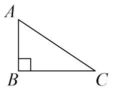
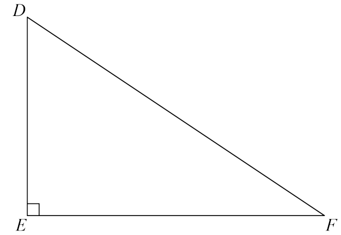


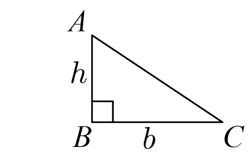
Problem of the Week
Problem C and Solution
A Bigger Triangle



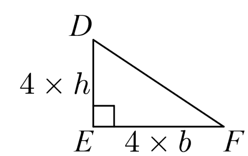
Problem

Naveen drew a right-angled triangle, $\triangle ABC$, with an area of 14 cm^2. His brother Anand drew a bigger right-angled triangle, $\triangle DEF$, with side lengths four times the lengths of the sides in $\triangle ABC$. In particular, $DE = 4 \times AB$, $EF = 4 \times BC$, and $DF = 4 \times AC$. Calculate the area of $\triangle DEF$.

Solution



In $\triangle ABC$, let b represent the length of the base, BC, and h represent the length of the height, AB. Then the area of $\triangle ABC$ is equal to $\frac{b \times h}{2}$. We know this area is equal to 14 cm^2, so it follows that $14 = \frac{b \times h}{2}$, or $28 = b \times h$.



$\triangle DEF$ is formed by multiplying each of the side lengths of $\triangle ABC$ by 4. So the length of the base of $\triangle DEF$ is equal to $4 \times b$ and the length of the height is equal to $4 \times h$. We can calculate the area of $\triangle DEF$ as follows.

$$\begin{aligned}\text{area of } \triangle DEF &= \frac{(4 \times b) \times (4 \times h)}{2} \\ &= \frac{16 \times b \times h}{2} \\ &= \frac{16 \times 28}{2}, \quad \text{since } b \times h = 28 \\ &= 224\end{aligned}$$

Therefore, the area of $\triangle DEF$ is 224 cm^2.

Extension:

Notice that $\triangle DEF$ has side lengths that are each 4 times the corresponding side lengths of $\triangle ABC$ and that the area of $\triangle DEF$ ended up being $224 = 16 \times 14 = 4^2 \times$ area of $\triangle ABC$.

Show that if $\triangle DEF$ has side lengths that are each k times the corresponding side lengths of $\triangle ABC$, then the area of $\triangle DEF$ will be equal to k^2 times the area of $\triangle ABC$.