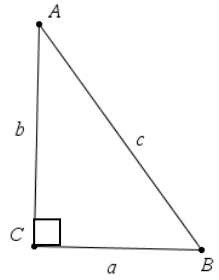
Name_____

Investigating the Relationship between the Sides of Right Triangles and Oblique Triangles with TI-Nspire Handheld

1. What does the Pythagorean Theorem tell us about the relationship of sides *a, b*, and *c* of right ΔABC? State the formula as you know it.



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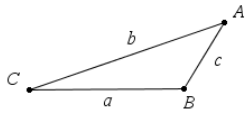
2. What is the value of $a^2 + b^2 - c^2$ for a right triangle? _____

3. Open file "Triangle Investigation" on TI-Nspire and do problem #1.

4. If *a* and *b* stay constant and ∠C becomes an acute angle, predict whether $a^2 + b^2 - c^2$ is positive, negative, or zero.

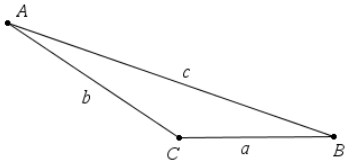


_____

Explain why.

_____

5. If *a* and *b* stay constant and ∠C becomes an obtuse angle, predict whether $a^2 + b^2 - c^2$ is positive, negative, or zero.



_____

Explain why.

_____

6. Based on your answers above, if ∠C varies from 0° to 180°, describe the behavior of $a^2 + b^2 - c^2$.

_____

7. Do problem #2 from file "Triangle Investigation" on TI-Nspire to check your thinking.

8. On page 2.2 of file "Triangle Investigation", side *a* and side *b* are constant: *a*= 3 cm and *b*= 4 cm. Side *c* and ∠C vary. Collect some data from your drawing, and enter it in the chart on the right.

9. If you graph ∠C on the x-axis and $a^2 + b^2 - c^2$ on the y-axis, describe what you know about the shape of the graph from your observations.

_____

∠C	$a^2 + b^2 - c^2$
0°	
30°	
60°	
90°	
120°	
150°	
180°	

10. Let's look at the relationship in the table from #8 a little further. We'll collect more data in a spreadsheet and graph that data. Go to problem #3 in the file "Triangle Investigation", and follow the directions carefully. You will be graphing m∠C on the x-axis and the algebraic expression $a^2 + b^2 - c^2$ on the y-axis.

11. Does the shape of the graph look like you thought it would? _____

12. What type of functions would fit this data? _____

13. Return to page 3.5 in the file "Triangle Investigation". To enter your function guess, you will need to show the function entry line. To do this press (menu), then 2:View, and 6:Show Entry Line. Press (enter). Enter your guess in the line f1(x)= .

Guess f1(x)= _____

14. What features of your function are correct?

_____

15. What features of your function need adjustment?

_____

16. Edit the function to better fit the data. (If the entry line now says f2(x)= , up arrow to return to f1(x)= .)

What is your final function? f1(x)= _____

17. Side a and side b of the triangle were constants in this investigation: side a = 3 and side b = 4. How does the constant in your function relate to these constant sides?

_____

18. Generalize your hypothesis, and complete this equation for all triangles.

$a^2 + b^2 - c^2 =$ _____

19. Solve the equation for c^2.

$c^2 =$ _____

Extension:

In the extension, side b and m∠C are constant, and side a and side c will vary. Go to problem #4 in the file "Triangle Investigation" and follow directions carefully.

What is the shape of the graph? _____

Write an equation to fit the data & enter it in f1(x)= _____
(Refer to #13 to show function entry line.)

Explain the shape of the graph in relation to the triangle. _____

_____