

Should you measure carefully?

Lesson Information
<i>By Ron Lancaster</i>
Subject:
Trigonometry Geometry Pre-Calculus
Topic:
Functions Geometry and Measurement Graphing
Technology:
Graphing Calculator
Level:
Moderate
Activity Structure:
Pooled Data Analysis
Duration of Activity:
Whole Class Period Multiple Classes

Overview:

This activity has students discover how small changes in the measurements of a right triangle can influence the whole triangle. Students track data and analyze changes in order to look for patterns. Students then use these patterns to develop a function that describes how the changes relate to one another.

Learning Objectives:

- Solve for missing triangle information using trigonometric relationships
- Use patterns to predict values
- Use patterns to develop functions

Materials:

- Graphing Calculator
- Worksheet
- Pencil
- Paper

Question 1

- (a) Given that TAN is a right triangle with $\angle TAN = 90^\circ$ and $\angle NTA = 85^\circ$ find the length of AN (see Figure 1) for each of the following cases. Before you begin, describe how you think the length of AN will change over the course of these cases.

TA (meters)	AN (meters)
100	
100.1	
100.2	
100.3	
100.4	
100.5	

TA (meters)	AN (meters)
100.6	
100.7	
100.8	
100.9	
101	

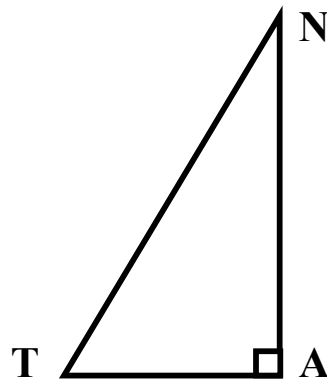


Figure 1

- (b) Study your results from part (a) and write a few sentences to describe how the length of AN changed as the value of TA steadily increased from 100 to 101 meters.
- (c) Search for a pattern in the results for part (a) and use your observations to predict the value of the length of AN for the case where $TA = 104$. Then find the length of AN using trigonometry and compare the result with your prediction.
- (d) Let $TA = x$ and let y equal the length of AN . Develop an equation for y in terms of x and use this equation to sketch the graph of y versus x . Is this graph consistent with your results from parts (a) to (c) of this question?

Question 2

- (a) Given that TAN is a right triangle, with $\angle TAN = 90^\circ$ and $TA = 100$, find the length of AN (see Figure 1 on the previous page) for each of the following cases. Before you begin, describe how you think the length of AN will change over the course of these cases.

$\angle NTA$	AN (meters)
85°	
85.1°	
85.2°	
85.3°	
85.4°	
85.5°	

$\angle NTA$	AN (meters)
85.6°	
85.7°	
85.8°	
85.9°	
86°	

- (b) Study your results from part (a) and write a few sentences to describe how the length of AN changed as the value of $\angle NTA$ steadily increased from 85° to 86° .
- (c) Search for a pattern in the results for part (a) and use your observations to predict the value of the length of AN for the case where $\angle NTA = 89^\circ$. Then find the length of AN using trigonometry and compare the result with your prediction.
- (d) Let $\angle NTA = x$ and let y equal the length of AN . Develop an equation for y in terms of x and use this equation to sketch the graph of y versus x . Is this graph consistent with your results from parts (a) to (c) of this question?