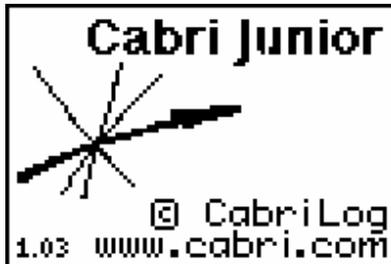


Investigating Special Triangles

First, turn on your TI-84 and press the APPS key. Arrow down until you see Cabri Jr and press **ENTER**. You should now see this introduction screen.



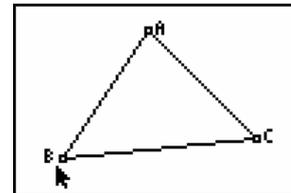
To begin the program, press any key. If a drawing comes up on the screen, press the **Y=** key (note the F1 above and to the right of the key – this program uses F1, F2, F3, F4, F5 names instead of the regular key names) and arrow down to NEW. It will ask you if you would like to save the changes. Press the **2nd** key and then enter to not save the changes.

We are now ready to begin.

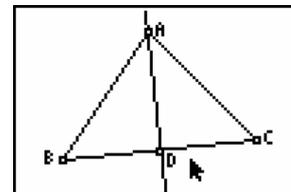
Two 8xv files are needed for this activity. Use the TI-Navigator™ to send these files to your students' TI-84 or use TI-Connect™ and a TI Connectivity Cable.

In earlier constructions, you worked with isosceles and equilateral triangles. In this activity, you will use those results to construct two triangles considered to be special – the $30^\circ - 60^\circ - 90^\circ$ triangle and the $45^\circ - 45^\circ - 90^\circ$ triangle.

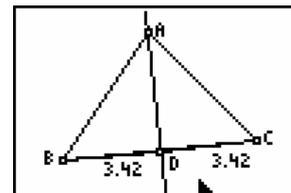
Open the file ISOSC. This is an APPVAR (short for application variable). This file has a triangle with an isosceles triangle with $AB = AC$.



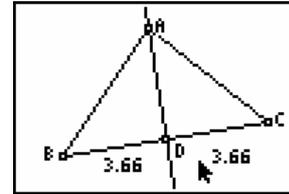
Construct a perpendicular from point A to side BC. Label the point of intersection of this line with BC as D.



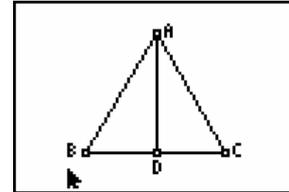
Construct and measure line segments BD and CD. Would you have expected these segments to be equal in length?



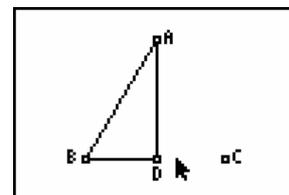
Drag point C or B to see the effect on the lengths of the line segments. It appears that the perpendicular from the vertex always bisects the opposite side. Measure the angles BAD and CAD. Will they always be equal?



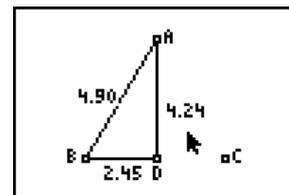
Open the file EQUILAT. Note that all three angles are 60° angles. Construct the perpendicular from A to side BC. Label the point of intersection as D. From the construction above, we know that D bisects BC and that angle $BAD = 30^\circ$.



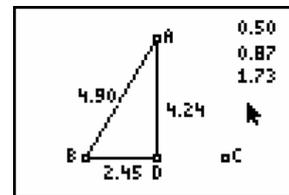
Hide side AC and BC. Leave point C. We will need it later. Construct segment BD. We now have triangle BAD where angle $D = 90^\circ$, angle $B = 60^\circ$ and angle $A = 30^\circ$. This completes the construction of the 30° - 60° - 90° triangle.



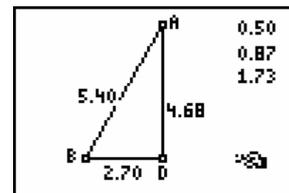
Measure the three sides of the triangle.



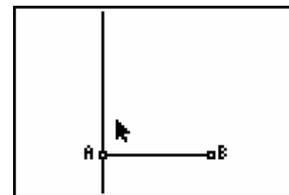
Press [F5] and select the CALCULATE tool. Click on the length of BD, then on the length of AB. Press the $\frac{\square}{\square}$ key. You will see the result 0.5. Move it to the upper corner. Repeat this step to find the ratio of AD:AB and AD:BD. These ratios will become important when you start working with trigonometry.



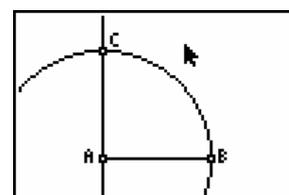
Drag point C to another location. Why do the three ratios remain constant?



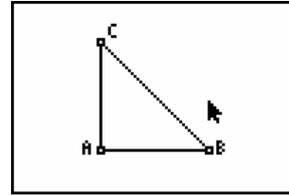
To begin the construction of the 45° - 45° - 90° triangle, construct line segment AB and a perpendicular to AB at A.



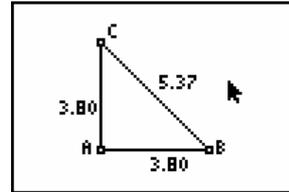
Use the compass tool with center A and radius AB. The circle will intersect the perpendicular line at C.



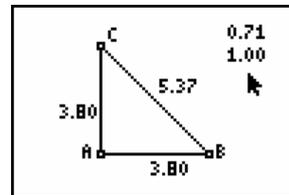
Hide the circle and construct segments AC and BC. Can you explain why $AB = AC$ and why angle $ACB = \text{angle } ABC$? Why are these two angles 45° each?



Measure the sides of the triangle. This verifies that $AB = AC$.



Use the CALCULATE tool to find the ratio of $AC:BC$ and $AC:AB$. Once again, these ratios will be important when you study trigonometry.



Drag point B and observe what happens to the sides and ratios. Why do the ratios remain constant while the sides change?

