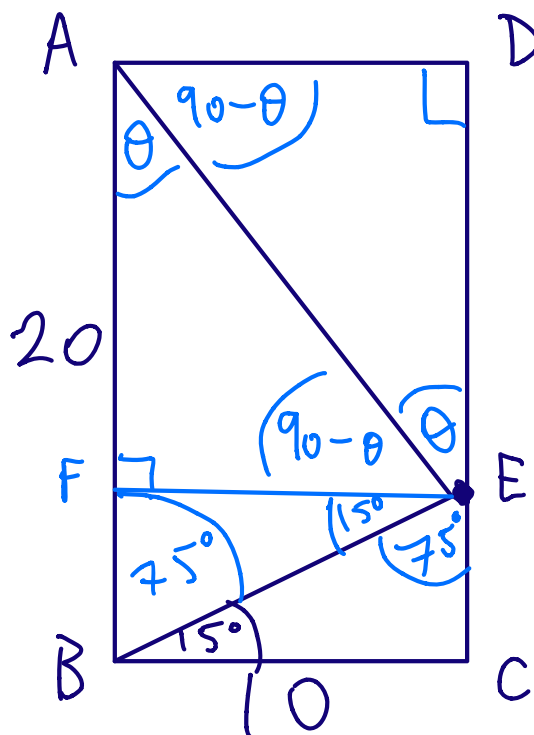


What is AE ?

We know that  $\angle CEB = 180^\circ - 15^\circ - 90^\circ$   
 $= 75^\circ$

$\angle EBC = 90^\circ - 15^\circ$   
 $= 75^\circ$



$$\angle AED = \angle EAB \quad (\text{alternate angles})$$

Construct point F & line EF  
parallel to top & bottom edges of rectangle.

$$\frac{FB}{FE} = \tan(15^\circ)$$

$$\text{We have } \tan(15^\circ) = \frac{1 - \cos(30^\circ)}{\sin(30^\circ)}$$

$$= \frac{1 - \frac{\sqrt{3}}{2}}{\frac{1}{2}}$$

$$= \frac{1}{2} - \frac{\sqrt{3}}{4}$$

$$\text{So } FB = 10 \left( \frac{1}{2} - \frac{\sqrt{3}}{4} \right)$$

$$= 5 - \frac{5\sqrt{3}}{2}$$

$$\tan(\theta) = \frac{10}{20 - 5\left(1 - \frac{\sqrt{3}}{2}\right)}$$

$$= \frac{10}{15 + 5\frac{\sqrt{3}}{2}}$$

$$= \frac{2}{3} + \frac{10 \times 2}{5\sqrt{3}} \quad \frac{4}{\sqrt{3}}$$

$$= \frac{2}{3} + \frac{4}{\sqrt{3}}$$

Now,  $\tan(\theta) = \frac{AD}{DE} = \frac{10}{DE}$

$$\Rightarrow \frac{2}{3} + \frac{4}{\sqrt{3}} = \frac{10}{DE}$$

$$\Rightarrow \frac{2 + 4\sqrt{3}}{3} = \frac{10}{DE}$$

$$\Rightarrow DE = \frac{30}{2+4\sqrt{3}}$$

$$\therefore AE^2 = AD^2 + DE^2$$

$$= 100 + \frac{900}{(2+4\sqrt{3})^2}$$

$$= 100 + \frac{900}{4 + 48 + 16\sqrt{3}}$$

$\approx$

$$\therefore AE = \sqrt{\quad}$$