Q.1 Give $m\overline{AC} = 1cm$, $m\overline{BC} = 2cm$, $m\angle C = 120°$,
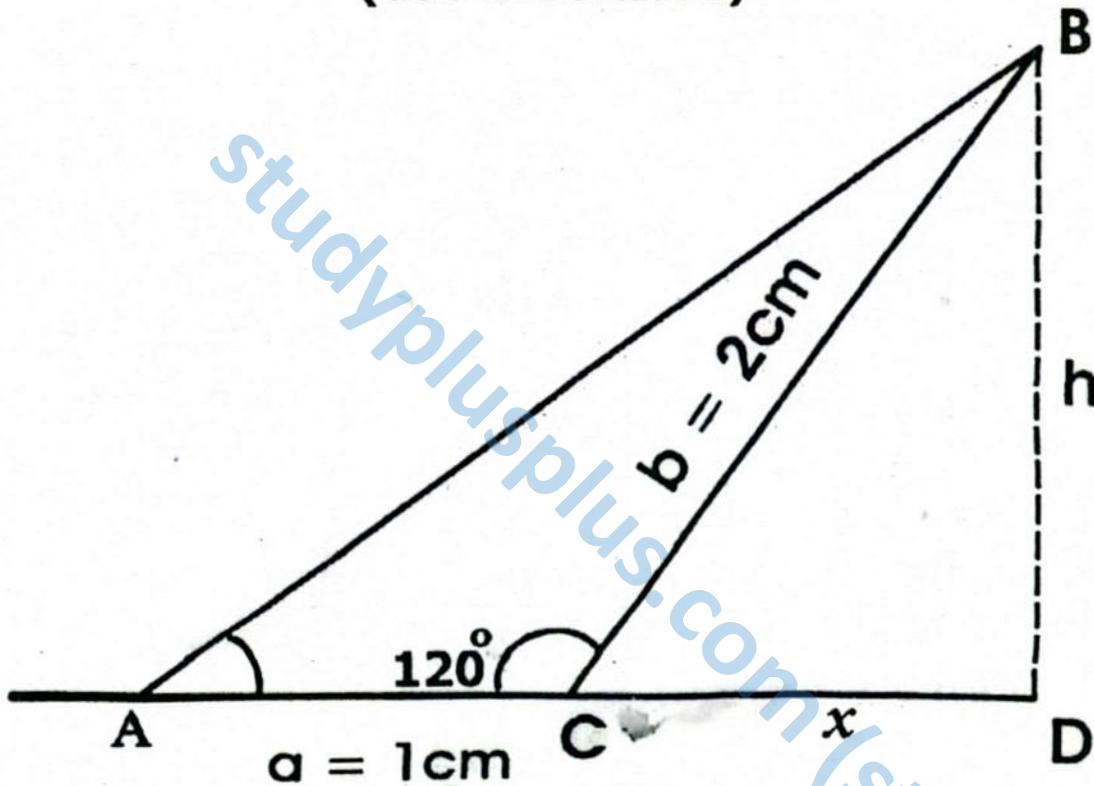Compute the length $\overline{AB}$ and the area of $\triangle ABC$,
Hint: $(AB)^2 = (AC)^2 + (BC)^2 + 2m\overline{AC}.m\overline{CD}$
Where $(m\overline{CD}) = (m\overline{BC}) \, Cos(180° - m\angle C)$
(USE THEOREM 1)

$c^2 = a^2 + b^2 + 2a \, (Theorem)$
$c^2 = (1)^2 + (2)^2 + 2(1)(x)$
$Now \, m\overline{CD} = x = \overline{BC} \, Cos(180° - C)$
$= 2 \, Cos(180° - 120°)$
$= 2 \, Cos \, 60°$

$= 2 \times \dfrac{1}{2}$

Putting value of x in (i)

$$C^2 = (1)^2 + (2)^2 + 2(1)(1)$$
$$= 1 + 4 + 2$$
$$C^2 = 7$$
$$C = \sqrt{7}$$
$$C = 2.646 \ cm$$

Thus $m\overline{AB} = 2.464 cm.$

Area of ΔABC

$$= \frac{1}{2} \ base \times height$$
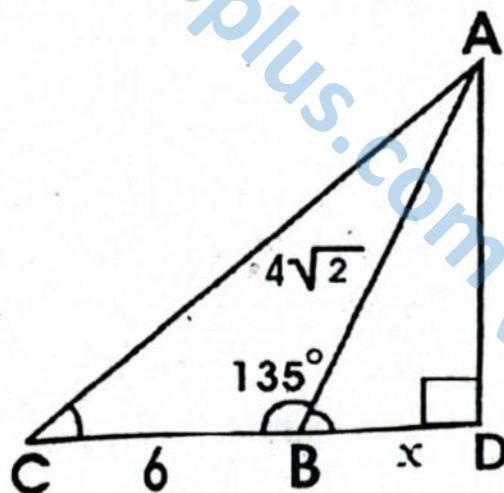$$= \frac{1}{2} \ m\overline{AC} \times m\overline{BD}$$
$$= \frac{1}{2} \times 1 \times \sqrt{3}$$

Area of $\Delta ABC = \dfrac{\sqrt{3}}{2} \ cm$

Q.2 Find $m\overline{AC}$ if in ΔABC $m\overline{BC} = 6cm$, $m\overline{AB} = 4\sqrt{2} \ cm$ and $m\angle ABC = 135^\circ$.

Solution:

Let $m\overline{BD} = x$

in ΔABD, we have

$$Cos \ 45^\circ = \frac{\overline{BD}}{\overline{AB}}$$
$$\frac{1}{\sqrt{2}} = \frac{x}{4\sqrt{2}}$$
$$\sqrt{2}x = 4\sqrt{2}$$
$$x = 4 \ cm$$

we know that

To Prove:

$$(m \overline{AC})^2 = (m \overline{CB})^2 + (m \overline{AB})^2 + 2 \times m \overline{CB} \times m \overline{BD}$$
$$= (6)^2 + (4\sqrt{2})^2 + 2 \times 6 \times 4$$
$$= 36 + 32 + 48$$
$$= 116$$
$$m \overline{AC} = \sqrt{116} = \sqrt{4 \times 29} = 2\sqrt{29} \ cm$$