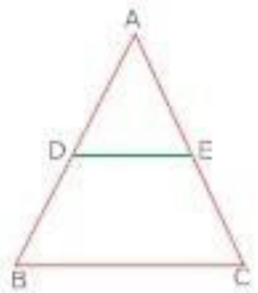
CBSE Test Paper 01

CH-8 Quadrilaterals

1. E Divides AB in the ratio 1 : 3 and also, F divides AC in the ratio 1 : 3. EF = 2.8cm, Find BC
   a. 11.2cm
   b. 11cm
   c. 11.5cm
   d. 12cm

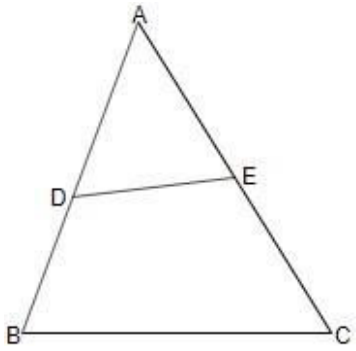
2. The figure formed by joining the mid-points of the sides of a quadrilateral ABCD, taken in order, is a square only if
   a. ABCD is a Rhombus
   b. Diagonals of ABCD are equal and perpendicular
   c. Diagonals of ABCD are perpendicular
   d. Diagonals of ABCD are equal

3. In fig if DE = 8 cm, DE $\parallel$ BC and D is the mid-Point of AB, then the true statement is



   a. E is the mid-Point of AC
   b. AB = BC
   c. DE = BC
   d. DE and BC meet at some point if we extend both of them indefinitely.

4. In fig D is mid-point of AB and DE $\parallel$ BC then AE is equal to



a. AD

b. DB

c. BC

d. EC

5. In a triangle ABC, P, Q and R are the mid-points of the sides BC, CA and AB respectively. If AC = 21cm, BC = 29cm and AB = 30cm, find the perimeter of the quadrilateral ARPQ?

a. 20cm

b. 80cm

c. 51cm

d. 52cm

6. Fill in the blanks:

If in a parallelogram its diagonals bisect each other at right angles and are equal, then it is a________.

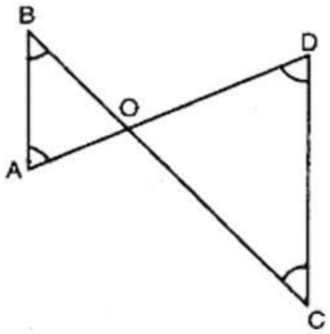
7. Fill in the blanks:

If the two non-parallel sides of a trapezium are equal, then it is called an _________ trapezium.

8. ABCD is a parallelogram. If its diagonals are equal, then find the value of $\angle$ABC.

9. In a parallelogram PQRS, if $\angle P = (3x - 5)^{o}$ and $\angle Q = (2x + 15)^{o}$. Find the value of x.

10. In figure, $\angle B < \angle A$ and $\angle C < \angle D$. Show that AD < BC.



11. If the angles of a triangle are in the ratio 1 : 2 : 3, determine three angles.

12. In $\triangle ABC$, if $\angle A = 120^{o}$ and AB = AC. Find $\angle B$ and $\angle C$.

13. Show that the line segments joining the mid-points of the opposite sides of a quadrilateral bisect each other.

14. PQ and RS are two equal and parallel line-segments. Any point M not lying on PQ or RS is joined to Q and S and lines through P parallel to QM and through R parallel to SM meet at N. Prove that line segments MN and PQ are equal and parallel to each other.

15. Show that the line segments joining the mid-points of opposite sides of a quadrilateral bisect each other.

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Solution

1. (a) 11.2cm

   Explanation:

   Let AE = x and EB = 3x , AF = y and FC = 3y.

   EF = 2.8 cm

   AE + AF = 2.8 implies x + y = 2.8

   BC = CF + FA + AE + EB

   = 3y + y + x + 3x

   = 4 (x + y) = 4 (2.8) = 11.2 cm

2. (b) Diagonals of ABCD are equal and perpendicular

   Explanation: A quadrilateral formed by joining the mid points of a square is a square. So, ABCD is a square. In Square, diagonals are equal and perpendicular.

3. (a) E is the mid-Point of AC

   Explanation: By the converse of Mid Point Theorem, which states that," If a line segment is drawn passing through the midpoint of any one side of a triangle and parallel to another side, then the line segment bisects the remaining third side.

4. (d) EC

   Explanation: By midpoint theorem of a triangle E is the midpoint of AC, hence AE = EC

5. (c) 51cm

   Explanation:

   Given:

   A B C is a triangle .

   P Q R are the mid points of sides BC , CA nad AB .

   AC = 21 cm

   BC = 29 cm

   AB = 30 cm

To find :

perimeter of quadrilateral ARQP ?

Q is the mid point of AC

P is the mid point of BC

QP is parallel to AB

QP = half of AB (according to mid point theorem)

AB = 30 cm , QP = 15 CM (QP is half of BA) (proved above)

R is the mid point of side AB

QP is also parallel to AR (half of side AB)

PR is parallel to AC

PR = half of AC (according to mid point theorem)

AC = 21 cm , PR = 10.5 cm (PR is half of AC) (proved above)

PR is parallel to AQ (AQ is half of AC)

Since , in quadrilateral ARQP both the opposite sides are parallel it is a parallelogram.

Therefore , ARQP is a parallelogram .

WE know that

In parallelogram , opp sides are equal .

Therefore ,

PR = AQ = 10.5 cm

QP = AR = 15 cm

10.5 cm + 10.5 cm + 15 cm + 15 cm = 51 cm .

Therefore the perimeter of quadrilateral ARQP = 51 cm .

6. Square

7. isosceles

8. As diagonals of the parallelogram ABCD are equal, hence it is a rectangle. We know that, each angle of the rectangle is 90° .

   $\therefore \angle ABC = 90^o$

9. $\angle P + \angle Q = 180^\circ$ (Angles on the same side of a transversal are supplementary)

   $\Rightarrow \ 3x - 5 + 2x + 15 = 180^\circ$

   $5x + 10 = 180^o$

   $\Rightarrow 5x + 170^o \Rightarrow x = 34^o$

10. In $\triangle AOB$,

    $\angle B < \angle A$ [Given]

    $\Rightarrow OA < OB$ ...(i) [Side opposite to greater angle is longer]

    In Δ COD,

    $\angle C < \angle D$ [Given]

    $\Rightarrow OD < OC$ ...(ii) [Side opposite to greater angle is longer]

    Adding eq. (i) and (ii),

    OA + OD < OB + OC

    $\Rightarrow AD < BC$

11. Let the angles be x, 2x, 3x

    $\therefore x + 2x + 3x = 180^o$ (sum of all angles of a triangle)

    $\Rightarrow 6x = 180^o$

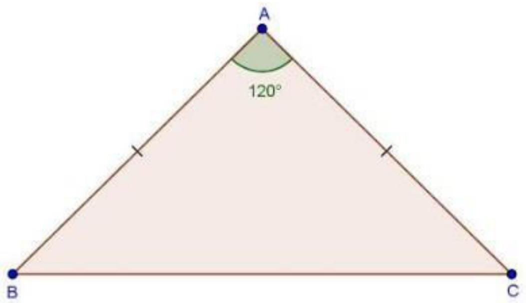
    $\Rightarrow x = 30^o$

    Since $x = 30^o$

    $2x = 2 \times 30^o = 60^o$

    $3x = 3 \times 30^o = 90^o$

    $\therefore$ angles are $30^o, 60^o, 90^o$

12. 

In $\triangle$ABC

$\because$ AB = AC

$\Rightarrow \angle B = \angle C$ = x [Angle opposite to equal sides are equal]

Now in $\triangle$ABC,

$\angle A + \angle B + \angle C = 180^\circ$

$\Rightarrow 120^\circ + x + x = 180^\circ$

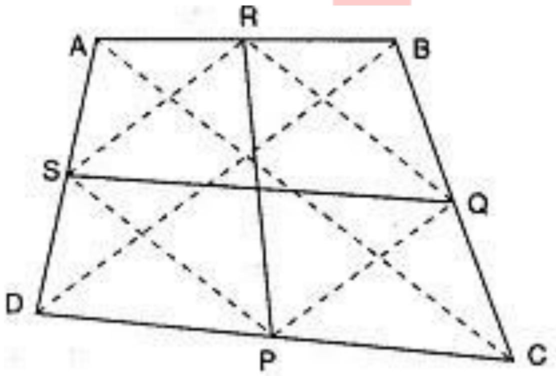
$\Rightarrow 2x = 180^\circ - 120^\circ$

$\Rightarrow 2x = 60^\circ$

$\Rightarrow x = 30^\circ$

$\Rightarrow \angle B = \angle C = 30^\circ$

13. ABCD is a quadrilateral P, Q, R and S are the mid-points of the sides DC, CB, BA and AD respectively.



To prove : PR and QS bisect each other.

Construction : Join PQ, QR, RS, SP, AC and BD.

Proof : In $\triangle$ABC,

As R and Q are the mid-points of AB and BC respectively.

$\therefore$ RQ || AC and RQ $= \frac{1}{2}$ AC

Similarly, we can show that

PS || AC and PS = $\frac{1}{2}$AC

$\therefore$ RQ || PS and RQ = PS.

Thus a pair of opposite sides of a quadrilateral PQRS are parallel and equal.

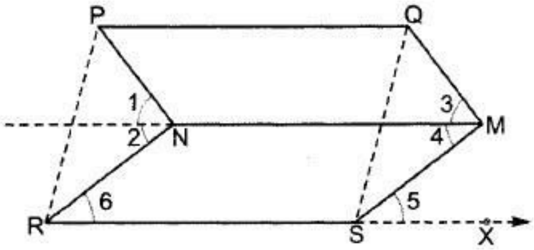
$\therefore$ PQRS is a parallelogram.

Since the diagonals of a parallelogram bisect each other.

$\therefore$ PR and QS bisect each other.

14. **Given**: PQ = RS, PQ $\parallel$ RS, PN $\parallel$ QM, RN $\parallel$ MS

To prove: MN = PQ, MN $\parallel$ PQ



Proof: Since PQ = RS and PQ $\parallel$ RS, therefore PQSR is a parallelogram.

$\Rightarrow$ PR = QS, PR $\parallel$ QS

Since PN $\parallel$ QM and MN is the transversal, we have

$\angle 1 = \angle 3$ (Corresponding angles) .... (i)

Similarly, RN $\parallel$ MS, we have

$\angle 2 = \angle 4$ .... (ii)

Adding (i) and (ii), we obtain

$\angle 1 + \angle 2 = \angle 3 + \angle 4$ i.e., $\angle PNR - \angle QMS$

Again, $\angle PRS = \angle QSX$ ....(Corresponding angles as PR $\parallel$ QS)

and $\angle 6 = \angle 5$ ....(Corresponding angles as RN $\parallel$ SM)

Subtracting the above two equations, we get

$\angle PRS - \angle 6 = \angle QSX - \angle 5$ i.e., $\angle PRN = \angle QSM$

Now, in $\angle$PNR and $\angle$QMS,

PR - QS (Opp. sides of $\parallel$gm)

$\angle PNR = \angle QMS$ (Proved above)

$\angle PRN = \angle QSM$

Therefore, By AAS congruence criterion, we have

$\triangle PNR = \triangle QMS$

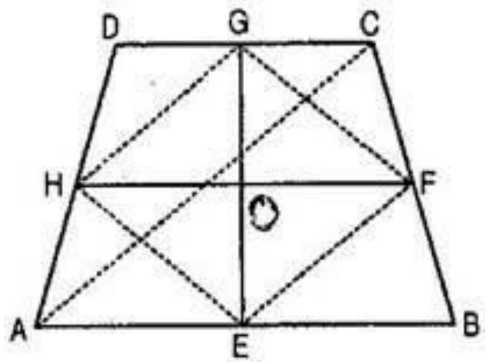
$\Rightarrow$ PN = QM (CPCT)

Also, PN $\parallel$ QM (Given)

Therefore, PNMQ is a parallelogram.

$\Rightarrow$ PQ $\parallel$ MN and PQ = MN.

15. Given: A quadrilateral ABCD in which EG and FH are the line-segments joining the mid-points of opposite sides of a quadrilateral.



To prove: EG and FH bisect each other.

Construction: Join AC, EF, FG, GH and HE.

Proof: In ABC, E and F are the mid-points of respective sides AB and BC.

$\therefore$ EF || AC and EF = $\frac{1}{2}$ AC.......... (i)

Similarly, in ADC,

G and H are the mid-points of respective sides CD and AD.

$\therefore$HG || AC and HG = $\frac{1}{2}$ AC.......... (ii)

From eq. (i) and (ii), we get,

EF || HG and EF = HG

$\therefore$EFGH is a parallelogram.

Since the diagonals of a parallelogram bisect each other, therefore line segments (i.e. diagonals) EG and FH (of parallelogram EFGH) bisect each other.

Hence, Proved.