

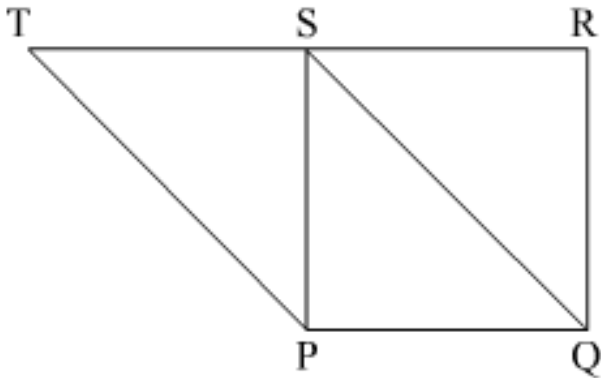
Area Theorems

- Parallelograms on the same (or equal) base and between the same parallels are equal in area.

Converse of the property is also true, which states that parallelograms on the same base and having equal areas lie between the same parallels.

Example:

In the given figure, if the area of parallelogram PQST is 16 cm^2 then find the side of the square PQRS.



Solution:

Square **PQRS** and parallelogram **PQST** lie on the same base PQ and between the same parallels PQ and TR.

We know that the parallelograms on the same base and between the same parallels are equal in area.

$$\therefore \text{area (PQRS)} = \text{area (PQST)} = 16 \text{ cm}^2$$

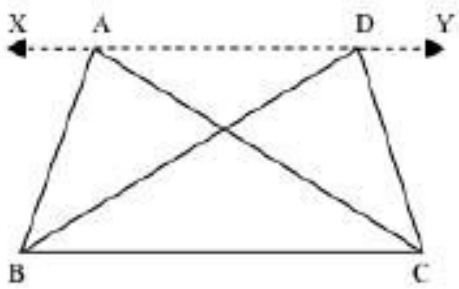
$$\text{area of square (PQRS)} = \text{side} \times \text{side}$$

$$\Rightarrow (\text{side})^2 = 16 \text{ cm}^2$$

$$\Rightarrow \text{side} = 4 \text{ cm}$$

- If a parallelogram and a triangle lie on the same (or equal) base and between the same parallels then the area of the triangle is half the area of the parallelogram.
- Triangles on the same base (or equal base) and between the same parallels are equal in area.

In the given figure, $\triangle ABC$ and $\triangle DBC$ lie on the same base BC and $BC \parallel XY$, therefore area of $\triangle ABC$ is equal to the area of $\triangle DBC$.



Converse of the property is also true, which states that triangles having the same base and equal areas lie between the same parallels.

- An important result states that a median of a triangle divides it into two triangles of equal area.