Problem of the Week
Problem C and Solution
New Heights (Revised)

Problem

An altitude is a line segment drawn from a vertex of a triangle to the opposite side or opposite side extended such that the line segment is perpendicular to the opposite side. In $\triangle ABC$, $CD$ is an altitude. $AB = 18$ cm, $AC = 20$ cm and $CD = 16$ cm. An altitude is drawn from $B$ to $AC$ intersecting at $E$. Determine the length of $BE$.

Solution

The area of a triangle is determined using the formula $\text{base} \times \text{height} \div 2$. 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.

\[
\text{Area } \triangle ABC = \frac{(CD) \times (AB)}{2} = \frac{16 \times 18}{2} = 144 \text{ cm}^2
\]

But, \[
\text{Area } \triangle ABC = \frac{(BE) \times (AC)}{2}
\]

\[
144 = \frac{(BE) \times 20}{2}
\]

\[
144 = 10 \times BE
\]

\[
14.4 \text{ cm} = BE
\]

Therefore, the length of altitude $BE$ is 14.4 cm.
Problem of the Week
Problem C and Solution
New Heights (Original Problem)

Problem

An altitude is a line segment drawn from a
vertex of a triangle to the opposite side or
opposite side extended such that the line
segment is perpendicular to the opposite side.
In \( \triangle ABC \), \( CD \) is an altitude. \( AB = 16 \) cm,
\( AC = 12 \) cm and \( CD = 6 \) cm. An altitude is
drawn from \( B \) to \( AC \) extended intersecting at
\( E \). Determine the length of \( BE \).

Solution

The area of a triangle is determined using the formula \( \text{base} \times \text{height} \div 2 \). 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.

\[
\text{Area } \triangle ABC = \frac{(CD) \times (AB)}{2} = \frac{6 \times 16}{2} = 48 \text{ cm}^2
\]

But, \( \text{Area } \triangle ABC = \frac{(BE) \times (AC)}{2} \)

\[
48 = \frac{(BE) \times 12}{2} \quad 48 = 6 \times BE \quad 8 \text{ cm} = BE
\]

Therefore, the length of altitude \( BE \) is 8 cm.