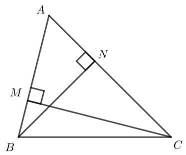

Problem of the Week
Problem C and Solution
Altitude Change

Problem

In acute $\triangle ABC$, two altitudes have been drawn in. Point M lies on AB so that CM is an altitude of $\triangle ABC$, and point N lies on AC so that BN is an altitude of $\triangle ABC$.

Suppose $CM = 32$ cm, $AB = 36$ cm, and $AC = 40$ cm. Determine the length of altitude BN.

Solution

The area of a triangle is determined using the formula

$$\text{area} = \frac{\text{base} \times \text{height}}{2}$$

The height of the triangle is the length of an altitude and the base of the triangle is the length of the side to which a particular altitude is drawn.

Thus,

$$\begin{aligned} \text{Area } \triangle ABC &= \frac{AB \times CM}{2} \\ &= \frac{36 \times 32}{2} \\ &= 576 \text{ cm}^2 \end{aligned}$$

Also,

$$\begin{aligned} \text{Area } \triangle ABC &= \frac{AC \times BN}{2} \\ 576 &= \frac{40 \times BN}{2} \\ 1152 &= 40 \times BN \\ BN &= 28.8 \text{ cm} \end{aligned}$$

Therefore, the length of altitude BN is 28.8 cm.