

LAB 11.4

Ratios Involving the Hypotenuse

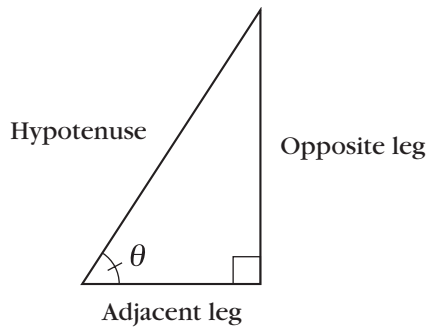
Name(s) _____

■ **Equipment:** CircleTrig geoboard, CircleTrig geoboard paper

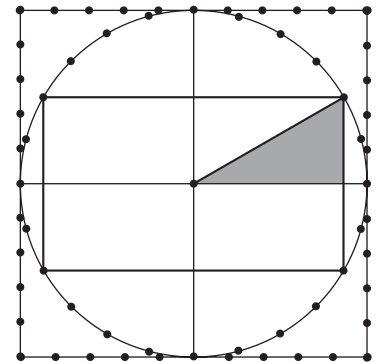
In Labs 11.1 and 11.2, we were working with three numbers: the two legs of a right triangle (which we thought of as rise and run) and an angle. Given any two of those, it was possible to find the third. In some right triangle situations, however, the three numbers you have to work with could be the hypotenuse, one leg, and an angle.

To address such problems, we will use two ratios involving the hypotenuse:

$$\frac{\text{adjacent leg}}{\text{hypotenuse}} \quad \text{and} \quad \frac{\text{opposite leg}}{\text{hypotenuse}}$$



To find those ratios, use your CircleTrig geoboard. To find lengths of adjacent and opposite legs, recall how you found slopes for given angles in Lab 11.1. See the figure at right. Using this method, the length of the hypotenuse will always be the same (what is it?), which makes it easy to write the ratios without using a calculator. Enter your results in the table below. Since you can find lengths to the nearest 0.1 cm, express your ratios to the nearest 0.01 unit.



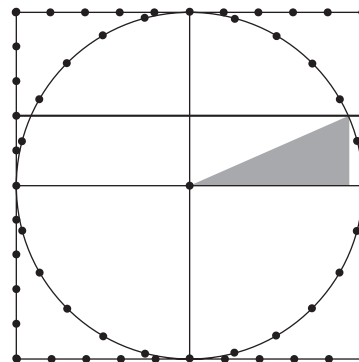
θ	opp/hyp	adj/hyp
0°		
15°		
30°		
45°		
60°		
75°		
90°		

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Ratios Involving the Hypotenuse (continued)

The figure at right shows one way to find an angle given an opp/hyp ratio of 0.4. Stretch a rubber band to connect two 4-cm pegs. Read off the angle where the rubber band crosses the protractor markings. (Can you see why the opp/hyp ratio is 0.4 in this example?) You can use a similar method to find angles for given adj/hyp ratios. Enter your results in the tables below.



opp/hyp	θ
0	
0.2	
0.4	
0.6	
0.8	
1	

adj/hyp	θ
0	
0.2	
0.4	
0.6	
0.8	
1	

Discussion

- When filling out the tables, look for patterns. What is the relationship between the ratios for complementary angles? For what angles do we have ratios of 0? 1?
- Some of the triangles you used to fill out the tables are “famous right triangles.” Check that the angles and ratios you found are correct by comparing your answers with those you got in Lab 10.7.
- Can the $\frac{\text{opp}}{\text{hyp}}$ ratio, or the $\frac{\text{adj}}{\text{hyp}}$ ratio, be greater than 1? Explain.