Activity 20 – The Pythagorean Theorem (Part 1)

First, turn on your TI-84 Plus and press the APPS key. Arrow down until you see Cabri Jr and press ENTER. You should now see this introduction screen.
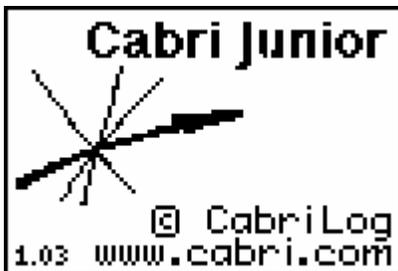
To begin the program, press any key. If a drawing comes up on the screen, press the Y= key (note the F1 above and to the right of the key – this program uses F1, F2, F3, F4, F5 names instead of the regular key names) and arrow down to NEW. It will ask you if you would like to save the changes. Press the 2nd key and then enter to not save the changes.

We are now ready to begin.

The Pythagorean Theorem states that, in a right angled triangle, the sum of the squares of the two smaller sides is equal to the square of the third side. In this activity, you will construct a right angled triangle and test the conditions for the Pythagorean Theorem by constructing squares on each side and comparing the sum of the two smaller squares to the square of the third side.

Start with a line segment BC and a line through BC that is perpendicular to BC.
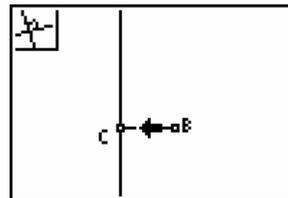
Construct a point on the perpendicular line and label it A. Hide the perpendicular line and construct line segments AC and AB. For the time being, keep sides AB and BC fairly small so that squares can be constructed on the sides.
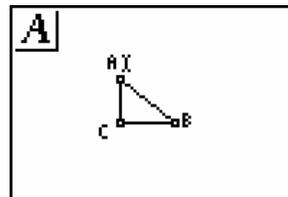
In the lower right corner, use the Alpha-Num tool to place the number 90 on the screen. We will use this as an angle of rotation.
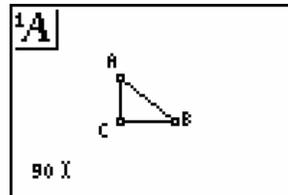
Use the rotation tool to rotate point C about point B through an angle of 90°. Click on point B as the center of rotation, then click on the angle (the number 90) and finally, click on point C. Notice that the number now has a degree symbol associated with it and that the point has been rotated in the counter-clockwise direction.
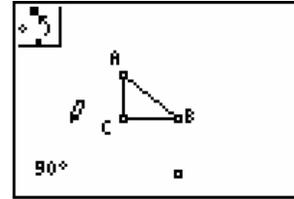
What we want to do next is to rotation point B about point C through an angle of 90° in the clockwise direction. To do this we will need an angle of -90. Place this number on the screen.
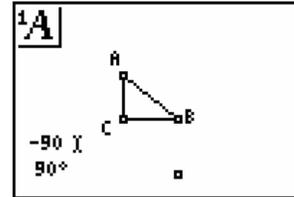
Using the value of -90, rotate point B about point C through an angle of -90°.
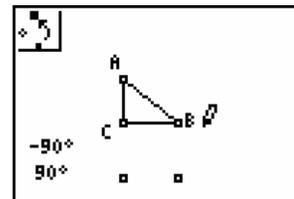
You should now have two points below the line segment BC. Use the Quad tool to construct a quadrilateral using points B, C and the two points constructed above. Can you explain why this is a square?
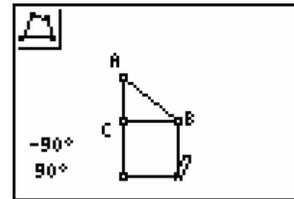
In a similar fashion, rotate point C about point A through an angle of -90° and rotate point A about point C through an angle of 90°. This will allow us to construct a second square.
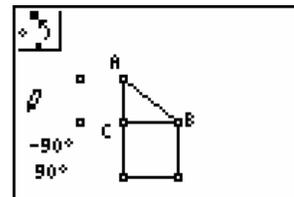
Use the Quad tool again to construct the square on side AC.
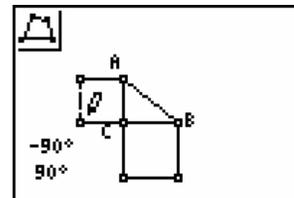
Finally, rotate point B about point A through an angle of 90° and rotate point A about point B through an angle of -90°. This will allow us to construct a third square
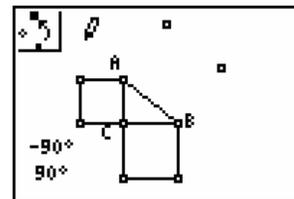
Using the new points, construct a square on the hypotenuse AB.
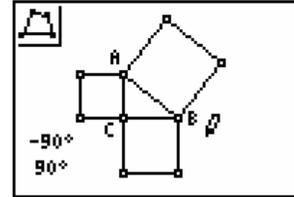
Measure the area of the three squares.
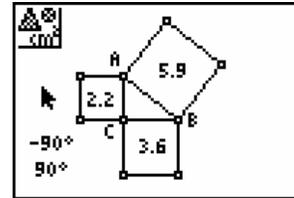
Using the Calculate tool, click on the measurements of the two smaller squares and then press the ⊞ key. Place the sum off to the side of the screen. How does this sum compare to the square of the hypotenuse?
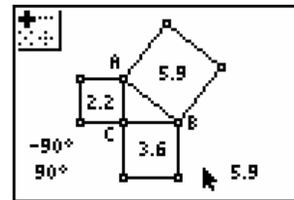
To test your construction, drag points A, B and/or C to a new location on the screen. Does the Pythagorean relationship still hold?