Stair Stepping Steepness
(Teacher's Guide)

Common Core Standard: 8.EE.6a

Materials: none (internet connection for video is optional)

Student Learning Goals:

(1)

Premise

Lesson

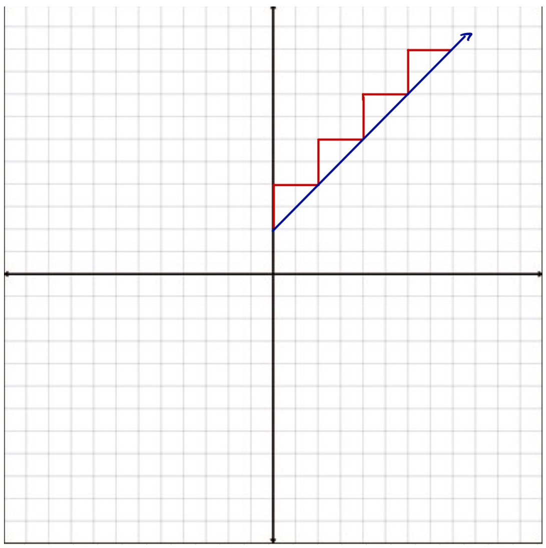
Extensions

Stair Stepping Steepness

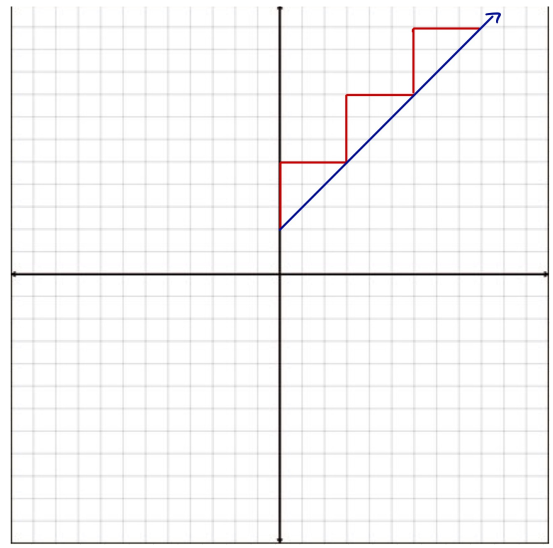
Have you ever thought about how you measure steepness? What makes one set of stairs steeper than another? Sure you can use the angle measure of the stairs to compare them, but the truth is that the angle of a staircase is rarely used during construction to determine steepness. Can you discover what is?

1) Look at the two examples of stairs below. Which one is steeper? How can you prove it mathematically?

A)

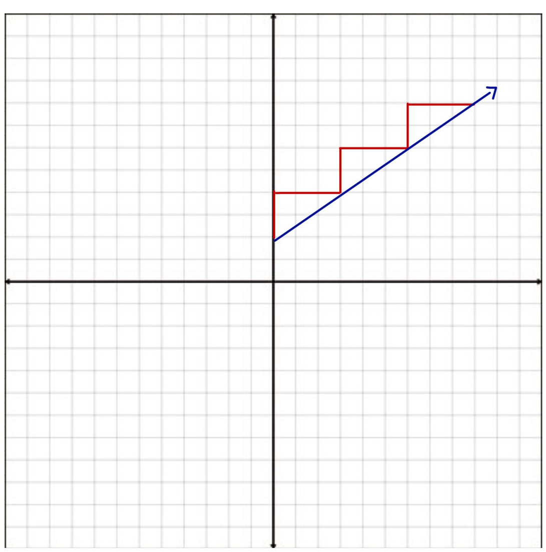


B)

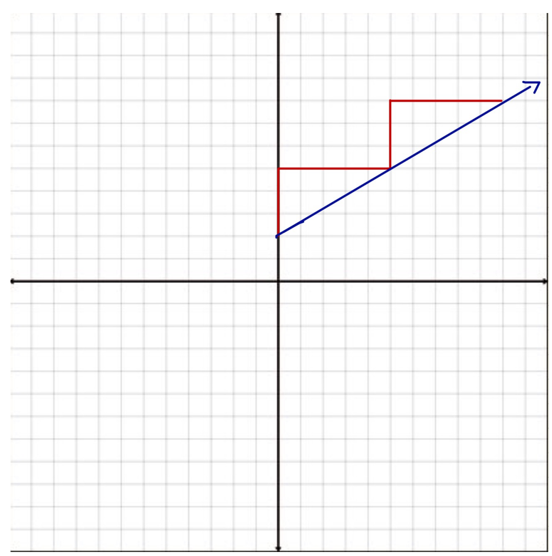


2) Look at the next two examples of stairs below. Which one is steeper? How can you prove it mathematically?

A)



B)

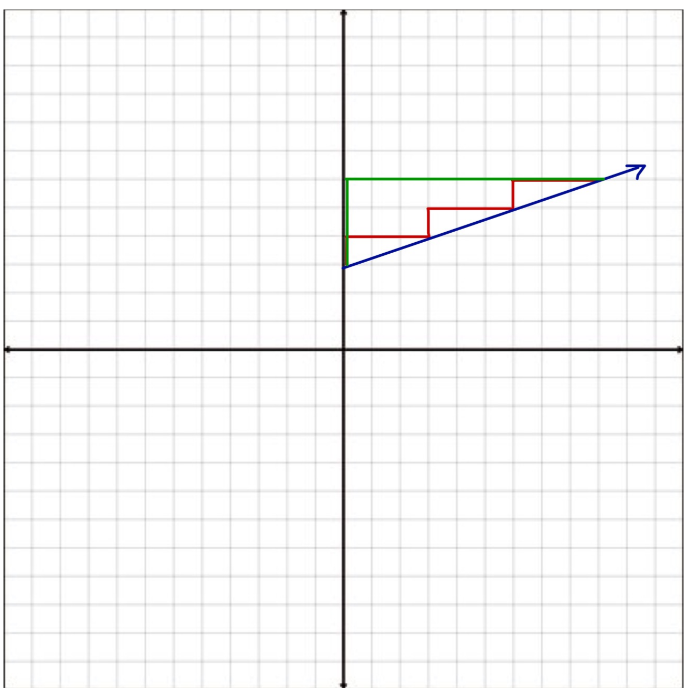


3) In the two questions on the first page, how did the steps (or triangles) help you to determine which set of steps was steeper?

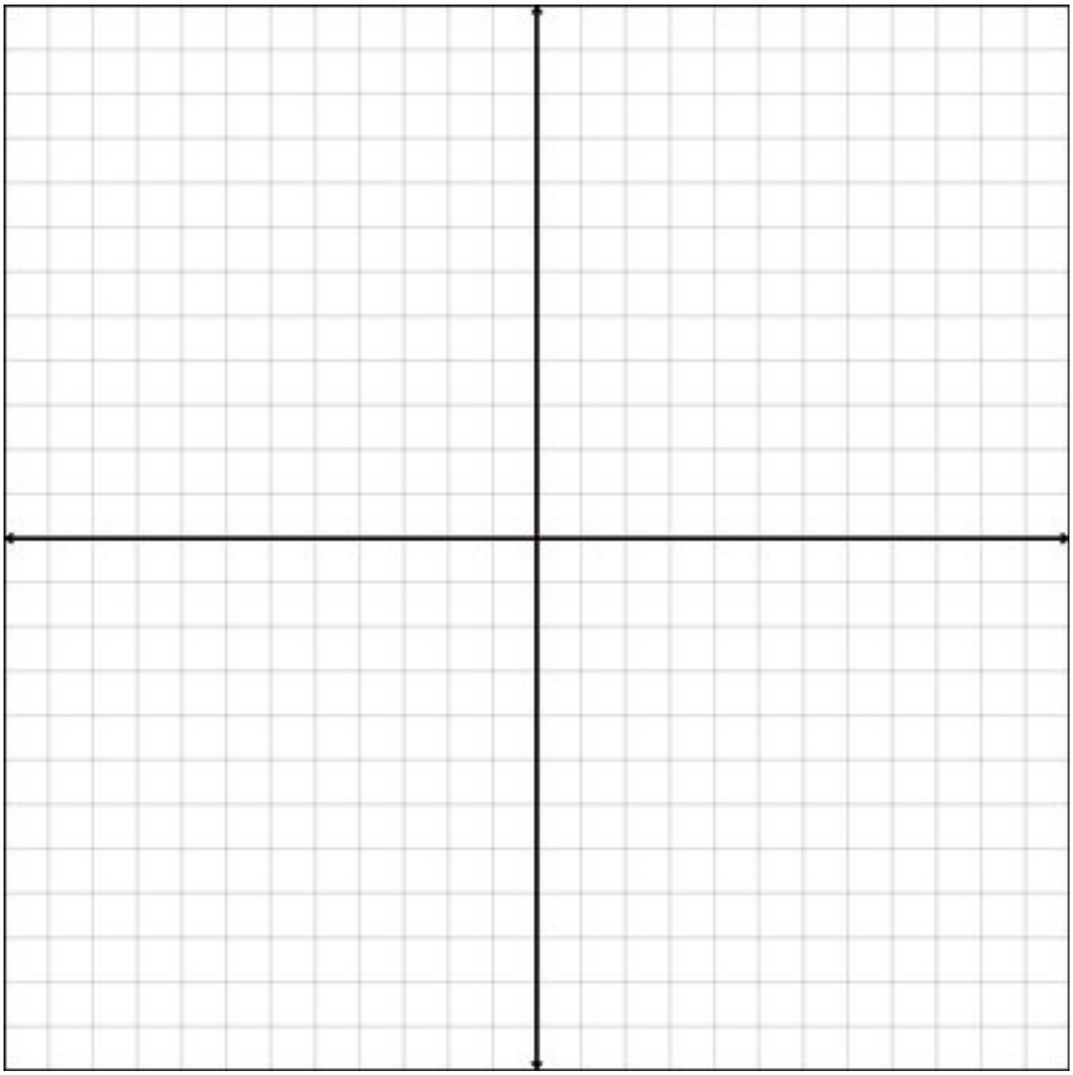
4) The mathematical steepness of a line is called the *slope*. What is the slope of each line above?

1A: **1B:** **2A:** **2B:**

5) Using the same thinking you employed on the previous problems look at the following set of steps. What are the two different sized triangles (stairs) showing about the steepness of the line? Mathematically compare the triangles - what does the math show about the comparison of the differently sized triangles?



6) Now it is your turn to create a staircase. Create a set of stairs and then make sure you draw your line like the previous examples. After you are done drawing your staircase make sure you determine the slope of your line.



Slope:

7) Building code generally states that stairs should have a riser height between 4 and 7 inches and a minimum tread length of 10 inches. How does your slope ratio compare to the ratio of the building code? Is your staircase up to code?

Imagine you are tasked with building a staircase to connect a first floor to the second floor of a new construction home. The total height the staircase needs to elevate to is 103 inches. How would you go about constructing the stairs? Write out what you would do and sketch pictures to show.

When you are done visit https://www.youtube.com/watch?v=iALK0-n-81c **(search: bob vila how to build a staircase)**

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JOURNAL ENTRY:
How did your plan for building a staircase compare to that of building expert Bob Vila? How did the slope of the line or stairs factor into their building process?

Write your thoughts below, making sure to describe the math you did and how it helps us explain or understand the world around us.