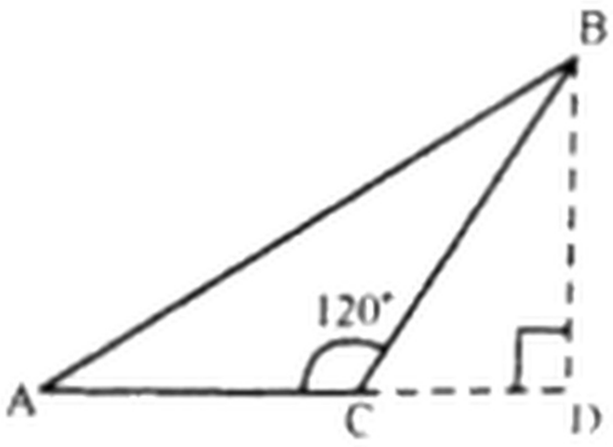
# Exercise 8.1

**Ql. Given m $\overline{AC}$ = 1cm, m $\overline{BC}$ = 2cm, m∠C = 120°. Compute the length AB and the area of △ ABC.**

**Hint:** $\left(\overline{AB}\right)^2 = \left(\overline{AC}\right)^2 + \left(\overline{BC}\right)^2 + 2mAC.m\overline{CD}$

$\text{Where}\left(m\overline{CD}\right) = \left(m\overline{BC}\right)\cos\left(180^\circ - m\angle C\right)$ *(Use theorem I)*

**Solution:**




$m\overline{AC} = 1cm;\ m\overline{BC} = 2cm;\ m\angle C = 120^\circ$

Required: $m\overline{AB} = ?$

and Area of ABC = ?

$m\overline{AB}^2 = m\overline{AC}^2 + m\overline{BC}^2 + 2m\overline{AC}m\overline{CD}$

$= (1)^2 + (2)^2 + 2(1)\left(\overline{CD}\right)$

$= 1 + 4 + 2\overline{CD}$

$= 1 + 4 + 2\overline{CD}$ ____ $(i)$

In △ BCD,

$m\angle BCD = 60^\circ$

*and* $m\angle CBD = 30^\circ$

The side opposite to $\angle 30^\circ$ is $\overline{CD}$ which is $\frac{1}{2}\overline{CB}$, the hypotenuse of right △CDB.

$\overline{CD} = 1cm$

By putting the value of $\overline{CD}$ in eq.(1)

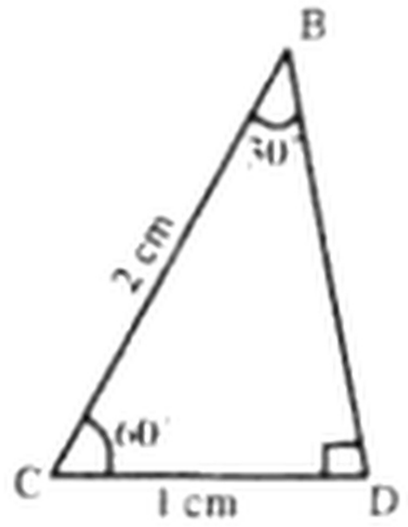
$m\overline{AB}^2 = 5 + 2(1)(1) = 5 + 2 = 7$

$$m\overline{CB}^2 = m\overline{CD}^2 + \overline{BD}^2$$

$$2^2 = 1^2 + m\overline{BD}^2$$

$$mBD^2 = 4 - 1 = 3$$

$$h = m\overline{BD} = \sqrt{3}$$




Area of ABC

$$= \frac{1}{2}\text{base} \times \text{height}$$

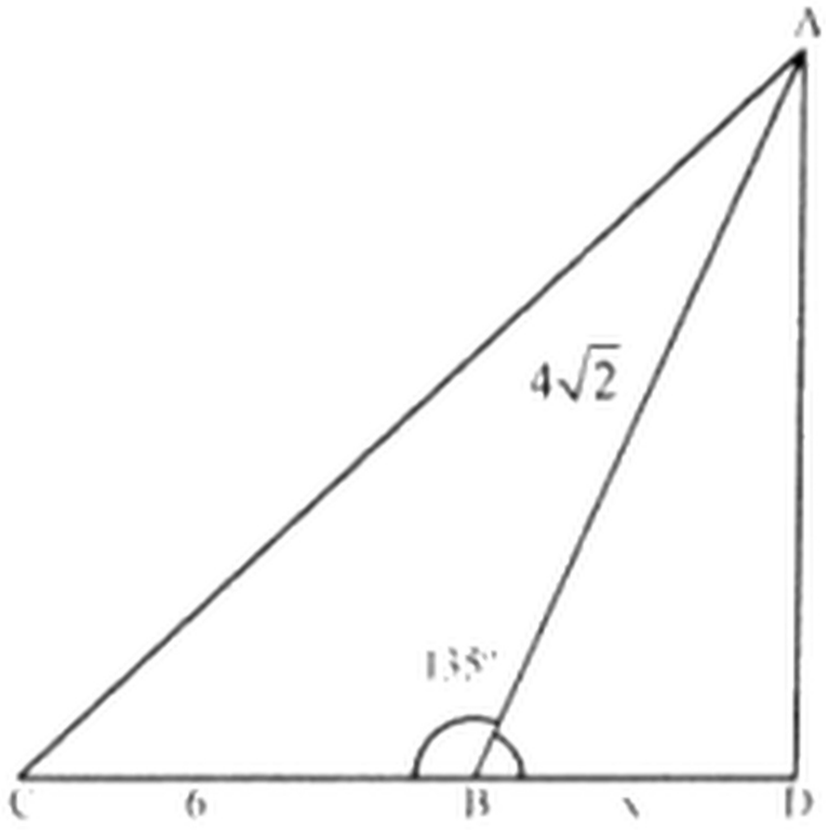
$$= \frac{1}{2}m\overline{AC} \times m\overline{BD}$$

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

$$\text{Area of ABC} = \frac{\sqrt{3}}{2}\text{sq cm}$$

**Q2. Find m $\overline{AC}$ if in $\square ABC$ m $\overline{BC}$ = 6 cm, m $\overline{AB}$ = $4\sqrt{2}$ cm and m∠ABC = 135°.**

**Solution:**




Let $m\overline{BD} = x$

In $\square$ ABD, we have

$$\cos 45^\circ = \frac{\overline{BD}}{AB}$$

$$\frac{1}{\sqrt{2}} = \frac{x}{4\sqrt{2}}$$

$$\sqrt{2}\ x = 4\sqrt{2}$$

$$x = 4 \text{ cm}$$

We know that

To Prove

$$\left(m\overline{AC}\right)^2 = \left(m\overline{CB}\right)^2 + \left(m\overline{AB}\right)^2 + 2 \times m\overline{CB} \times m\overline{BD}$$

$$= 36 + 32 + 48$$

$$= 116$$

$$\Rightarrow m\overline{AC} = \sqrt{116} = \sqrt{4 \times 29} = 2\sqrt{29}\,\text{cm}$$