Just Cos
Student Activity

TI-Nspire CAS   Investigation   Student   45min

Aim

The aim of this investigation is to use similarity to explore ratios in right angled triangles, specifically the ratio between the hypotenuse and adjacent side.

Equipment

For this activity you will need:

- TI-nspire CAS

- TI-nspire CAS document – Just Cos

Introduction – Setting up the calculations

This activity requires access to the "Just Cos" TI-nspire document. This document should be loaded on your device before proceeding.
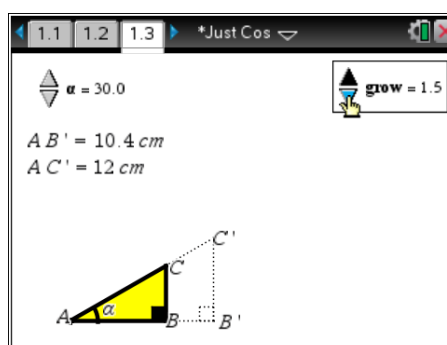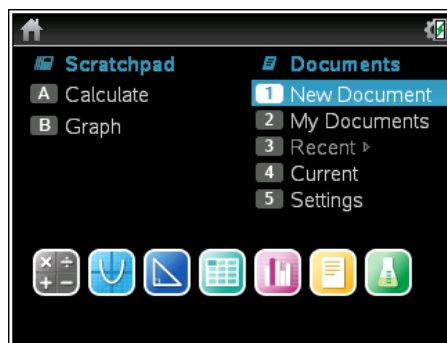
Once the document is on your handheld, press [Home] and select **My Documents**. Locate the document and press [Enter] to open.

Navigate to page 1.3 and use the spinners to adjust the angle (α) and scale factor (grow) to:

$\alpha = 30^{o}$

Grow = 1.5

Use the mouse to click on the spinner, the measurements and diagram change accordingly.

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The first question in this investigation requires calculations to be performed. The Scratchpad is a place where calculations can be computed and then discarded. To access the Scratchpad press [Home] and select Scratchpad or press **A**.

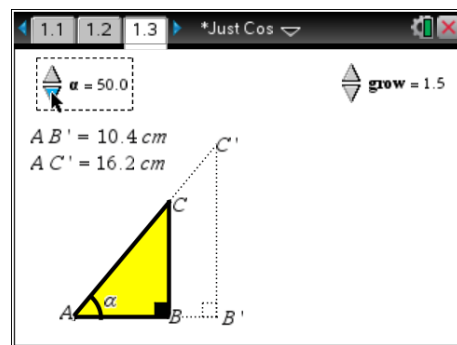To return to the current document, press [Esc] followed by **Current** (4).
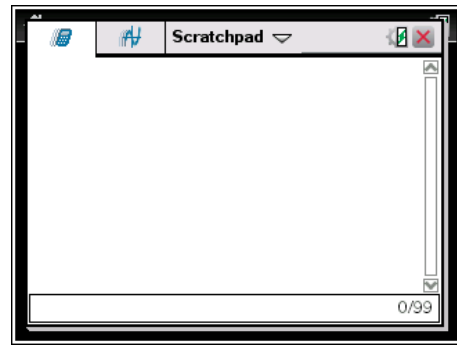
1. Copy and complete the table below.

Angle	Grow	AB'	AC'	AB' / AC'
30°	1.5			
30°	2.0			
30°	2.5			
30°	3.0			

Change the angle (α) and scale factor (grow) to:

   $\alpha = 50°$

   Grow = 1.5

2. Copy and complete the table below.

| Angle	Grow	AB'	AC'	AB' / AC'
50°	1.5			
50°	2.0			
50°	2.5			
50°	3.0			

3. Complete the following statement:
    "For a given angle, the ratio AB' / AC' _____ when the scale (grow) is changed."

It is possible to have the calculator perform computations on this Geometry application directly. Move the mouse to a clear space and use a right mouse click [CTRL] + [Menu] and select **text**.
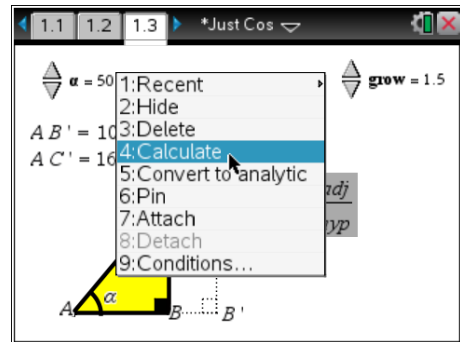
Type the following text:

adj / hyp

where ÷ is displayed as / then press [Enter]
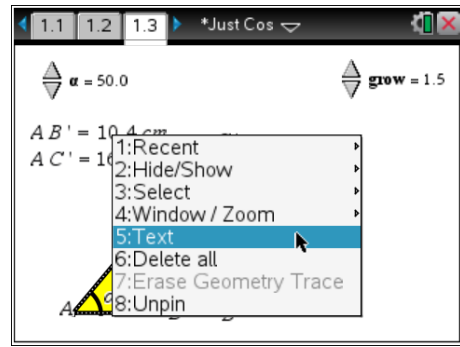
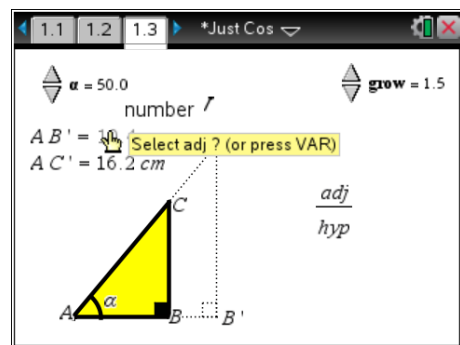Move the mouse over the text and again use a right mouse click, select **calculate**.

The **calculate** option checks the text for possible variables and requires the variables to be linked to values on the current screen.

AB' represents the adjacent side (adj).

The prompt requests "Select adj ?", move the mouse over the measurement and click on it.

AC' represents the hypotenuse (hyp).

Move the mouse over the measurement and click on it. The calculation is complete and the result is 'stuck' to the mouse. Move the mouse adjacent to the text expression and click to place the answer next to the text.

Adjust the angle and grow variable to:

$\alpha = 60^{o}$

Grow = 1.5

Make sure the computation is the same as the result shown opposite.

Author: P Fox
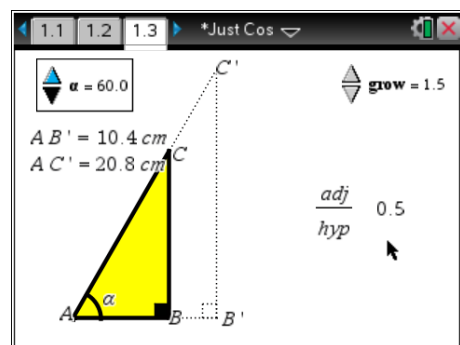
4. Copy and complete the table below.

Angle	Grow	AB′	AC′	AB′ / AC′
10°	2.0			
20°	2.0			
30°	2.0			
40°	2.0			
50°	2.0			
60°	2.0			
70°	2.0			
80°	2.0			

5. Explain why the ratio AB′/AC′ gets close to 1 (one) when the angle is small, such as 10°.

6. Does the ratio increase by the same amount each time the angle is changed by 10°?

7. Complete the following table by estimation. Estimate the ratio to 2 (two) decimal places. Check your estimation using the calculator and record the actual ratio correct to 2 (two) decimal places.

Angle	Grow	Estimate: Adj/Hyp	Actual: Adj/Hyp
5°	2.0		
15°	2.0		
25°	2.0		
35°	2.0		
45°	1.5		
55°	2.5		
65°	3.0		
75°	0.6		
85°	2.4		

8. Complete the following table by estimation. Estimate the ratio to 2 (two) decimal places. Ask your teacher to check your estimates.

Angle	Grow	Estimate: Adj/Hyp	Teacher: Adj/Hyp
28°	2.2		
42°	1.6		
72°	2.0		