# Understanding Slope with Similar Triangles

**Short description:** Learn how similar triangles can be used to help explain the concept of slope in this Math Shorts video.

**Long description:** In this video, learn how similar triangles can be used to help explain the concept of slope. In the accompanying classroom activity, students apply the concept of similar triangles to explore the slope between different points on the coordinate plane. Students may already know that two points make a line. In the activity, they use similar right triangles to explore why the slope of a line is constant between any two points on that line. The activity begins with a review of two concepts: similar triangles and slope. Students then watch the video, which relating the two ideas, and break into partner groups to develop mathematical arguments relating slope and similarity.

**Activity Text**

**Learning Outcomes**
Students will be able to:

- find the slope of a line given two points on the line
- apply concepts of similarity to understand that the slope of a line is constant between any two points on the line

**Common Core State Standards:** 8.EE.B.6

**Vocabulary:** Similar, similar triangles, proportional, ratios, slope

**Materials**: Rulers, protractors, graph paper, calculator, laptops/tablets (if available), Slope and Similar Triangles worksheet

**Procedure**

**1. Introduction (5 minutes, whole group)**
Review the mathematical concept of *similar* with students, specifically with respect to *similar triangles*. For two triangles to be similar, they must have the same angle measurements—even if the lengths of the three legs are different. Emphasize that similar triangles are also *proportional*: the *ratios* of any two corresponding sides will be equal. (If time allows, draw two similar triangles, indicating the corresponding sides.)

Then review the idea of *slope*. Slope is often described as the "steepness" of a line (the steeper the line, the greater the slope). Remind students that they can calculate the slope of a line by dividing the vertical change between two points by the horizontal change between those same two points (more simply, rise/run).

**2. Watch the Video (10 minutes, pairs)**
Have students watch the video in pairs. The video covers a lot of material, so students may need to watch it multiple times before the relationship between the robot, the slope of the

line, and the similar triangles makes sense. After watching the video, have students discuss the following questions:

- What does Jason do to figure out if his robot is moving at a constant speed?
- Why can't Jason answer this question by just looking at the data points on his graph?
- How does using similar triangles help Jason see that his robot is moving at a constant speed?

**3. Activity (20 minutes, pairs)**

Hand out one worksheet to each pair as well as a ruler, protractor, graph paper, and calculator. (If laptops/tablets are available, distribute these too so that students can watch the video from earlier in this lesson again.) In this activity, students develop their ability to make a mathematical argument by exploring (and answering) some questions about slope and similar triangles.

As students discuss the questions on the worksheet, walk around the room and make notes about their ideas. What ideas are coming up in discussion? How are they making sense of the questions? What viable arguments are they constructing? These observations can form the basis of the class discussion at the end of the lesson.

**4. Conclusion (5 minutes, whole group)**

Discuss some of the questions from the worksheet as a group. Ask students to share their answers and proofs and point out the similarities and differences in reasoning among the different partners. Also review your notes from observing the different student groups at work and bring up any observations you have about students' understanding of slope and similar triangles.