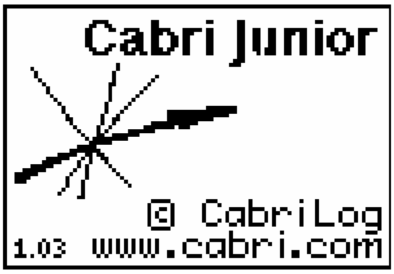
Activity 16 Construction of a Rhombus and Investigating its Properties

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.

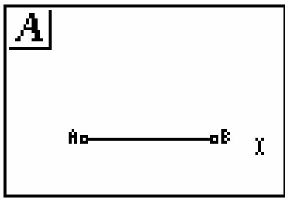


To begin the program, press any key. If a drawing comes up on the screen, press the [Y=] key (note the F1 above and to the right of the key – this program uses F1, F2, F3, F4, F5 names instead of the regular key names) and arrow down to NEW. It will ask you if you would like to save the changes. Press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

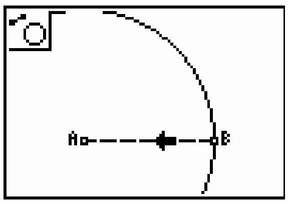
We are now ready to begin.

A rhombus is a special type of parallelogram where all four sides have equal length. So, it is equilateral, but not regular. Can you explain the difference? Is a rhombus ever a regular polygon? If so, what conditions must apply for this to occur.
In case you are curious about the origins of the word, do an internet search on "math words".

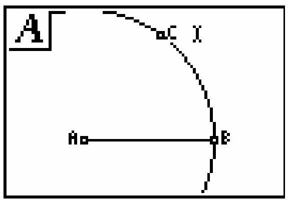
To construct a rhombus, begin with a line segment AB.



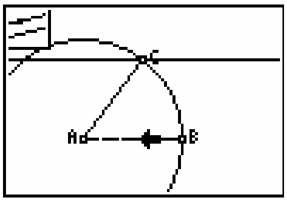
Using the compass tool, construct a circle with center A and radius AB.



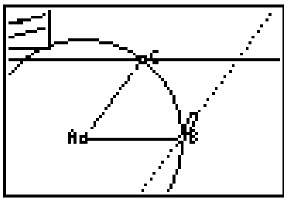
Using the "Point On" tool, construct a point on the circumference of the circle.



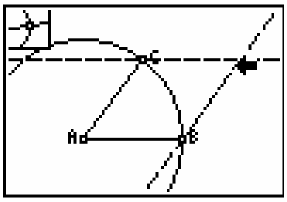
Construct the line segment AC. Construct a line through point C that is parallel to AB. To complete the figure, it may be necessary to reduce the length of AB.



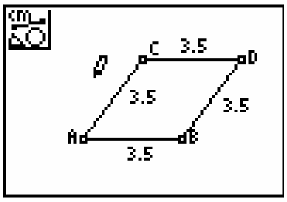
Construct a line through B that is parallel to AC. These steps should start to look familiar as they are identical to the steps required to construct a parallelogram.



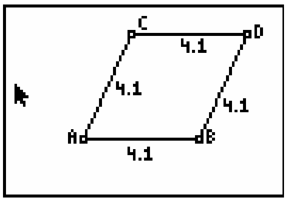
Construct the point of intersection of the two parallel lines. This will be point D and complete the rhombus.



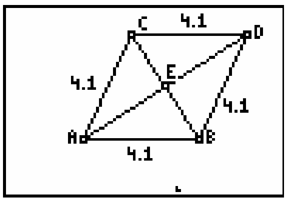
Hide the circle and the parallel lines. Label point D, construct line segments CD and BD and measure the lengths of the four sides.



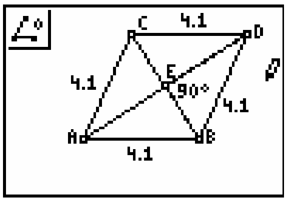
If you drag either point A, B or C the figure will change, but the lengths will remain equal to each other. Can you explain why? What can't you drag point D?



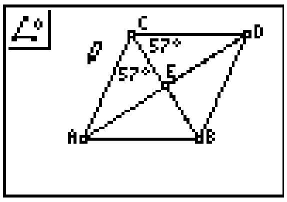
Since this is a special type of parallelogram, it has the same properties as a parallelogram. However, it also displays three unique properties. To begin investigating these properties, construct the diagonals AD and BC and their point of intersection E.



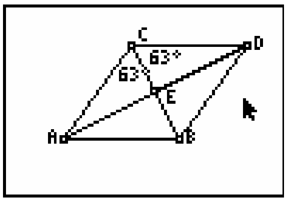
Measure the angle BED. Will this angle always be 90º or is this just a coincidence? One of the properties of a rhombus is that the diagonals are perpendicular. Can you prove the converse of this property – this is, if the diagonals of a quadrilateral are perpendicular, then the quadrilateral must be a rhombus? Begin with any quadrilateral and its diagonals. Measure the angles at point E where the diagonals intersect. Drag the vertices until you have the four angles at E all equal to 90 º. Is the resulting quadrilateral a rhombus?



Measure the angles BCD and BCA. What other angles in the figure will be congruent to these angles? The last property of a rhombus is that each diagonal bisects a pair of opposite angles.



Drag points A, B or C to test this property. Do the angles at A and B always remain equal?



How does the construction change if you wanted to construct a square? Review the construction of a square from activity 13. Do the properties of a rhombus apply to a square as well?