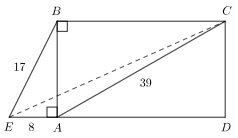


Problem of the Week
Problem C and Solution
All the Way Across

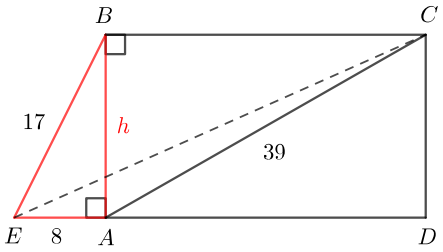
Problem

Francie has a field. It is made up of rectangle $ABCD$ and right triangle ABE, as shown above. She knows the length of AC, the diagonal of the rectangle, is 39 m. She also knows the lengths of sides EA and EB of the triangle are 8 m and 17 m, respectively. She would like to know the distance from E to C. What is the length of EC, accurate to one decimal place?

Solution

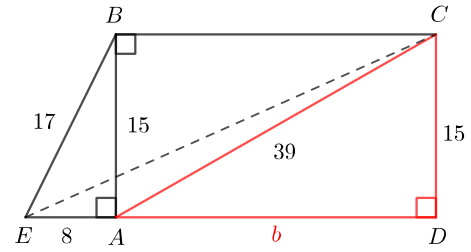
Step 1: In $\triangle ABE$, let $AB = h$.
Since $\triangle ABE$ is a right triangle, we can use the Pythagorean Theorem.

$$\begin{aligned} AB^2 + EA^2 &= EB^2 \\ h^2 + 8^2 &= 17^2 \\ h^2 + 64 &= 289 \\ h^2 &= 289 - 64 \\ &= 225 \\ h &= 15, \text{ since } h > 0 \end{aligned}$$



Step 2: In $\triangle ADC$, let $AD = b$.
Since $ABCD$ is a rectangle, then $AB = DC = 15$ and $\angle ADC = 90°$.
Therefore, $\triangle ADC$ is a right triangle and we can use the Pythagorean Theorem.

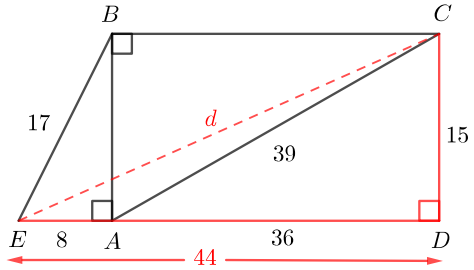
$$\begin{aligned} AD^2 + DC^2 &= AC^2 \\ b^2 + 15^2 &= 39^2 \\ b^2 + 225 &= 1521 \\ b^2 &= 1521 - 225 \\ &= 1296 \\ b &= 36, \text{ since } b > 0 \end{aligned}$$



Step 3: In $\triangle EDC$, let $EC = d$.
We know that $DC = 15$, $\angle EDC = \angle ADC = 90°$, and $ED = EA + AD = 8 + 36 = 44$ m.

Since $\triangle EDC$ is a right triangle, we can use the Pythagorean Theorem.

$$\begin{aligned} EC^2 &= ED^2 + DC^2 \\ d^2 &= 44^2 + 15^2 \\ &= 1936 + 225 \\ &= 2161 \\ &= \sqrt{2161} \\ d &\approx 46.5, \text{ since } d > 0 \end{aligned}$$



Therefore, the length of EC is approximately 46.5 m.