

9. Areas of Parallelograms and Triangles

Q 1 State true or false : A diagonal of a parallelogram divides it into two parts of equal areas.

Mark (1)

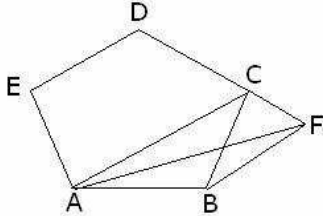
Q 2 State true or false: Parallelograms on the same base and between the same parallels are equal in area.

Mark (1)

Q 3 State true or false: A parallelogram and triangle on same base and between same parallel lines are equal in area.

Mark (1)

Q 4 ABCDE is a pentagon. A line through B parallel to AC meets DC produced at F. Show $\text{ar}(\triangle ACB) = \text{ar}(\triangle ACF)$.



Marks (2)

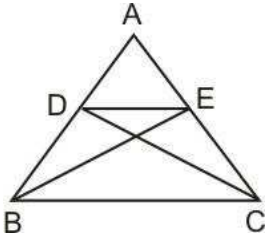
Q 5 BD is one of the diagonal of a quadrilateral ABCD. AM and CN are the perpendiculars from A and C, respectively, on BD. Show

$$\text{ar}(\text{quad. ABCD}) = \frac{1}{2}BD.(AM + CN)$$

that

Marks (2)

Q 6 In fig. D and E are points on sides AB and AC respectively of $\triangle ABC$ such that $\text{ar}(\triangle BCE) = \text{ar}(\triangle BCD)$. Show that $DE \parallel BC$.

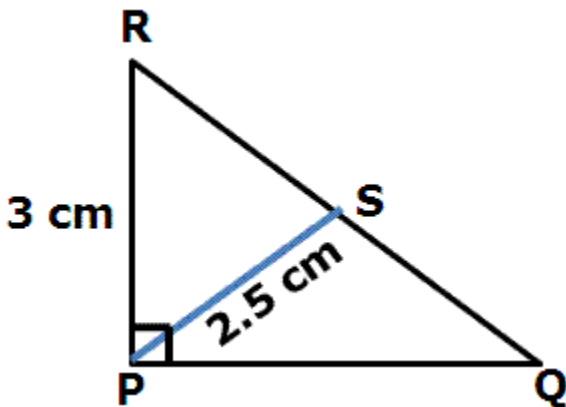


Marks (2)

Q 7 Prove that of all the parallelograms of which the sides are given, the parallelogram which is rectangle has the greatest area.

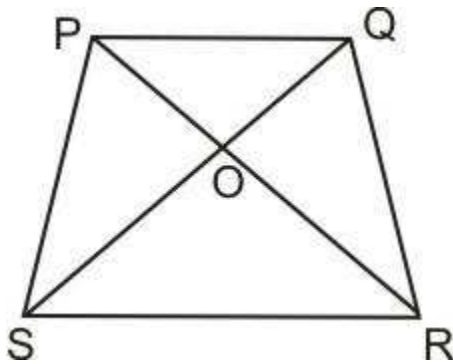
Marks (2)

Q 8 In figure, $\angle RPQ = 90^\circ$, S is the mid-point of QR and $SP = 2.5$ cm. Compute the area of the triangle PQR.



Marks (2)

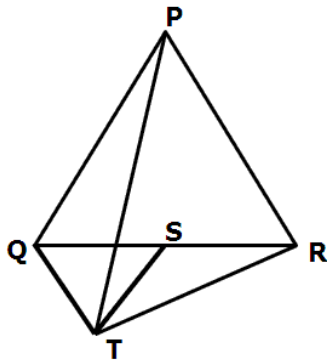
Q 9 In the following figure, PQRS is a trapezium in which $PQ \parallel SR$. Prove that $\text{ar}(\triangle QOR) = \text{ar}(\triangle POS)$.



Marks (2)

Q 10 In the given figure, PQR and QST are two quadrilateral triangles such that S is the mid-point of QR.

Prove that $\text{ar}(\triangle QST) = \frac{1}{2} \text{ar}(\triangle PQT)$



Marks (2)

Q 11 The angles of a quadrilateral are in the ratio 1:2:3:4. Find all the angles of the quadrilateral.

Marks (2)

Q 12 The angles of a quadrilateral are in the ratio 2:4:5:7. Find the angles.

Marks (2)

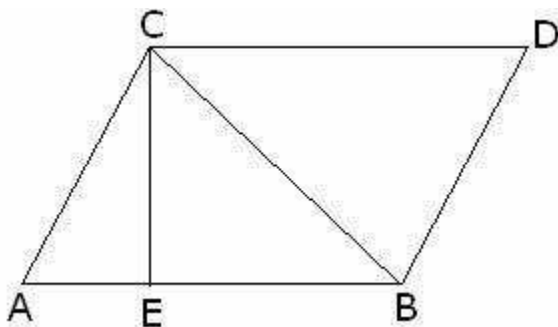
Q 13 Prove that, the bisector of any two consecutive angles of parallelogram intersect at right angle.

Marks (2)

Q 14 Two opposite angles of a parallelogram are $(3x-2)^\circ$ and $(50-x)^\circ$. Find the measure of each angle of the parallelogram.

Marks (2)

Q 15 Prove that the area of triangle is half the product of any of its sides and the corresponding altitude.



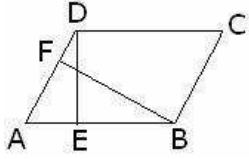
Marks (3)

$$\frac{1}{2}h \times (a + b)$$

Q 16 prove that the area of a trapezium is equal to $\frac{1}{2}h \times (a + b)$, where h is the perpendicular distance between parallel sides and a, b are the measurement of parallel sides.

Marks (3)

Q 17 If in fig ABCD is a parallelogram, $DE \perp AB$ and $BF \perp AD$. If $AB = 16\text{cm}$, $DE = 8\text{ cm}$ and $BF = 10\text{ cm}$, find AD.



Marks (3)

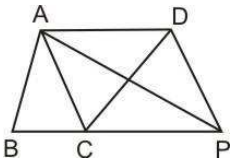
Q 18 ABCD is a trapezium in which $AB = 5\text{ cm}$, $AD = BC = 4\text{ cm}$ and distance between parallel sides AB and DC is 3 cm. Find DC and area of trapezium ABCD.

Marks (3)

Q 19 O is any point on diagonal BD of the parallelogram ABCD. Prove that $\text{ar}(\triangle OAB) = \text{ar}(\triangle OBC)$.

Marks (3)

Q 20 ABCD is a Quadrilateral. A line through D, parallel to AC, meets BC produced in P as shown in figure. Prove that $\text{ar}(\triangle ABP) = \text{ar}(\text{Quad ABCD})$.



Marks (3)

Q 21 XY is a line parallel to side BC of $\triangle ABC$. $BE \parallel AC$ and $CF \parallel AB$ meet XY (produced on both sides) in E and F respectively. Show that $\text{ar}(\triangle ABE) = \text{ar}(\triangle ACF)$.

Marks (3)

Q 22 P is the point in the interior of a parallelogram ABCD. Show that

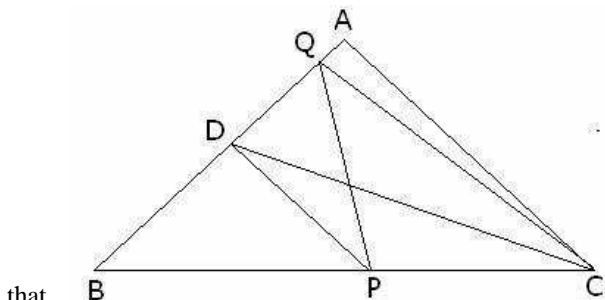
$$\text{ar}(\triangle APB) + \text{ar}(\triangle PCD) = \frac{1}{2} \text{ar}(\text{parallelogram ABCD})$$

Marks (4)

Q 23 A quadrilateral ABCD is such that diagonal BD divides its area in two equal parts. Prove that BD bisect AC.

Marks (4)

Q 24 In a triangle ABC, D is the mid-point of AB. P is any point of BC. $CQ \parallel PD$ meets AB in Q. Show



that. $\text{ar}(\triangle BPQ) = \frac{1}{2} \text{ar}(\triangle ABC)$

Marks (4)

Q 25 Prove that parallelogram on the same base and between the same parallels are equal in area.

Marks (4)

Q 26 The diagonal of a parallelogram ABCD intersect at a point O. Through O, a line is drawn to intersect AD at P and BC at Q. Show that PQ divides the parallelogram into two parts of equal area.

Marks (4)

Q 27 A point O inside a rectangle ABCD is joined to the vertices. Prove that $\text{ar}(\triangle AOB) + \text{ar}(\triangle COD) = (1/2)\text{ar}(\text{rect} ABCD)$.

Marks (4)

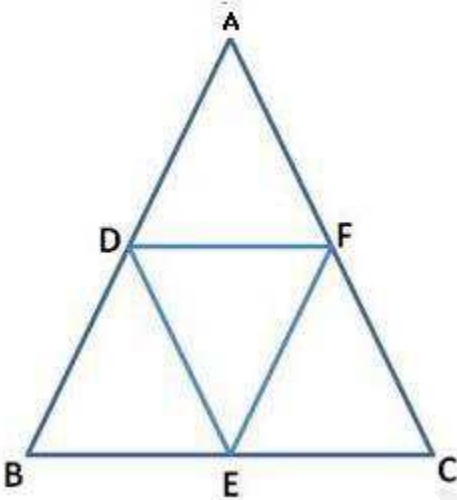
Q 28 In $\triangle ABC$, D is the mid-point of BC, E is the mid-point of BD. If 'O' is the mid-point of AE, prove that $\text{ar}(\triangle BOE) = (1/8)\text{ar}(\triangle ABC)$.

Marks (4)

Q 29 The side AB of a parallelogram ABCD is produced to any point P. A line through A parallel to CP meets CB produced in Q and the parallelogram PBQR is completed. Show that $\text{ar}(\text{rect} ABCD) = \text{ar}(\text{rect} BPRQ)$.

Marks (4)

Q 30 D, E, F are the mid-points of the sides AB, BC and CA respectively of $\triangle ABC$. Prove that DBEF is a parallelogram whose area is half the area of $\triangle ABC$.



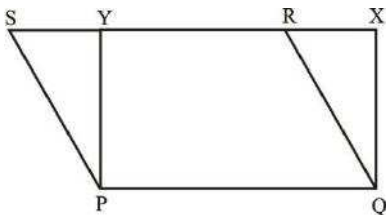
Marks (4)

Most Important Questions

Q 1 Prove that parallelograms on equal bases and between the same parallels are equal in area.

Q 2 Prove that parallelograms on the same base and having equal areas lie between the same parallels.

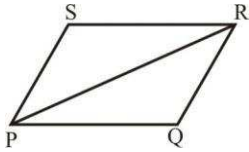
Q 3 The area of parallelogram PQRS is 152 cm^2 . Find the area of rectangle PQXY. If the base PQ = 19 cm, find the height of the parallelogram.



Q 4 Prove that the area of triangle is half as the area of parallelogram if a parallelogram and a triangle lie on the same base and between the same parallels.

Q 5 Prove that the area of a triangle is half the product of its base and corresponding height.

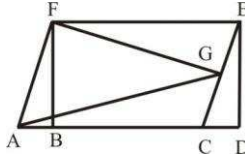
Q 6 Find the area of $\triangle PQR$ given that the area of the parallelogram PQRS is 25 cm^2 .



Q 7 Show that the area of rhombus is half the product of its diagonals.

Q 8 Show that the area of trapezium is half the product of sum of parallel sides and perpendicular distance between parallel sides.

Q 9 Prove that $\text{area}(\triangle AFG) = \frac{1}{2} \times \text{area}(BDEF)$.



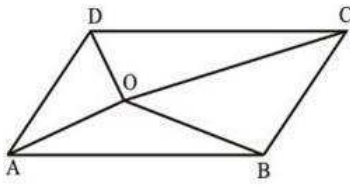
Q 10 Prove that two triangles having same base and equal areas lie between the same parallels.

Q 11 Prove that a median of a triangle divides it into two triangles of equal area.

Q 12 In the given figure, ABCD is a parallelogram and O is any point inside ABCD.

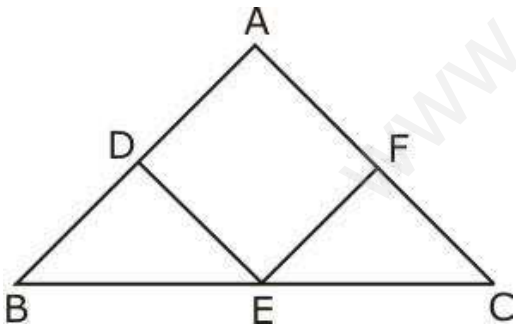
Prove that

$\text{area}(\triangle AOB) + \text{area}(\triangle OCD) = \frac{1}{2} \text{area}(ABCD)$.



Q 13 $\triangle ABC$ is a triangle in which D is the mid-point of BC and E is the mid-point of AD. prove that $\text{area}(\triangle BED) = \frac{1}{4} (\text{area of triangle ABC})$.

Q 14 If D, E and F are the mid points of sides AB, BC and AC respectively then show that

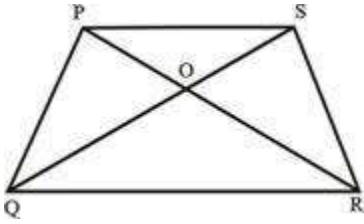


(i) $\text{area}(\triangle ADE) = \text{area}(\triangle AFE)$

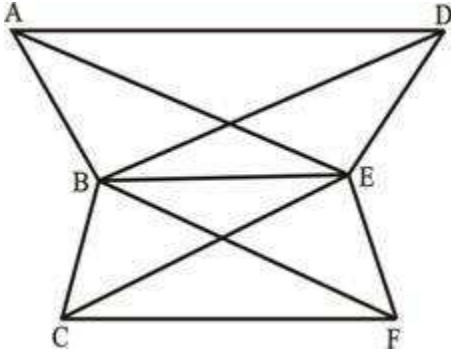
(ii) $\text{area}(\triangle BDE) = \text{area}(\triangle CEF)$

(iii) $\text{area}(\triangle DEF) = \frac{1}{4} \text{area}(\triangle ABC)$

Q 15 In a trapezium PQRS prove that $\text{area}(\triangle POR) = \text{area}(\triangle SOR)$



Q 16 In the given figure, if $BE \parallel CF$ and $\text{area}(ABCE) = \text{area}(BDEF)$ then prove that $AD \parallel BE$.



Q 17 If one diagonal of a quadrilateral bisect the other then prove that the first diagonal divides the quadrilateral into two triangles of equal area.

Q 18 In the given figure E is the mid point of BC and D is the mid point of AE. PEDB and QEDC are parallelograms then show that

$$\text{area}(\triangle PBE) + \text{area}(\triangle QCE) = \frac{1}{2} \text{area}(\triangle ABC).$$

