

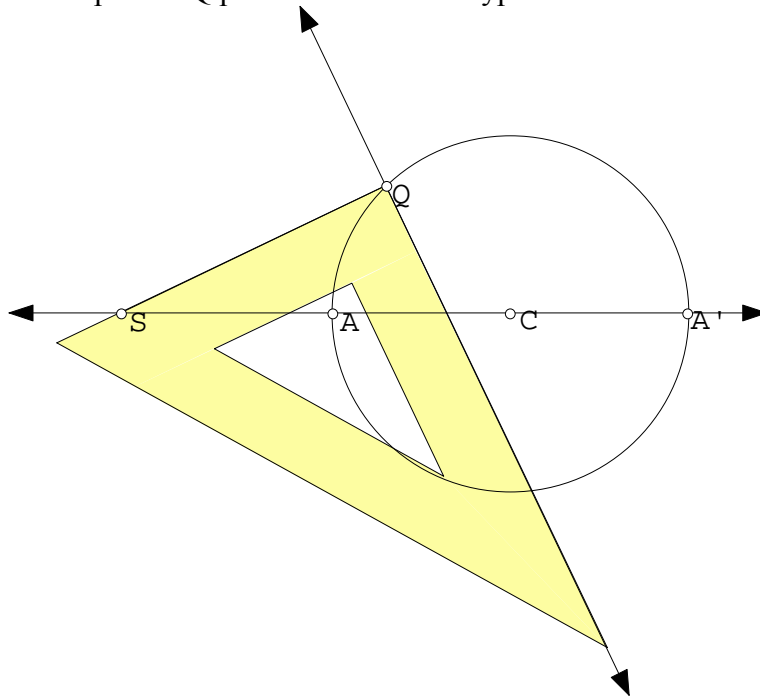
Investigating the Hyperbola

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You may have already seen the construction of a hyperbola by paper folding. Here is a similar method¹.

To draw a hyperbola

Draw a circle, center C , and a diameter ACA' (Fig 1). Mark any point S on $A'A$ produced. Using a set square, draw from any point Q on the circle a chord QR at right angles to SQ . Repeat for numerous positions of Q , keeping S fixed. The envelope of RQ produced will be a hyperbola.



¹ A Book of Curves, E.H. Lockwood, Cambridge University Press 1961

1. Describe how you could implement this construction using the Trace and Animate features of The Geometer's Sketchpad.
2. Create a dynamic model using Sketchpad.
3. Which lines would form the asymptotes of the hyperbola?
4. Create a set of axes, centred at C so that the point S is on the x -axis. Measure the values of a , b , and c and the slope of the asymptotes.
 - a. Make a conjecture about the relationships between these values.
 - b. Describe how the ratio of c/a affects the shape of the hyperbola.
 - c. Can you express this as a trigonometric ratio of an angle?