

Extending the Trigonometric Ratios

<p>Concepts</p> <ul style="list-style-type: none"> • Trigonometric ratio <p>Materials</p> <ul style="list-style-type: none"> • TI-Nspire • TI-Nspire document 	<p>Objectives</p> <ul style="list-style-type: none"> • Students will use a rotating ray in a coordinate plane to define angles measuring greater than 90° and less than 360°. • Students will define sine, cosine, and tangent for angles of any size.
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1. Download the TI-Nspire document called *ExtendingTrigRatios* to your handheld. Use TI-Nspire computer link. (Fig 1)

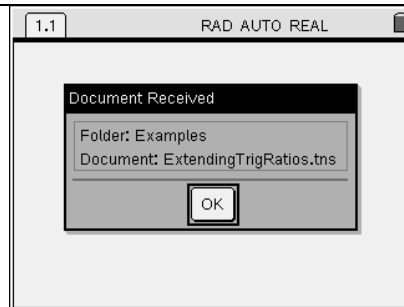


Fig 1

2. Open the document in your handheld. Press Home, 7:MyDocuments, select the document *ExtendingTrigRatios* using the NavPad (arrows), hit enter.(Figs 2-4)

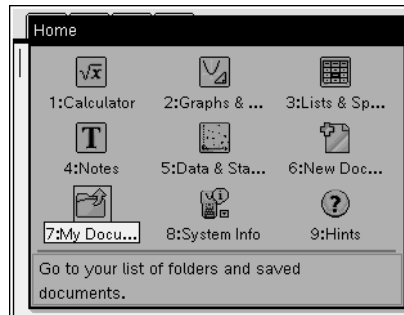


Fig2

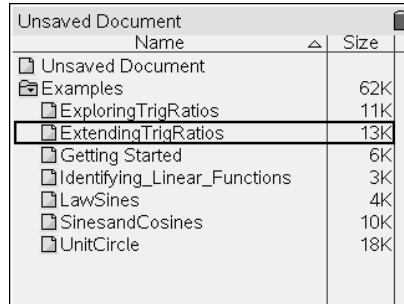


Fig3

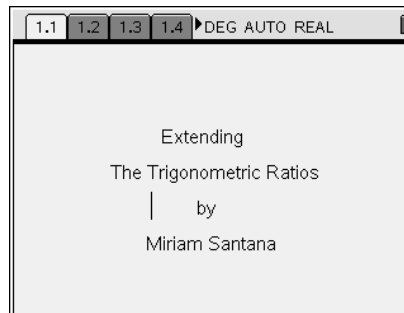


Fig 4

Measuring angles greater than 90°

1. Go to page 1.2 Press ctrl and > (right arrow key). You will see the objectives of this lesson.
2. Skip page 1.3 Go to page 1.4 by pressing ctrl and right arrow key.
3. In page 1.4 there are 3 windows. You can move between windows by pressing ctrl tab. Fig 6
4. Explore how to measure angles greater than 90° . Measure $\angle ABC$. Drag point C and measure the angle in the different quadrants.
 - Drag point C. Use the NavPad to put the cursor on top of point C. To hold the point press ctrl click. Now move the point
 - Observe how the measurement of the angle changes.
 - Is the angle always positive?
 - How do you think an angle of rotation could have a negative measure? Answer in your handheld. (Fig 7)

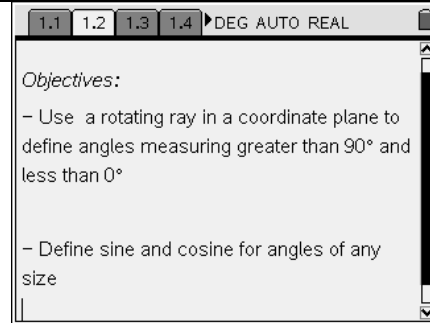


Fig 5

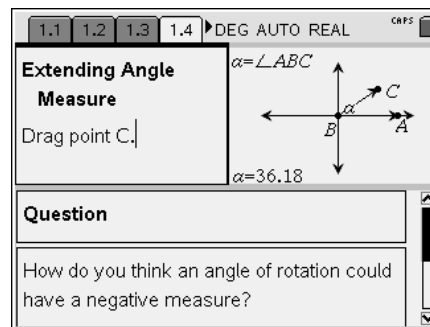


Fig 6

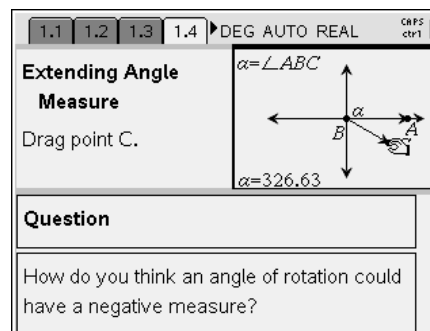


Fig 7

Extending Sine and Cosine

1. Go to problem 2. Page 2.3 Press ctrl right arrow key (NavPad).

Now we will drag point P and measure the sine and cosine for the angles between O and 360 degrees.

- Make sure that in your spreadsheet screen you can see columns E, F and G.
- Grab point P and each time you want to capture a set of data press Ctrl + . (Figs 8 and9)

2. Go to pages 2.4 and 2.5 and observe how these points are plotted.

In page 2.4 you will see sine in function of the angle.

In page 2.5 you will see cosine in function of the angle

Go back to page 2.3 to capture more points that will allow you to have a better graph.

3. Now, observe your graphs and answer the questions.

- What is the maximum value?
- What is the minimum value?
- Where is the graph zero? (fig 10)

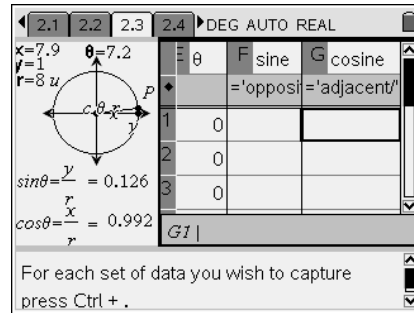


Fig 8

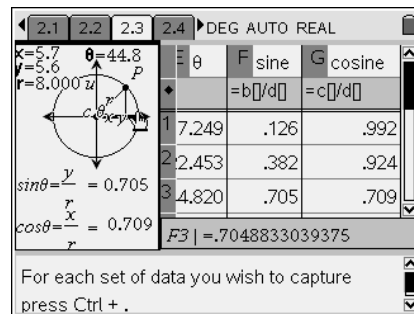


Fig9

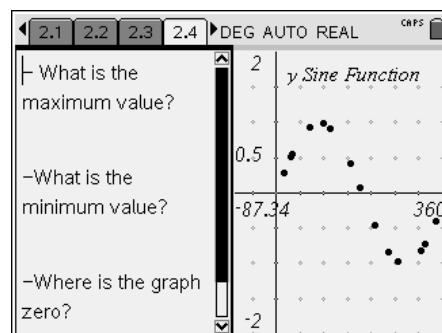


Fig 10

4. To get a better look of your graph.
 - Go to your graphing window. Press ctrl tab.
 - Press menu, 2:View,6:Show Entry Line, write $\sin(x)$ Fig 11
 - Press Menu, 5:Trace,1:Graph trace and find the max, min and zero of your graph.

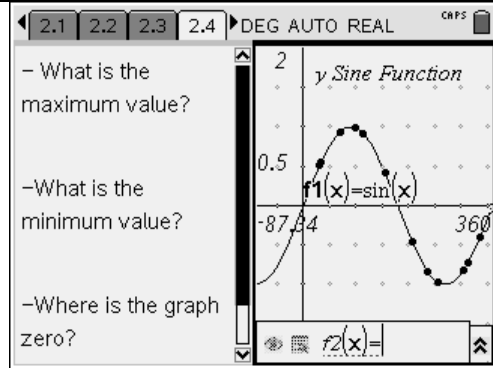


Fig 11

5. Repeat steps 8 and 9 for Cosine graph.
6. Go to page 2.6 and complete the table. (Fig 12)

	A	B	C
1	Quadrant	Sign of $\sin\theta$	Sign of $\cos\theta$
2	I		
3	II		

Fig 12

Graphing Tangent from a Right Triangle

1. Go to page 3.2 and drag point A towards point C. Each time that you want to capture angle α and $\tan\alpha$ press ctrl + . (Figures 13-14)

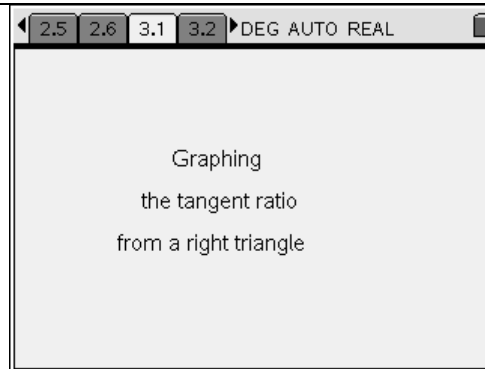


Fig 13

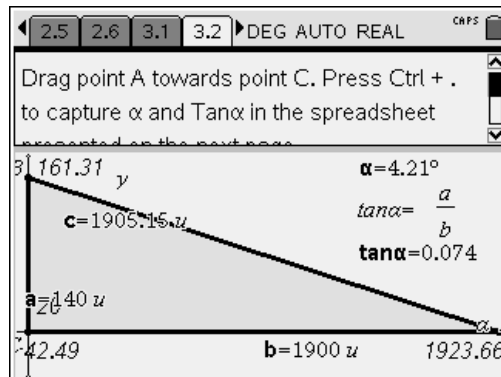


Fig 14

2. All the values of α and $\text{Tan}\alpha$ are capture in the spreadsheet of page 3.3 Fig 15

	A ang...	B tan...	C	D	E
	=capture	=capture			
8	8.842	.156			
9	11.310	.200			
10	13.134	.233			
11	15.642	.280			
12	19.290	.350			

A8 | =8.8418145602

Fig 15

3. Go to page 3.4 and observe the graph of $\text{Tan}\alpha$ (Fig 16)

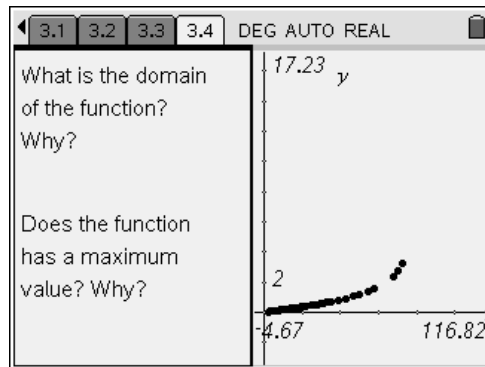


Fig 16

4. Answer the questions:

- What is the domain of the function? Why?
- Does the function have a maximum value? Why?

5. To get a better look of your graph.

- Go to your graphing window. Press ctrl tab.
- Press menu, 2:View,6:Show Entry Line, write $\tan(x)$
- Press Menu, 5:Trace,1:Graph trace and find the max, min and zero of your graph. (Fig 17)

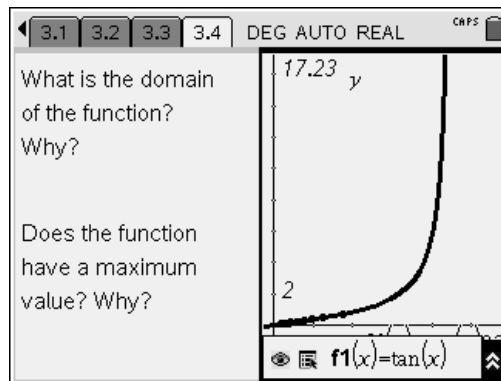


Fig 17

6. Discuss your answers and findings with the rest of the class.