Quadrilaterals

OLYMPIAD EXCELLENCE BOOK **MATHEMATICS**

QUESTIONS

1. **Q is a point in the interior of a rectangle ABCD. If $QA = 4$ cm, $QB = 3$ cm and $QC = 5$ cm, then the length of QD (in cm) is**

(a) $4\sqrt{2}$ (b) $5\sqrt{2}$ (c) $\sqrt{34}$ (d) $\sqrt{41}$

2. **The length of the two adjacent sides of a rectangle inscribed in a circle are 3 cm and 4 cm respectively. Then the radius of the circle will be**

(a) 6 cm (b) 2.5 cm (c) 8 cm (d) 8.5 cm

3. **PQRA is a rectangle, $AP = 24$ cm. $PQ = 8$ cm. ΔABC is a triangle whose vertices lie on the sides of PQRA such that BQ = 2 cm and $QC = 18$ cm. Then the length of the line joining the mid points of the sides AB and BC is**

(a) $4\sqrt{2}$ cm. (b) 5 cm (c) 6 cm. (d) 10 cm.

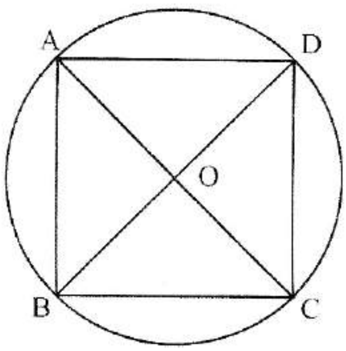
4. **The length of the diagonal BD of the parallelogram ΔBCD is 12 cm. If P and Q are the centroid of the ΔABC and ΔADC respectively then the length of the line segment PQ is**

(a) 4 cm (b) 4 cm (c) 9 cm (d) 12 cm

5. **ABCD is a cyclic trapezium whose sides AD and BC are parallel to each other. If $\angle ABC = 75^\circ$, then the measure of the $\angle BCD$ is**

(a) 162° (b) 18° (c) 108° (d) 75°

6. **ABCD is a cyclic quadrilateral and O is the centre of the circle. If $\angle COD = 120^\circ$ and $\angle BAC = 60^\circ$, then the value of $\angle BCD$ is equal to**



(a) 70° (b) 90° (c) 60° (d) 80°

7. **ABCD is a cyclic quadrilateral and AD is a diameter. If $\angle DAC = 65^\circ$ then value of $\angle ABC$ is**

(a) 55° (b) 35° (c) 155° (d) 125°

8. **ABCD is a cyclic quadrilateral. AB and DC when produced meet at P, if $PA = 12$ cm., PB = 8 cm, PC = 6 cm, then the length (in cm) of PD is**

(a) 8 cm (b) 6 cm (c) 10 cm (d) 16 cm

9. **In a cyclic quadrilateral ABCD, $\angle BCD = 130^\circ$ and passes through the centre of the circle. Then $\angle \mathbf{ABD} = ?$**

(a) 30° (b) 40° (c) 50° (d) 60°

10. **PQRS is a rhombus. A straight line through R cuts PS produced at X and PQ produced at Y. If $SX = \frac{1}{2}PQ$, then the ratio of the length of QY and PQ is**

(a) 2 : 1 (b) 1 : 2 (c) $1:1$ (d) 3 : 1

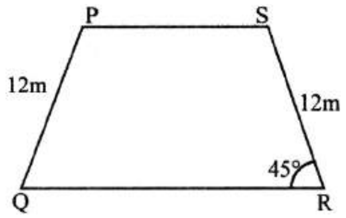
11. **In a quadrilateral ABCD, the bisectors of $\angle \mathbf{A}$ and $\angle B$ meet at O. If $\angle C = 80^\circ$ and $\angle \mathbf{D} = \mathbf{120}^\circ$, then measure of $\angle \mathbf{AOB}$ is**

(a) 40° (b) 60° (c) 80° (d) 100°

12. **If PQRS be a rhombus, PR is** its **smallest diagonal and $\angle \mathbf{PQR} = \mathbf{60}^\circ$, find length of a side of the rhombus when $\mathbf{PR} = \mathbf{6}$ cm.**

(a) 6 cm (b) 3 cm (c) $6\sqrt{2}$ cm (d) $3\sqrt{3}$ cm

13. **PQRS is a trapezium in which $\mathbf{PS} \parallel \mathbf{QR}$ and $PQ = SR = 12$ m. then the distance of PS from QR is:**



(a) $10\sqrt{2}$ m (b) $4\sqrt{2}$ m (c) $5\sqrt{2}$ m (d) $6\sqrt{2}$ m

14. **In a trapezium ABCD If $\mathbf{AB} \parallel \mathbf{CD}$, thee $\mathbf{AC}^2 + \mathbf{BD}^2$ is equal to:**

(a) $BC^2 + AD^2 + 2AB.CD$

(b) $AB^2 + CD^2 + 2AD.BC$

(c) $AB^2 + CD^2 + 2AB.CD$

(d) $BC^2 + AD^2 + 2BC.AD$

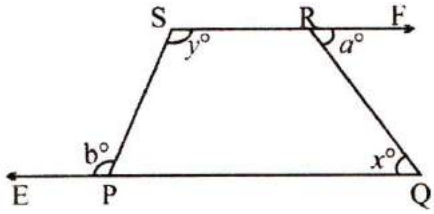
15. **The parallel sides of a trapezium are *x and y* respectively. The line joining the points of its non-parallel sides will be:**

(a) $\sqrt{xy}$ (b) $\frac{2xy}{x+y}$ (c) $\frac{(x+y)}{2}$ (b) $\frac{1}{4}(x-y)$

16. **ABCD is a trapezium in which $\mathbf{AB} \parallel \mathbf{CD}$ and $AB = 3CD$ Its diagonals intersect other at O then the ratio of the areas of the triangles AOB and COD is:**

(a) 1 : 2 (b) 2 : 1 (c) 9 : 1 (d) 1 : 4

17. **The sides BA and DC of quadrilateral ABCD are produced as shown la figure. *Them* which of the following statements is correct?**



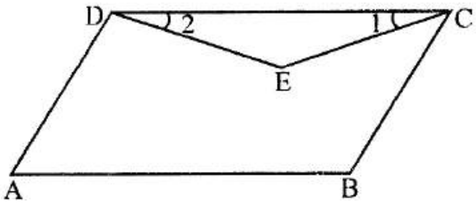
(a) $2x^\circ + y^\circ = a^\circ + b^\circ$

(b) $x^\circ + \frac{1}{2}y^\circ = \frac{a^\circ + b^\circ}{2}$

(c) $x^\circ + y^\circ = a^\circ + b^\circ$

(d) $x^\circ + a^\circ = y^\circ + b^\circ$

18. **In the quadrilateral ABCD, the line segments bisecting $\angle$C and $\angle D$ at E. Then the correct statement is:**



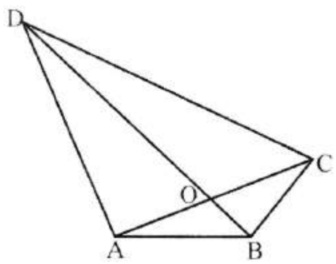
(a) $\angle A + \angle B = \angle CED$

(b) $\angle A + \angle B = 2\angle CED$

(c) $\angle A + \angle B = 3\angle CED$

(d) None of these

19. **If ABCD is a quadrilateral whose diagondals AC and BD intersect at O, then:**



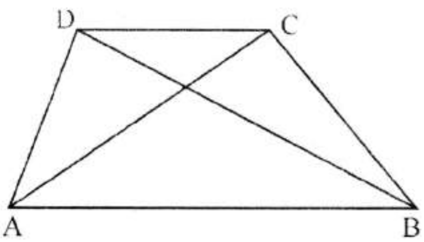
(a) $(AB + BC + CD + DA) < (AC + BD)$

(b) $(AB + BC + CD + DA) > 2(AC + BD)$

(c) $(AB + BC + CD + DA) > (AC + BD)$

(d) $AB + BC + CD + DA = 2(AC + BD)$

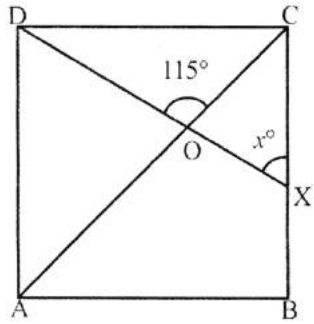
20. **In the adjoining figure, ABCD is a quadrilateral in which AB is the longest side and CD is the shortest side, then:**



(a) $\angle C > \angle A$ and $\angle D > \angle B$ (b) $\angle C > \angle A$ and $\angle B > \angle D$

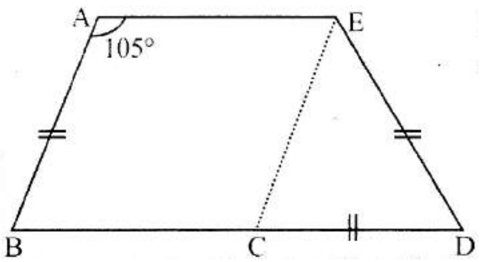
(c) $\angle C < A$ and $\angle D < \angle B$ (d) $\angle C < \angle A$ and $\angle D = \angle B$

21. In the given figure, ABCD is a square. A line segment DX cuts the side BC at X and the diagonal AC at 0 Such that $\angle COD = 115^{\circ}$ and $\angle OXC = x^{\circ}$. The value of x is:



(a) 40° (b) 60° (c) 80° (d) 85°

22. In the given figure AE=BC and $AE \parallel BC$ and the three sides AB, CD and ED are equal in length. If $m\angle A = 105^{\circ}$, find measures of $\angle BCD$:



(a) 138° (b) 165° (c) 88° (d) None of these

23. A point X inside a rectangle PQRS is joined to the vertices then, which of the following is true?

(a) area(ΔPSX) = area(ΔPXQ)

(b) $area(\Delta PSX) + area(\Delta PXQ) = area(RSX) + area(\Delta RQX)$

(c) $area(\Delta PXS) + area(\Delta RXQ) = area(\Delta SRX) + area(\Delta PXQ)$

(d) None of these

24. In a rectangle ABCD, P, Q are the mid-points of BC and AD respectively and R is any point on PQ, then ΔARB equals:

(a) $\frac{1}{2}([\ \ ]ABCD)$ (b) $\frac{1}{3}([\ \ ]ABCD)$ (c) $\frac{1}{4}([\ \ ]ABCD)$ (d) None of these

25. A quadrilateral is a parallelogram if:

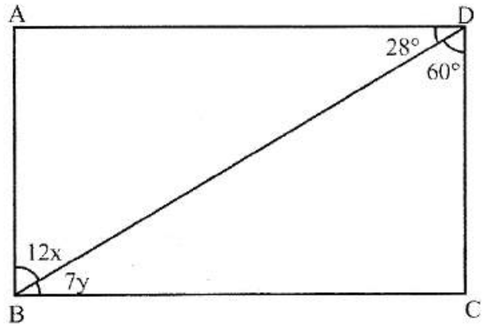
(a) A pair of opposite sides is equal

(b) A pair of opposite sides is equal and parallel

(c) A pair of opposite sides is parallel

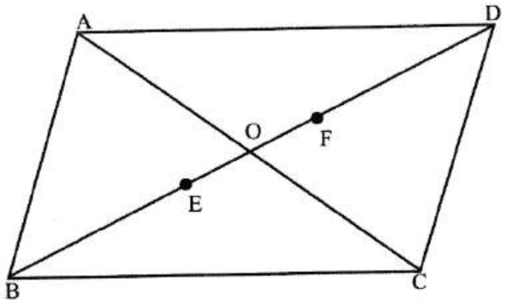
(d) None of these

26. **In the adjoining figure, the value of x and y are:**



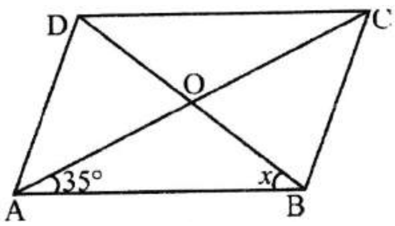
(a) $5^{\circ}, 4^{\circ}$ (b) $3^{\circ}, 4^{\circ}$ (c) $2^{\circ}, 1^{\circ}$ (d) None of these

27. **In the adjoining figure ABCD is a parallelogram and E, F are the centroids of $\triangle ABD$ and $\triangle BCD$ respectively, then EF equals:**



(a) AE (b) BE (c) CE (d) DE

28. **In given figure, ABCD is a rhombus. If $\angle OAB = 35^{\circ}$, Then the value of x** is



(a) 25° (b) 35° (c) 55° (d) 70°

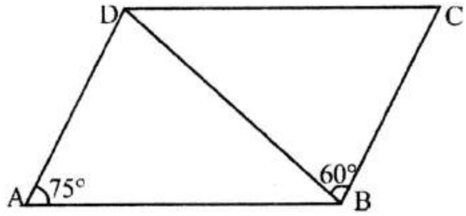
29. **ABCD is a quadrilateral such that $\angle D = 90^{\circ}$. A circle C(O, r) touches the sides AB, BC, CD and DA at P, Q R and S respectively. If $BC = 38$ cm. $CD = 25$ cm and $BP = 27$ cm then radius 'r' is equal to**

(a) 14 cm (b) 11 cm (c) 12 cm (d) 10 cm

30. **Find each interior and exterior angle of regular polygon having 30 sides.**

(a) $154^{\circ}, 34^{\circ}$ (b) $168^{\circ}, 12^{\circ}$ (c) $122^{\circ}, 15^{\circ}$ (d) $121^{\circ}, 58^{\circ}$

31. **In the given figure, ABCD is a parallelogram in which $\angle BAD = 75^{\circ}$ and $\angle CBD = 60^{\circ}$.**
Then, $\angle BDC = ?$



(a) 60° (b) 75° (c) 45° (d) 50°

32. **In a quadrilateral ABCD, If AO and BO are the bisectors of $\angle A$ and $\angle B$ respectively $\angle C = 30^{\circ}$ and $\angle D = 70^{\circ}$. Then, $\angle AOB = ?$**

(a) 40° (b) 50° (c) 80° (d) 100°

33. **The diagonals AC and BD of a parallelogram ABCD intersect each other at the O such that $\angle DAC = 40^{\circ}$ and $\angle AOB = 80^{\circ}$, Then $\angle DBC = ?$**

(a) 40° (b) 35° (c) 45° (d) 50°

34. **The lengths of the diagonals of a rhombus are 16 cm and 12 *cm*. The length of side of the rhombus is**

(a) 10 cm (b) 12 cm (c) 9 cm (d) 8 cm

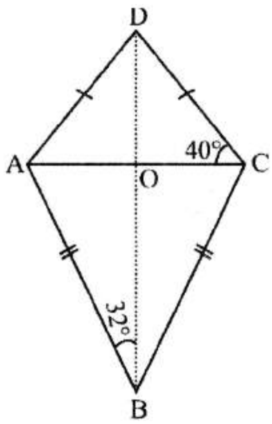
35. **The length of each side of a rhombus is 10 *cm* and of its diagonals 1$ of 16cm. The length of the other diagonal is**

(a) 13 cm (b) 12 cm (c) $2\sqrt{39}$ cm (d) 6 cm

36. **In a rhombus ABCD,, its diagonal intersect at O then $\angle AOB$ is**

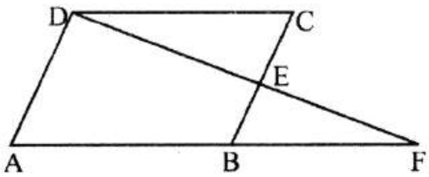
(a) 180° (b) 0° (c) 90° (d) 60°

37. **In. the adjoining *kite*, diagonals intersect at O If $\angle ABO = 32^{\circ}$ and $\angle(OCD) = 40^{\circ}$, $\angle ABC$**



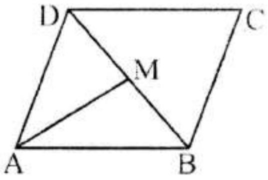
(a) 60° (b) 64° (c) 75° (d) 90°

38. **In the given figure, ABCD Is a $\|$ gm and E is the mid-point of BC Also DE and AB when produced meet at F, Then,**



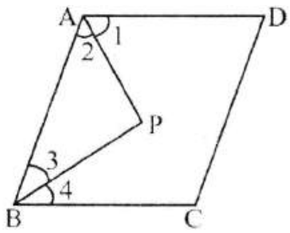
(a) $AF = \frac{3}{2}AB$ (b) $AF = 2AB$ (c) $AF = 3AB$ (d) $AF^2 = 2AB^2$

39. **In the given figure, ABCD is a parallelogram, M is the mid-point of BD and BD bisects $\angle B$ as well as $\angle D$. Then $\angle AMB = ?$**



(a) 45° (b) 60° (c) 90° (d) 30°

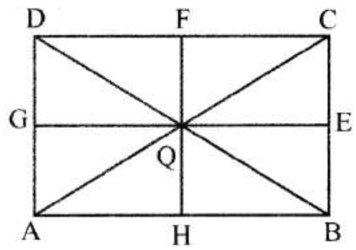
40. **In the adjoining figure, AP and BP are angle bisectors of $\angle A$ and $\angle B$ which meets At P in the parallelogram ABCD. Then $2\angle APB = ?$**



(a) $\angle C + \angle D$ (b) $\angle A + \angle C$ (c) $\angle B + \angle D$ (d) $2\angle C$

ANSWER KEY & HINTS

1. (a)



Using Pythagoras theorem,

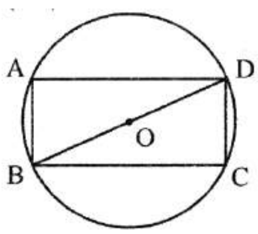
$QD^2 + QB^2 = QA^2 + QC^2$

$\Rightarrow QD^2 + 9 = 16 + 25$

$\Rightarrow QD^2 = 41 - 9 = 32$

$\Rightarrow QD = \sqrt{32} = 4\sqrt{2}$ cm

2. (b)



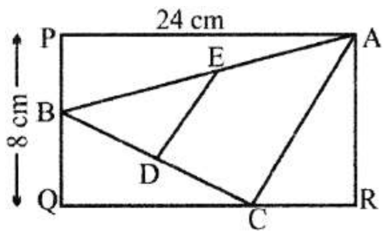
Diameter of a circle = Diagonal of rectangle

$BC = 4cm, CD = 3cm.$

$\therefore BD = \sqrt{BC^2 + CD^2} = \sqrt{4^2 + 3^2} = \sqrt{16 + 9} = \sqrt{25} = 5$ cm.

$\therefore$ Radius of a circle $= BO = \dfrac{BD}{2} = \dfrac{5}{2} = 2.5$ cm.

3. (b)



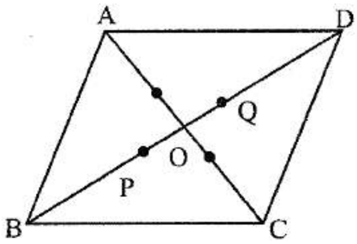
$QC = 18$ cm.

$AC = \sqrt{CR^2 + AR^2} = \sqrt{6^2 + 8^2} = \sqrt{36 + 64} = \sqrt{100} = 10$ cm.

$BD = DC;\ BE = EA$

$\therefore DE \parallel AC$ and $DE = \frac{1}{2}AC = \frac{10}{2} = 5$ .cm

4. (b)

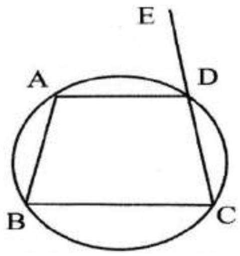


$OP = \frac{1}{3} \times 6 = 2$ cm.

$OQ = \frac{1}{3} \times 6 = 2$ cm.

$\therefore PQ = 4$ cm.

5. (d)



$\angle ABC + \angle DCA = 180^\circ$

$\Rightarrow \angle CDA = 180^\circ - 75^\circ = 105^\circ$

$AD \parallel BC$

$\angle BCD = \angle ADE = \angle ABC = 75^\circ$

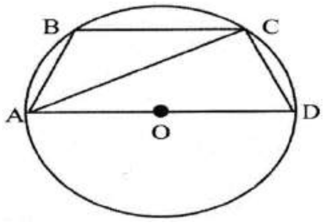
6. (c): The angle subtended at the centre by an arc is twice to that of angle subtended at the circumference.

$\therefore \angle CAD = \frac{1}{2}\angle COD = 60^\circ$

$\therefore \angle BAD = 60^\circ + 60^\circ = 120^\circ$

$\therefore \angle BCD = 180^\circ - 120^\circ = 60^\circ$

7. (c)



In ΔACD

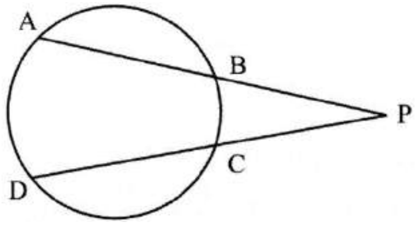
$\angle DAC = 65^\circ \quad \angle ACD = 90^\circ$

$\angle D = 180^\circ - 65^\circ - 90^\circ = 25^\circ$

$\therefore \angle ABC + \angle ADC = 180^\circ$

$\Rightarrow \angle ABC = 180^\circ - 25^\circ = 155^\circ$

8. (d)



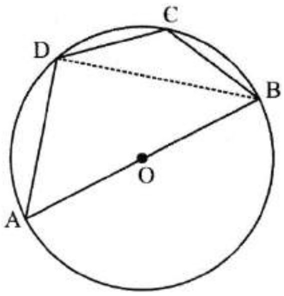
Clearly,

$AP \times BP = PD \times PC$

$\Rightarrow 12 \times 8 = PD \times 6$

$\Rightarrow PD = \dfrac{12 \times 8}{6} = 16$ cm.

9. (b)



The sum of opposite angles of a concyclic quadrilateral is 180°.

$\therefore \angle BCD + \angle BAD = 180^\circ$

$\Rightarrow 130^\circ + \angle BAD = 180^\circ$

$\Rightarrow \angle BAD = 180^\circ - 130^\circ = 50^\circ$

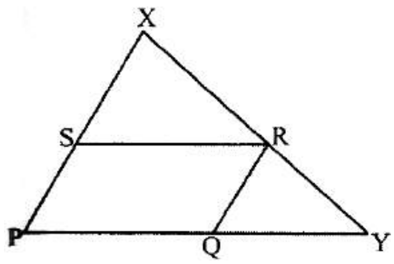
The angle in a semi - circle is a right angle.

$\therefore \angle BDA = 90^\circ$

$\therefore$ In ΔABD,

$\therefore \angle ABD = 90^\circ - 50^\circ = 40^\circ$

10. (a)



$PQ = QR = RS = SP$

[PQRS is a rhombus]

$SX = \frac{1}{2}PQ = \frac{1}{2}QR = \frac{1}{2}RS = \frac{1}{2}SP$

In Δs PXY and QRY,

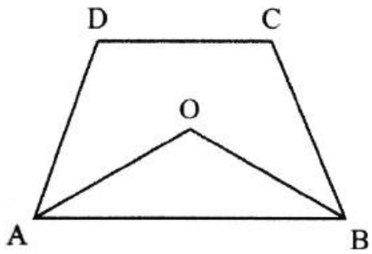
$\angle X = \angle YRQ; \angle P = \angle YQR; \angle Y = \angle Y \therefore \Delta PXY$ and ΔQRY are similar.

$\therefore \frac{PQ+PY}{QY} = \frac{PS+SK}{QR}$

$\Rightarrow \frac{PQ}{QY} + 1 = \frac{\frac{3}{2}QR}{QR} = \frac{3}{2}$

$\Rightarrow \frac{PQ}{QY} = \frac{3}{2} - 1 = \frac{1}{2} \Rightarrow \frac{QY}{PQ} = \frac{1}{2} \Rightarrow 2:1$

11. (d)



$\angle A + \angle B + \angle C + \angle D = 360^\circ$

$\Rightarrow \angle A + \angle B + \angle 80^\circ + \angle 120^\circ = 360^\circ$

$\Rightarrow \angle A + \angle B = 360^\circ - 80^\circ - 120^\circ = 160^\circ$

In $\Delta AOB, \angle OAB + \angle OBA + \angle AOB = 180^\circ$

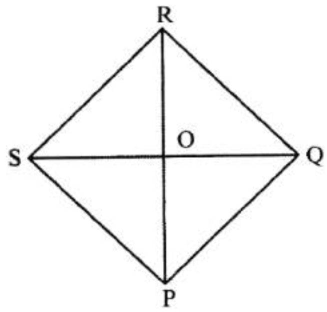
$\Rightarrow \frac{\angle A}{2} + \frac{\angle B}{2} + \angle AOB = 180^\circ$

$$\Rightarrow \frac{1}{2}(\angle A+\angle B)+\angle AOB=180^\circ$$

$$\Rightarrow \frac{1}{2}\times 160^\circ+\angle AOB=180^\circ$$

$$\Rightarrow \angle AOB=180^\circ-80^\circ=100^\circ$$

12. (a)



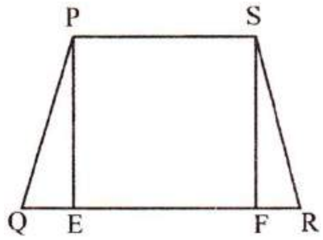
$\angle PQR=60^\circ$

$PQ=QR$

$\therefore \angle QPR=\angle QRP=60^\circ$

$\therefore \Delta PQR$ is an equilateral triangle.

13. (d)



$PE\perp QR; SF\perp QR$

$\therefore \angle SRQ=45^\circ$

In ΔRSF,

$$\sin 45^\circ=\frac{SF}{SR}$$

$$\Rightarrow \frac{1}{\sqrt{2}}=\frac{SF}{SR}$$

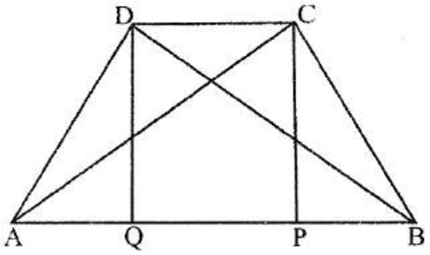
$$\Rightarrow SF=\frac{12}{\sqrt{2}}=6\sqrt{2}$$

14. (a) In $\Delta ABD, \angle A$ is acute.

So $BD^2 = AD^2 + AB^2 - 2AB.AQ$ ....(i)

In $\Delta ABC, \angle B$ is acute.

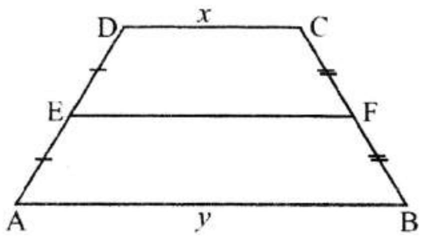
So, $AC^2 = BC^2 + AB^2 - 2AB.AD$ .., ,(ii)



Adding (i) and (ii) $AC^2 + BD^2 = (BC^2 + AD^2) + 2AB\{AB - BP - AQ\} = (BC^2 + AD^2) + 2AB.PQ$

$= BC^2 + AD^2 + 2AB.CD \quad [\therefore PQ = DC]$

15. (c) Here as ABCD is trapezium

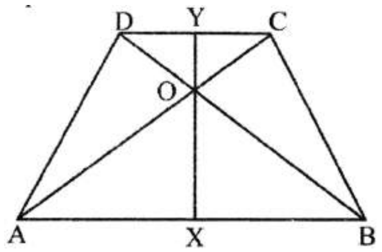


So, $EF = \frac{1}{2}(AB + DC)$

$\Rightarrow EF = \frac{1}{2}(x + y)$

$\therefore \{AB = y, DC = x\}$

16. (c) let PQ be the perpendicular distance between the two parallel sides AB AND CD.



So, $\frac{Area\, of\, \Delta AOB}{Area\, of\, \Delta COD} = \frac{\frac{1}{2} AB \times OX}{\frac{1}{2} CD \times OY}$

$= \frac{3CD \times 3OY}{CD \times OY} = \frac{9}{1}$

17. (c): As $a^{\circ}+b^{\circ}=180^{\circ}$

$\Rightarrow \angle A=180^{\circ}-b$

Also, $\angle C+a^{\circ}=180^{\circ}$ (linear pair)

$\Rightarrow \angle C=180^{\circ}-a^{\circ}$

But $\angle A+\angle B+\angle C+\angle D=360^{\circ}$

$\Rightarrow \left(180^{\circ}-b^{\circ}\right)+x+\left(180^{\circ}-a^{\circ}\right)+y^{\circ}=360^{\circ}$

$\Rightarrow x^{\circ}+y^{\circ}=a^{\circ}+b^{\circ}$

18. (b) $\angle 1=\frac{1}{2}\angle C, \angle 2=\frac{1}{2}\angle D$

$\angle 1+\angle 2+\angle CED=180^{\circ}$

$\therefore \angle CED=180^{\circ}-(\angle 1+\angle 2)$

Also $\angle A+\angle B+\angle C+\angle D=360^{\circ}$

$\angle A+\angle B+2(\angle 1+\angle 2)=360^{\circ}$

$\angle A+\angle B=360^{\circ}-2(\angle 1+\angle 2)$

$\angle A+\angle B=2\angle CED$

19. (c): In $\Delta ABC, \Delta ACD, \Delta BCD$ and ΔABD

$AB+BC>AC$

$CD+DA>AC$

$BC+CD>BD$

$DA+AB>BD$

Adding above inequalities

$2(AB+BC+CD+DA)>2(AC+BD)$

$\Rightarrow AB+BC+CD+DA>(AC+BD)$

20. (a):- Join AC and BD.

As $AB>BC \Rightarrow \angle ACB>\angle BAC$

Also $AD>DC \Rightarrow \angle ACD>\angle CAD$

$\therefore \angle ACB+\angle ACD>\angle BAC+\angle CAD$

$\Rightarrow \angle C>\angle A$, similarly $\angle D>B$

21. (b): $\angle OCX = 45^\circ$

$\angle COD + \angle COX = 180^\circ$

$\angle COX = 180^\circ - \angle COD = 180^\circ - 115^\circ = 65^\circ$

In ΔOCX

$\angle OCX + \angle COX + \angle OXC = 180^\circ$

$\Rightarrow 45^\circ + 65^\circ + \angle OXC = 180^\circ$

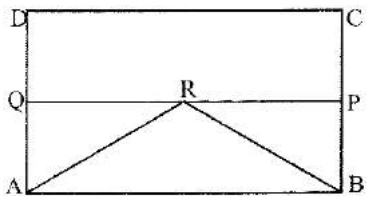
$\Rightarrow \angle OXC = 180^\circ - 110^\circ = 70^\circ \Rightarrow x = 70^\circ$

22. (b): $\angle BCE = 105^\circ$ *and* $\angle ECD = 60^\circ$

$\therefore \angle BCD = 105^\circ + 60^\circ = 165^\circ$

23. (c):-

24. (c):- $area([\ \ ]ABPQ) = \frac{1}{2} area([\ \ ]ABCD)$



and area $\left([\ \ ]ARB\right) = \frac{1}{2} area\left([\ \ ]ABPQ\right)$

$\therefore area\left(\Delta ARB\right) = \frac{1}{4} area\left([\ \ ]ABCD\right)$

25. (b):- A quadrilateral is a parallelogram if a pair of opposite sides is equal and parallel.

26. (a) $\angle ADB = \angle DBC$

$\Rightarrow 28^\circ = 7y$

$= y = \frac{28^\circ}{7^\circ} 4^\circ$

Also, $\angle ABD = \angle BDC$

$\angle 12x = 60^\circ \Rightarrow x = \frac{60^\circ}{12^\circ}$

$\Rightarrow x = 5^\circ$

27. (a)

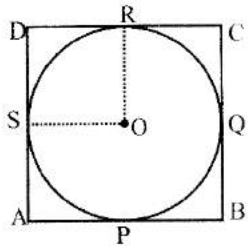
28. (c): In ΔAOB

$\angle OBA + \angle OAB + \angle AOB = 180^\circ$

$x + 35^\circ + 90^\circ = 180^\circ$

$x = 180^\circ - 125^\circ = 55^\circ$

29. (a)



$\angle ORD = \angle OSD = 90^\circ$

$\therefore$ ORDS is a square

Since tangents from an exterior point to a circle are equal in length.

$\therefore \ BP = BQ : CQ = CR \ and \ DR = DS.$

$BQ = 27$

$\Rightarrow \ BC - CQ = 27$

$\Rightarrow \ 38 - CQ = 27$

$\Rightarrow \ CQ = 11 \ cm$

$\Rightarrow \ CR = 11 \ cm$

$\Rightarrow \ CD - DR = 11 \ cm$

$\Rightarrow \ 25 - DR = 11 \ cm$

$\Rightarrow \ DR = 14cm$

$\Rightarrow \ OR = DR = 14cm$

30. (b)

31. (c) $\angle C = \angle A = 75^\circ$ (Opposite $\angle s$ of aligm)

In ΔBCD,

$\angle CBD + \angle BCD + \angle BDC = 180^\circ$

$\angle ADB = 60^\circ$ - alternate angle

$\angle ABD = 45^\circ$

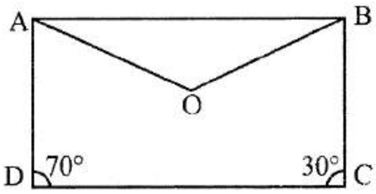
Then, $\angle BDC = 45^\circ$ - alternate angle

32. (b) Sum of the angles of quadrilateral is 360°,

$\therefore \ \angle A + \angle B + 30^\circ + 70^\circ = 360^\circ$

$\therefore \angle A + \angle B = 260^\circ$

$\Rightarrow \frac{1}{2}\angle A + \frac{1}{2}\angle B = 130^\circ$



$\therefore \angle AOB = (180° - 130°) = 50°$

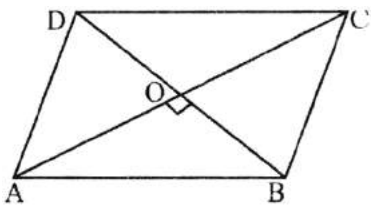
33. (a)

34. (a):

We know that the diagonals of a rhombus bisect each other at right angles.

$\therefore OA = 8cm,\ OB = 6cm\ and\ \angle AOB = 90^\circ$

$\therefore AB^2 = \left(OA^2 + OB^2\right) = \left(8^2 + 6^2\right) = (64 + 36) = 100$



$\Rightarrow AB = \sqrt{100} = 10\,\text{cm}$

So, each side = 10 cm.

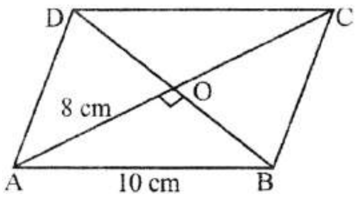
35. (b):

In the given rhombus, we have: $AB = 10$ cm and $OA = 8$ cm

$\therefore\ OB^2 = AB^2 - OA^2 = (10)^2 - 8^2 - 36$

$\Rightarrow OB = \sqrt{36} = 6cm$

$\therefore\ BD = 2 \times OB = (2 \times 6)cm = 12cm$



36. (c): Diagonals of a rhombus intersect at $90°$

37. (b): Given, ABCD is a kite

As diagonal BD bisects ZABC,

$\angle ABC - 2\angle ABO = 2 \times 32^\circ = 64^\circ$

38. (b): In ΔEDC and ΔEFB, we have:

$\angle DCE = \angle EBF$

$\angle DEC = \angle FEB$

and $EC = EB$.

$\therefore \angle EDC \cong \Delta EFB$ and therefore. $BF = DC$

$\therefore AF = (AB + BF) = (AB + DC) = 2AB$.

39. (c): $\angle B = \angle D \Rightarrow \frac{1}{2}\angle B = \frac{1}{2}\angle D$

$\Rightarrow \angle ADB = \angle ABM.$

$\therefore \Delta ABD$ is isosceles and M is the mid-point of BD,

$\therefore AM \perp BD$ and hence $\angle AMB = 90^\circ$.

40. $\angle A + \angle B + \angle C + \angle D = 360^\circ$

$$\frac{\angle A}{2} + \frac{\angle B}{2} + \frac{\angle C}{2} + \frac{\angle D}{2} = 180^\circ$$

$$180^\circ - \angle APB + \frac{\angle C}{2} + \frac{\angle D}{2} = 180^\circ$$

$$\Rightarrow \angle APB = \frac{\angle C}{2} + \frac{\angle D}{2}$$

$2\angle APB = \angle C + \angle D.$