

9 TAKS PREPARATION



TAKS Obj. 7
TEKS G.7.A

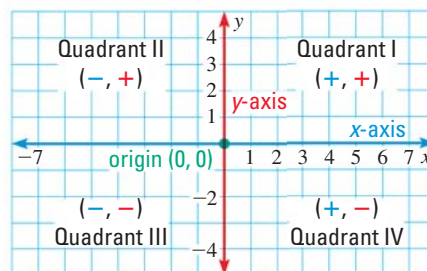
REVIEWING COORDINATE GEOMETRY

Coordinate geometry is the algebraic study of geometry that uses the coordinate plane to represent position.

A *coordinate plane* is a plane divided into four quadrants by the x -axis and the y -axis. It is used to plot ordered pairs of the form (x, y) .

Coordinate geometry problems include:

- using a coordinate plane to classify a two-dimensional figure
- identifying characteristics, such as vertices and lines of symmetry, of a two-dimensional figure in a coordinate plane
- performing transformations in a coordinate plane



EXAMPLE

Quadrilateral $MNPQ$ has vertices $M(2, 1)$, $N(7, 2)$, $P(8, 7)$, and $Q(3, 6)$. What type of quadrilateral is $MNPQ$?

Solution

To classify the quadrilateral, first draw it in a coordinate plane, as shown at the right.

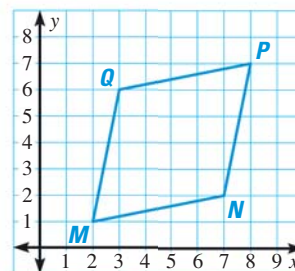
Second, find the side lengths.

$$MN = \sqrt{(7 - 2)^2 + (2 - 1)^2} = \sqrt{5^2 + 1^2} = \sqrt{26}$$

$$NP = \sqrt{(8 - 7)^2 + (7 - 2)^2} = \sqrt{1^2 + 5^2} = \sqrt{26}$$

$$PQ = \sqrt{(3 - 8)^2 + (6 - 7)^2} = \sqrt{(-5)^2 + (-1)^2} = \sqrt{26}$$

$$QM = \sqrt{(2 - 3)^2 + (1 - 6)^2} = \sqrt{(-1)^2 + (-5)^2} = \sqrt{26}$$



Because the four sides are congruent, $MNPQ$ is a rhombus.

To decide whether $MNPQ$ is also a square, find the slope of each side and use the slopes to determine if adjacent sides are perpendicular.

$$m_{MN} = \frac{2 - 1}{7 - 2} = \frac{1}{5}$$

$$m_{NP} = \frac{7 - 2}{8 - 7} = \frac{5}{1} = 5$$

$$m_{PQ} = \frac{6 - 7}{3 - 8} = \frac{-1}{-5} = \frac{1}{5}$$

$$m_{QM} = \frac{1 - 6}{2 - 3} = \frac{-5}{-1} = 5$$

The slopes of adjacent sides are not negative reciprocals of each other, so adjacent sides are not perpendicular. Therefore, $MNPQ$ is not a square.

► Quadrilateral $MNPQ$ is a rhombus.