ACTIVITY

Area Of Parallelogram On The Same Base And Between The Same Parallels

Objective

To show that the parallelograms on the same base and between the same parallel lines are equal in the area by paper cutting and pasting.

Material Required

Glazed paper, a pair of scissors, glue stick, geometry box.

Theory

1. Area of parallelogram = base × height
2. The shortest distance between two parallel lines is the perpendicular distance between parallel lines and it remains same for that pair of parallel lines.

Procedure

1. Draw a parallelogram by paper folding activity.
2. Cut this parallelogram using scissors and name it as ABCD, [fig. (i)].

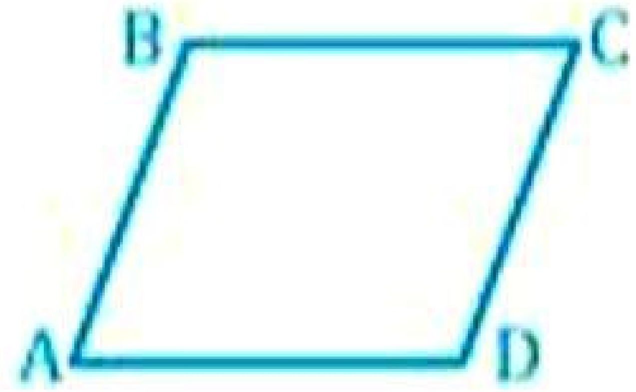


fig. (i)

3. Mark any point E on DC.
4. From A fold the parallelogram till the point E (any point on DC). A increase AE is formed, as show in ΔADE. [fig. (ii)].

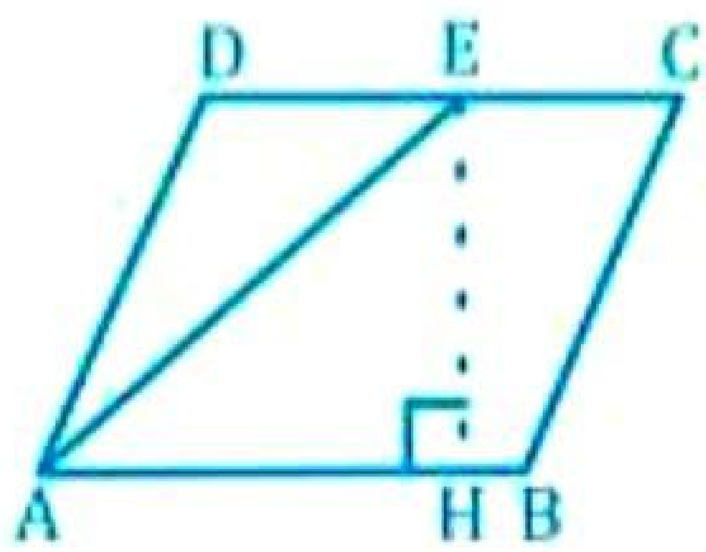


fig. (ii)

5. Cut the parallelogram ABCD along AE to get ΔAED.
6. Paste the ΔAED on the other side along BC of parallelogram ABCD as shown in fig. (iii).

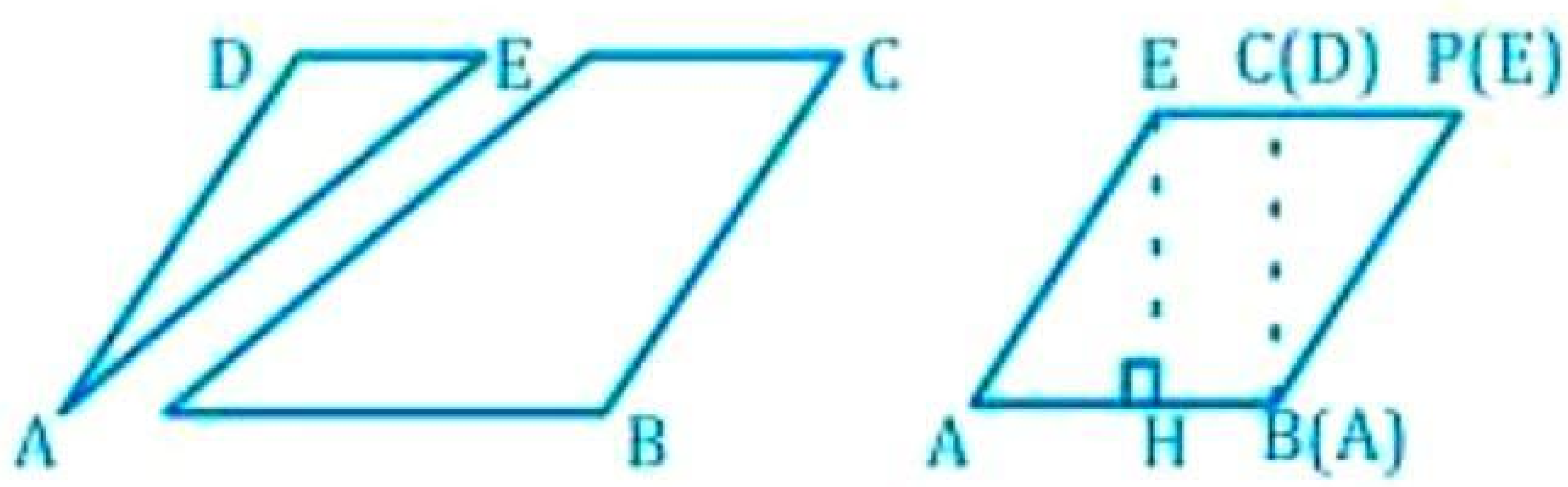


fig. (iii)

7. We get a new parallelogram AEPB.

Observation

We observe that the two parallelograms ABCD and ABPE have same base AB.
Two parallelograms lie between same parallel lines, i.e., AB and CD and the height between them are same at all points.
By formula, area of parallelogram = base × height

$$ar(\parallel gmABCD) = AB \times EH$$
$$ar(\parallel gmABPE) = AB \times EH$$

Result

We have verified that two parallelograms lying on same base and between same parallel lines are equal in area.

Learning Outcome

Students follow that the parallelograms on the same base and between the same parallels have same area.

Activity Time

This theorem can be proved by using graph paper. Students will try this and verify the theorem.
Prove that areas of a rectangle and a square of same height and on the same base are equal by using the paper cutting and pasting method.

Viva Voce

Q1. What is the relationship between the areas of the parallelograms on the same base (or equal bases) and between the same parallel lines?
Ans: Both areas are same.

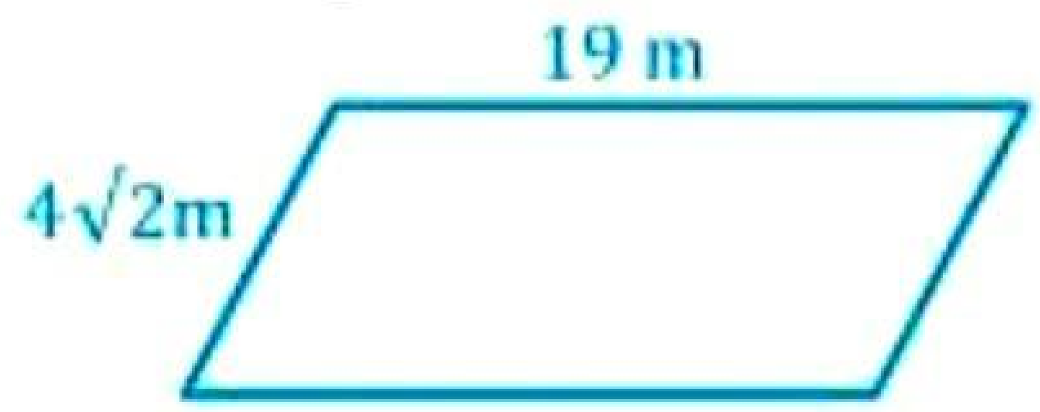
Q2. Do the diagonals of a parallelogram divide it into two triangles of the equal base?
Ans: No, the diagonals of a parallelogram divide it into four triangles of an equal base.

Q3. What is the altitude of a parallelogram?
Ans: Altitude of a parallelogram is the perpendicular distance between two parallel sides.

Q4. How would you define the area of a parallelogram?
Ans: Area of a parallelogram is the product of its base and the corresponding altitude.

Q5. What are the types of parallelograms?
Ans: Parallelograms are of three types, i.e., rectangle, square and rhombus.

Q6. Find the perimeter of the following parallelogram:



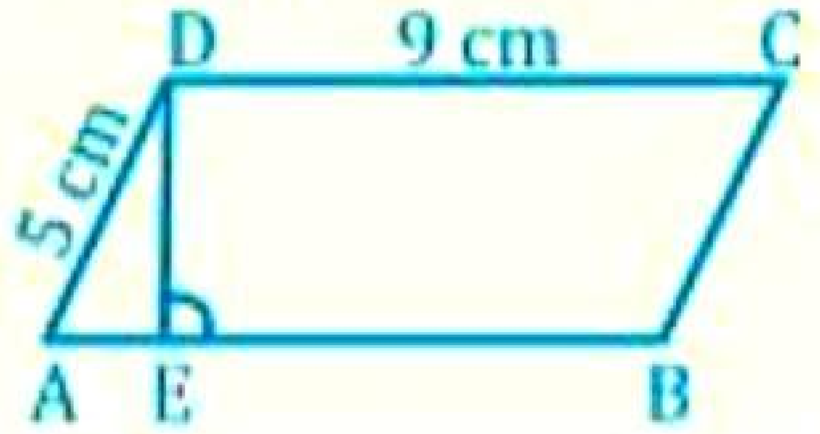
Ans: $38 + 8\sqrt{2}$m

Q7. Is it correct that every square and rhombus are parallelograms?
Ans: Yes, because opposite sides of these figures are parallel and equal.

Q8. Adjacent sides of a rectangle are 16 cm and 8 cm. Find the area of the rectangle.
Ans: Area of rectangle = 16 cm × 8 cm = 128 cm

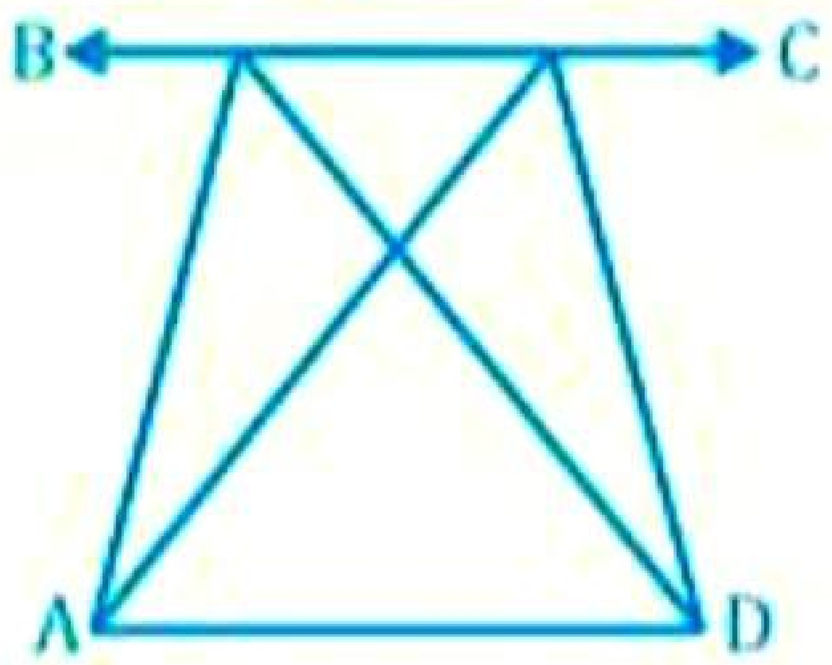
Multiple Choice Questions

Q 1. **Find the area of parallelogram ABCD if AE: EB = 1: 2.**



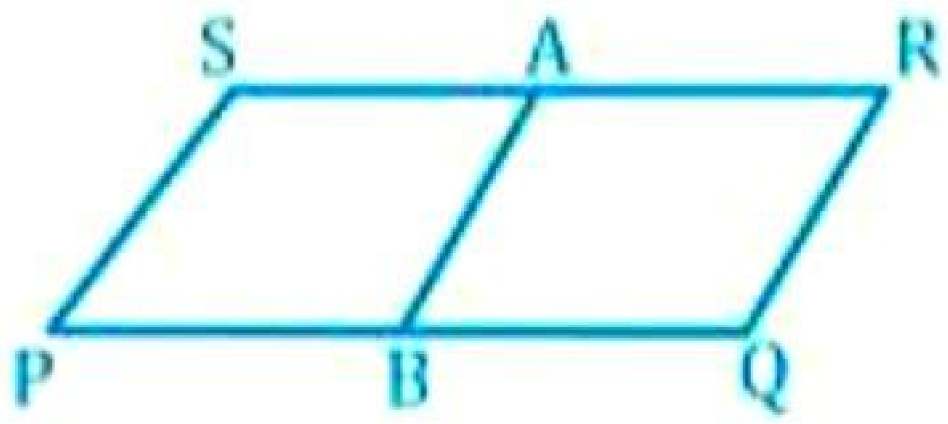
(a) 25 m^2 (b) 22.5 m^2 (c) 36 m^2 (d) 45 m^2

Q 2. **From the diagram given below, if area of triangle ABC is ar(ABD) and area of triangle ACD is ar (ACD), then what is the relation between ar(ABD) and ar(ACD)?**



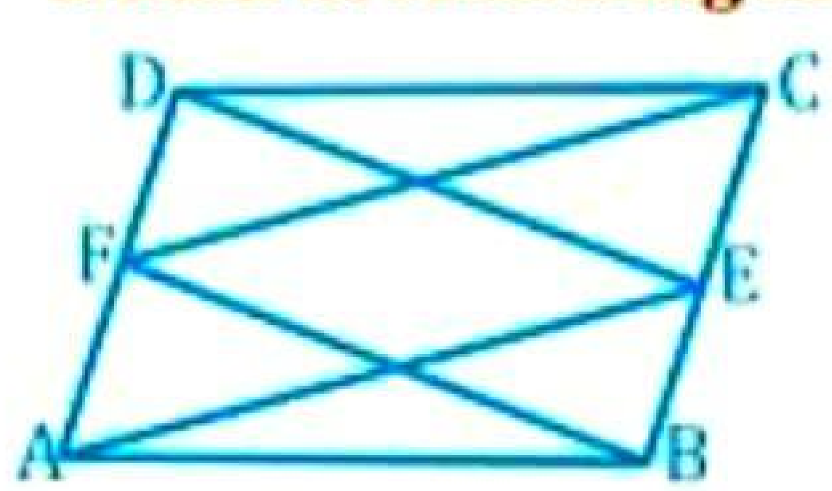
(a) ar(ABD) = 0.5ar(ACD)
(b) ar(ABC) = 4ar(ACD)
(c) ar(ABD) = 2ar(ACD)
(d) ar(ABD) = ar(ACD)

Q 3. **Find the ratio of the area of parallelogram ABCD to the area of parallelogram PQRS if A, B, C, and D, are mid-points of a parallelogram.**



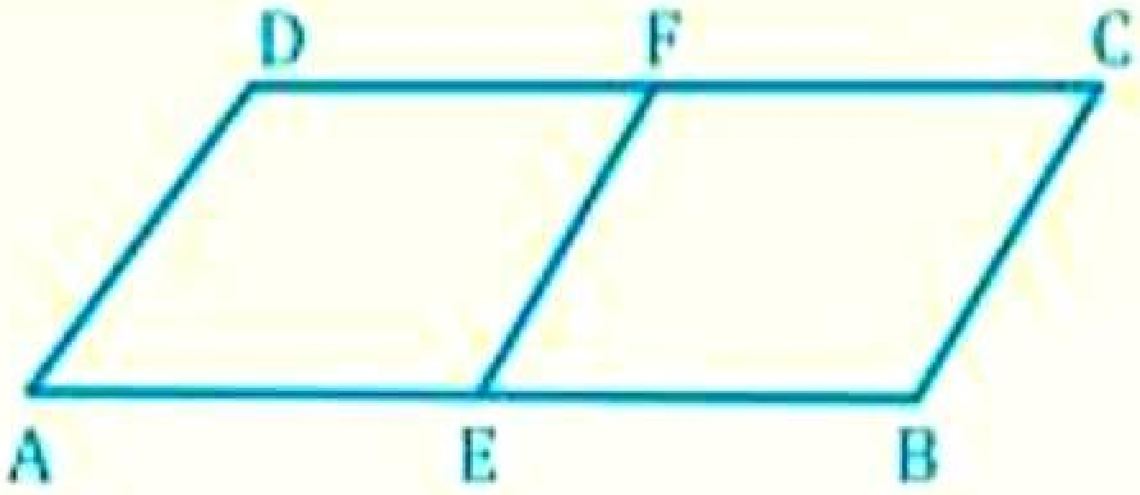
(a) $\frac{1}{2}$ (b) 1 (c) 2 (d) 3

Q 4. **Which of following relation is correct if ABCD is a parallelogram?**



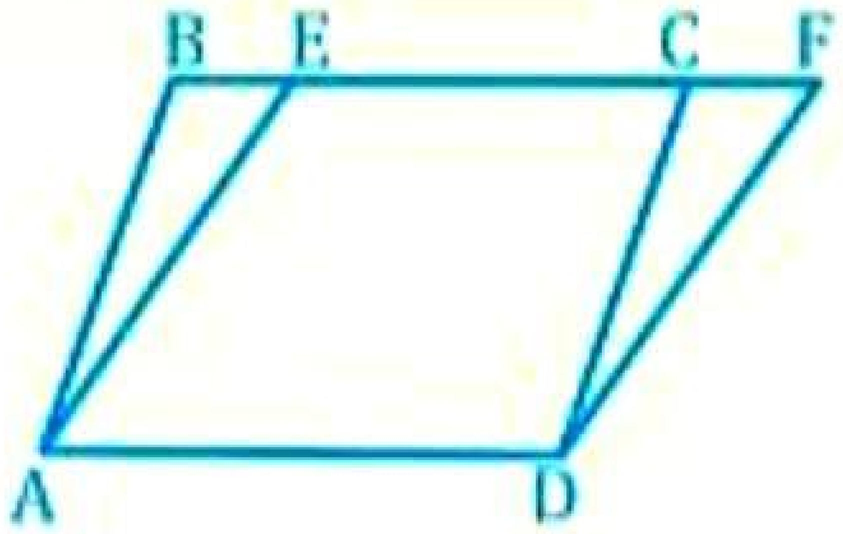
(a) a r(ADE) < a r(CDF)
(b) a r(ADE) > a r(CDF)
(c) a r(ADE) = a r(CDF)
(d) a r(ADE) = 1/2a r (CDF)

Q 5. **Find the ratio of the area of parallelogram AEFD to the area of parallelogram EBCF if E and F are mid-points of AB and CD respectively.**



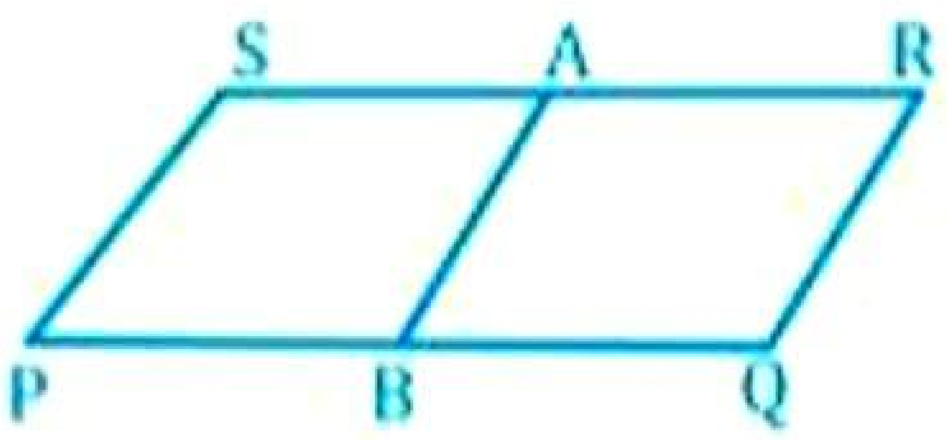
(a) 1 (b) 2 (c) 4 (d) 3

Q 6. From the diagram given below, if area of parallelogram ABCD is ar (ABCD) and area of parallelogram AEFD is ar (AEFD), then what is the relation between ar(ABCD) and ar(AEFD)?



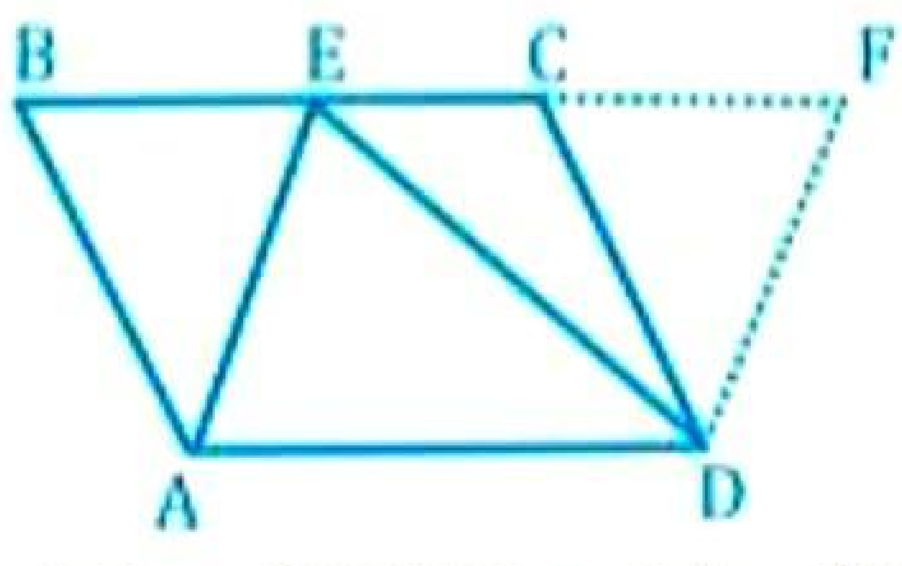
(a) ar(ABCD) = ar(AEFD)
(b) ar(ABCD) < ar(AEFD)
(c) ar(ABCD) > ar(AEFD)
(d) There is no relation between areas of the two parallelograms

Q 7. Find the area of parallelogram ABQR if area of parallelogram PQRS is 150 cm^2, A and B are mid-points of PQ and RS.



(a) 100 m^2 (b) 300 m^2 (c) 150 m^2 (d) 75 m^2

Q 8. From the diagram given below, if area of parallelogram ABCD is ar (ABCD) and area of triangle AED is ar (AED), then what is the relation between ar (ABCD) and ar (AED)?



(a) a r (ABCD) = 0.5a r(AED)
(b) a r (ABCD) = 4a r(AED)
(c) a r (ABCD) = 2a r(AED)
(d) a r (ABCD) = a r(AED)

ANSWER KEY

1. (c)	2. (d)	3. (a)	4. (c)	5. (a)	6. (a)	7. (d)	8. (c)