

6.2 Is It Right?

A Solidify Understanding Task

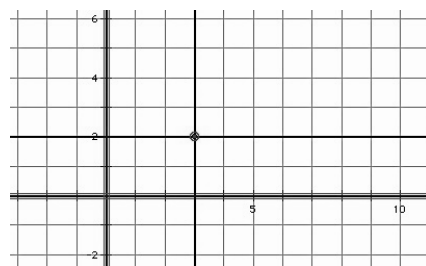
In *Leaping Lizards* you probably thought a lot about perpendicular lines, particularly when rotating the lizard about a 90° angle or reflecting the lizard across a line.



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In previous tasks, we have made the observation that *parallel lines have the same slope*. In this task we will make observations about the slopes of perpendicular lines. Perhaps in *Leaping Lizards* you used a protractor or some other tool or strategy to help you make a right angle. In this task we consider how to create a right angle by attending to slopes on the coordinate grid.

We begin by stating a fundamental idea for our work: *Horizontal and vertical lines are perpendicular*. For example, on a coordinate grid, the horizontal line $y = 2$ and the vertical line $x = 3$ intersect to form four right angles.

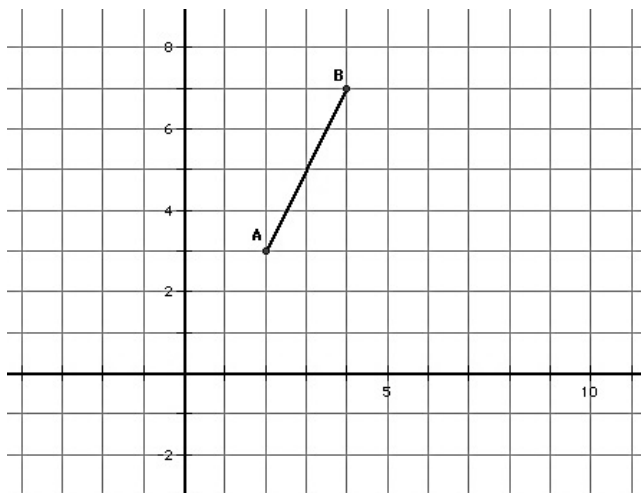


But what if a line or line segment is not horizontal or vertical?

How do we determine the slope of a line or line segment that will be perpendicular to it?

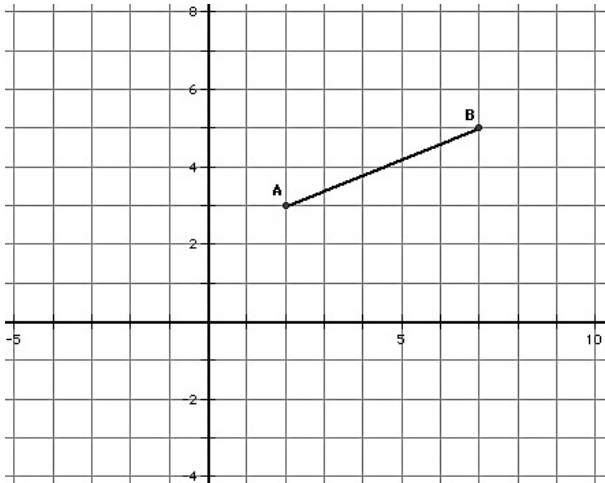
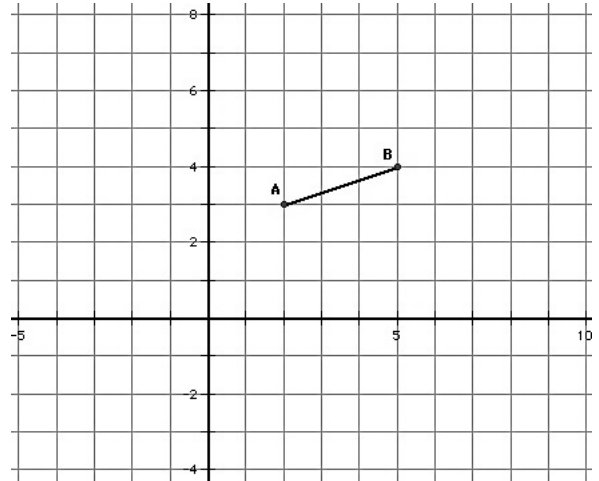
Experiment 1

1. Consider the points $A(2, 3)$ and $B(4, 7)$ and the line segment, \overline{AB} , between them. What is the slope of this line segment?
2. Locate a third point $C(x, y)$ on the coordinate grid, so the points $A(2, 3)$, $B(4, 7)$ and $C(x, y)$ form the vertices of a right triangle, with \overline{AB} as its hypotenuse.
3. Explain how you know that the triangle you formed contains a right angle?
4. Now rotate this right triangle 90° about the vertex point $(2, 3)$. Explain how you know that you have rotated the triangle 90° .
5. Compare the slope of the hypotenuse of this rotated right triangle with the slope of the hypotenuse of the pre-image. What do you notice?



Experiment 2

Repeat steps 1-5 above for the points $A (2, 3)$ and $B (5, 4)$.

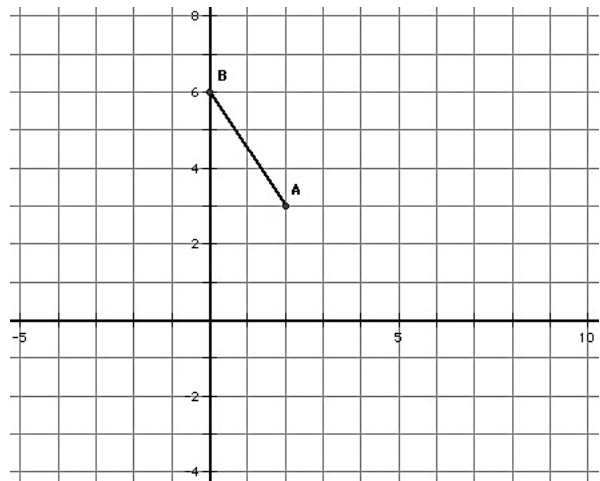


Experiment 3

Repeat steps 1-5 above for the points $A (2, 3)$ and $B (7, 5)$.

Experiment 4

Repeat steps 1-5 above for the points $A (2, 3)$ and $B (0, 6)$.



Based on experiments 1-4, state an observation about the slopes of perpendicular lines.

While this observation is based on a few specific examples, can you create an argument or justification for why this is always true? (Note: You will examine a formal proof of this observation in the next module.)

