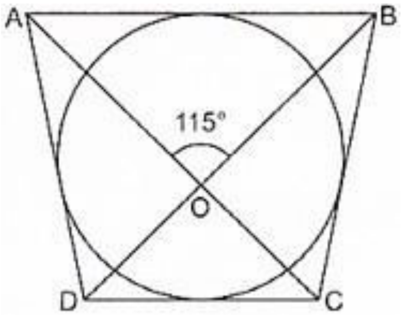
CBSE Test Paper 03

CH-8 Quadrilaterals

1. In Fig. the quadrilateral ABCD circumscribes a circle with centre O. If $\angle AOB = 115^{\circ}$, then find $\angle COD$.



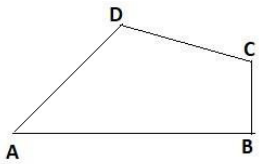
   a. 23°

   b. 24°

   c. 127°

   d. 115°

2. In Quadrilateral ABCD, $\angle A + \angle C = 140^{\circ}$, $\angle A : \angle C = 1 : 3$ and $\angle B : \angle D = 5 : 6$. Find the values of $\angle$A, $\angle$B, $\angle$C and $\angle$D?



   a. $10^{\circ}, 20^{\circ}, 100^{\circ}, 260^{\circ}$

   b. $35^{\circ}, 100^{\circ}, 105^{\circ}, 120^{\circ}$

   c. $100^{\circ}, 102^{\circ}, 120^{\circ}, 10^{\circ}$

   d. $90^{\circ}, 90^{\circ}, 100^{\circ}, 80^{\circ}$

3. Which of the following is not true for the Parallelogram?

   a. Opposite sides are equal

b. Diagonals bisect each other

c. Opposite angles are bisected by the diagonals

d. Opposite angles are equal

4. In quadrilateral ABCD, if $\angle$A = 60° and $\angle$B : $\angle$C : $\angle$D = 2:3:7, then $\angle$D is :

a. 175°

b. 25°

c. 180°

d. 50°

5. The Diagonals AC and BD of a Parallelogram ABCD intersect each other at the point O such that $\angle DAC = 30^\circ$ and $\angle AOB = 70^\circ$. Then, $\angle DBC$?

a. 40°

b. 35°

c. 45°

d. 30°

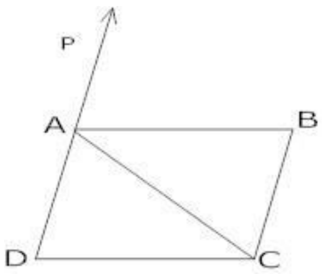
6. Fill in the blanks:

If angles of a quadrilateral are x, x + 3, x + 8 and x + 9, then the value of x is________.

7. Fill in the blanks:

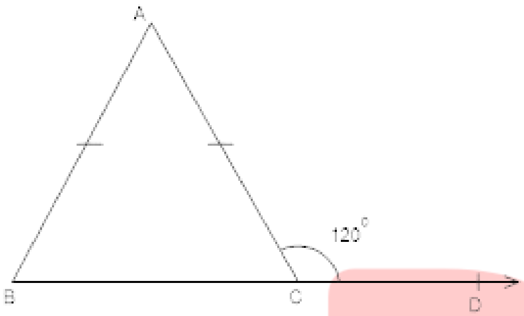
A quadrilateral in which both pairs of opposite sides are parallel, is called________.

8. In the adjoining Fig. AB = AC. CD $\parallel$ BA and AD is the bisector of $\angle$PAC prove that $\angle$DAC = $\angle$BCA and ABCD is a parallelogram.



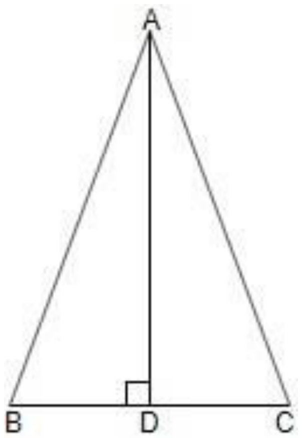
9. ABCD is a parallelogram in which ∠A = 70^o. Compute ∠B, ∠C, and ∠D.

10. In the figure, AB = AC and ∠ACD = 120°, find ∠B

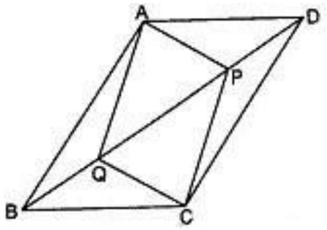


11. In a △ABC, if ∠A = 45° and ∠B = 70° • Determine the shortest and largest sides of the triangle.

12. In ΔABC, AD is the perpendicular bisector of BC (See figure). Show that ΔABC is an isosceles triangle in which AB = AC.



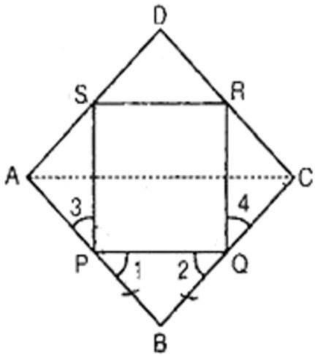
13. In parallelogram ABCD, two points P and Q are taken on diagonal BD such that DP = BQ.



Show that

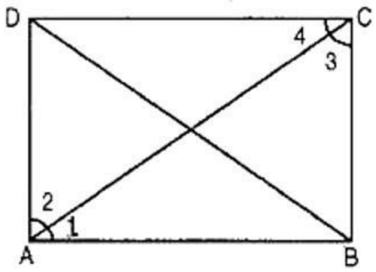
i. $\triangle APD \cong \triangle CQB$
ii. AP = CQ
iii. $\triangle AQB \cong \triangle CPD$
iv. AQ = CP
v. APCQ is a parallelogram.

14. ABCD is a rhombus and P, Q, R, S are mid-points of AB, BC, CD and DA respectively. Prove that quadrilateral PQRS is a rectangle.



15. ABCD is a rectangle in which diagonal BD bisects $\angle B$ as well as $\angle D$. Show that:

i. ABCD is a square.
ii. Diagonal BD bisects both $\angle B$ as well as $\angle D$.



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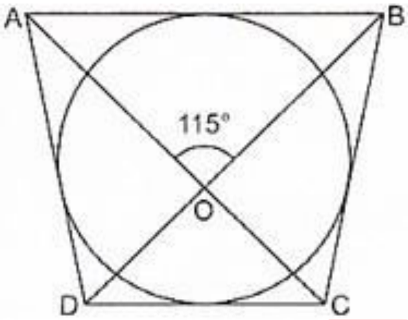
Solution

1. (d) 115^o

 Explanation:

 $\because \angle AOB = \angle COD$ (vertically opposite angle)

 $\therefore \angle COD = 115^\circ$



2. (b) $35^\circ, 100^\circ, 105^\circ, 120^\circ$

 Explanation:

 given - $\angle$ A+ $\angle$C=140^0

 and $\angle$ A: $\angle$ C = 1:3

 and $\angle B : \angle D = 5 : 6$

 $\implies \angle$ A = $\frac{1}{4} \times 140^0 = 35^0$

 $\implies \angle$ C = $\frac{3}{4} \times 140^0 = 105^0$

 now according to angle sum property of quadrilateral

 $\angle$ A +$\angle$B+ $\angle$ C+ $\angle$ D = 360^0

 $\implies 35^0 + \angle$ B+ $105^0 + \angle$ D = 360^0

 $\implies \angle B + \angle D = 360^0 - 140^0 = 220^0$

 $\implies$ 5x + 6x = 220^0

 $\implies$ x = 20^0

 so, $\angle$ B = $5 \times 20^0 = 100^0$

 and $\angle D = 6 \times 20^0 = 120^0$

3. (c) Opposite angles are bisected by the diagonals

 Explanation: If opposite angles are bisected by diagonals in parallelogram, all four bisected angles become equal which leads to equal adjacent side. That is not true in case of parallelogram.

4. (a) 175°

Explanation:

In quadrilateral, the sum of the all four angles equal to 360. let angle B = 2x, angle C = 3x and angle D = 7x.

angle A + angle B + angle C + angle D = 360

60 + 2x + 3x + 7x = 360

12x = 300

x= 25

So, angle D = 7x = 7 (25) = 175

5. (a) 40°

Explanation:

angle DAC = angle ACB = 30 (alternate angles)

angle BOA + angle BOC = 180 (linear pair)

angle BOC = 180 - 70 = 110

In triangle BOC, angle BOC + angle OCB + angle CBO = 180 (angle sum property)

110 + 30 + angle CBO = 180

angle CBO = 180 - 140 =40 = angle DBC

6. 85

7. parallelogram

8. In $\triangle$ ABC AB = AC

$\Rightarrow \angle$BCA = $\angle$BAC [Opposite angle of equal sides are equal]

$\angle$CAD = $\angle$BCA + $\angle$ABC [Exterior angle]

$\Rightarrow \angle$PAC = $\angle$BCA

Now $\angle$PAC = $\angle$BCA

$\Rightarrow$ AP $\parallel$ BC

Also CD $\parallel$ BA Given)

$\therefore$ ABCD is a parallelogram

9. In parallelogram ABCD,

$\angle A = 70^o$

$\angle A + \angle B = 180^o$ [Adjacent angles are supplementary]

$70^o + \angle B = 180^o$

$\angle B = 180^o - 70^o = 110^o$

$\angle A = \angle C = 70^o$ [Opposite angles of a parallelogram are equal]

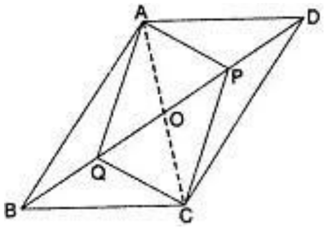
$\angle B = \angle D = 110^o$ [Opposites angles of a parallelogram are equal]

10. Since in $\triangle ABC$, AB = AC
$\Rightarrow \angle B = \angle C$ [angles opposite to equal sides are equal
Also, $\angle ACB + \angle ACD = 180°$ [Linear pair]
$\Rightarrow \angle ACB = 180° - 120°$
and, $\angle C = \angle B = 60°$

11. We have, $\angle A = 45°$ and $\angle B = 70°$
$\therefore \angle A + \angle B + \angle C = 180^o$
$\Rightarrow 45^o + 70^o + \angle C = 180^o$
$\Rightarrow \angle C = 180^o - 115^o$
$\Rightarrow \angle C = 65^o$
Since the side opposite to the greatest angle is largest. Therefore, side AC is largest.
The side opposite to the least angle is the smallest. So, side opposite to $\angle A$ i.e. side BC is the smallest.

12. Given, AD is perpendicular bisector of BC. Hence, in ΔADB and ΔADC,
BD = CD. [Since, AD bisects BC]
$\angle ADB = \angle ADC = 90^\circ$ [AD $\perp$ BC]
AD = AD . [Common side]
$\therefore \Delta ABD \cong \Delta ACD$ [By SAS congruency criterion]
$\Rightarrow$ AB = AC [By C.P.C.T.]
Therefore, ABC is an isosceles triangle with AB = AC. Hence, proved.

13. In parallelogram ABCD, two points P and Q are taken on diagonal BD such that DP = BQ.
To Prove:
Construction: Join AC to intersect BD at O.



i. $\triangle APD \cong \triangle CQB$

ii. AP = CQ

iii. $\triangle AQB \cong \triangle CPD$

iv. AQ = CP

v. APCQ is a parallelogram.

vi. In $\triangle APD$ and $\triangle CQB$

AD || BC . . . [Opp. sides of || gm ABCD]

A transversal BD intersects them

$\therefore \angle ADB = \angle CBD$ . . .[Alternate angles]

$\Rightarrow \angle ADP = \angle CBQ$ . . . (1)

DP = BQ . . . [Given] . . . (2)

AD = CB . . . [Opp. sides of || gm ABCD] . . . (3)

According to (1), (2), (3)

$\triangle APD \cong \triangle CQB$

vii. $\triangle APD \cong \triangle CQB$ . . . [As proved above]

$\therefore$ AP = CQ . . . [c.p.c.t.]

viii. In $\triangle AQB$ and $\triangle CPD$,

AB || CD........... [Opp. sides of || gm ABCD]

A transversal BD intersects them

$\therefore \angle ABD = \angle CDP$ .... [Alternate angles]

$\Rightarrow \angle ABQ = \angle CDP$

AQ = CP .... [From (3)]

QB = PD....... [Given]

AB = CD ...... [Opp. sides of || gm ABCD]

$\therefore \triangle AQB \cong \triangle CPD$ ..... [By SAS rule]

ix. $\triangle AQB \cong \triangle CPD$...... [As proved above]

$\therefore$ AQ = CP ..... [c.p.c.t]

As the diagonals of a parallelogram bisect each other

$\therefore$ OB = OD

$\therefore$ OB – BQ = OD – DP . . .[Given : BQ = DP]

$\therefore$ OQ = OP . . . (1)

Also OA = OC . . . [As diagonals of a || gm bisect each other] . . .(2)

In view of (1) and (2) APCQ is a parallelogram.

14. Given: P, Q, R and S are the mid-points of respective sides AB, BC, CD and DA of rhombus. PQ, QR, RS and SP are joined.

To prove: PQRS is a rectangle.

Construction: Join A and C.

Proof: In $\triangle$ ABC, P is the mid-point of AB and Q is the mid-point of BC.

$\therefore$ PQ $\parallel$ AC and PQ = $\frac{1}{2}$ AC ...(i)

In $\triangle$ADC, R is the mid-point of CD and S is the mid-point of AD.

$\therefore$ SR $\parallel$ AC and SR = $\frac{1}{2}$ AC ...(ii)

From eq. (i) and (ii),PQ $\parallel$ SR and PQ = SR

$\therefore$ PQRS is a parallelogram.

Now ABCD is a rhombus. [Given]

$\therefore$ AB = BC

$\Rightarrow$ BP = $\frac{1}{2}$ BC $\Rightarrow$ BP = BQ

$\therefore$ $\angle$1 = $\angle$2 [Angles opposite to equal sides are equal]

Now in triangles APS and CQR, we have,

AP = CQ [P and Q are the mid-points of AB and BC and AB = BC]

Similarly AS = CR and PS = QR [Opposite sides of a parallelogram]

$\therefore$ $\triangle$ APS $\cong$ $\triangle$CQR [By SSS congreuancy]

$\Rightarrow$ $\angle$3 = $\angle$4 [By C.P.C.T.]

Now we have $\angle$1 + $\angle$SPQ + $\angle$3 = 180° And $\angle$2 + $\angle$PQR + $\angle$4 = 180° [Linear pairs]

$\therefore$ $\angle$1 + $\angle$SPQ + $\angle$3 = $\angle$2 + $\angle$PQR + $\angle$4

Since $\angle$1 = $\angle$2 and $\angle$3 = 4[Proved above]

$\therefore$ $\angle$SPQ = $\angle$PQR ...(iii)

Now PQRS is a parallelogram [Proved above]

$\therefore$ $\angle$SPQ + $\angle$PQR = 180° ...(iv) [Interior angles]

Using eq. (iii) and (iv),

$\angle$SPQ + $\angle$SPQ = 2 $\angle$SPQ = 180°

$\Rightarrow$ $\angle$SPQ = 90°

Hence PQRS is a rectangle.

15. ABCD is a rectangle. Therefore AB = DC ...(i)

And BC = AD

Also $\angle A = \angle B = \angle C = \angle D = 90°$

i. In $\triangle ABC$ and $\triangle ADC$

$\angle 1 = \angle 2$ and $\angle 3 = \angle 4$

[AC bisects $\angle A$ and $\angle C$ (given)]

AC = AC [Common]

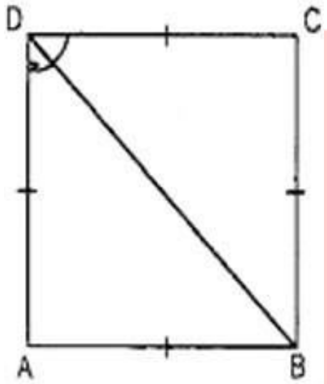
$\therefore \triangle ABC \cong \triangle ADC$ [By ASA congruency]

$\Rightarrow$ AB = AD ...(ii)

From eq. (i) and (ii), AB = BC = CD = AD

Hence ABCD is a square.

ii. In $\triangle ABC$ and $\triangle ADC$



AB = BA [Since ABCD is a square]

AD = DC [Since ABCD is a square]

BD = BD [Common]

$\therefore \triangle ABD \cong \triangle CBD$ [By SSS congruency

$\Rightarrow \angle ABD = \angle CBD$ [By C.P.C.T.] ...(iii)

And $\angle ADB = \angle CDB$ [By C.P.C.T.] ...(iv)

From eq. (iii) and (iv), it is clear that diagonal BD bisects both $\angle B$ and $\angle D$.