} && \text{Substitute (4, 6) and (-5, 3).} \\ &= \sqrt{(-9)^2 + (-3)^2} && \text{Simplify.} \\ &= \sqrt{81 + 9} && \text{Evaluate squares.} \\ &= \sqrt{90} && \text{Simplify.} \end{aligned}$$

The distance between second base and third base is  $\sqrt{90}$  units.

- p. What is the distance between third base and home plate?

$$\begin{aligned}
 d &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} && \text{Distance formula} \\
 &= \sqrt{((-2) - (-5))^2 + ((-6) - (3))^2} && \text{Substitute } (-5, 3) \text{ and } (-2, -6). \\
 &= \sqrt{(3)^2 + (-9)^2} && \text{Simplify.} \\
 &= \sqrt{9 + 81} && \text{Evaluate squares.} \\
 &= \sqrt{90} && \text{Simplify.}
 \end{aligned}$$

The distance between third base and home plate is  $\sqrt{90}$  units.

- q. What is the distance between home plate and first base?

$$\begin{aligned}
 d &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} && \text{Distance formula} \\
 &= \sqrt{((7) - (-2))^2 + ((-3) - (-6))^2} && \text{Substitute } (-2, -6) \text{ and } (7, -3). \\
 &= \sqrt{(9)^2 + (3)^2} && \text{Simplify.} \\
 &= \sqrt{81 + 9} && \text{Evaluate squares.} \\
 &= \sqrt{90} && \text{Simplify.}
 \end{aligned}$$

The distance between home plate and first base is  $\sqrt{90}$  units.

- r. Is the baseball diamond a square? How do you know?

The baseball diamond is a square because all sides have the same length of  $\sqrt{90}$  units.

Opposite sides have the same slope, so they are parallel.

Consecutive sides have opposite reciprocal slopes, so they are perpendicular.

- s. What is the distance between second base and home plate?

$$\begin{aligned}
 d &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} && \text{Distance formula} \\
 &= \sqrt{((-2) - (4))^2 + ((-6) - (6))^2} && \text{Substitute (4, 6) and (-2, -6).} \\
 &= \sqrt{(-6)^2 + (-12)^2} && \text{Simplify.} \\
 &= \sqrt{36 + 144} && \text{Evaluate squares.} \\
 &= \sqrt{180} && \text{Simplify.}
 \end{aligned}$$

The distance between second base and home plate is  $\sqrt{180}$  units.

- t. What is the distance between third base and first base?

$$\begin{aligned}
 d &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} && \text{Distance formula} \\
 &= \sqrt{((7) - (-5))^2 + ((-3) - (3))^2} && \text{Substitute (-5, 3) and (7, -3).} \\
 &= \sqrt{(12)^2 + (-6)^2} && \text{Simplify.} \\
 &= \sqrt{144 + 36} && \text{Evaluate squares.} \\
 &= \sqrt{180} && \text{Simplify.}
 \end{aligned}$$

The distance between third base and first base is  $\sqrt{180}$  units.

- u. What do you notice about these two distances?

The distance from first base to third base is equal to the distance from second base to home plate.

### Recommended Closure Activity

Select one or more of the essential questions for a class discussion or as a journal entry prompt.