Exploring the Orthocenter of a Triangle
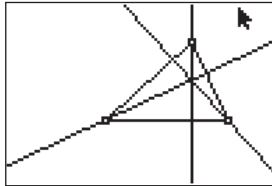
ACTIVITY OVERVIEW:

In this activity we will

- Draw a triangle
- Draw the altitudes of the triangle
- Locate the *orthocenter*
- Explore properties of the *orthocenter*

Do you know how to construct a line perpendicular to a given line and through a given point?
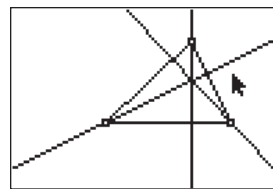This activity is a great companion to that construction as we use the Cabri Jr. tools to draw *altitudes* in a triangle.

NCTM Geometry Standard: Analyze characteristics and properties of 2- and 3-dimensional geometric shapes and develop mathematical arguments about geometric relationships.
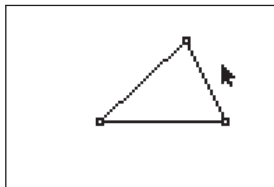
1

Press ⟦APPS⟧. Move down to the CabriJr APP and press ⟦ENTER⟧. Press ⟦ENTER⟧, or any key, to begin using the application.

Press ⟦Y=⟧ for the F1 menu and select **New**. (If asked to **Save changes?** press ⟦◄⟧ ⟦ENTER⟧ to choose "No.")

2

Press ⟦WINDOW⟧ for F2, move down to **Triangle** and press ⟦ENTER⟧. Move to the location of a vertex and press ⟦ENTER⟧. Move to the second vertex and press ⟦ENTER⟧. Move to the third vertex and press ⟦ENTER⟧. Press ⟦CLEAR⟧ to exit the triangle drawing tool.

3

Press ⟦ZOOM⟧ for the F3 menu, move to **Perp.**, and press ⟦ENTER⟧. Move the pencil to a vertex and when it is flashing, press ⟦ENTER⟧. Move the arrow to the side opposite the vertex and when it is flashing, press ⟦ENTER⟧. This will draw a line through the vertex and perpendicular to the opposite side.

4

With the **Perp.** tool still active, move until the pencil is near another vertex. When the point is flashing, press ⟦ENTER⟧ then move so that the opposite side is flashing and press ⟦ENTER⟧.

5

With the **Perp.** tool still active, move until the pencil is near the third vertex. When the point is flashing, press ⟦ENTER⟧ then move until the opposite side is flashing and press ⟦ENTER⟧. Press ⟦CLEAR⟧ to exit the **Perp.** drawing tool.

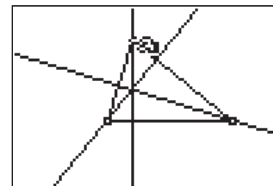### For TI-Navigator™ Users

Use Screen Capture to observe and assess individual progress in drawing and exploring. For help, see page 56.
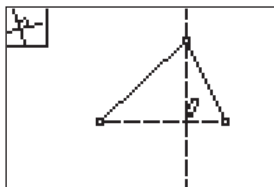
6

What appears to be true about the intersection of the altitudes of the triangle?

(They appear to intersect at a common point.)

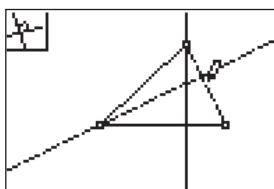Move to a vertex of the triangle, press ⟦ALPHA⟧ to activate the *hand* and move the vertex to a new location.

7

Press ⟦CLEAR⟧ to deactivate the *hand* and move to a different vertex of the triangle. Press ⟦ALPHA⟧ and move the point at this vertex.

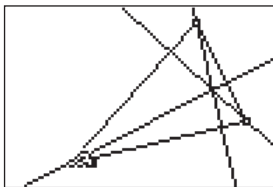What appears to be true about the intersection of the altitudes of the angles of the triangle?

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8
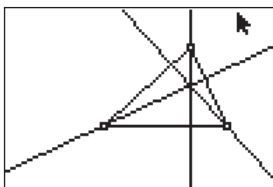
Press CLEAR to deactivate the *hand* and move to a different vertex of the triangle. Press ALPHA and move the third point defining the triangle.

What appears to be true about the intersection of the altitudes of the angles of the triangle?

9

The altitudes of a triangle intersect at a common point. This point is called the *orthocenter* of the triangle.

What is true about the *orthocenter* of an acute triangle? an obtuse triangle? a right triangle?

10

To exit the APP, press Y= for the F1 menu. Move to **Quit**, then press ENTER. (Or you can press 2nd MODE for [QUIT].)