ACTIVITY

Area Of Parallelogram

Objective

To show that the area of a parallelogram is equal to the product of its base and corresponding height by using paper cutting and pasting.

Material Required

Glazed papers, pencil, a pair of scissors, glue stick.

Theory

1. Construction of parallelogram by paper folding.
2. Area of rectangle = length × breadth
3. Area of parallelogram = base × corresponding height.

Procedure

1. Draw a parallelogram by paper folding using colored glazed paper and name it ABCD.
2. Cut the parallelogram with the help of scissors.
3. In the parallelogram, draw a perpendicular from a vertex D to its opposite side AB of the parallelogram ABCD by paper folding.
4. We will get a crease along with DE. Dark the color in ΔADE [fig (i)]. Now cut it along DE. We will get two pieces, one triangle named as AED and the other one a trapezium named E'D'CB as shown in fig. (ii).

Fig. (i)

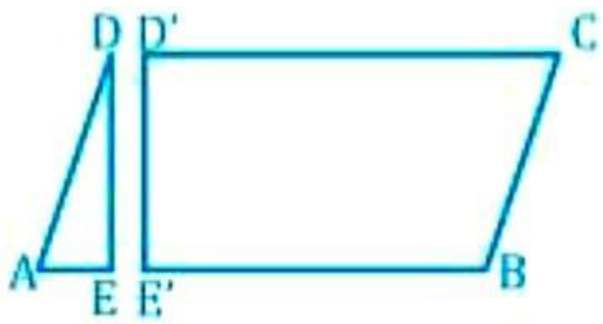


Fig. (ii)

5. Paste this triangular piece AED on the other side of trapezium such that its side AD coincides with BC [fig. (iii)].

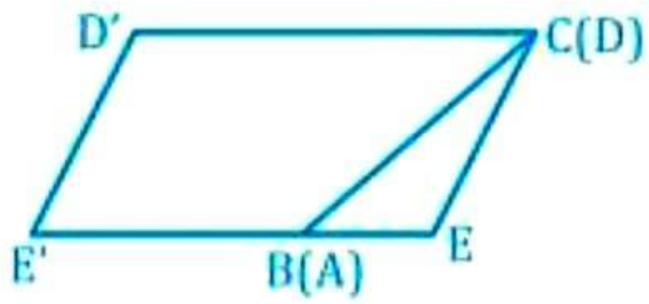
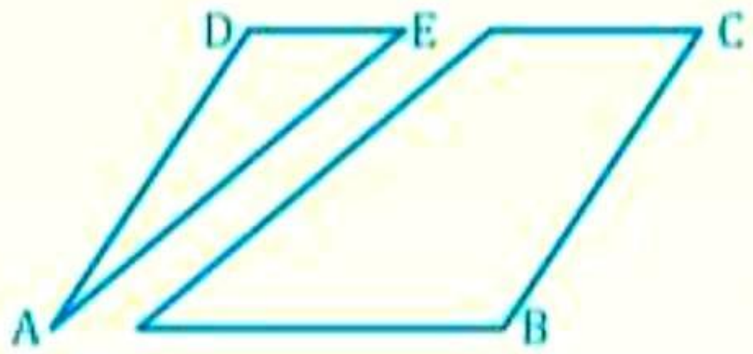
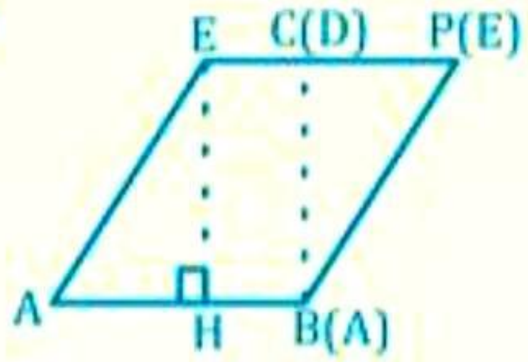


Fig. (iii)

6. After pasting, we get a rectangle E'ECD' with length as E'B + BE = E'E = D'C = AB and breadth as E'D' = EC.





Observation

We observe that new figure D'E'EC is a rectangle.

Area of parallelogram ABCD = Area of rectangle E'ECD'

= length × breadth

= E'E × D'E'

= AB × DE

Hence, Area of parallelogram = Base × Height

Result

It is verified that the area of a parallelogram is equal to the product of its base and corresponding height by the paper cutting and pasting method.

Learning Outcome

We can draw a perpendicular from different vertices on opposite sides of a parallelogram and verify that the area of the parallelogram is the product ofbase and height.

Area of a parallelogram with the same base and the same height are identical. This leads to a famous theorem:

"Parallelogram between the same parallel lines and on the same base are equal in area."

Activity Time

Verify the area of a parallelogram is equal to the product of its base and corresponding height in which perpendicular falls outside the base of the parallelogram.

Viva Voce

Q1. How does a diagonal of a parallelogram form two triangles of equal area?

Ans: A diagonal of a parallelogram divides it into two triangles of equal area.

Q2. In a parallelogram if AB = 4 cm, BC = 6 cm , CD = 8 cm and AD = 10 cm then find perimeter of parallelogram.

Ans: P = 28 cm.

Q3. If one side of a parallelogram is 10 cm and its area is 60 cm^2. Find the corresponding altitude.

Ans: Side of the parallelogram (base) = 10 cm

Area of the parallelogram = 60 cm^2

Now, base × altitude = 60 cm^2

$\Rightarrow$ altitude $= \frac{60\ cm^2}{10\ cm} = 6\ cm$

Q4. If the base of a parallelogram is 5 cm and the corresponding altitude is 3 cm. Find the area of the parallelogram.

Ans: Base of the parallelogram = 5 cm
Corresponding altitude of the parallelogram = 3 cm
Area of the parallelogram = $5 \times 3\ cm^2 = 15\ cm^2$.

Q5. What is the area of a triangle?

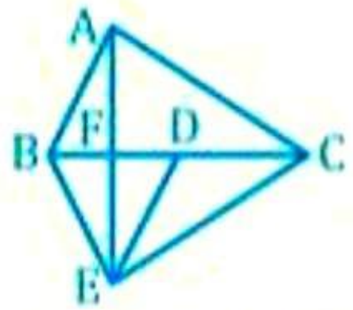
Ans: Area of a triangle = $\frac{1}{2} \times$ base $\times$ height.

Q6. Define an altitude of a quadrilateral.

Ans: An altitude of a quadrilateral is a perpendicular line segment joining a vertex of the quadrilateral to the opposite side

Multiple Choice Questions

Q 1. In the figure, ABC and BDE are two equilateral triangles such that D is the mid-point of BC. If AB intersects BC in F, then we have

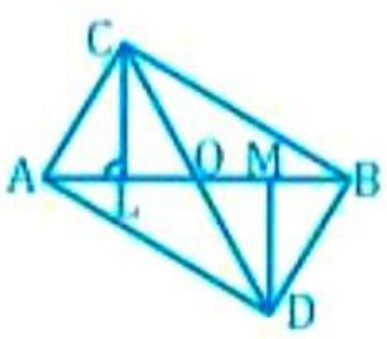


(a) Area ($\triangle$ BDE) = $\frac{1}{4}$ area ($\triangle$ ABC)
(b) Area (ΔBDE) = $\frac{1}{2}$ area (ΔBAF)
(c) Area ($\triangle$ BEF) = 2 area ($\triangle$ FED)
(d) Area ($\triangle$ FED) = $\frac{1}{4}$ area ($\triangle$ AFC)

Q 2. If Diagonals AC and BD of a quadrilateral ABCD intersect at O in such a way that ar($\triangle$ AOD) = ar($\triangle$ BOC). Then ABCD is a:

(a) Parallelogram
(b) Rectangle
(c) Square
(d) Trapezium

Q 3. If ar(parallelogram ABCD) = 25 cm^2 and a r($\triangle$ BCD) = x cm^2, then the value of x is:



(a) 25 cm^2
(b) 50 cm^2
(c) 12.5 cm
(d) 12.5 cm^2

Q 4. Given, a triangle ABC and E is the mid-point of median AD of $\triangle$ ABC. If ar($\triangle$ BED) = 20 cm^2, then ar($\triangle$ ABC) is:

(a) 10 cm^2
(b) 5 cm^2
(c) 60 cm^2
(d) 80 cm^2

Q 5. Measure of one angle of a parallelogram is 2/3 of its measure of the adjacent angle. Measure of the smaller angle of the parallelogram is:

(a) 54°
(b) 72°
(c) 81°
(d) 108°

ANSWER KEY

1.(a)	2.(d)	3.(a)	4.(c)	5.(b)