Lesson 5: Criterion for Perpendicularity

Classwork

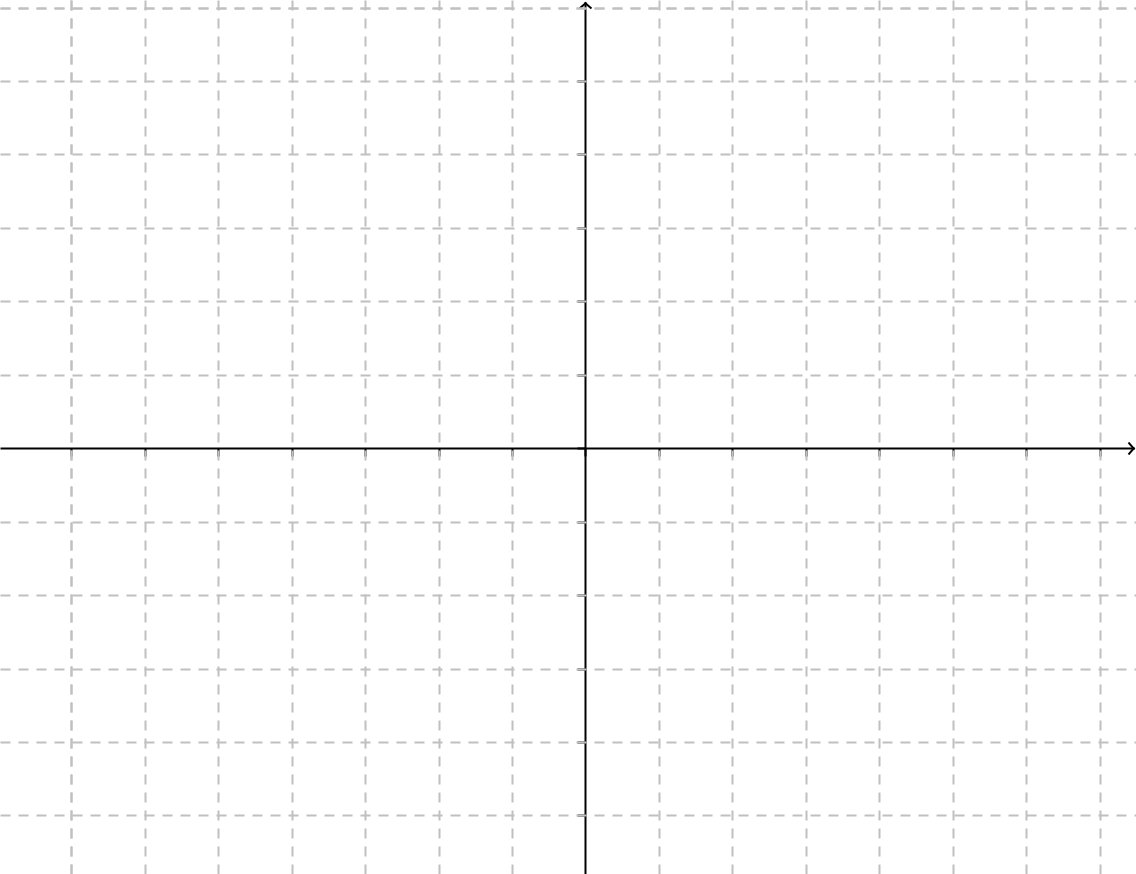
Opening Exercise

In right triangle , find the missing side.

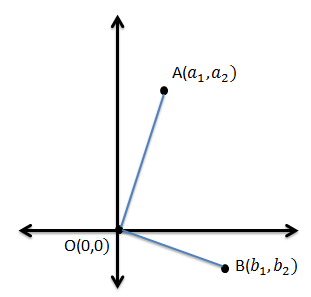
* 1. If and, what is ? Explain how you know.
  2. If and, what is ?

* 1. If and, what is (and )?

Exercise 1

1. Use the grid at the right.
   1. Plot points , , and on the coordinate plane.
   2. Determine whether and are perpendicular. Support your findings.

Example 2

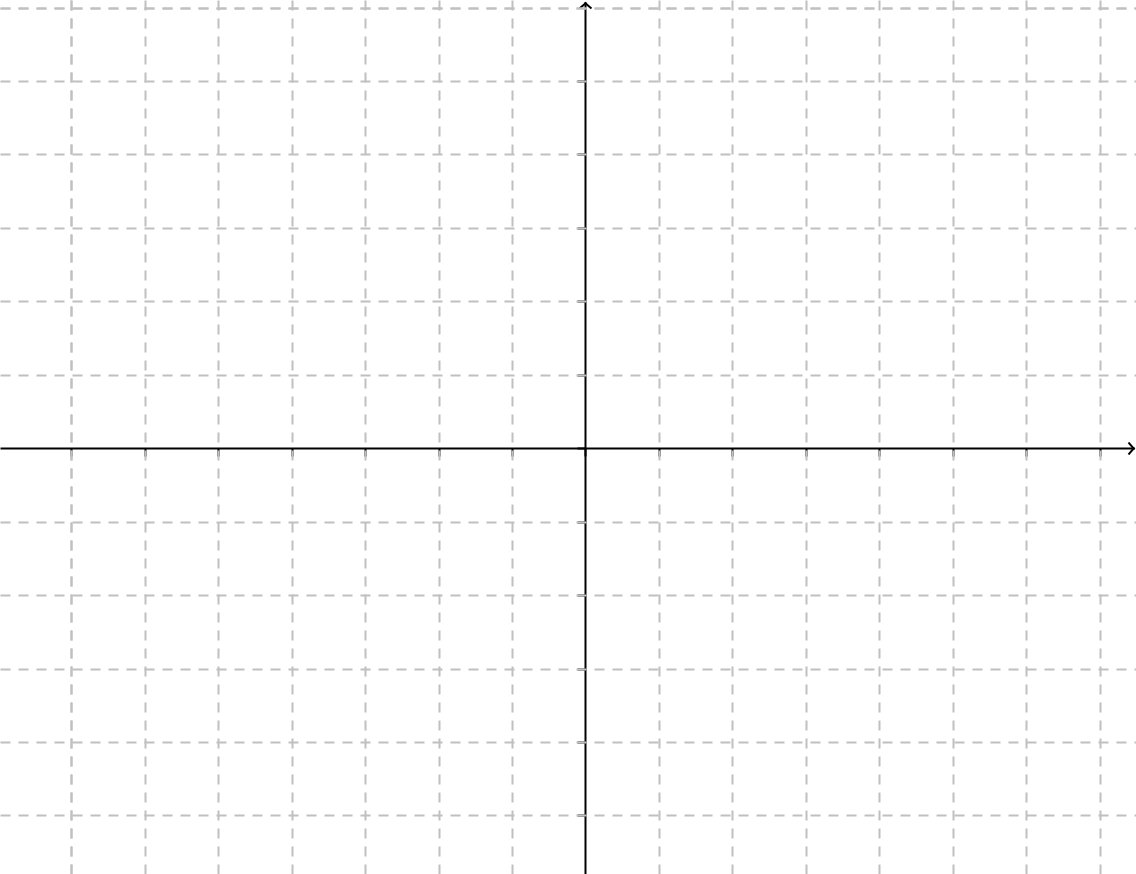


Exercises 2–4

1. Given points ,, ,, ,,, and, find all pairs of segments from the list below that are perpendicular. Support your answer.

,,,,,,,and

1. The points ,,, and are the vertices of parallelogram . Is this parallelogram a rectangle? Support you answer.



Problem Set

1. Prove using the Pythagorean theorem that is perpendicular to given and
2. Using the general formula for perpendicularity of segments through the origin and , determine if segments and are perpendicular.
   1. ,
   2. ,
3. Given points , , and , where is perpendicular to , will the images of the segments be perpendicular if the three points , , and are translated four units to the right and eight units up? Explain your answer.
4. In Example 1, we saw that was perpendicular to for ,, and. Suppose ,, and. Are segments and perpendicular? Explain without using triangles or the Pythagorean theorem.
5. Challenge: Using what we learned in Exercise 2, if ,,and, what is the general condition of,,,,,andthat ensures segments and are perpendicular?
6. A robot that picks up tennis balls is on a straight path from towards a ball at . The robot picks up a ball at , then turns right. What are the coordinates of a point that the robot can move towards to pick up the last ball?
7. Gerry thinks that the points and form a line perpendicular to a line with slope . Do you agree? Why or why not?