# Downloaded from www.studiestoday.com 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 $\operatorname{ar}\left(\Delta_{\mathrm{ACB}}\right)=\operatorname{ar}\left(\Delta_{\mathrm{ACF}}\right)$.


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 that

## $\operatorname{ar}($ quad. $\cdot A B C D)=\frac{1}{2} B D \cdot(A M+C N)$

Marks (2)
Q 6 In fig. D and E are points on sides AB and AC respectively of $\triangle_{\mathrm{ABC}}$ such that $\operatorname{ar}\left(\Delta_{\mathrm{BCE})}\right) \operatorname{ar}\left(\Delta_{\mathrm{BCD}}\right)$. Show that $\mathrm{DE} \|$ 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, $\angle \mathrm{RPQ}=90^{\circ}, \mathrm{S}$ is the mid-point of QR and $\mathrm{SP}=2.5 \mathrm{~cm}$. Compute the area of the triangle PQR .


Marks (2)

Q 9 In the following figure, PQRS is a trapezium in which $\mathrm{PQ} \|$ SR. Prove that $\operatorname{ar}\left(\Delta_{\mathrm{QOR}}\right)=\operatorname{ar}\left(\Delta_{\mathrm{POS}}\right)$.


Marks (2)
Q 10 In the given figure, PQR and QST are two quadrilateral triangles such that S is the mid-point of QR .

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



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 $(3 x-2)^{0}$ and $(50-x)^{0}$. 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.


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

Marks (3)
Q 17 If in fig $A B C D$ is a parallelogram, $D E \perp A B$ and $B F \perp A D$. If $A B=16 \mathrm{~cm}, \mathrm{DE}=8 \mathrm{~cm}$ and $\mathrm{BF}=10 \mathrm{~cm}$, find AD .


Marks (3)

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

Marks (3)
Q 19 O is any point on diagonal BD of the parallelogram ABCD . Prove that $\operatorname{ar}\left(\Delta_{\mathrm{OAB}}\right)=\operatorname{ar}\left(\Delta_{\mathrm{OBC}}\right)$.
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 $\operatorname{ar}\left(\mathrm{D}_{\mathrm{ABP}}\right)$ $=\operatorname{ar}($ Quad ABCD$)$.


Marks (3)
Q 21 XY is a line parallel to side BC of $\triangle_{\mathrm{ABC}}$. $\mathrm{BE} \| \mathrm{AC}$ and $\mathrm{CF} \| \mathrm{AB}$ meet XY (produced on both sides) in E and F respectively. Show that $\operatorname{ar}\left(\Delta_{A B E}\right)=\operatorname{ar}\left(\Delta_{A C F}\right)$.

Marks (3)
Q 22 P is the point in the interior of a parallelogram ABCD . Show that

## $\operatorname{ar}(\triangle A P B)+\operatorname{ar}(\triangle P C D)=\frac{1}{2} \operatorname{ar}\left(| |^{\mathrm{gm}} \mathrm{ABCD}\right)$

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 $A B C, D$ is the mid-point of $A B . P$ is any point of $B C . C Q \| P D$ meets $A B$ in $Q$. Show
that.


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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 $\operatorname{ar}\left(\mathrm{D}_{\mathrm{AOB}}\right)+\operatorname{ar}\left(\Delta_{\mathrm{COD}}\right)=(1 / 2) \operatorname{ar}\left(\|^{\mathrm{gm}} \mathrm{ABCD}\right)$.
Marks (4)
Q 28 In $\triangle_{\text {ABC, D }}$ is the mid-point of BC, E is the mid-point of BD. If ' O ' is the mid-point of AE, prove that ar $\left(\triangle_{\mathrm{BOE})}=(1 / 8) \mathrm{ar}\right.$ $\left(\Delta_{\mathrm{ABC}}\right)$.

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 $\operatorname{ar}\left(\|^{\mathrm{gm}} \mathrm{ABCD}\right)=\operatorname{ar}\left(\|^{\mathrm{gm}} \mathrm{BPRQ}\right)$.

## Marks (4)

Q 30 D, E, F are the mid-points of the sides $A B, B C$ and CA respectively of $\triangle$ ABC. Prove that DBEF is a parallelogram whose area is half the area of $\mathrm{ABC}_{\mathrm{ABC}}$.


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 $P Q R S$ is $152 \mathrm{~cm}^{2}$. Find the area of rectangle $P Q X Y$. If the base $P Q=19 \mathrm{~cm}$, 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.

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Q 6 Find the area of $\triangle_{\mathrm{PQR}}$ given that the area of the parallelogram PQRS is $25 \mathrm{~cm}^{2}$.


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 area $\left(\Delta_{\text {AFG }}\right)=\frac{\frac{1}{2}}{2} \times$ 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, $A B C D$ is a parallelogram and $O$ is any point inside $A B C D$.
Prove that



Q $13 \triangle_{\text {ABC }}$ is a triangle in which D is the mid-point of BC and E is the mid-point of AD . prove that triangle $\mathrm{BED}=1 / 4$ (area of triangle ABC ).
Q 14 If $\mathrm{D}, \mathrm{E}$ and F are the mid points of sides $\mathrm{AB}, \mathrm{BC}$ and AC respectively then show that

(i) $\quad \operatorname{area}\left(\Delta_{\mathrm{ADE}}\right)=\Delta_{\text {area }}(\mathrm{AFE})$
(ii) $\operatorname{area}\left(\Delta_{\mathrm{BDE}}\right)=\operatorname{area}\left(\Delta_{\mathrm{CEF}}\right)$
(iii) area $(\mathrm{ADEF})=\frac{\frac{1}{2}}{2}$ area $\left(\Delta_{\mathrm{ABC}}\right)$

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Q 15 In a trapezium PQRS prove that area $\left(\Delta_{\mathrm{POR})}\right)=\operatorname{area}\left(\Delta_{\mathrm{SOR}}\right)$


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


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 $\operatorname{area}\left(\Delta_{\mathrm{PBE})+\operatorname{area}( } \Delta_{\mathrm{QCE})}=\frac{\frac{1}{2}}{\text { area }( } \Delta_{\mathrm{ABC})}\right.$.


