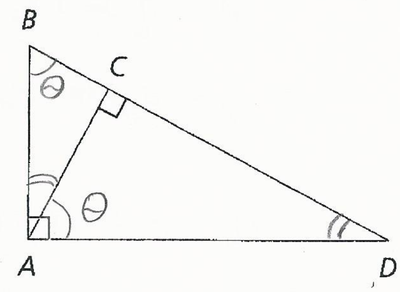
Thinking, Inquiry, Problem Solving: Use similar triangles to prove the Pythagorean theorem. **Hint:** Show that the two smaller triangles are similar to the larger triangle and then examine the ratios of corresponding sides.



In $\triangle ABD$ designate $\angle B$ as θ.

Then $\angle D = 90^\circ - \theta$ and from $\triangle ACD$, $\angle CAD = 90^\circ - (90^\circ - \theta) = \theta$

We now establish (below) that $\triangle ABC \sim \triangle DAC$

Indeed,

$\angle ABC = \angle DAC$ (both θ)

$\angle BAC = \angle ADC$ (both $90^\circ - \theta$)

$\angle BCA = \angle ACD$ (both 90°)

$\therefore$ $\triangle ABC \sim \triangle DAC$ by AAA (authority/criterion)

We can now use equality of ratios of corresponding sides.

$$\frac{AB}{DA} = \frac{BC}{AC} = \frac{AC}{DC}$$

Consider

$AB^2 + AD^2$

$\frac{AB}{DB} = \frac{BC}{BA} = \frac{AC}{DA}$ and $\frac{AD}{BD} = \frac{AC}{BA} = \frac{CD}{AD}$

$\Rightarrow AB^2 = DB \cdot BC$ $\qquad$ $\Rightarrow AD^2 = BD \cdot CD$

$AD^2 + AB^2 = DB \cdot BC + DB \cdot CD$

$AD^2 + AB^2 = DB(BC + CD) = BD \cdot BD = BD^2$