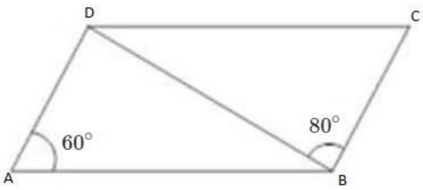
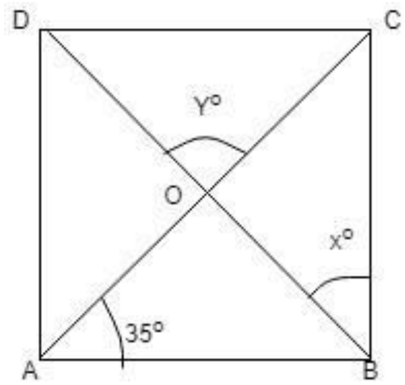
CBSE Test Paper 02

CH-8 Quadrilaterals

1. If bisector of $\angle A$ and $\angle B$ of a quadrilateral ABCD intersect each other at p , $\angle B$ and $\angle C$ at Q , $\angle C$ and $\angle D$ at R and, $\angle D$ and $\angle A$ at S then PQRS is a
   a. Rectangle
   b. Parallelogram
   c. Rhombus
   d. Quadrilateral whose opposite angles are supplementary
2. If the diagonals of a quadrilateral bisect each other, and opposite sides are parallel and equal,then the quadrilateral must be.
   a. Rectangle
   b. Rhombus
   c. Square
   d. Parallelogram
3. The Diagonals AC and BD of a Parallelogram ABCD intersect each other at point O. If $\angle DAC = 32^\circ$ and $\angle AOB = 70^\circ$, then $\angle DBC$ is equal to
   a. 86°
   b. 38°
   c. 32°
   d. 24°
4. In fig ABCD is a parallelogram. If $\angle DAB = 60^\circ$ and $\angle DBC = 80^\circ$ then $\angle CDB$ is



   a. 60°
   b. 40°
   c. 60°
   d. 80°
5. In the figure, ABCD is a Rectangle. Find the values of x and y?



a. x = 55° and y = 110°

b. x = 100° and y = 100°

c. x = 50° and y = 100°

d. x = 60° and y = 120°

6. Fill in the blanks:

A parallelogram in which one of its angles is right angle, is called________.

7. Fill in the blanks:

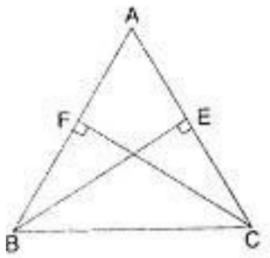
The quadrilateral formed by joining the mid-points of the sides of a quadrilateral ABCD taken in order is a square only if diagonals of ABCD are equal and________.

8. The perimeter of a parallelogram is 22 cm. If the longer side measures 6.5 cm, what is the measure of the shorter side?

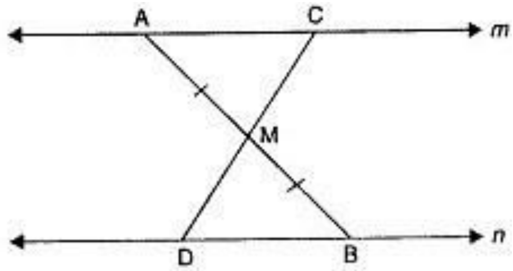
9. ABCD is a rectangle with $\angle ABD = 40^{o}$. Determine $\angle DBC$.

10. ABC is a right-angled triangle in which $\angle A = 90^{o}$ and AB = AC. Find $\angle B$ and $\angle C$.

11. ABC is a triangle in which altitudes BE and CF to sides AC and AB are equal. Show that $\triangle ABE \cong \triangle ACF$, AB = AC i.e. $\triangle$ ABC is an isosceles triangle.



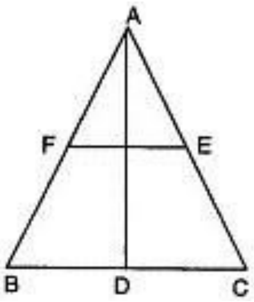
12. In figure, m $||$ n and M is the mid-point of line segment AB, where A and B are any points on m and n respectively. Prove that M is also the mid-point of any other line segment CD having its end points on m and n respectively.



13. ABC is a triangle and through A, B, C lines are drawn parallel to BC, CA and AB respectively intersecting at P, Q and R. Prove that the perimeter of △PQR is double the perimeter of △ABC.

14. In a parallelogram, show that the angle bisectors of two adjacent angles intersect at right angles.

15. In figure, △ABC is an isosceles with AB = AC. D, E and F are respectively the mid-points of sides BC, AC and AB. Show that line segment AD is perpendicular to the line segment EF and is bisected by it.



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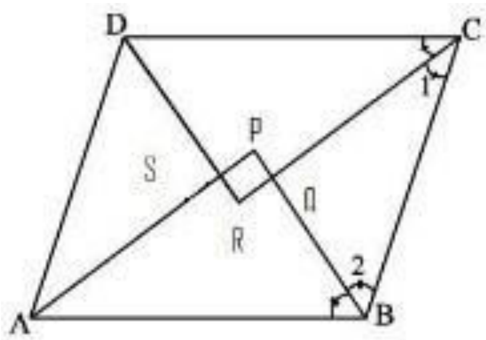
Solution

1. (a) Rectangle

   Explanation: Let's assume our quadrilateral ABCD as a parallelogram :



   we know

   $\angle DCB + \angle ABC = 180°$ (Co-interior angles of parallelogram are supplementary)

   $\Rightarrow \frac{1}{2}\angle DCB + \frac{1}{2}\angle ABC = 90°$ (Both sides divide by 2)

   $\Rightarrow \angle 1 + \angle 2 = 90°$... (1)

   In, ΔCQB we know

   $\Rightarrow \angle 1 + \angle 2 + \angle CQB = 180°$ ... (2)

   From eq(1) and eq(2), We get

   $\Rightarrow \angle CQB = 180° - 90°$

   $\Rightarrow \angle CQB = 90°$

   $\Rightarrow \angle PQR = 90°$ (because $\angle CQB = \angle PQR$, vertically opposite angles)

   Similarly, it can be shown

   $\angle QPS = \angle PSR = \angle SRQ = 90°$

   So, quadrilateral PQRS is a rectangle.

2. (d) Parallelogram

   Explanation: By theorm diagonals of quadrilateral bisect each other if and only if it is a parallelogram.For a quadrilateral to be parallelogram some other properties are required: Opposite sides are equal and parallel. Opposite angles are equal. Sum of any adjacent angles is 180.

3. (b) 38°

Explanation:

angle DAC = angle ACB = 32 (alternate angles)

angle AOB + angle COB = 180 (linear pair)

Angle COB = 180 - 70 = 110

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

110 + 32 + angle CBO = 180

angle CBO = 180 - 142 = 38

4. (b) 40°

Explanation: 40° Angle C = 60° as opposite angles of a parallelogram are equal and angle CDB = 40° angle sum property of a triangle. [In triangle CDB, angle C + angle CDB + angle DBC = 180°]

5. (a) x = 55° and y = 110°

Explanation: ABCD is a rectangle

The diagonals of a rectangle are congruent and bisect each other. Therefore, in $\triangle$AOB, we have:

OA = OB

$\angle$OAB = $\angle$OBA = 35°

x = 90° – 35° = 55° and $\angle$AOB = 180° – (35° + 35°) = 110°

y = $\angle$AOB = 110° [Vertically opposite angles]

Hence, x = 55° and y = 110°

6. Rectangle

7. perpendicular

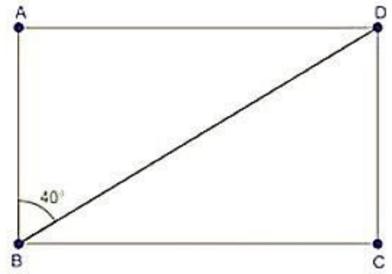
8. Let the shorter side be x.

Perimeter = x + 6.5 + x + 6.5

22 = 2(x + 6.5)

11 = x + 6.5

x = 11 - 6.5 = 4.5 cm

9. 

We have,

$\angle ABC = 90^o$

$\Rightarrow \angle ABD + \angle DBC = 90^o$

$\Rightarrow 40^o + \angle DBC = 90^o$

$\Rightarrow \angle DBC = 50^o$

10. In $\triangle$ ABC,

AB = AC

$\angle B = \angle C$ . . .[$\angle$s opposite to equal side of a $\triangle$] . . . (1)

In $\triangle$ ABC,

$\angle A + \angle B + \angle C = 180^o$ . . . [Sum of three angles of a triangle]

$90^o + \angle B + \angle C = 180^o$ . . .[As given : $\angle A = 90^o$]

$\angle B + \angle C = 90^o$ . . . (2)

$\angle B = \angle C = 45^o$ . . . [From (1) and (2)]

11. Given : ABC is a triangle in which altitude BE and CF to side AC and AB are equal.

To Prove : $\triangle ABE \cong \triangle ACF$

i. AB = AC i.e. $\triangle$ABC is an isosceles triangle.

Proof : BE = CF....... [Given]

$\angle BAE = \angle CAF$ ....[Common]

$\angle AFB = \angle AFC$ ....[Each 90^o]

$\therefore \triangle ABE \cong \triangle ACF$ .... [By AAS property]

ii...$\triangle ABE \cong \triangle ACF$......... [As proved]

$\therefore$ AB = AC ..... [c.p.c.t.]

$\therefore \triangle$ABC is an isosceles triangle.

12. m $\parallel$ n and AB intersects them

$\therefore \angle MAC = \angle MBD$ ...[Alternate angles] ...(1)

In DMAC and DMBD,

MA = MB

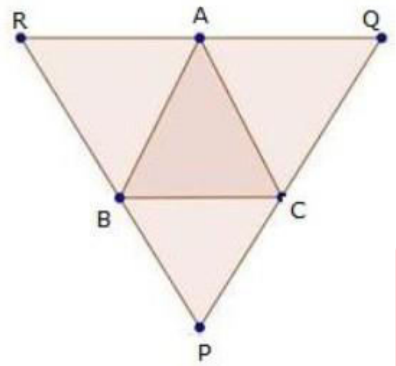
$\angle MAC = \angle MBD$ ...[From (1)]

$\angle AMC = \angle BMD$ ...[Vertically opposite angles]

$\therefore$ DMAC $\cong$ DMBD ...[ASA axiom]

$\therefore$ MC = MD ...[c.p.c.t.]

$\therefore$ M is the mid-point of CD.

13. 

Given: In ΔABC is a triangle and through A, B, C lines are drawn parallel to BC, CA and AB respectively intersecting at P, Q and R. (as shown in figure)

To Prove: The perimeter of $\triangle PQR$ is double the perimeter of $\triangle ABC$. i.e. Perimeter (ΔPQR) = $2 \times$ Perimeter (ΔABC)

Clearly, ABCQ and ARBC are parallelograms.

$\therefore$ BC = AQ and BC = AR

$\Rightarrow$ AQ = AR

$\Rightarrow$ A is the mid-point of QR.

Similarly, B and C are the mid-points of PR and PQ respectively.

$\therefore AB = \frac{1}{2} PQ$, $BC = \frac{1}{2} QR$ and $CA = \frac{1}{2} PR$

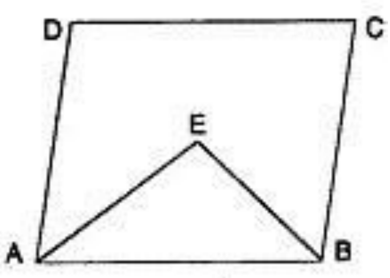
$\Rightarrow$ PQ = 2AB, QR = 2BC and PR = 2CA

$\Rightarrow$ PQ + QR + RP = 2(AB + BC + CA)

$\Rightarrow$ Perimeter of $\triangle PQR$ = 2 (Perimeter of $\triangle ABC$)

Hence proved

14. Given: ABCD is a parallelogram. The angle bisectors AE and BE of adjacent angles A and B meet at E.



To Prove : $\angle AEB = 90^o$

Proof : AD || BC . . . [Opposite sides of || gm]

$\therefore$ $\angle DAB + \angle CBA = 180^o$ . . .[As the sum of interior angles on the same side of a transversal is 180^o]

$\Rightarrow$ $2\angle EAB + 2\angle EBA = 180^o$ . . .[As AE and BE are the bisectors of $\angle DAB$ and $\angle CBA$ respectively]

$\Rightarrow$ $\angle EAB + \angle EBA = 90^o$

In $\triangle EAB$,

$\angle EAB + \angle EBA + \angle AEB = 180^o$ . . .[As the sum of three angles of a triangle is 180^o]

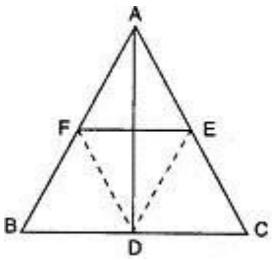
$\Rightarrow$ $90^o + \angle AEB = 180^o$ . . . [From (1)]

$\Rightarrow$ $\angle AEB = 90^o$

15. Given: $\triangle$ ABC is an isosceles with AB = AC. D, E and F are respectively the mid-points of sides BC, AC and AB.

To Prove: AD EF and AD is bisected by EF.

Construction : Join DE and DF.



Proof: In $\triangle$ ABC,

As D and E are the mid-points of BC and AC respectively.

DE || AB and DE = $\frac{1}{2}$ AB

In $\triangle$ ABC,

As D and F are the mid points of BC and BA respectively.

DF || CA and DF = $\frac{1}{2}$ CA

As AB = AC . . . [Given]

DE = DF . . .[From (1) and (2)] . . .(3)

Again, AB = AC . . . [Given]

$\Rightarrow \frac{1}{2}$ AB = $\frac{1}{2}$ AC ....[Halves of equals are equal]

AF = AE.......(4)

Similarly, DE = $\frac{1}{2}$ AB = AF . . . . [As F is the mid-point of AB] ..... (5)

and DE = $\frac{1}{2}$ AC = AE . . .[As E is the mid-point of AC] .....(6)

DF = FA = AE = ED ...... [From (3), (4), (5) and (6)]

$\Rightarrow$ AFDE is a rhombus.

Diagonals of a rhombus bisect each other at 90°.

AD $\perp$ EF and AD is bisected by EF.