



# MATHS

## BOOKS - ICSE

### RECTILINEAR FIGURES

#### Questions

1. The sum of the interior angles of a polygon is five times the sum of its exterior angles. Find the number of sides in the polygon.



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2. One angle of an eight-sided polygon is  $100^\circ$  and the other angles are equal. Find the measure of each equal angle.



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3. In a pentagon ABCDE, AB is parallel to ED and angle  $B = 140^\circ$ . Find the angles C and D, if  $\angle C : \angle D = 5 : 6$



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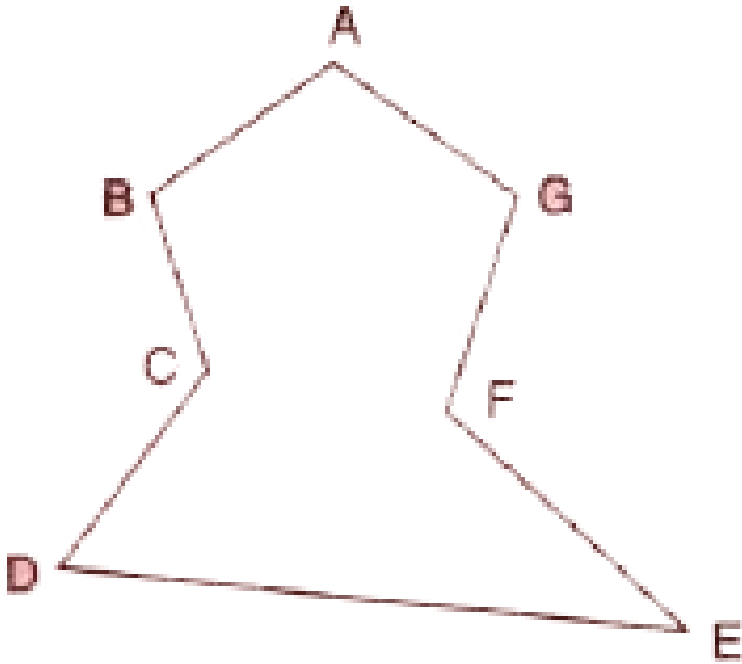
4. In the pentagon  $ABCDE$ , angle  $A = 110^\circ$ , angle  $B = 140^\circ$  and angle  $D = \text{angle } E$ . The sides  $AB$  and  $DC$ , when produced, meet at right angle. Calculate angles  $BCD$  and  $E$ .



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5. By dividing into triangles, find the sum of the angles of the doubly re-entrant heptagon  $ABCDEFG$  as shown alongside. Does the

general value of  $(2n - 4)$  right-angles hold for re-entrant polygon?



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6. Each interior angle of a regular polygon is  $160^\circ$ . Find the interior angle of another regular polygon whose number of sides is two-thirds the number of sides of the given polygon.



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7. If the difference between an exterior angle of a regular polygon of 'n' sides and an exterior angle of another regular polygon of

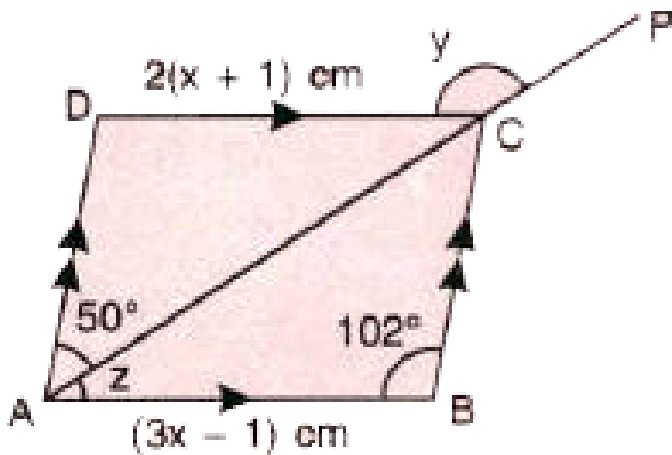
' $(n + 1)$ ' sides is equal to  $5^\circ$ , find the value of 'n'.



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8. In the given figure, ABCD is a parallelogram.

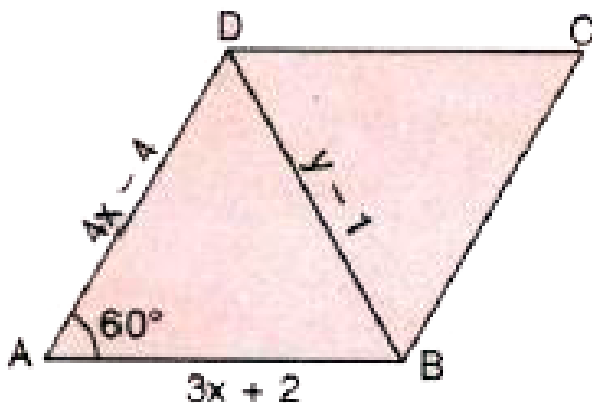
Find the values of  $x$ ,  $y$  and  $z$



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9. The given figure shows a rhombus ABCD.

Find  $x$  and  $y$



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10. ABCD is a parallelogram and AP and CQ are perpendiculars from vertices A and C on

diagonal  $BD$  . Show that(i)  $\triangle APB \cong \triangle CQD$

(ii)  $AP = CQ$



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**11.**  $ABCD$  is a parallelogram and  $AP$  and  $CQ$  are perpendiculars from vertices  $A$  and  $C$  on diagonal  $BD$  . Show that(i)  $\triangle APB \cong \triangle CQD$

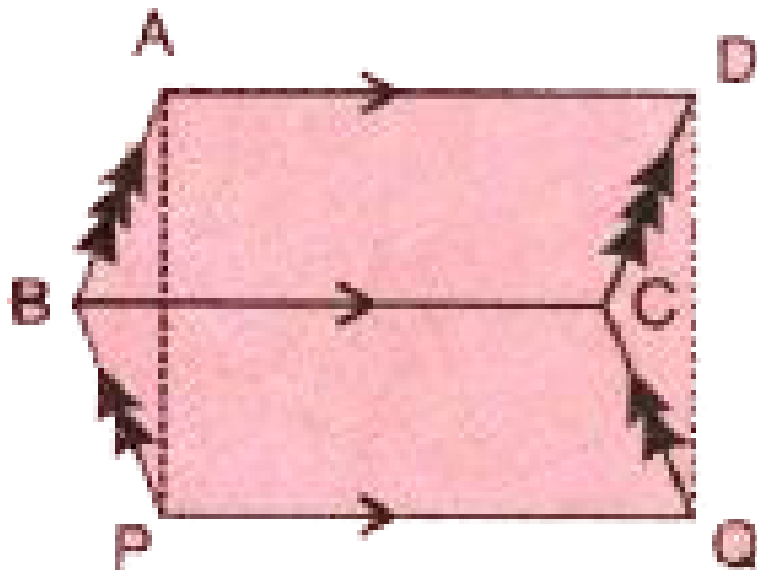
(ii)  $AP = CQ$



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12. In the adjoining figure, ABCD and PBCQ are parallelogram. Prove that:

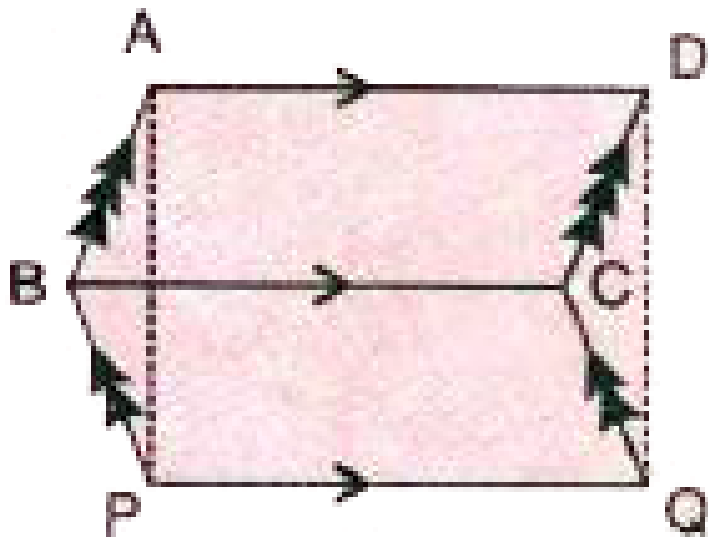


APQD is a parallelogram



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13. In the adjoining figure, ABCD and PBCQ are parallelogram. Prove that:

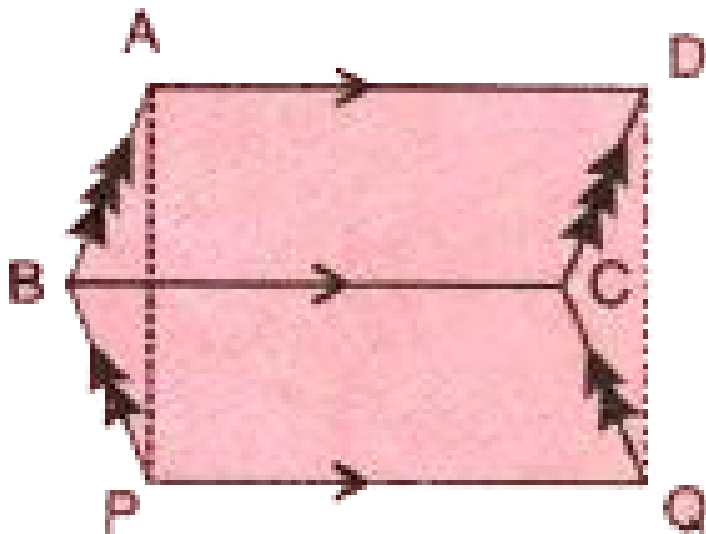


$$AP = DQ$$



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14. In the adjoining figure, ABCD and PBCQ are parallelogram. Prove that:



$$\triangle ABP \cong \triangle DCQ$$

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**15.** A transversal cuts two parallel lines PQ and RS at points A and B respectively. The two interior angles at A are bisected and so are the two interior angles at B, the four bisectors form a quadrilateral ACBD. Prove that:

ACBD is a rectangle



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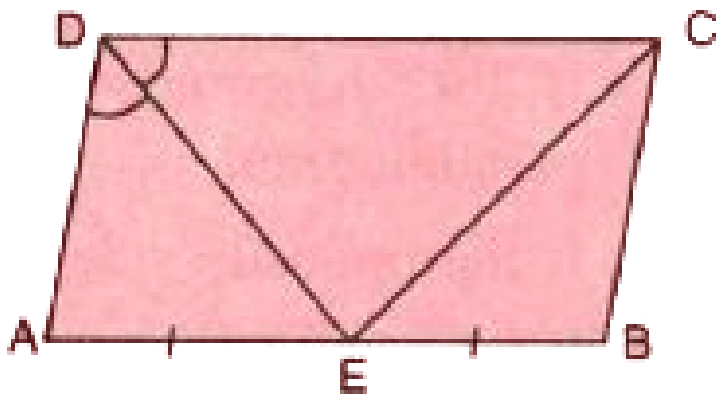
**16.**  $ABCD$  is a rhombus,  $EABF$  is a straight line such that  $EA = AB = BF$ . Prove that

$ED$  and  $FC$  when produced meet at right angles.



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17. ABCD is a parallelogram E is mid-point of AB and DE bisects angle D. Prove that



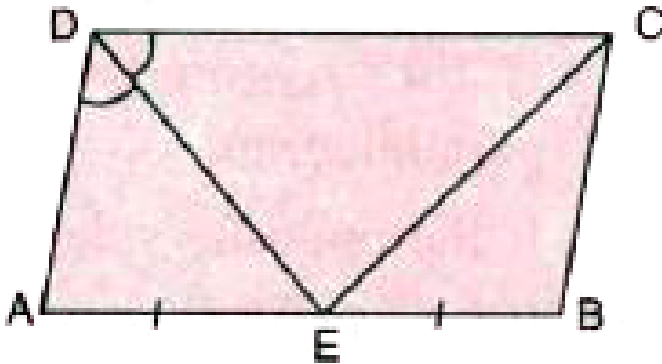
$BC = BE$





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18. ABCD is a parallelogram E is mid-point of AB and DE bisects angle D. Prove that CE bisects angle C

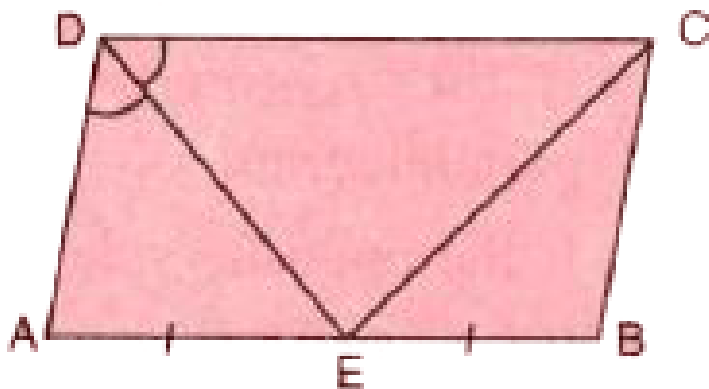


CE bisects angle C



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19. ABCD is a parallelogram E is mid-point of AB and DE bisects angle D. Prove that



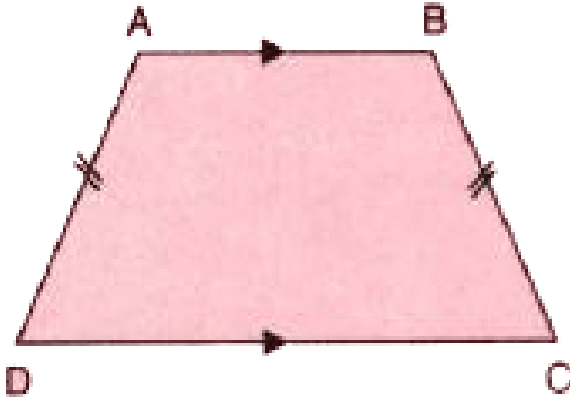
$$\angle DEC = 90^\circ$$



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20. The figure, given alongside, shows a trapezium ABCD in which  $AB \parallel DC$  and  $AD = BC$ .

Prove that:



$$\angle A = \angle B$$

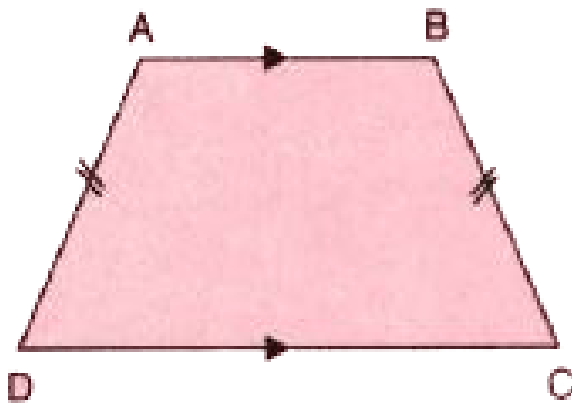


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21. The figure, given alongside, shows a trapezium ABCD in which  $AB \parallel DC$  and  $AD = BC$ .

Prove that:





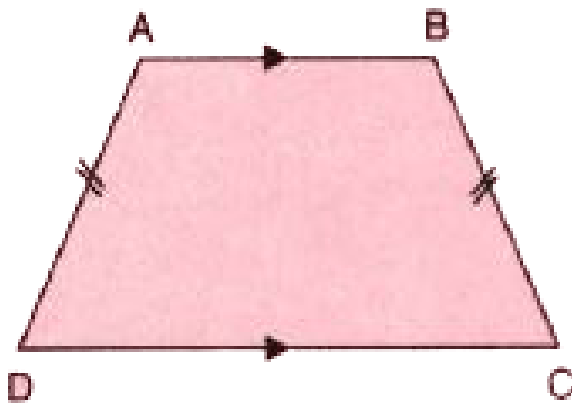
$$\angle C = \angle D$$



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22. The figure, given alongside, shows a trapezium ABCD in which  $AB \parallel DC$  and  $AD = BC$ .

Prove that:



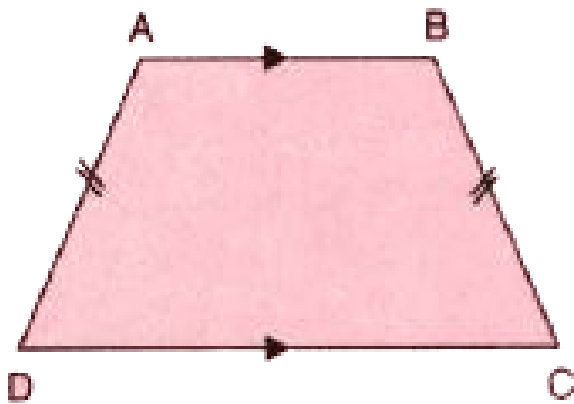
$$\triangle ABC \cong \triangle BAD$$



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**23.** The figure, given alongside, shows a trapezium ABCD in which  $AB \parallel DC$  and  $AD = BC$ .

Prove that:



Diagonal  $AC =$  diagonal  $BD$



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## Exercise 14 A

1. The sum of the interior angles of a polygon is four times the sum of its exterior angles.

Find the number of sides in the polygon.



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2. The angles of a pentagon are in the ratio 4: 8: 6: 4: 5. Find each angle of the pentagon.



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3. One angle of a six-sided polygon is  $140^\circ$  and the other angles are equal. Find the measure of each equal angle.



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4. In a polygon, there are 5 right angles and the remaining angles are equal to  $195^\circ$  each. Find the number of sides in the polygon.



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5. Three angles of a seven sided polygon are  $132^\circ$  each and the remaining four angles are equal . Find the value of each equal angle.



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6. Two angles of an eight sided polygon are  $142^\circ$  and  $176^\circ$ . If the remaining angles are equal to each other, find the magnitude of each of the equal angles.



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7. In a pentagon ABCDE, AB is parallel to DC and  $\angle A : \angle E : \angle D = 3 : 4 : 5$ . Find angle E.



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8. AB, BC and CD are the three consecutive sides of a regular polygon. If  $\angle BAC = 15^\circ$ , find,  
each exterior angle of the polygon



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9. AB, BC and CD are the three consecutive sides of a regular polygon. If  $\angle BAC = 15^\circ$ ,

find,

each exterior angle of the polygon



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**10.** AB, BC and CD are the three consecutive sides of a regular polygon. If  $\angle BAC = 15^\circ$ ,

find,

number of sides of the polygon



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**11.** The ratio between an exterior angle and an interior angle of a regular polygon is  $2 : 3$ . Find the number of sides in the polygon.



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**12.** The difference between an exterior angle of  $(n - 1)$  sided regular polygon and an exterior angle of  $(n + 2)$  sided regular polygon is  $6^\circ$ . Find the value of  $n$



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**13.** Two alternate sides of a regular polygon, when produced, meet at right angle. Find: the value of each exterior angle of the polygon.



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**14.** Two alternate sides of a regular polygon, when produced, meet at right angle. Calculate the number of sides in the polygon.



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## Exercise 14 B True False

1. The diagonals of a rectangle bisect each other



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2. State 'True' or 'False'

The diagonals of a quadrilateral bisect each other



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**3.** The diagonals of a parallelogram bisect each other.



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**4.** Each diagonal of a rhombus bisects it.



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5. The quadrilateral, whose four sides are equal, is a square



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6. Which of the following statements are true and which are false ?

Every rhombus is a parallelogram.



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7. State True or False

Every parallelogram is a rhombus



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8. Diagonals of a rhombus are equal.



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9. State True or False

If two adjacent sides of a parallelogram are

equal, it is a rhombus



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### 10. State True or False

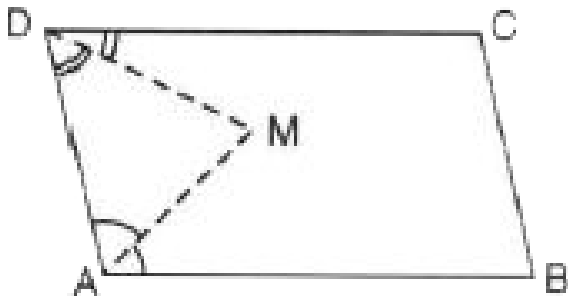
If the diagonals of a quadrilateral bisect each other at right angle, the quadrilateral is a square.



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1. In the figure, given below, AM bisects angle A and DM bisects angle D of parallelogram ABCD.

Prove that:  $\angle AMD = 90^\circ$

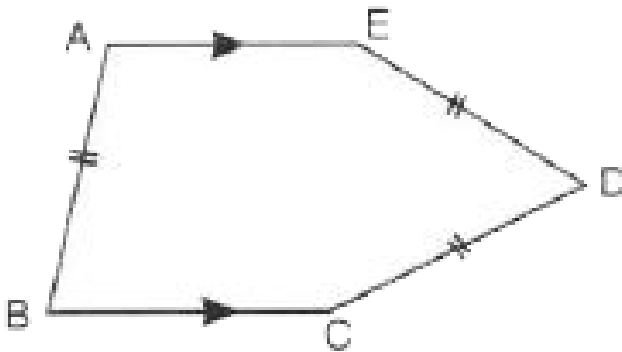


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2. In the following figure, AE and BC are equal and parallel and the three sides AB, CD and DE are equal to one another. If angle A is  $102^\circ$ .

Find angles AEC and BCD



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3. In a square ABCD, diagonals meet at O. P is a point on BC, such that OB= BP. Show that:

$$\angle POC = \left(22\frac{1}{2}\right)^\circ$$



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4. In a square ABCD, diagonals meet at O. P is a point on BC, such that OB= BP. Show that:

$$\angle BDC = 2\angle POC$$



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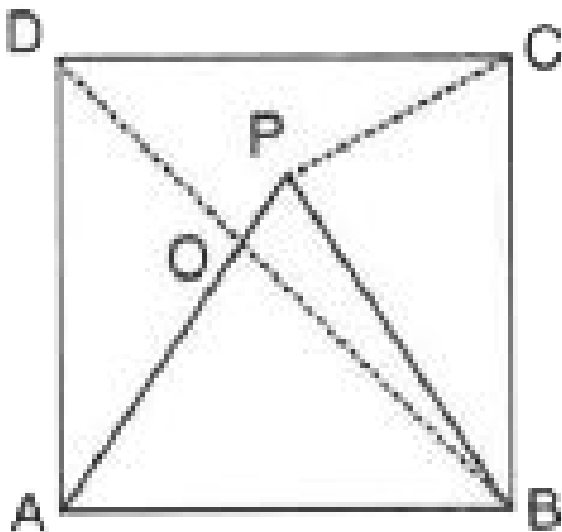
5. In a square ABCD, diagonals meet at O. P is a point on BC, such that  $OB = BP$ . Show that:

$$\angle BOP = 3\angle COP$$



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6. The given figure shows a square ABCD and an equilateral triangle ABP. Calculate:

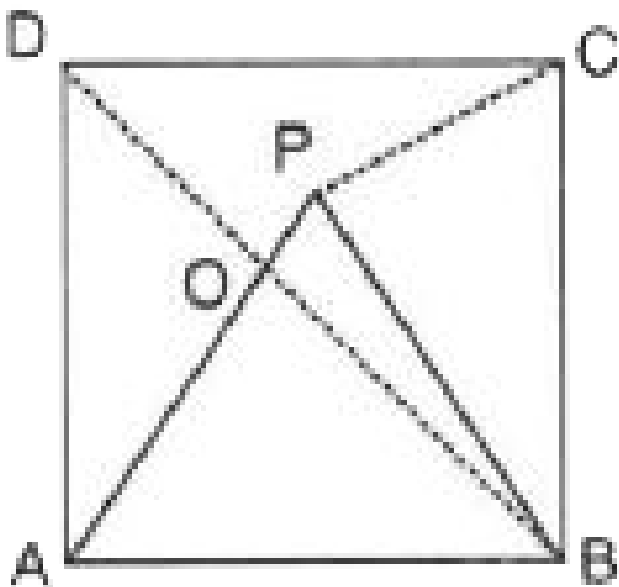


$\angle AOB$



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7. The given figure shows a square ABCD and an equilateral triangle ABP. Calculate:

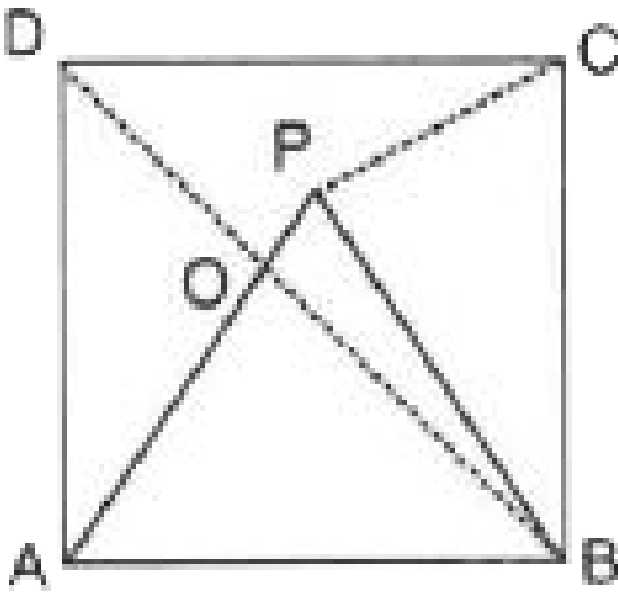


$\angle BPC$



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8. The given figure shows a square ABCD and an equilateral triangle ABP. Calculate:

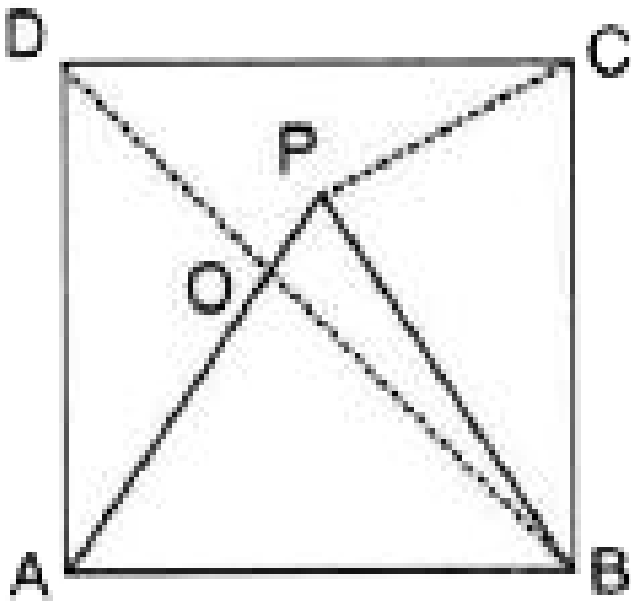


$\angle PCD$



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9. The given figure shows a square ABCD and an equilateral triangle ABP. Calculate:

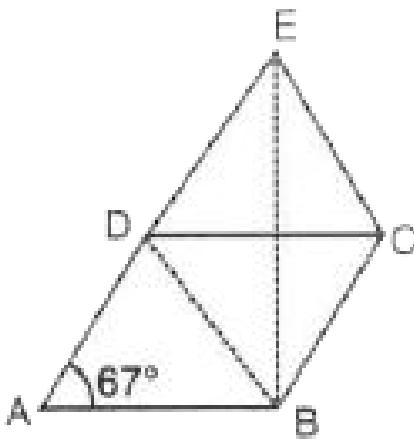


reflex  $\angle APC$



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**10.** In the given figure, ABCD is a rhombus with angle  $A = 67^\circ$



If DEC is an equilateral triangle, calculate:

$\angle CBE$

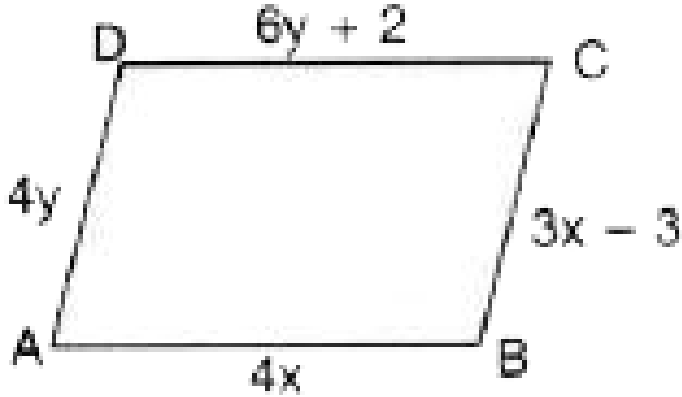


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**11.** In the given figure, ABCD is a rhombus with angle  $A = 67^\circ$





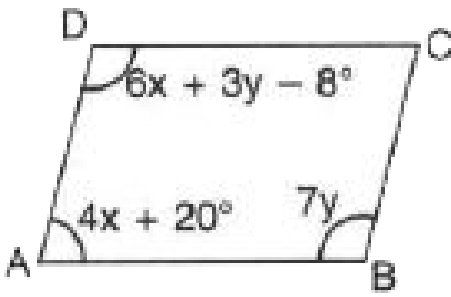


In each case, given above, find the values of  $x$  and  $y$



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**13.** In each of the following figures, ABCD is a parallelogram



In each case, given above, find the values of  $x$  and  $y$



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**14.** The angles of a quadrilateral are in the ratio 3 : 4 : 5 : 6. Show that the quadrilateral is a trapezium.



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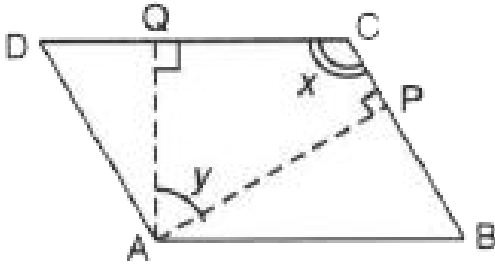
**15.** In a parallelogram ABCD,  $AB = 20$  cm and  $AD = 12$  cm. The bisector of angle A meets DC at E and BC produced at F. Find the length of CF.



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**16.** In parallelogram ABCD, AP and AQ are perpendiculars from vertex of obtuse angle A as shown. If  $\angle x : \angle y = 2 : 1$ , find the angles of

the parallelogram.



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## Exercise 14 C

1.  $E$  is the mid-point of side  $AB$  and  $F$  is the mid-point of side  $DC$  of parallelogram  $ABCD$ . Prove

that AEFD is a parallelogram.



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2. The diagonal BD of a parallelogram ABCD bisects angles B and D. Prove that ABCD is a rhombus.



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3. The alongside figure shows a parallelogram ABCD in which  $AE = EF = FC$ .



Prove that:

DE is parallel to FB



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4. The alongside figure shows a parallelogram ABCD in which  $AE = EF = FC$ .



Prove that:

DE = FB



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5. The alongside figure shows a parallelogram ABCD in which  $AE = EF = FC$ .



Prove that:

DEBF is a parallelogram



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6. In the alongside figure, ABCD is a parallelogram in which AP bisects angle A and BQ bisects angle B. Prove that:





ABPQ is a parallelogram



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7. In the alongside figure, ABCD is a parallelogram in which AP bisects angle A and BQ bisects angle B. Prove that:



ABPQ is a parallelogram



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8. In the alongside figure, ABCD is a parallelogram in which AP bisects angle A and BQ bisects angel B. Prove that:



ABPQ is a parallelogram



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9. In the given figure, ABCD is a parallelogram.

Prove that:  $AB = 2BC$



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**10.** Prove that the bisectors of opposite angles of a parallelogram are parallel.



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**11.** The bisectors of the angle of a parallelogram enclose a parallelogram (b) rhombus rectangle (d) square



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**12.** Prove that the bisectors of the interior angles of a rectangle form a square.



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**13.** In parallelogram ABCD, the bisector of angle A meets DC at P and  $AB = 2AD$ . Prove that:  
BP bisects angle B



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**14.** In parallelogram ABCD, the bisector of angle A meets DC at P and  $AB = 2AD$ . Prove that:

Angle  $APB = 90^\circ$



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**15.** Points M and N are taken on the diagonal AC of a parallelogram ABCD such that  $AM = CN$ . Prove that BMDN is a parallelogram.



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**16.** In the following figure, ABCD is a parallelogram. Prove that:

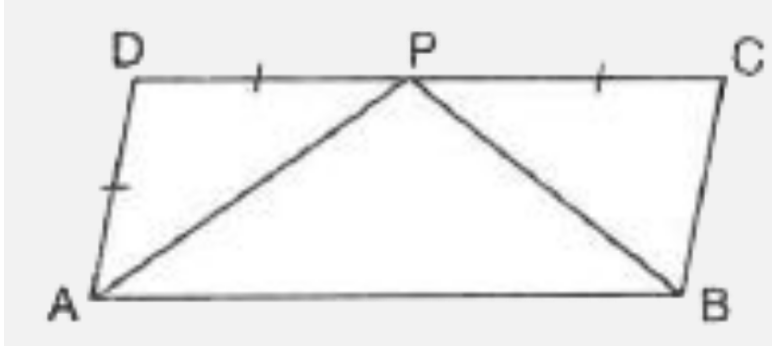


AP bisects angle A



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**17.** In the following figure, ABCD is a parallelogram. Prove that:

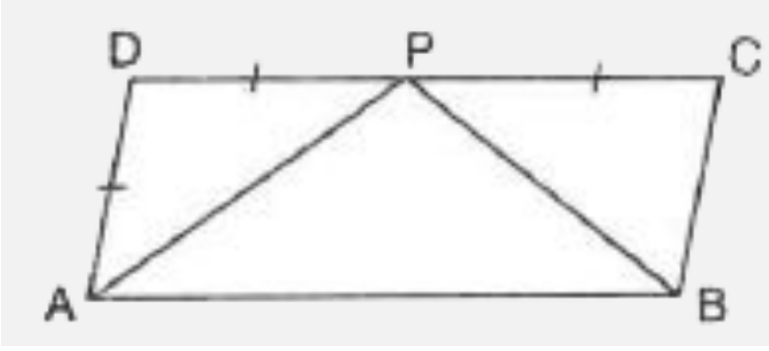


BP bisects angle B



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**18.** In the following figure, ABCD is a parallelogram. Prove that:



$$\angle DAP + \angle CBP = \angle APB$$

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**19.** ABCD is a square. A is joined to a point P on BC and D is joined to a point Q on AB. If  $AP = DQ$ , prove that AP and DQ are perpendicular to each other.

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**20.** In a quadrilateral ABCD,  $AB = AD$  and  $CB = CD$ .

Prove that:

AC bisects angle BAD



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**21.** In a quadrilateral ABCD,  $AB = AD$  and  $CB = CD$ .

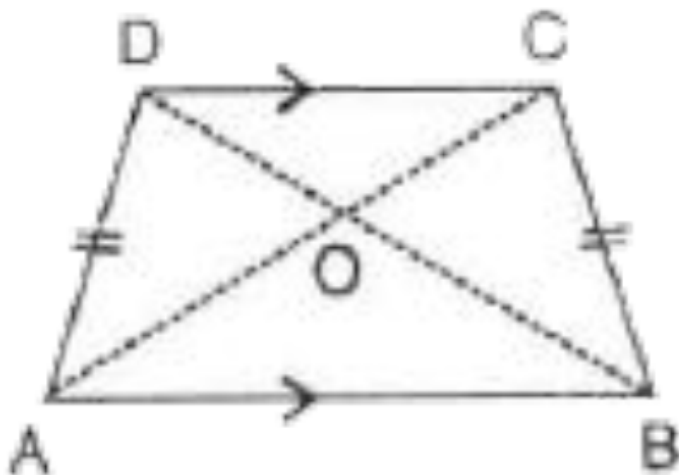
Prove that:

AC is perpendicular bisector of BD



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22. The following figure shows a trapezium ABCD in which AB is parallel to DC and AD= BC



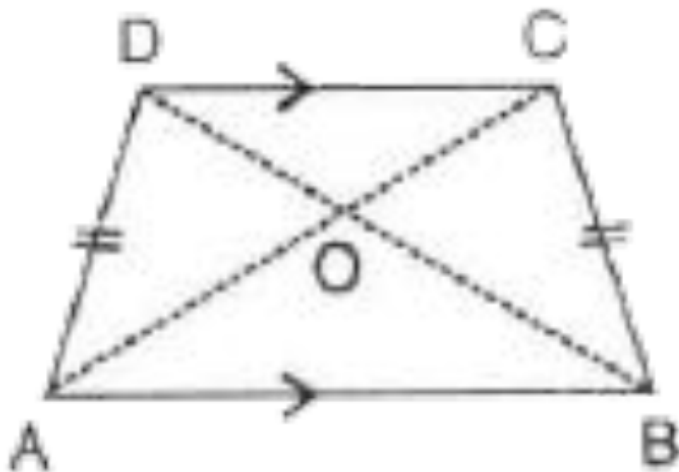
Prove that:

$$\angle DAB = \angle CBA$$



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23. The following figure shows a trapezium ABCD in which AB is parallel to DC and  $AD = BC$



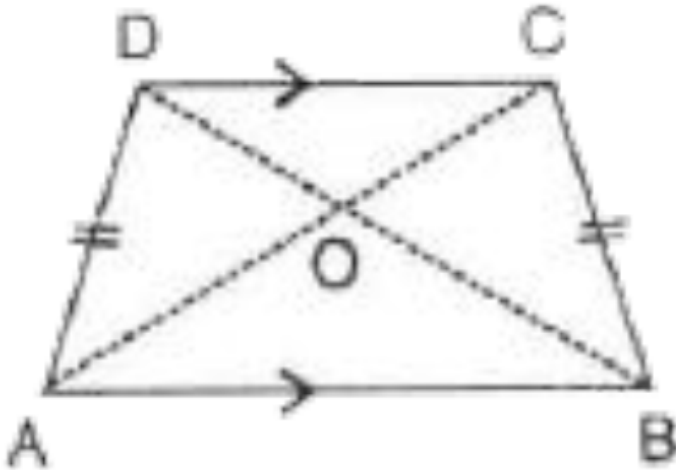
Prove that:

$$\angle ADC = \angle BCD$$



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24. The following figure shows a trapezium ABCD in which AB is parallel to DC and  $AD = BC$



Prove that:

$OA = OB$  and  $OC = OD$



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**25.** In a parallelogram, prove that the bisectors of any two consecutive angles intersect at right angle.



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**26.** Prove that the bisectors of opposite angles of a parallelogram are parallel.



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27. The diagonals of a rectangle intersect each other at right angles. Prove that the rectangle is a square.



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28. In the following figure, ABCD and PQRS are two parallelogram such that  $\angle D = 120^\circ$  and  $\angle Q = 70^\circ$ . Find the value of x.





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## Polygons 3 Marks Questions

1. The sum of interior angles of a regular polygon is twice the sum of its exterior angles.  
Find the number of sides of the polygon.



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2. The interior angles of a pentagon are in the ratio 4:5:6:7:5. Find each angle of the

pentagon.



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3. In a polygon, there are 5 right angles and the remaining angles are equal to  $195^\circ$  each.

Find the number of sides in the polygon.



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4. Two angles of an eight sided polygon are  $142^\circ$  and  $176^\circ$ . If the remaining angles are



equal to each other, find the magnitude of each of the equal angles.



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5. Each interior angle of a regular polygon is  $135^\circ$ . Find :

(i) the measure of each exterior angle

(ii) number of sides of the polygon

(iii) name of polygon



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## Polygons 4 Marks Questions

1. In a pentagon ABCDE, AB is parallel to DC and  $\angle A : \angle E : \angle D = 3 : 4 : 5$ . Find angle E.



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2. AB, BC and DC are the three consecutive sides of a regular polygon. If  $\angle BAC = 15^\circ$ , find :

(i) each interior angle of the polygon.

(ii) each exterior angle of the polygon.

(iii) number of sides of the polygon.



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**3.** The ratio between an exterior angle and an interior angle of a regular polygon is  $2 : 3$ . Find the number of sides in the polygon.



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4. The difference between an exterior angle of  $(n - 1)$  sided regular polygon and an exterior angle of  $(n + 2)$  sided regular polygon is  $6^\circ$ .

Find the value of  $n$



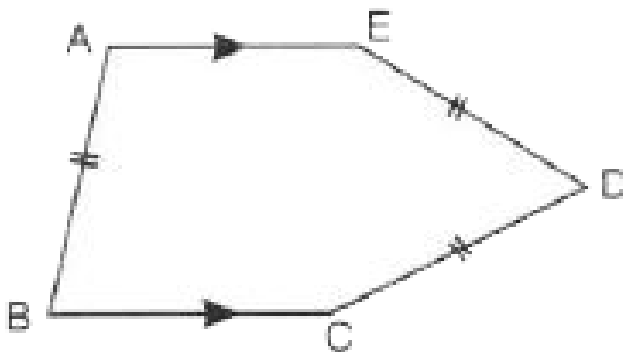
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## Quadrilaterals And Its Properties 3 Marks Questions

1. In the following figure,  $AE$  and  $BC$  are equal and parallel and the three sides  $AB$ ,  $CD$  and  $DE$

are equal to one another. If angle A is  $102^\circ$ .

Find angles AEC and BCD



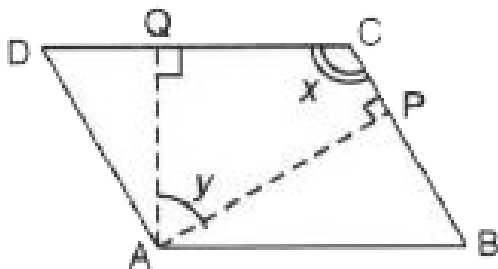
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2. The angles of a quadrilateral are in the ratio 3:4:5:6. Show that the quadrilateral is a trapezium.



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3. In parallelogram ABCD, AP and AQ are perpendiculars from vertex of obtuse angle A as shown. If  $\angle x : \angle y = 2 : 1$ , find the angles of the parallelogram.

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4. The diagonal  $BD$  of a parallelogram  $ABCD$  bisects angles  $B$  and  $D$ . Prove that  $ABCD$  is a rhombus.



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5. Points  $M$  and  $N$  are taken on the diagonal  $AC$  of a parallelogram  $ABCD$  such that  $AM = CN$ . Prove that  $BMDN$  is a parallelogram.



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6. The diagonals of a rectangle intersect each other at right angles. Prove that the rectangle is a square.



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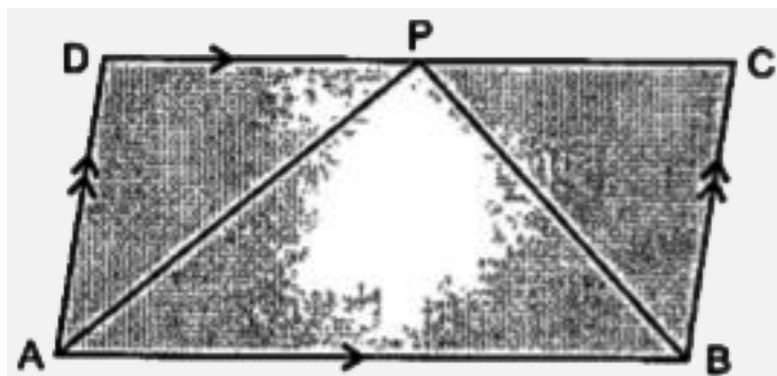
7. The opposite angles of a parallelogram are equal.



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8. ABCD is a parallelogram in which  $\angle DAB = 80^\circ$ . Bisector of  $\angle A$  and  $\angle B$  meets CD at P. Prove that :



(i)  $AD = DP$

(ii)  $CP = CB$

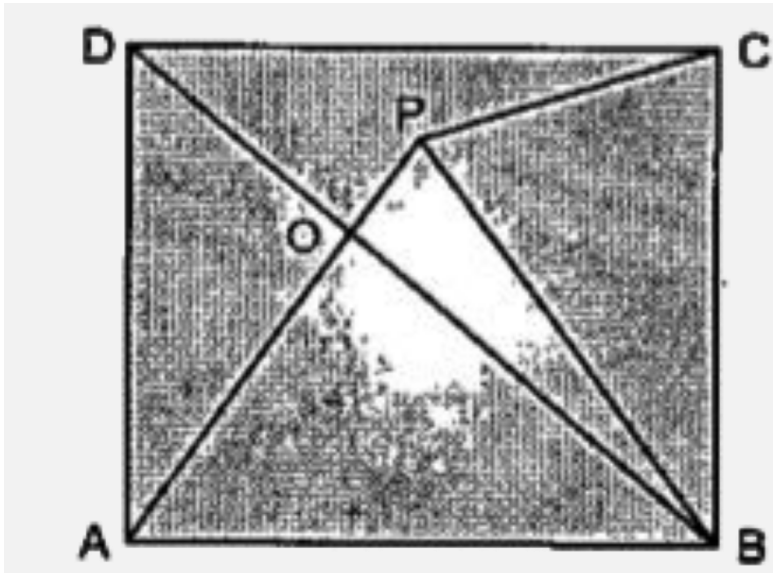
(iii)  $DC = 2AD$



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# Quadrilaterals And Its Properties 4 Marks Questions

1. The given figure shows a square ABCD and an equilateral triangle ABP.



Calculate :

(i)  $\angle AOB$

(ii)  $\angle BPC$

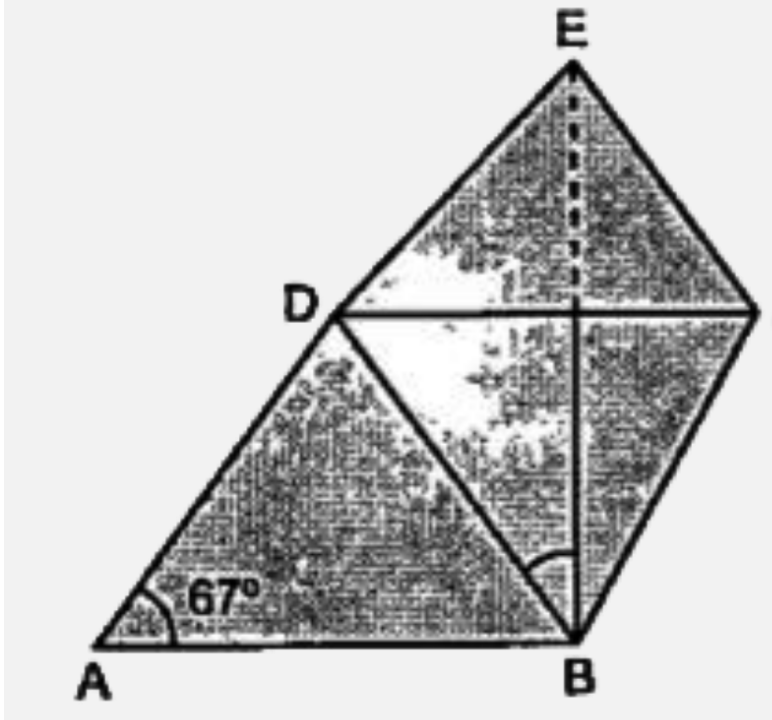
(iii)  $\angle PCD$

(iv) reflex  $\angle APC$



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2. In the given figure, ABCD is a rhombus with angle A =  $67^\circ$ .



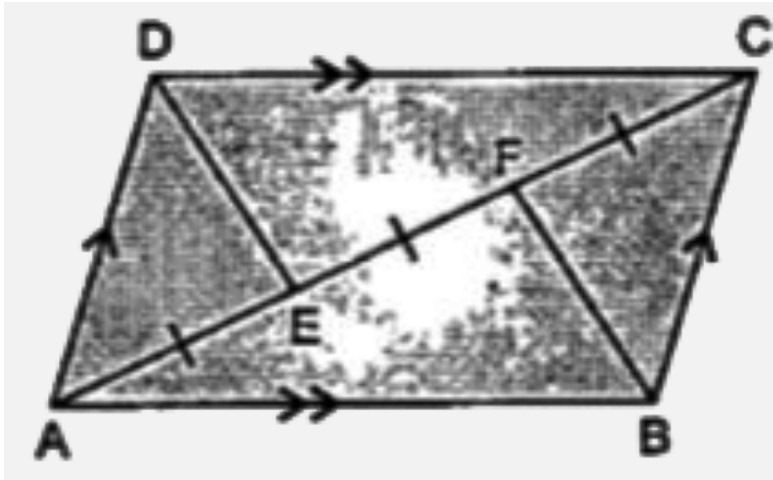
If DEC is an equilateral triangle. Calculate :

- (i)  $\angle CBE$     (ii)  $\angle DBE$



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3. The along side figure shows a parallelogram ABCD in which  $AE = EF = FC$ .



Prove that :

- (i) DE is parallel to FB
- (ii)  $DE = FB$
- (iii) DEBF is a parallelogram



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4. The bisectors of the angle of a parallelogram enclose a parallelogram (b) rhombus rectangle (d) square



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5. In parallelogram ABCD, the bisector of angle A meets DC at P and  $AB = 2AD$ .

Prove that :

(i) BP bisects angle B.

(ii) Angle APB =  $90^\circ$



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6. In a quadrilateral ABCD,  $AB = AD$  and  $CB = CD$ .

Prove that :

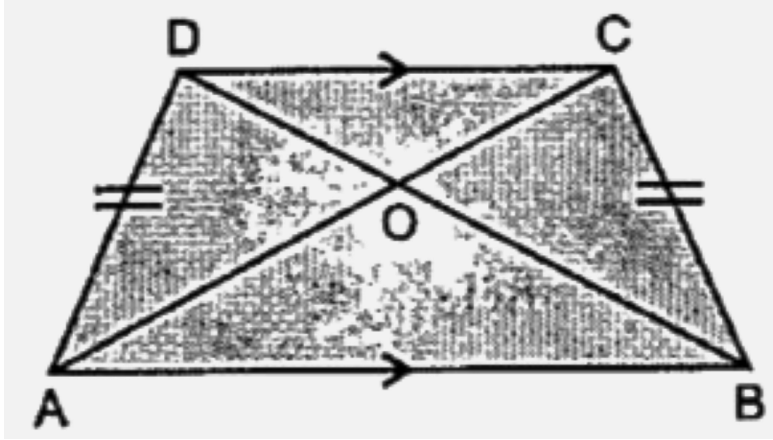
(i) AC bisects angle BAD

(ii) AC is perpendicular bisector of BD.



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7. The following figure shows a trapezium ABCD in which AB is parallel to DC and  $AD = BC$ .



Prove that :

(i)  $\angle DAB = \angle CBA$

(ii)  $\angle ADC = \angle BCD$

(iii)  $AC = BD$

(iv)  $OA = OB$  and  $OC = OD$



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