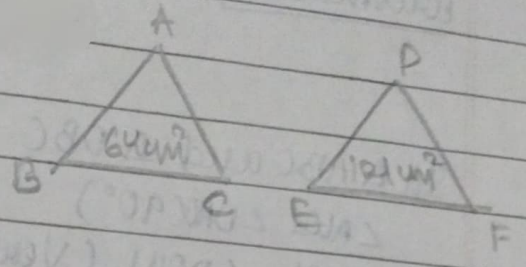
Exercise 6.4

1. Given : $\triangle ABC \sim \triangle DEF$



In $\triangle ABC$ and $\triangle DEF$

$$\frac{AB}{DE} = \frac{BC}{EF} = \frac{CA}{FD}$$

$$\frac{\text{area of } \triangle ABC}{\text{area of } \triangle DEF} = \left(\frac{BC}{EF}\right)^2$$

$$\Rightarrow \frac{64}{121} = \left(\frac{BC}{EF}\right)^2$$

$$\Rightarrow \frac{64}{121} = \frac{(BC)^2}{(15.4)^2} = \frac{BC^2}{237.16}$$

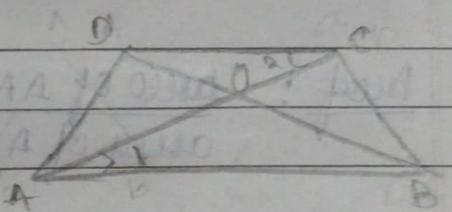
$$\Rightarrow 121\,BC^2 = 64 \times 237.16$$

$$\Rightarrow BC^2 = \frac{64 \times 237.16}{121} = 125.44$$

$$\Rightarrow BC = \sqrt{125.44} = 11.2 \text{ cm}$$

2. Given : $AB = 2CD$

$AB \parallel DC$



In $\triangle AOB$ and $\triangle COD$

$\angle AOB = \angle COD$

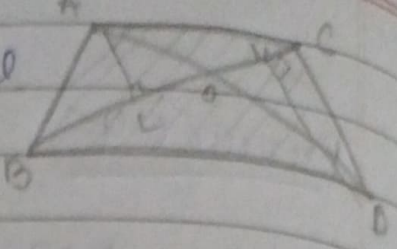
~~$\angle OBC = \angle OCD$~~ $\angle 1 = \angle 2$ (Alternate angle)

$\triangle AOB \sim \triangle COD$ by AA.

$$\frac{\text{Area of } \triangle AOB}{\text{Area of } \triangle COD} = \frac{AB^2}{CD^2} = \frac{(2CD)^2}{CD^2} = \frac{4CD^2}{CD^2}$$

Area of $\triangle AOB$: Area of $\triangle COD$ = 4 : 1

3. Given : $\triangle ABC$ and $\triangle DBC$ are on BC base



Construction : Draw $AL \perp BC$
$DM \perp CB$

In $\triangle ABC$ and $\triangle DBC$
$\angle ALO = \angle DMO = 90°$
$\angle AOL = \angle DOM$ (Vertically Opposite Angle)
$\triangle ABC \sim \triangle DBC$ by AA

$$\frac{\text{Area of } \triangle ABC}{\text{Area of } \triangle DBC} = \frac{\frac{1}{2} \times AL \times BC}{\frac{1}{2} \times DM \times BC} = \frac{AL}{DM}$$

$$\frac{AL}{DM} = \frac{AO}{DO} \quad \text{(proved)}$$

4. Given : $\triangle ABC \sim \triangle DEF$
Area of $\triangle ABC$ = Area of $\triangle DEF$

To prove : $\triangle ABC \cong \triangle DEF$

Proof : $\frac{\text{Area of } \triangle ABC}{\text{area of } \triangle DFF} = \frac{AB^2}{DE^2} = \frac{AC^2}{DF^2} = \frac{BC^2}{EF^2} = 1$

$AB^2 = DE^2$, $AC^2 = DF^2$, $BC^2 = EF^2$
$\Rightarrow AB = DE$ $\Rightarrow AC = DF$ $\Rightarrow BC = EF$

$\therefore \triangle ABC \cong \triangle DEF$ (by SSS)