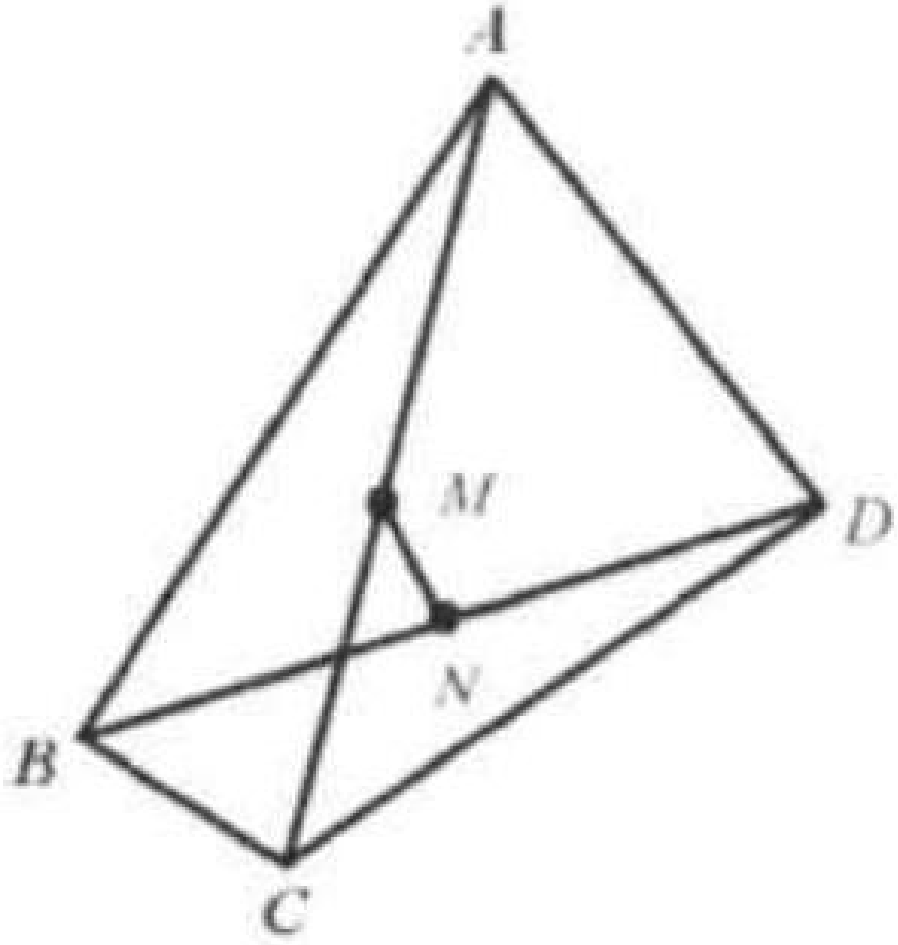
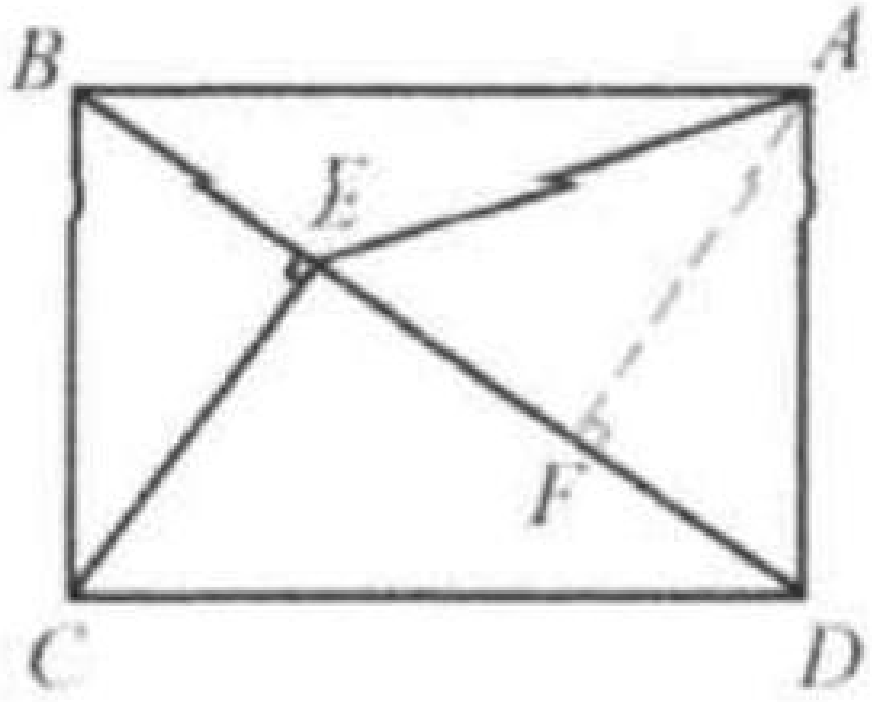
Problem

Both $\triangle ABC$ and $\triangle ADC$ are right triangles sharing the hypotenuse AC with $\angle ABC = \angle ADC = 90°$. Points M and n are the midpoints on sides AC and BD, respectively. Show that $MN \perp BD$.



Solution

(D).
$\triangle ABD$ is 3:4:5 right triangle. Since $BD = 25, AD = 15$, and $AB = 20$.
We know that
$CD^2 = BD \times DE \Rightarrow \quad 20^2 = 25 \times DE \Rightarrow \quad DE = 16$
Draw $AF \perp BD$. $\frac{AF \times BD}{2} = \frac{AD \times AB}{2}$



$$\Rightarrow \frac{AF \times 25}{2} = \frac{15 \times 20}{2} \Rightarrow AF = 12$$

The area of $\triangle ADE$ is $\frac{AF \times ED}{2} = \frac{12 \times 20}{2} = 120$.