

5.8**Coordinate Proofs**

For use with Exploration 5.8

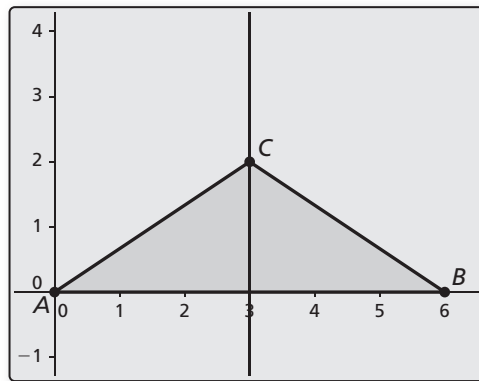
Essential Question How can you use a coordinate plane to write a proof?

1 EXPLORATION: Writing a Coordinate Proof

Go to *BigIdeasMath.com* for an interactive tool to investigate this exploration.

Work with a partner.

- Use dynamic geometry software to draw \overline{AB} with endpoints $A(0, 0)$ and $B(6, 0)$.
- Draw the vertical line $x = 3$.
- Draw $\triangle ABC$ so that C lies on the line $x = 3$.
- Use your drawing to prove that $\triangle ABC$ is an isosceles triangle.

**Sample**

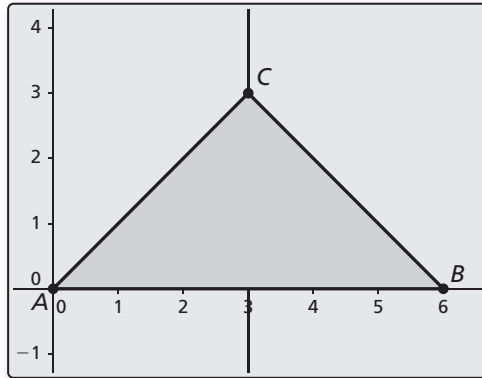
Points
 $A(0, 0)$
 $B(6, 0)$
 $C(3, y)$
 Segments
 $AB = 6$
 Line
 $x = 3$

2 EXPLORATION: Writing a Coordinate Proof

Go to *BigIdeasMath.com* for an interactive tool to investigate this exploration.

Work with a partner.

- Use dynamic geometry software to draw \overline{AB} with endpoints $A(0, 0)$ and $B(6, 0)$.
- Draw the vertical line $x = 3$.
- Plot the point $C(3, 3)$ and draw $\triangle ABC$. Then use your drawing to prove that $\triangle ABC$ is an isosceles right triangle.

5.8 Coordinate Proofs (continued)**2** **EXPLORATION:** Writing a Coordinate Proof (continued)**Sample**

Points

$A(0, 0)$

$B(6, 0)$

$C(3, 3)$

Segments

$AB = 6$

$BC = 4.24$

$AC = 4.24$

Line

$x = 3$

- d. Change the coordinates of C so that C lies below the x -axis and $\triangle ABC$ is an isosceles right triangle.
- e. Write a coordinate proof to show that if C lies on the line $x = 3$ and $\triangle ABC$ is an isosceles right triangle, then C must be the point $(3, 3)$ or the point found in part (d).

Communicate Your Answer

3. How can you use a coordinate plane to write a proof?
4. Write a coordinate proof to prove that $\triangle ABC$ with vertices $A(0, 0)$, $B(6, 0)$, and $C(3, 3\sqrt{3})$ is an equilateral triangle.

Name _____ Date _____

5.8

Notetaking with Vocabulary

For use after Lesson 5.8

In your own words, write the meaning of each vocabulary term.

coordinate proof

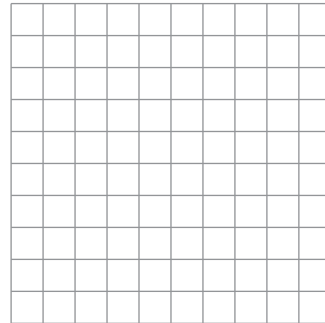
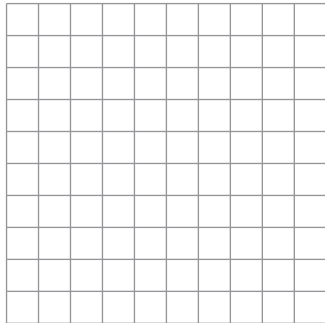
Notes:

5.8 Notetaking with Vocabulary (continued)

Extra Practice

In Exercises 1 and 2, place the figure in a coordinate plane in a convenient way. Assign coordinates to each vertex. Explain the advantages of your placement.

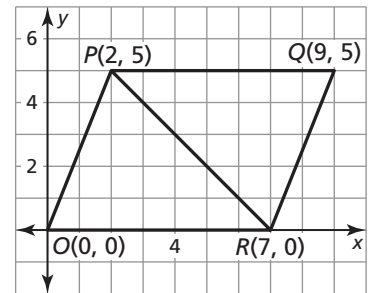
- 1. an obtuse triangle with height of 3 units and base of 2 units
- 2. a rectangle with length of $2w$



In Exercises 3 and 4, write a plan for the proof.

- 3. **Given** Coordinates of vertices of $\triangle OPR$ and $\triangle QRP$

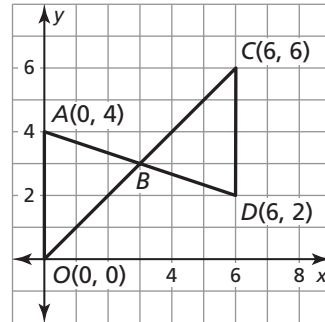
Proof $\triangle OPR \cong \triangle QRP$



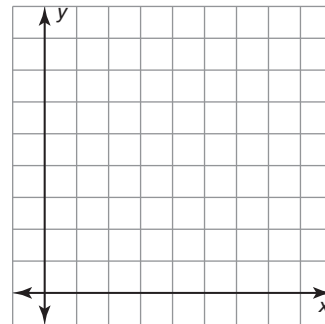
5.8 Notetaking with Vocabulary (continued)

4. **Given** Coordinates of vertices of $\triangle OAB$ and $\triangle CDB$

Prove B is the midpoint of \overline{AD} and \overline{OC} .



5. Graph the triangle with vertices $A(0, 0)$, $B(3m, m)$, and $C(0, 3m)$. Find the length and the slope of each side of the triangle. Then find the coordinates of the midpoint of each side. Is the triangle a right triangle? isosceles? Explain. (Assume all variables are positive.)



6. Write a coordinate proof.

Given Coordinates of vertices of $\triangle OEF$ and $\triangle OGF$

Prove $\triangle OEF \cong \triangle OGF$

