

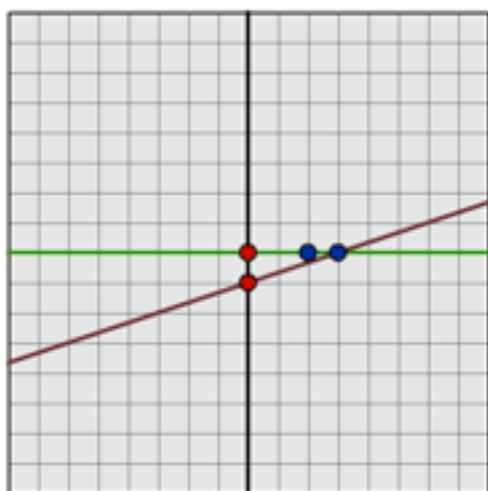
# Parallel and Perpendicular Lines

## G2\_RT2\_2

In this interactivity you can move the dots to determine the positions of two lines.

Move the dots until the lines are parallel. What do you notice about the equations of the lines?

Experiment with the lines in several positions. What can you say about the equations of parallel lines?



Can you **explain** your findings?

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You can now use the interactivity to explore equations of perpendicular lines. Move the dots until the lines are perpendicular. How do you know that they are perpendicular? What do you notice about the equations of the lines?

Experiment with the lines in several positions. What can you say about the equations of perpendicular lines?

Can you **explain** your findings?

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How can we tell whether two lines intersect? Can we tell this just from their equations? Can we find the number of points of intersection without actually finding the points themselves? You may like to use the interactivity to explore.

How can we use the equations of the lines to find all their points of intersection?

For each of the following questions, try to think geometrically and also algebraically (working just from the equations of the lines, with no picture).

Can you find two lines that do not intersect?

Can you find two lines that intersect at exactly one point?

Can you find two lines that intersect at exactly two points?

Can you find two lines that intersect at exactly  $n$  points, for any  $n \geq 3$ ?

Can you find two lines that intersect at infinitely many points?



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How many points of intersection might there be amongst three lines? What if there are even more lines?

## Relevance

**E2**

How is the solution of equations related to problems in geometry?

**G2**

What is the connection between algebra and geometry, and how can we exploit it?