CBSE Test Paper 05
CH-8 Quadrilaterals

1. D and E are the mid-points of the sides AB and AC res. Of $\triangle ABC$. DE is produced to F. To prove that CF is equal and parallel to DA, we need an additional information which is:
    a. AE = EF
    b. DE = EF
    c. $\angle ADE = \angle ECF$
    d. $\angle DAE = \angle EFC$
2. A diagonal of a parallelogram divides it into
    a. Two congruent triangles
    b. two similes triangles
    c. none of these
    d. two equilateral triangles
3. What is the length of PQ in a trapezium ABCD in which AB||DC and P and Q are mid-points on AD and BC respectively?
    a. $\frac{1}{2}$ (AB + BD)
    b. $\frac{1}{2}$ (AB + CD)
    c. $\frac{1}{2}$ AB
    d. $\frac{1}{2}$ CD
4. The Quadrilateral forms by joining the mid-points of the sides of a Quadrilateral

PQRS, taken in order, is a Rhombus if

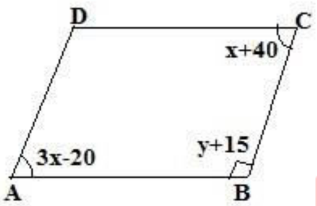
a. None of these

b. PQRS is a Parallelogram

c. Diagonals of PQRS are equal

d. PQRS is a Rhombus

5. In a parallelogram ABCD if angle A = (3x - 20), angle B = (Y + 15), angle C = (x + 40) then find the value of x and y



a. x = 30° and y = 65°

b. x = 30° and y = 95°

c. x = 32° and y = 95°

d. x = 38° and y = 85°

6. Fill in the blanks:

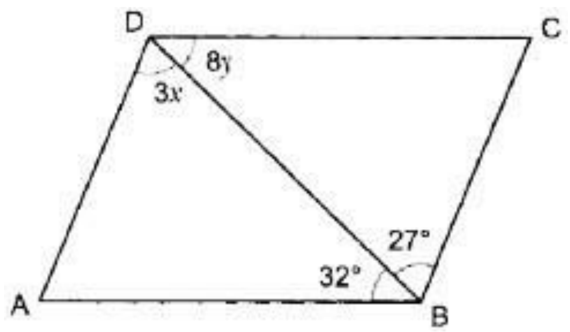
Three angles of a quadrilateral are respectively equal to 110^{o}, 60^{o}, and 80^{o}, then its fourth angle will be________.

7. Fill in the blanks:

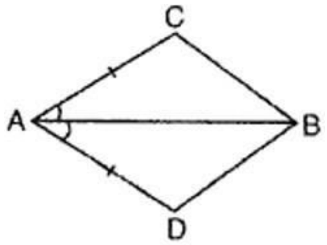
The consecutive angles of a parallelogram are________.

8. Three angles of a quadrilateral are respectively equal to 110°, 60° and 80°. Find its fourth angle.

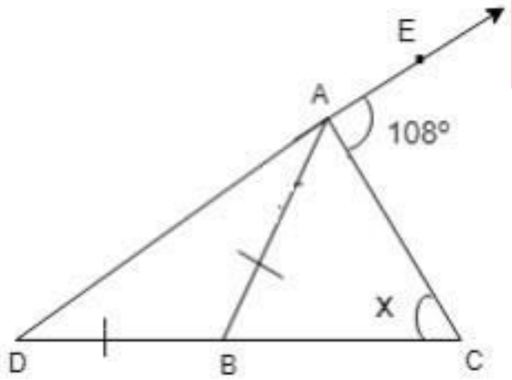
9. In the given figure, ABCD is a parallelogram. Find x and y



10. In quadrilateral ABCD (See figure). AC = AD and AB bisects $\angle$A. Show that $\triangle$ ABC $\cong$ $\triangle$ABD. What can you say about BC and BD?



11. In a given figure, AB divides $\angle$DAC in the ratio 1 : 3 and AB = DB. Determine the value of x.



12. In a $\triangle$ABC, AD bisects $\angle$A and $\angle$C > $\angle$B. Prove that $\angle$ADB > $\angle$ADC.

13. In a parallelogram ABCD, AB = 10 cm and AD = 6 cm. The bisector of $\angle$A meets DC in E. AE and BC produced meet at F. Find the length of CF.

14. ABCD is a rectangle in which diagonal BD bisects $\angle B$. Show that ABCD is a square.

15. Prove that the four triangles formed by joining in pairs, the mid-points of three sides of a triangle, are congruent to each other.

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Solution

1. (b) DE = EF

   Explanation: If DE = EF then triangle AED become congruent to triangle CEF by SSS congruence rule.

   By CPCT, angle ECF = angle EAD which forms a pair of an alternate angles.

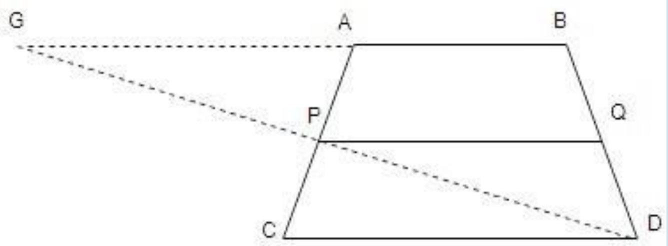
   which proves that AD is parallel to CF

2. (a) Two congruent triangles

   Explanation: By SSS congruence condition; opposite sides are equal and common diagonal.

3. (b) $\frac{1}{2}$(AB + CD)

   Explanation: Join PD and Produce it to meet BA at G.

   In $\triangle$PCD and $\triangle$APG,

   $\angle$DPC = $\angle$GPA,

   $\angle$PDC = $\angle$AGP

   $\therefore \triangle PCD \cong \triangle APG$

   CD = AG and PD = PG

   In $\triangle$BGD,

   P is the mid - point of GD

   Q is the mid -point of BD

   Therefore, By mid - point theorem, PQ $||$ AB

   and PQ = $\frac{1}{2}$(GB)

   but GB = GA + AB = CD + AB

   $\therefore PQ = \left(\frac{1}{2}\right)(AB + CD)$

4. (c) Diagonals of PQRS are equal

Explanation: A quadrilateral formed by joining the mid points of the sides of the Rectangle is a rhombus. In rectangle , diagonals are equal.

5. (b) $x = 30°$ and $y = 95°$

Explanation:

Given, ABCD is a parallelogram.

So,

$\angle A = \angle C$ (Opposite angles of parallelogram are equal in size)

$\Rightarrow 3x - 20 = x + 40$

$\Rightarrow 3x - x = 40 + 20$

$\Rightarrow 2x = 60$

$\Rightarrow x = 30°$

Thus, $\angle A = 3 \times 30 - 20 = 90 - 20 = 70°$

Now, $\angle A + \angle B = 180°$ (Sum of interior angles of parallelogram is 180°)

$\Rightarrow 70° + \angle B = 180°$

$\Rightarrow \angle B = 180° - 70°$

$\Rightarrow \angle B = 110°$

$\Rightarrow y + 15 = 110°$

$\Rightarrow y = 95°$

Hence, $x = 30°$ and $y = 95°$

6. 110^o

7. Supplementary

8. Let fourth angle = x^o

Sum of angles of a quadrilateral = 360^o

$\Rightarrow 110^o + 60^o + 80^o + x = 360^o$

$\Rightarrow x = 360^o - 250^o = 110^o$

9. $AB || DC$ (Opposite sides of parallelogram)

$\therefore 8y = 32^o$ and $3x = 27^o$ (Alternate angles)

$\Rightarrow y = 4^o$ and $x = 9^o$

10. Given: In quadrilateral ABCD, AC = AD and AB bisects $\angle A$.

To prove: $\angle ABC \cong$ ABD

Proof: In $\triangle ABC$ and $\triangle ABD$,

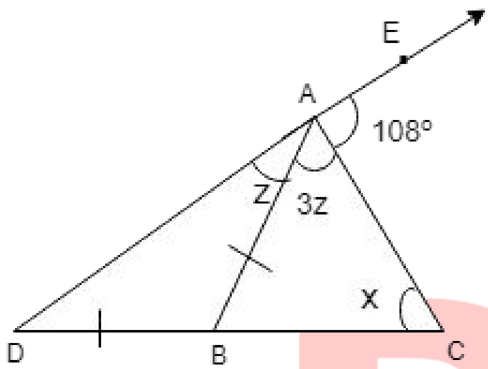
AC = AD [Given]

$\angle BAC = \angle BAD$ [$\because$ AB bisects $\angle A$]

AB = AB [Common]

$\therefore \triangle ABC \cong \triangle ABD$ [By SAS congruency]

Thus BC = BD [By C.P.C.T.]

11. 

Given: In a given figure, AB divides $\angle DAC$ in the ratio 1 : 3 and AB = DB.

To find : x.

Solution: Let the ratio be z and 3z.

$\angle CAE = 108^o$

Also $\angle DAC + \angle CAE = 180^o$ (Linear pair)

$\Rightarrow \angle DAC + 108^o = 180^o$

$\Rightarrow \angle DAC = 180^o - 108^o$

$\Rightarrow \angle DAC = 72^o$

$\Rightarrow z + 3z = 72^o$ [$\angle DAC = z + 3z$]

$\Rightarrow 4z = 72^o$

$\Rightarrow z = 18^o$

$\Rightarrow \angle BAC = 3z = 3 \times 18^o = 54^o$

$\Rightarrow \angle BDA = \angle BAD = z$ ($\because$ AB = DB)

$\Rightarrow \angle ADC = \angle BAD = 18^o$

Now, In $\triangle ADC$,

$\angle ADC + \angle ACD + \angle CAD = 180^o$ [angle sum property for triangle]

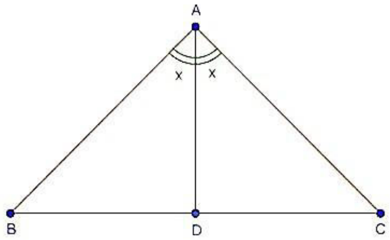
$\Rightarrow 18^o + x + 4z = 180^o$

$\Rightarrow x + 18^o + 72^o = 180^o$

$\Rightarrow x + 90^o = 180$

$\Rightarrow x = 90^o$

12.



$\because \angle C > \angle B$ (given)

$\Rightarrow \angle C + x > \angle B + x$ (adding both sides x)

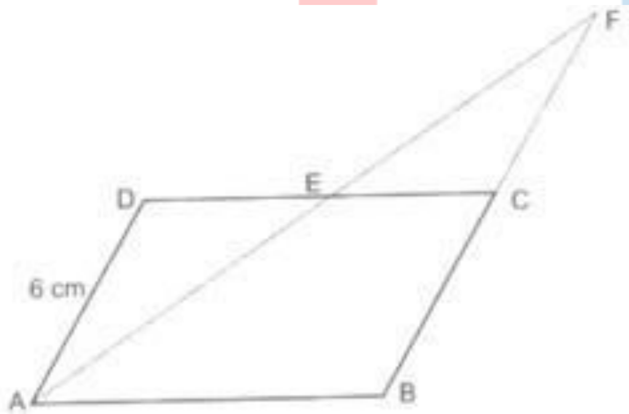
$\Rightarrow 180^o - \angle ADC > 180^o - \angle ADB$

$\Rightarrow -\angle ADC > -\angle ADB$

$\Rightarrow \angle ADB > \angle ADC$

Hence proved.

13. It is given that ABCD is a parallelogram, in which AB = 10 cm and AD = 6 cm. The bisector of $\angle A$ meets DC in E. AE and BC produced meet at F.



From the figure we have

$\angle BAE = \angle EAD$ ....(1) [$\because$ bisect of $\angle A$]

$\angle EAD = \angle EFB$ ....(2) [Alt. $\angle s$]

Therefore, from (1) and (2), we obtain

$\angle BAE = \angle EFB$

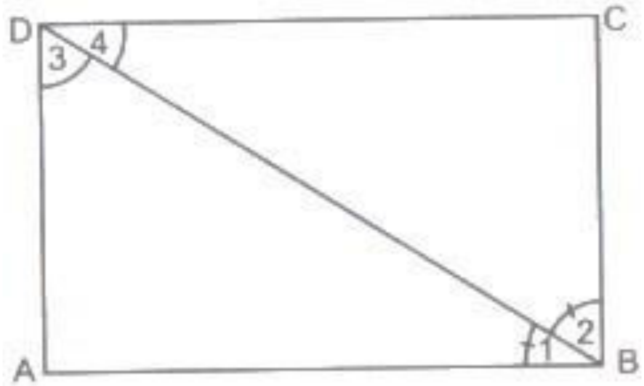
∴ BF = AB ....[∵ Sides opposite to equal $\angle s$ are equal]

⇒ BF = 10 cm ......[∵ AB = 10 cm]

⇒ BC + CF = 10 cm ⇒ 6 cm + CF = 10 cm [∵ BC = AD = 6 cm, opposite sides of a || gm]

⇒ CF = 10 – 6 cm = 4 cm

14. Given: A rectangle ABCD in which diagonal BD bisects $\angle B$.



To prove: ABCD is a square.

Proof: DC||AB [∵ Opposite sides of a rectangle are parallel]

⇒ $\angle 4 = \angle 1$ ..(1) [Alternate interior angles]

Similarly, $\angle 3 = \angle 2$ ...(2) [Alternate interior angles]

And $\angle 1 = \angle 2$...(3) [Given]

From equation (1), (2) and (3), we get

$\angle 3 = \angle 4$

In ΔBDA and ΔBDC, we have

$\angle 1 = \angle 2$ [Given]

BD = BD [Common side]

$\angle 3 = \angle 4$ [proved above]

So, By ASA criterion of congruence, we have

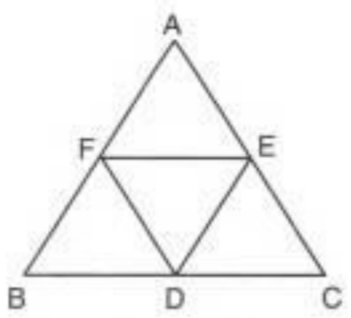
$\Delta BDA \cong \Delta BDC$

∴ AB = BC [CPCT]

So, ABCD is a square.

Hence, proved.

15. A triangle ABC and D, E, F are the mid-points of sides BC, CA and AB respectively.



To prove: △AFE ≅ △FBD ≅ △EDC ≅ △DEF.

Since the segment joining the mid-points of the sides of a triangle is half of the third side. Therefore,

DE = $\frac{1}{2}$ AB ⇒ DE = AF = BF ...(i)

EF = $\frac{1}{2}$ BC ⇒ EF = BD = CD ...(ii)

DF = $\frac{1}{2}$ AC DF ⇒ AE = EC ...(iii)

Now, in △s DEF and AFE, we have,

DE = AF [From (i)]

DF = AE [From (ii)]

and, EF = EF [Common]

So, by SSS criterion of congruence, we obtain

△DEF ≅ △AFE

Similarly, we have △DEF ≅ △FBD and △DEF ≅ △EDC

Hence, △AFE ≅ △FBD ≅ EDC ≅ △DEF