

## Investigate Method 3: Use *Cabri Jr.*

1. Go to *Cabri Jr.* Press  $\boxed{Y=}$ , and select **New** if a sketch already appeared on your calculator.

2. Press  $\boxed{\text{WINDOW}}$ , and select the **Line** tool. Move your pencil tool to the upper left hand corner of the screen. Press  $\boxed{\text{ENTER}}$  to construct one point on the line. Move the pencil tool to the bottom right corner, and press  $\boxed{\text{ENTER}}$  to construct another point on the line (See Figure 1).

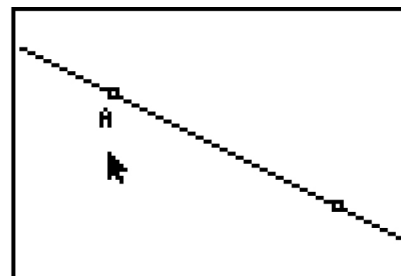


Figure 1

3. Label the point in the upper left corner with an A. To do this, press  $\boxed{\text{GRAPH}}$ , and select **Alph-num** for the label tool. Move the text cursor over point A. When this point becomes active (blinking), press  $\boxed{\text{ENTER}}$ . Press  $\boxed{\text{MATH}}$  to insert the letter A. Press  $\boxed{\text{ENTER}}$  to finish the label. Press  $\boxed{\text{CLEAR}}$  to de-activate the **Alph-num** tool. Move your arrow pointer over the label, and the arrow pointer will appear hollow. Press  $\boxed{\rightarrow}$  to move the label to the underside of the line (See Figure 1).

4. Press  $\boxed{\text{WINDOW}}$ , and select the **Line** tool. Move the pencil tool to point A. When point A becomes active (blinking), press  $\boxed{\text{ENTER}}$  to construct a point on the line. Press and hold the arrow keys to form a horizontal line. Press  $\boxed{\text{ENTER}}$  to construct another point on the horizontal line (see Figure 2). Label this point as C by using the **Alph-num** tool (See Step 3).

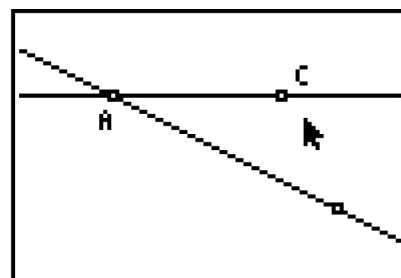


Figure 2

5. Press  $\boxed{\text{ZOOM}}$ , and select **Perp** for a perpendicular line. Move the pencil tool to point C so that the point is active (blinking), and press  $\boxed{\text{ENTER}}$ . Move the arrow tool over the line AC so that it is active (blinking), and press  $\boxed{\text{ENTER}}$  to select it. A perpendicular line has been made (See Figure 3). Press  $\boxed{\text{CLEAR}}$  to de-activate the tool.

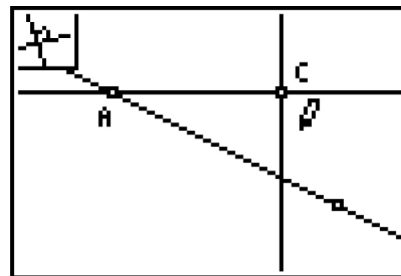


Figure 3

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6. Press **[WINDOW]**, highlight **Point**, and right arrow to see other choices. Select the **Intersection** tool by pressing **[ENTER]** (See Figure 4).

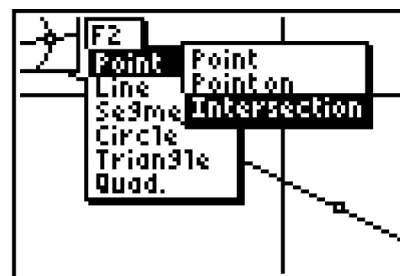


Figure 4

7. Move the arrow pointer to the intersection of the vertical line and the line going downward. This will cause the two lines to become active (blinking). Note the arrow pointer will automatically change to a pencil pointer. Press **[ENTER]** at the intersection point, and the point will be constructed (See Figure 5).

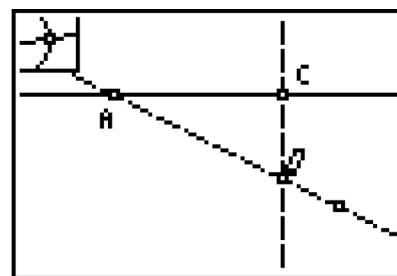


Figure 5

8. Label the point constructed in Step 7 as B.
9. Activate the **Measure** tool. To do this, press **[GRAPH]**, highlight **Measure**, and press **[>]** to show more choices. Press **[ENTER]** with D and **Length** highlighted (See Figure 6).

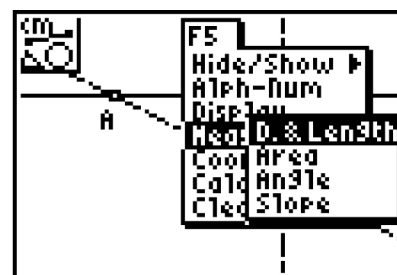


Figure 6

10. Move the pencil pointer over point A, and the point will become active (blinking). Press **[ENTER]**, move the pencil pointer of point B, and press **[ENTER]**. The measurement for AB will automatically appear with a hand attached. Move the measure to the line AB using the arrow keys. Press **[ENTER]** to release the measurement. Note the **Measure** tool is still active. Measure the other line segments, and place the other measurements close to their lines (See Figure 7).

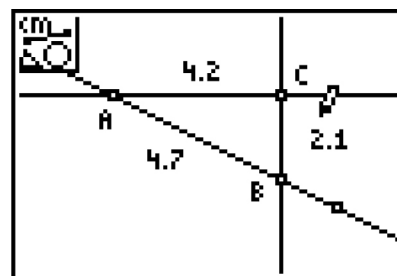


Figure 7

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11. Press **[CLEAR]** to de-activate the **Measure** tool. Move the arrow pointer overtop of the measurement created for the length BC. The arrow pointer will become hollow. Press **[2nd]**, **[+]** to increase the accuracy to the nearest hundredth (two digits after the decimal point). Note: Pressing **[2nd]**, **[-]** decreases the accuracy by one decimal place with each press of the **[-]** key. Move to the other measurements (length AC and length AB), and increase the accuracy to the nearest hundredth.

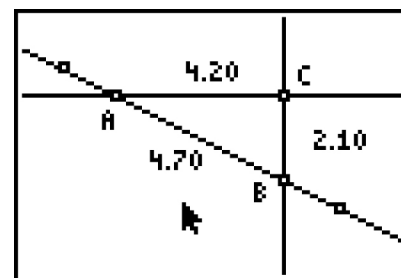


Figure 8

12. Activate the **Measure** tool for angles. Press **[GRAPH]**, highlight **Measure**, and **[▶]** to access another menu. Press the **[F5]** key to highlight **Angle**, and press **[ENTER]** (See Figure 9).

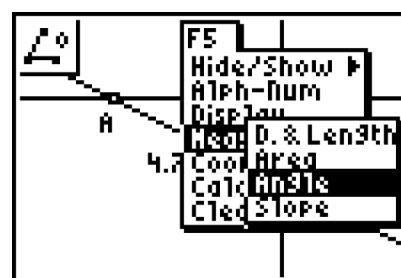


Figure 9

13. Measure  $\angle BCA$ . Move the pencil pointer over point B so that it becomes active (blinking), and press **[ENTER]** to select the first point. Move to point C, and press **[ENTER]** to select the second point. Move to point A, and press **[ENTER]** to select the third point. The angle measure will automatically appear with a hand attached. Move the angle to the inside of the triangle at point C using the arrow keys. Press **[ENTER]** to release the measurement. Measure  $\angle CAB$ , and move the measure inside the triangle at point A (See Figure 10).

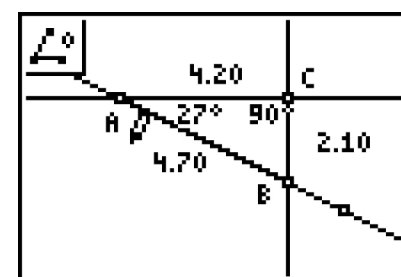


Figure 10

14. Press **[CLEAR]** to de-activate the **Measure** tool. Move the arrow tool over point C to activate (blinking) the point and note its general location. Press **[F5]** to grab the point with a hand. Press and hold **[▶]**, and point C will move to the right. Do the angles change? Do the measures of the sides change? Press and hold **[◀]** to return point C to its start position.

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15. Move point C to four different positions along the horizontal line, making sure not to change the angles.

**Sample Table**

	<b>Lengths</b>		
<b>Triangle</b>	AB	BC	AC
<b>Sample</b>	4.70	2.10	4.20

Complete the table.

	<b>Lengths</b>		
<b>Triangle</b>	AB	BC	AC
1			
2			
3			
4			

16. Press **[2nd]**, **[MODE]** to quit *Cabri Jr.*, and return to the **Homescreen**. Calculate the ratios using the four sets of values you found in the previous step. Round the answers to the nearest hundredth.

**Sample Table**

	<b>Ratios</b>		
<b>Triangle</b>	$\frac{BC}{AB}$	$\frac{AC}{AB}$	$\frac{BC}{AC}$
<b>Sample</b>	$= \frac{2.10}{4.70}$ $= 0.4468085106$ $= 0.45$	$= \frac{4.20}{4.70}$ $= 0.8936170213$ $= 0.89$	$= \frac{2.10}{4.20}$ $= 0.5$

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Complete the table.

	Ratios		
Triangle	$\frac{BC}{AB}$	$\frac{AC}{AB}$	$\frac{BC}{AC}$
1			
2			
3			
4			

17. Complete the statement to summarize your findings. “Even though each triangle has side lengths that are different, the ratios...”

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18. Construct the ratio  $\frac{BC}{AB}$  within *Cabri Jr.* to confirm your findings by activating the **Calculate** tool. Go to *Cabri Jr.*, and press **[GRAPH]**. Highlight **Calculate** from the menu, and press **[ENTER]**. Move the arrow pointer over the measurement for the length of BC. Note that the arrow pointer changes to a horizontal arrow pointing to the left (See Figure 11). Press **[ENTER]** to select the measurement, press **[÷]**, and then move to the measurement for AB. Watch for the change in the arrow pointer (See Figure 12). Press **[ENTER]** to select the measurement, and the ratio will be automatically calculated with a hand attached. Move the value of the ratio to the bottom left corner of the screen, press **[ENTER]** to drop the measurement, and press **[CLEAR]** to de-activate the tool (See Figure 13).

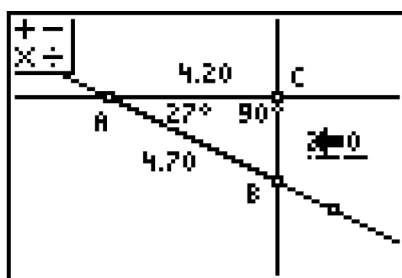


Figure 11

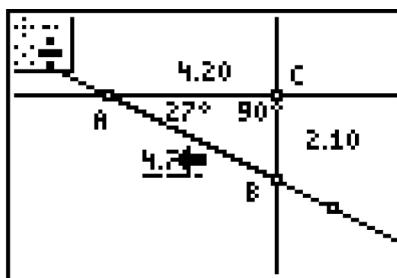


Figure 12

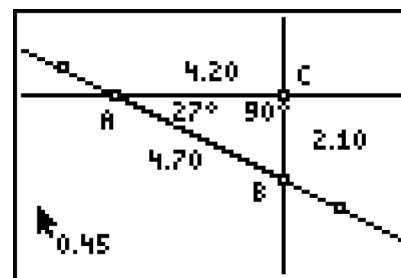


Figure 13

19. Move the arrow pointer over point C, press **[ ]** to grab the point, and move it left or right. Does the value of the ratio (bottom left corner) change? Does this confirm your result? Why does the value of the ratio  $\frac{BC}{AB}$  not change when the lengths of the sides of the triangle change?

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20. Press **[CLEAR]** to release point C. Move the arrow pointer over the value of the ratio in the bottom left corner, and press **[DEL]** to delete the value. Repeat Steps 18–20 to examine the ratios  $\frac{AC}{AB}$  and  $\frac{BC}{AC}$ .