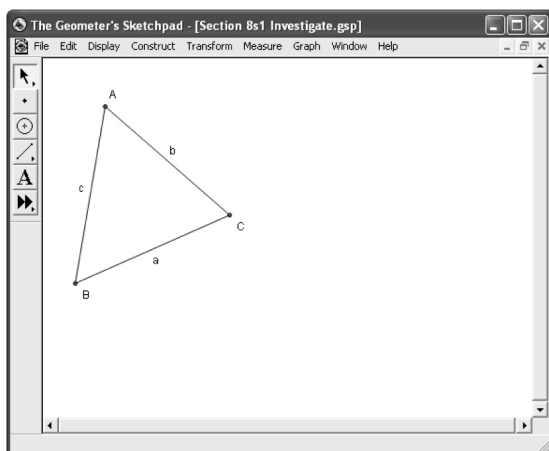# The Sine Law and *The Geometer's Sketchpad®*

How are the side lengths and sines of angles related in an acute triangle?

1. Open *The Geometer's Sketchpad®* and begin a new sketch.

2. a) Use the **Segment Tool** to construct an acute triangle.

b) Label the vertices as A, B, and C. Label the corresponding sides as *a*, *b*, and *c*.

- Select a vertex or line segment.
- Right click and choose **Label Point…** or **Label Segment…**, accordingly from the drop-down menu.
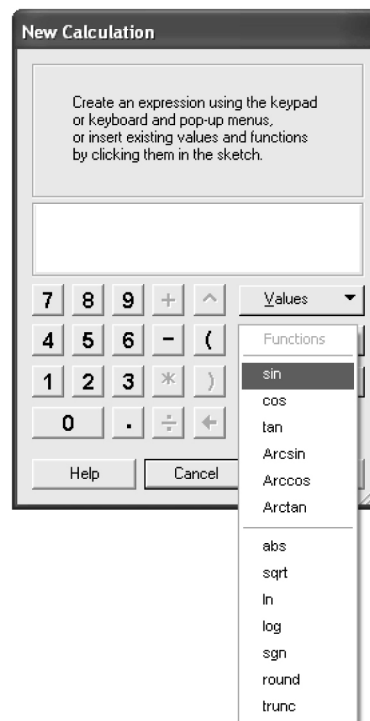- Change the label and click on **OK**.

3. a) Measure the lengths *a, b,* and *c*.

b) Measure ∠CAB, ∠ABC, and ∠ACB.

4. a) Calculate the ratio $\dfrac{a}{b}$.

- From the **Measure** menu, choose **Calculate**.
- Click on the measure of *a*.
- On the calculator, click ÷.
- Click on the measure of *b*.
- Click **OK**.

b) Similarly, calculate the ratios $\dfrac{a}{c}$ and $\dfrac{b}{c}$.

5. a) Calculate the ratio $\dfrac{\sin A}{\sin B}$.

- From the **Measure** menu, choose **Calculate**.
- From the **Functions** drop-down menu on the calculator, choose sin.
- Click the measure of ∠CAB.
- On the keyboard type).
- On the calculator, click ÷.
- From the **Functions** drop-down menu on the calculator, choose sin. Then, click the measure of ∠ABC.
- Click **OK**.

b) Similarly, calculate the ratios $\dfrac{\sin A}{\sin C}$ and $\dfrac{\sin B}{\sin C}$.

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6. Look at your results for steps 4 and 5. Do you notice any relationships between the ratios? Explain.

7. a) Calculate each ratio.

$$\frac{a}{\sin A} \qquad \frac{b}{\sin B} \qquad \frac{c}{\sin C}$$

b) Compare these results and explain what you notice.

8. Move one of the vertices to examine other acute triangles. Are the results the same? Explain.

9. Reflect Summarize the relationship of the sides and sines of angles in an acute triangle.