

CHAPTER TEST: AREAS OF PARALLELOGRAMS AND TRIANGLES (HOTS)

Mathematics | Class IX | (2026/AREA-HOTS/09/001)

Time: 1.5 Hours

Max. Marks: 40

General Instructions:

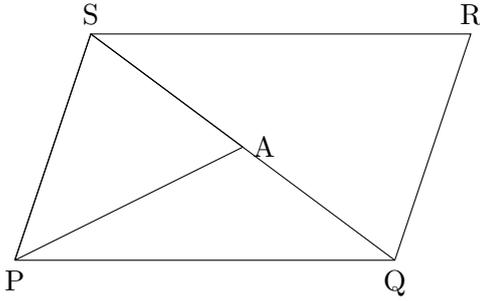
- All questions are compulsory.
 - Section A: 8 MCQs (1 mark each).
 - Section B: 4 Short Answer Questions (2 marks each).
 - Section C: 3 Short Answer Questions (3 marks each).
 - Section D: 3 Long Answer/HOTS questions (5 marks each).
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Section A: Multiple Choice Questions (1 Mark Each)

1. If a triangle and a parallelogram are on the same base and between the same parallels, then the ratio of the area of the triangle to the area of the parallelogram is:
(a) 1 : 1 (b) 1 : 2 (c) 2 : 1 (d) 1 : 4
 2. The median of a triangle divides it into two triangles of:
(a) Equal perimeter (b) Equal area (c) Congruent shape (d) All of these
 3. In $\triangle ABC$, D is the mid-point of BC . If $area(\triangle ABD) = 15 \text{ cm}^2$, then $area(\triangle ABC)$ is:
(a) 15 cm^2 (b) 45 cm^2 (c) 30 cm^2 (d) 7.5 cm^2
 4. Parallelograms on the same base and between the same parallels are:
(a) Equal in perimeter (b) Equal in area (c) Congruent (d) Similar
 5. A rectangle and a rhombus are on the same base and between the same parallels. If the area of the rectangle is 24 cm^2 , the area of the rhombus is:
(a) 12 cm^2 (b) 24 cm^2 (c) 48 cm^2 (d) Cannot be determined
 6. In a parallelogram $ABCD$, E is any point on side CD . If $area(\triangle ABE) = 20 \text{ cm}^2$, then $area(ABCD)$ is:
(a) 20 cm^2 (b) 40 cm^2 (c) 10 cm^2 (d) 80 cm^2
 7. Two triangles have equal areas and their bases lie on the same line. If their vertices opposite to the bases are P and Q , then PQ is:
(a) Parallel to the base line (b) Perpendicular to the base line (c) Equal to the base
(d) None of these
 8. If D, E, F are the mid-points of the sides BC, CA and AB of $\triangle ABC$, then $area(DEF)$ is:
(a) $\frac{1}{2}area(ABC)$ (b) $\frac{1}{3}area(ABC)$ (c) $\frac{1}{4}area(ABC)$ (d) $\frac{1}{8}area(ABC)$
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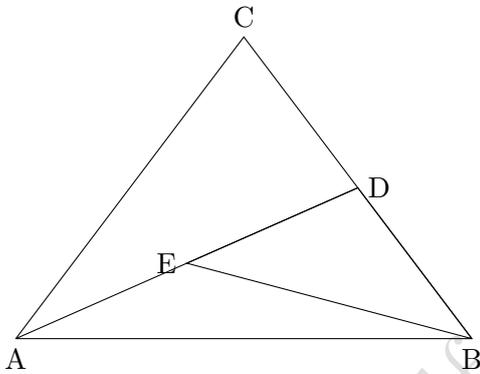
Section B: Short Answer Questions (2 Marks Each)

1. $PQRS$ is a parallelogram whose area is 40 cm^2 . A is any point on the diagonal QS .



Find the area of $\triangle PSA$.

2. Show that a diagonal of a parallelogram divides it into two triangles of equal area.
3. In $\triangle ABC$, E is the mid-point of median AD .

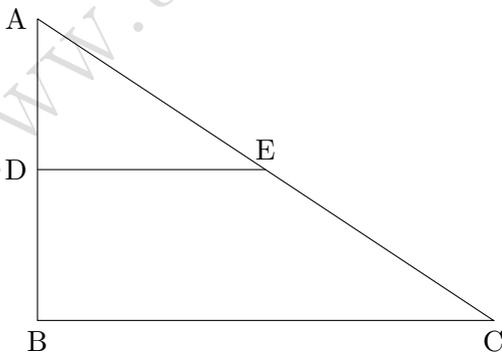


Show that $area(\triangle BED) = \frac{1}{4}area(\triangle ABC)$.

4. If the medians of a $\triangle ABC$ intersect at G , show that $area(\triangle AGB) = area(\triangle BGC) = area(\triangle CGA)$.

Section C: Short Answer Questions (3 Marks Each)

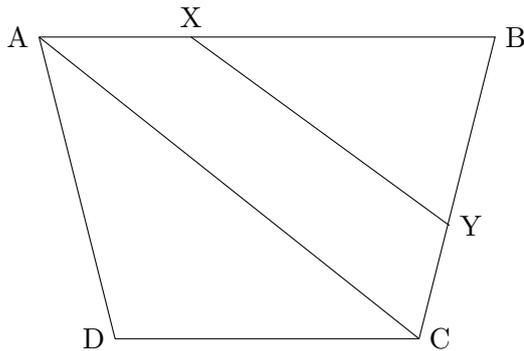
1. D and E are points on sides AB and AC respectively of $\triangle ABC$ such that $area(\triangle DBC) = area(\triangle EBC)$.



Prove that $DE \parallel BC$.

2. In a parallelogram $ABCD$, P and Q are any two points lying on the sides BC and CD respectively. Show that $area(\triangle APB) + area(\triangle AQD)$ is related to the area of the parallelogram. (Hint: Find the specific ratio).

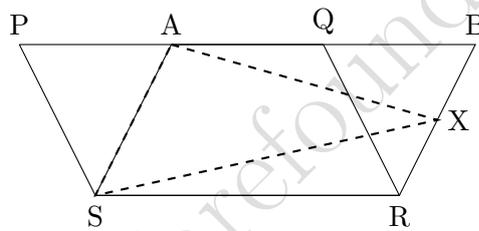
3. $ABCD$ is a trapezium with $AB \parallel DC$. A line parallel to AC intersects AB at X and BC at Y .



Prove that $area(\triangle ADX) = area(\triangle ACY)$.

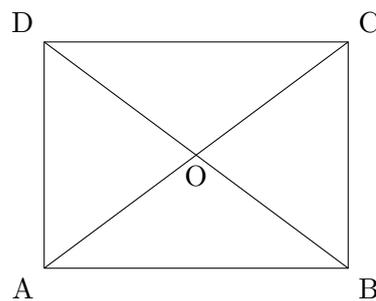
Section D: Long Answer / HOTS Questions (5 Marks Each)

1. In the figure, $PQRS$ and $ABRS$ are parallelograms and X is any point on side BR .



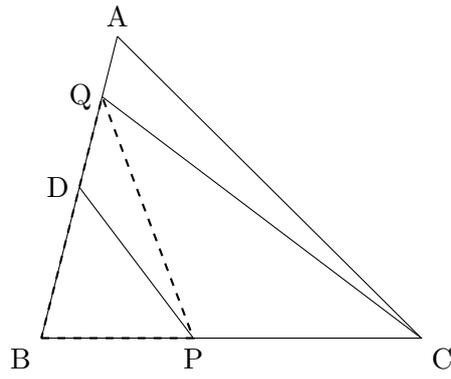
Show that:

- (i) $area(PQRS) = area(ABRS)$
 - (ii) $area(\triangle AXS) = \frac{1}{2}area(PQRS)$
2. Diagonals AC and BD of a quadrilateral $ABCD$ intersect at O such that $OB = OD$.



If $AB = CD$, then show that:

- (i) $area(\triangle DOC) = area(\triangle AOB)$
 - (ii) $area(\triangle DCB) = area(\triangle ACB)$
 - (iii) $ABCD$ is a parallelogram.
3. In $\triangle ABC$, D is the mid-point of AB and P is any point on BC . If $CQ \parallel PD$ meets AB in Q ,



then prove that $area(\triangle BPQ) = \frac{1}{2}area(\triangle ABC)$.

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