

**Math Worksheet: Geometry Problem (1)**

1. ABC is an equilateral triangle of side 6 units. Point D on AB is at a distance of 2 units from point A. Angles ADE and DEF are right angles. Find the length of segment DF.

$\triangle ABC$  is equilateral hence  $\angle DAE = 60^\circ$

$$\Rightarrow \angle AED = 30^\circ \Rightarrow \angle FEC = 60^\circ$$

$\Rightarrow \triangle EFC$  is equilateral

$$\text{Also } \sin 30^\circ = \frac{DA}{AE} = \frac{2}{AE} = \frac{1}{2}$$

$$\Rightarrow AE = 4$$

$$\Rightarrow EC = 6 - 4 = 2$$

$$\text{Also } DA^2 + DE^2 = AE^2 \Rightarrow DE = 2\sqrt{3}$$

Since  $\triangle EFC$  is equilateral  $\Rightarrow EF = EC = 2$ .

$$DE^2 + EF^2 = DF^2 \Rightarrow DF^2 = (2\sqrt{3})^2 + 2^2$$

$$\Rightarrow \underline{DF = 4}$$

Note : 1)  $\triangle DEF$  and  $\triangle EDA$  are congruent.  
2)  $\triangle DFB$  is also equilateral.

