CHAPTER 11

Areas

Parallelograms on the same base and between the same parallels:

In this section, we shall find a relation between the areas of two parallelograms on the same base and between the same parallel. For this, let us first define the following.

Base:

A base of a parallelogram is any side of it.

Altitude:

For each base of a parallelogram, the corresponding altitude is the line segment from a point on the base, perpendicular to the line containing the opposite side.

Theorem 1:

Parallelograms on the same base and between the same parallels are equal in area.

Given:

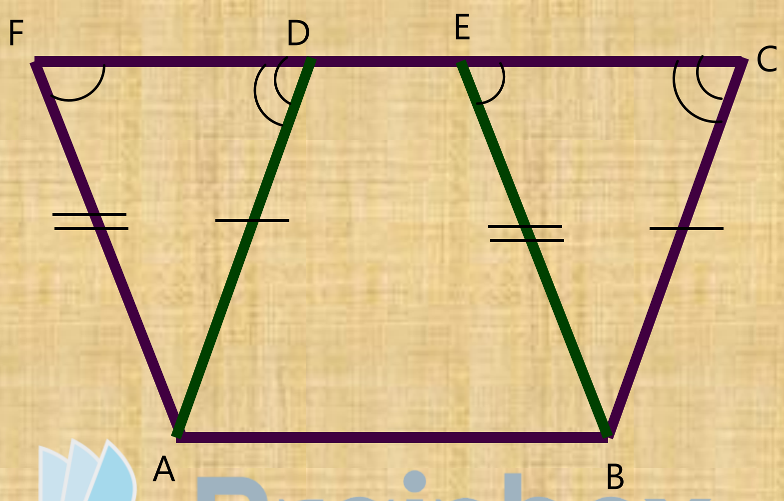
Two parallelograms ABCD and ABEF, which have the same base AB and which are between the same parallel lines AB and FC.

To prove:

ar (Parallelogram ABCD) = ar (Parallelogram ABEF)

Proof:

In ΔADF and ΔBCE, we have



AD = BC $(\because$ ABCD is a parallelogram)

AF = BE $(\because$ ABEF is a parallelogram)

And $\angle DAF = \angle CBE$

$(\because AF \parallel BE \Rightarrow \angle AFD = \angle BEC$ also, $AD \parallel BC \Rightarrow \angle ADF = \angle BCE)$

By SAS criterion of congruence, we have

$\Delta ADF \cong \Delta BCE$

Consider,

ar (Parallelogram ABCD) = ar (⏢ABED) + ar (Δ BCE)

= ar (⏢ABED) + ar (△ADF)

= ar (Parallelogram ABEF)