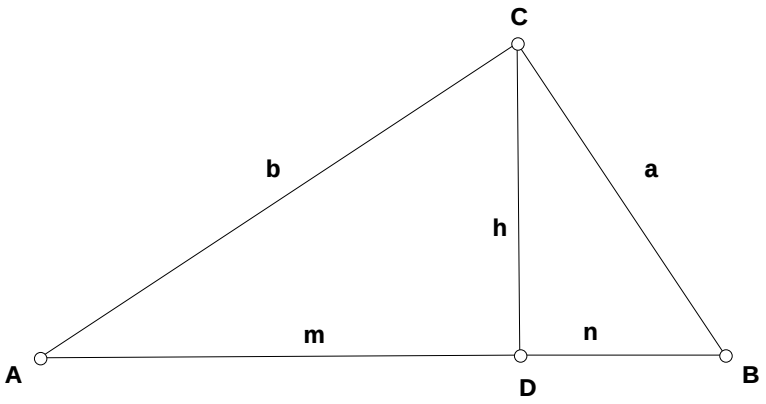
ACTIVITY THREE: Bhaskara's Similarity Proof



Consider a right triangle ABC with sides *a*, *b*, and *c*. (We will continue to assign the shorter leg as *a* and the hypotenuse *c*.) For ease in the construction, orient the triangle as shown in the diagram to the right.

Construct the perpendicular from point C to the hypotenuse at point D. Call the length of segment CD "*h*", the length of segment AD "*m*", and the length of segment DB "*n*".

Triangles ABC, CBD, and ACD are similar. (This is easy to show if you wish to do so.) Therefore, the ratio of hypotenuse to longer leg must be the same for each triangle; in particular, let's look at triangles ABC and ACD:

$$\frac{c}{b} = \frac{b}{m}$$

By cross-multiplying, we get Equation 1:

$$cm = b^2$$

Furthermore, the ratio of hypotenuse to shorter leg must also be the same for each triangle; in particular, let's look at triangles ABC and CBD:

$$\frac{c}{a} = \frac{a}{n}$$

By cross-multiplying, we get Equation 2:

$$cn = a^2$$

By adding equals to equals (Equation 1 + Equation 2), we have

$$cn + cm = a^2 + b^2$$
$$c(n + m) = a^2 + b^2$$
$$c^2 = a^2 + b^2$$