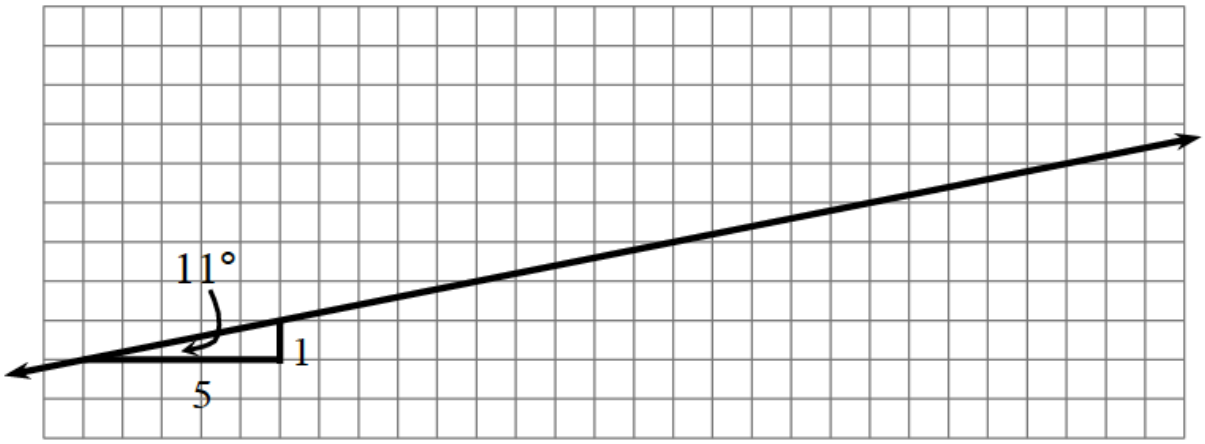
Name_____ Per_____ Date_____

3.2.1 Constant Ratios in Right Triangles

3-68. PATTERNS IN SLOPE TRIANGLES

In order to determine an angle (such as the angle at which the Leaning Tower of Pisa leans), you need to investigate the relationship between the angles and the sides of a right triangle. You will start by studying slope triangles. Obtain the Lesson 3.2.1 Resource Page and locate the graph shown below. Notice that one slope triangle has been drawn for you. Note: For the next several lessons, angle measures will be rounded to the nearest degree.



a. Draw three new slope triangles on the line. Each should be a different size. Label each triangle with as much information as you can, such as its horizontal and vertical lengths and its angle measures.

b. Explain why all of the slope triangles on this line must be similar.

c. Since the triangles are similar, what does that tell you about the slope ratios?

d. Confirm your conclusion by writing the slope ratio for each triangle as a fraction, such as $\frac{\Delta y}{\Delta x}$. (Note: Δy represents the vertical change or "rise", while Δx represents the horizontal change or "run".) Then change the slope ratio into decimal form and compare.

3-69. Tara thinks she sees a pattern in these slope triangles, so she decides to make some changes to investigate whether or not the pattern remains true.

a. She asks, "*What if I draw a slope triangle on this line with Δy = 6? What would be the Δx of my triangle?*" Answer her question and explain how you figured it out.

b. "*What if Δx is 40?*" Tara wonders, "*Then what is Δy?*" Determine the value of Δ*y*, and explain your reasoning.

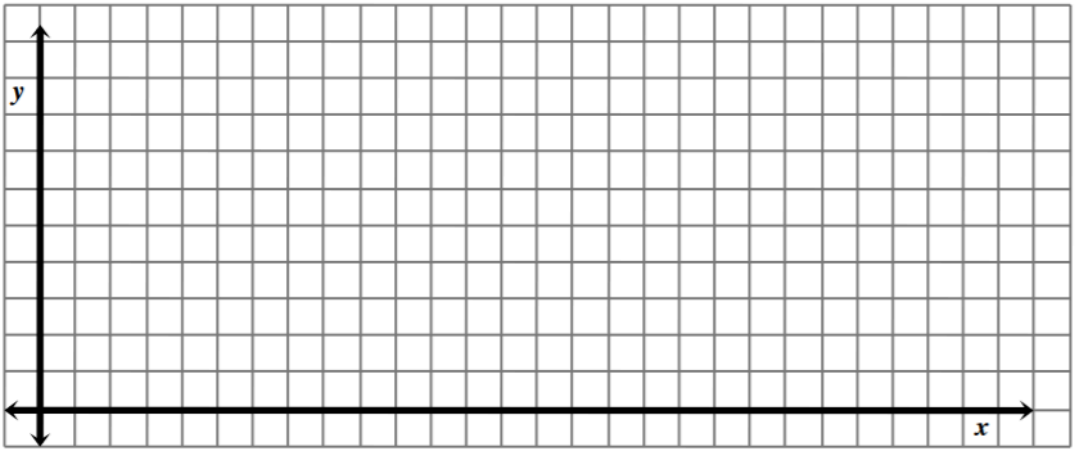
c. Tara wonders, "*What if I draw a slope triangle on a different line? Can I still use the same ratio to calculate a missing Δx- or Δy-value?*" Discuss this question with your team and explain to Tara what she could expect.

3-70. CHANGING LINES

In part (c) of problem 3-69, Tara asked, "*What if I draw my triangle on a different line?*" With your team, investigate what happens to the slope ratio and slope angle when the line is different. Use the grids provided on your Lesson 3.2.1 Resource Page to graph the lines described below. Use the graphs and your answers to the questions below to respond to Tara's question.

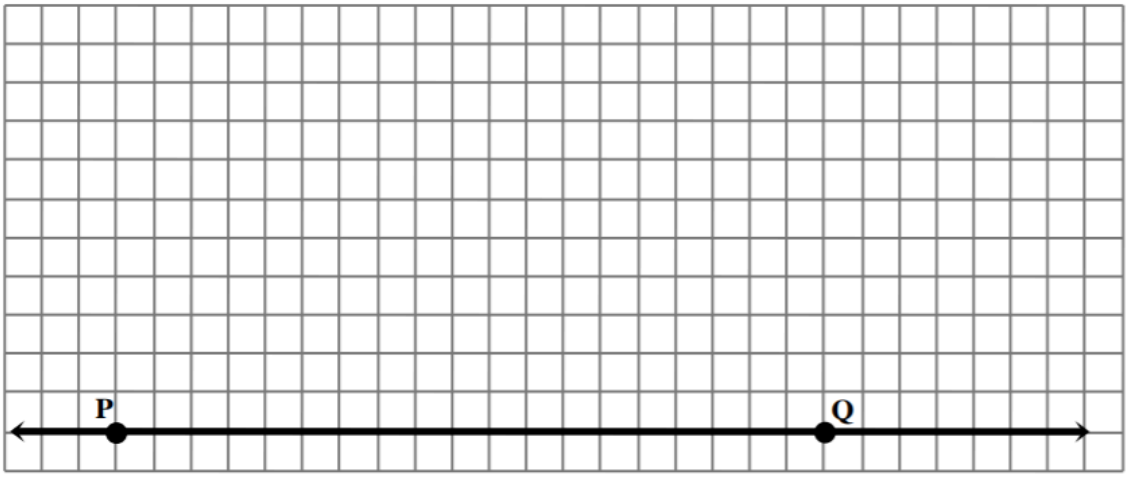
a. On graph A, graph the line $y = \frac{2}{5}x$. What is the slope ratio for this line? What does the slope angle appear to be? Does the information about this line support or change your conclusion from part (c) of problem 3-69? Explain.

Graph A: Problem 3-70 (a)



b. On graph B, you are going to create $\angle QPR$ so that it measures 18°. First, place your protractor so that point *P* is the vertex. Then find 18° and mark and label a new point, *R*. Draw ray $\overrightarrow{PR}$ to form $\angle QPR$. What is an approximate slope ratio for this line?

Graph B: Problem 3-70 (b)



c. Graph the line $y = x + 4$ on graph C. Draw a slope triangle and label its horizontal and vertical lengths. What is $\frac{\Delta y}{\Delta x}$ (the slope ratio)? What is the slope angle?

Graph C: Problem 3-70 (c)