SHIKSHA CLASSES

Sub. : Maths | **Answer Paper** | **Total Marks :30**

Std. IX (CBSE) | **8 : Quadrilaterals**

SECTION - A (Each 1 Marks)

Multiple Choice Questions. (MCQs)

Q.1 : A diagonal of a parallelogram divides it into:

Ans : d) All of the above

Q.2 : ABCD is a rhombus such that ∠ACB = 40° then ∠ADB is :

Ans : c) 50°

Q.3 : Two consecutive angles of a parallelogram are in the ratio 1:3 then the smaller angle is:

Ans : d) 45°

Q.4 : Perimeter of quadrilateral is _________ than sum of its diagonals.

Ans : a) greater

Q.5 : The figure obtained by joining the midpoint of the sides of a rhombus, taken in order is:

Ans : b) a rectangle

Q.6 : A trapezium has:

Ans : a) One pair of opposite sides parallel

Q.7 : The angles of a quadrilateral are in the ratio 4: 5: 10: 11. The angles are:

Ans : b) 48°, 60°, 120°, 132°

Q.8 : The quadrilateral formed by joining the mid-points of the sides of a quadrilateral PQRS, taken in order, is a rectangle, if

Ans : c) Diagonals of PQRS are perpendicular

Q.9 : Three angles of a quadrilateral are 75º, 90º and 75º. The fourth angle is

Ans : d) 120º

For question number 10 to 11 two statement are given one labeled Assertion and other labeled Reason select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below

Q.10 : Assertion: A parallelogram consists of two congruent triangles.

Reason : Diagonal of a parallelogram divides it into two congruent triangles.

Ans : a) both Assertion and reason are correct and reason is correct explanation for Assertion.

Q.11 : Assertion: Two opposite angles of a parallelogram are (3x-2)°and (50-x)° The measure of one of the angle is 37°

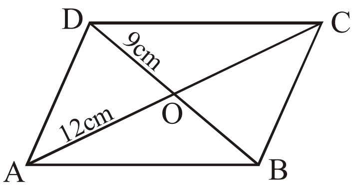
Reason : Opposite angles of a parallelogram are equal.

Ans : a) both Assertion and reason are correct and reason is correct explanation for Assertion.

Section B (Each 2 Marks)

Q.12 : If the diagonals of a rhombus are 9 cm and 12 cm. Find its sides.

Ans : Let □ ABCD is a rhombus in which AC = 12 and BD = 9 cm intersect at 'O'



$\therefore$ $OA = OC = \frac{1}{2}AC = \frac{1}{2} \times 12 = 6$ cm and

$OB = OD = \frac{1}{2}BD = \frac{1}{2} \times 9 = 4.5$ cm

Now in ΔAOB,

$\angle AOB = 90°$, $OA = 12$; $OB = 4.5$

By Pythagoras theorem

$AB^2 = AO^2 + OB^2$

$\Rightarrow AB^2 = 6^2 + (4.5)^2$

$= 36 + 20.25$

$\Rightarrow AB^2 = 56.25$

$\Rightarrow AB = \sqrt{56.25} = 7.5$ cm

Thus sides of rhombus are 7.5 cm.

Q.13 : Show that if the diagonals of quadrilateral bisect each other at right angles. Then it is a rhombus.

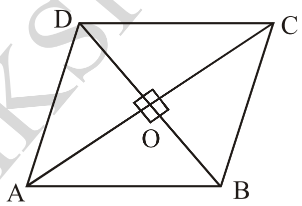
Ans : **Given :** AC and BD are diagonals of □ ABCD

$AC \perp BD$ and $AO = OC$ and $BO = OD$

'O' is intersection point of AC and BD.

To prove : □ ABCD is a rhombus.

Proof : In ΔAOB and ΔCOB



$AO = OC$ .... (given)

$\Delta AOB = \angle COB$ ..... (each 90°)

$OB = OB$ ..... (common)

$\therefore$ $\Delta AOB \cong \Delta COB$ .... (By SAS)

Therefore $AB = BC$ .... (1).. (c.p.c.t.)

Similarly, In ΔAOB and ΔAOD

$AO = OA$ ..... (common)

$OB = OD$ ..... (given)

$\angle AOB = \angle AOD$ ..... (each 90°)

$\therefore$ $\Delta AOB \cong \Delta AOD$ .... (by SAS)

Therefore $AB = AD$ ..... (2) ... (c.p.c.t.)

and In ΔAOD and ΔCOD

$AO = OC$ .... (given)

$\angle AOD = \angle COD$ ...(each 90°)

$OD = OD$ .... (common)

$\therefore$ $\Delta AOD \cong \Delta COD$ ... By SAS

Therefore $AD = CD$ ... (3) (c.p.c.t.)

Thus, $AB = BC = CD = AD$ ...(From 1, 2 & 3)

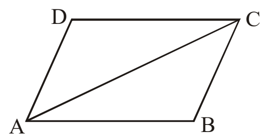
Hence, □ ABCD is a rhombus.

OR

Prove that opposite angles of a parallelogram are equal.

Ans : **Given :** □ ABCD is a parallelogram

$\therefore$ $AB = CD$ and $AD = BC$



To prove : $\angle B = \angle D$ and $\angle A = \angle C$

Construction : Join AC

Proof : In ΔABC and ΔCDA

$AB = CD$ ..... (given)

$BC = AD$ ..... (given)

$AC = AC$ .... (common)

$\therefore$ $\Delta ABC \cong \Delta CDA$ .... (By SSS)

Therefore $\angle B = \angle D$ ... (c.p.c.t.)

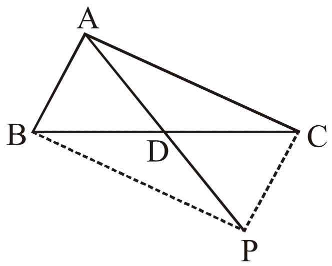
Similarly we can prove $\angle A = \angle C$

Hence, opposite angles of a parallelogram are equal.

Section C (Each 3 Marks)

Q.14 : In a triangle ABC median AD is produced to P such that AD = DP. prove that ABPC is a parallelogram.

Ans : **Given :** In ΔABC, median AD is produced to P such that AD = DP.



To prove : ABPC is a parallelogram.

Proof : Since AD is a median.

Therefore, D is midpoint of BC.

So, BD = DC.... (1)

In ΔABD and ΔPDC, we have,

BD = DC ... (from 1)

$\angle ADB = \angle PDC$...(Vertically opp.angles)

and AD = DP ..... (Given)

$\therefore$ $\Delta ABD \cong \Delta PDC$ .... (By SAS)

Therefore AB = CP

and $\angle ABD = \angle PCD$ ... (2) ... (c.p.c.t.)

The transversal BC intersects AB and CP at B and C respectively such that

$\angle ABC = \angle PCB$

i.e. Alternate interior angles are equal

So, AB || CP ...... (3)

Thus, in quadrilateral ABPC, we have

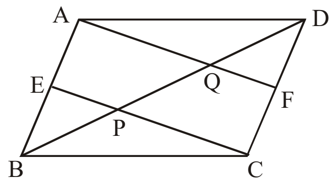
AB = CP and AB || CP ...(From (2) & (3))

Hence, ABPC is a parallelogram.

OR

$\square$ ABCD is a parallelogram. E and F are the mid points of the sides AB and CD respectively. Prove that the segments CE and AF trisect (divide into three equal parts) the diagonal BD.

Ans : **Given :** $\square$ ABCD is a parallelogram. E and F are the midpoints of the sides AB and CD respectively.



To prove : BP = PQ = QD

Proof : $\square$ ABCD is a parallelogram

$\therefore$ AB = DC and AB || DC.

E and F are midpoints of AB and DC respectively.

$\therefore$ AE || CF

Therefore AECF is a parallelogram

$\Rightarrow$ EC || AF .... (1)

In ΔDPC, F is midpoint of DC

and FQ || CP ..... (From (1))

$\therefore$ Q is mid point of PD

or PQ = QD ..... (2)

Similarly, In ΔABQ,

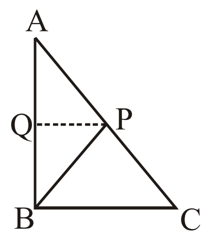
BP = PQ ...... (3)

From (2) & (3)

BP = PQ = QD Proved.

Q.15 : ΔABC is a right-angled triangle right angled at B; and P is the mid point of AC. Prove that PB = PA = $\frac{1}{2}$ AC.

Ans : **Given :** ΔABC is a right angled triangle right angled at B, P is midpoint of CA



To prove : PB = PA = $\frac{1}{2}$ AC

Construction : Through P, draw a line parallel to BC, meeting AB in Q.

Proof : Since P is mid point of AC

and PQ || BC ..... (construction)

$\therefore$ Q is the mid point of AB .... (Converse of midpoint theorem)

$\therefore$ AQ = QB.... (1)

Now In ΔABC, $\angle ABC = 90°$

and PQ $\parallel$ BC

$\therefore$ $\angle PQA = \angle PQB = 90°$ ....(2)

In ΔPPQ and ΔBPQ

AQ = QB ..... (from (1))

$\angle PQA = \angle PQB$ .... (from (2))

QP = QP .... (common)

$\therefore$ $\Delta APQ \cong \Delta BPQ$ .... (By SAS)

Therefore PA = PB ...(3)..(c.p.c.t.)

But P is mid point of AC

$\therefore PA = PC = \frac{1}{2}AC$ .... (4)

Hence, $PB = PA = \frac{1}{2}AC$ ... (From (3) & (4))

Proved.

Section D (5 M)

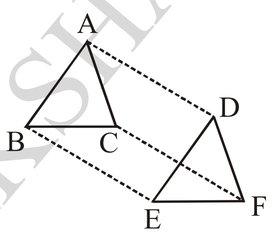
Q.16 : In ΔABC and ΔDEF, AB = DE, AB $\parallel$ DE, BC = EF and BC $\parallel$ EF, vertices A, B and C are joined to vertices D, E and F respectively show that.

i) ☐ ABED is a parallelogram

ii) ☐ BEFC is a parallelogram

iii) AD $\parallel$ CF and AD = CF

iv) ☐ ACFD is a parallelogram.



Ans : **Given :** ΔABC and ΔDEF such that

AB = DE and AB $\parallel$ ED also,

BC = EF and BC $\parallel$ EF

To prove : (i) ☐ ABED is a parallelogram

(ii) ☐ BEFC is a parallelogram

(iii) AD $\parallel$ CF and AD = CF

(iv) ☐ ACFD is a parallelogram.

Proof : (i) Consider the quadrilateral ABED

We have : AB = DE and AB $\parallel$ DE

So, ABED is a parallelogram

(One pair of opposite sides are equal and parallel)

(ii) Now consider quadrilateral BEFC;

We have, BC = EF and BC $\parallel$ EF

So, BEFC is a parallelogram.

(One pair of opposite sides are equal and parallel)

(iii) AD = BE and AD $\parallel$ BE ..(1)

.....($\because$ ABED is a $\parallel$gm)

and CF = BE and CF $\parallel$ BE ...(2)

.....($\because$ BEFC is a $\parallel$gm)

From (1) and (2), we have

AD = CF and AD $\parallel$ CF

(iv) Since AD = CF and AD $\parallel$ CF, therefore one pair of opposite sides are equal and parallel

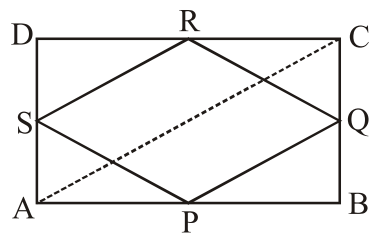
So, ACFD is a parallelogram.

OR

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

Ans : **Given :** A rectangle ABCD in which P, Q, R, S are midpoint of sides AB, BC, CD

and AD respectively.



To prove : □ PQRS is rhombus.

Construction : Join AC.

Proof : In ΔABC, P and Q are the midpoint of sides AB and BC respectively.

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

.... (mid point theorem)

In ΔADC, R and S are the mid point of CD and AD respectively.

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

From (1) and (2), we get

PQ || SR and PQ = SR

PQRS is a parallelogram. ...... (3)

$\because$ ABCD is a rectangle.

$\Rightarrow$ AD = BC $\Rightarrow \frac{1}{2}$ AD = $\frac{1}{2}$ BC

$\Rightarrow$ AS = BQ ...... (4)

In ΔAPS and ΔBPQ

AP = BP ... (P is the mid point AB)

$\angle PAS = \angle PBQ$ .... (each 90°)

and AS = BQ .... (From (4))

$\therefore$ $\Delta APS \cong \Delta BPQ$ .... (By SAS)

$\Rightarrow$ PS = PQ ..... (5) ... (c.p.c.t.)

From (3) and (5) we obtain that PQRS is a parallelogram such that PS = PQ

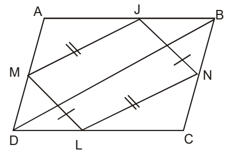
i.e. two adjacent sides are equal

Hence PQRS is a rhombus. Proved.

SECTION - E

Q.17 : Case Study : (Any four)

A class teacher gave students coloured paper in the shape of quadrilateral she asks to make a prallelogram from it using paper folding



i) One angle of a quadrilateral is 108^0 and the remaining three angles are equal then each of the three equal angles.

Ans : c) 84^0

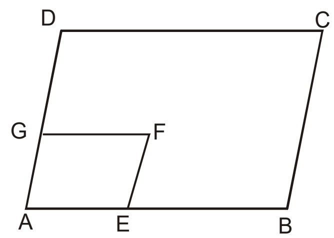
ii) How can a parallelogrm be formed by using paper folding?

Ans : b) By joining mid points of sides of a quadrilateral

iii) The quadrilateral formed by joining the mid points of the sides of a quadrilateral PQRS taken in order is rectangle if.

Ans : c) diagonals of PQRS are perpendicular

iv) In the fig. ABCD and AEFG are two parallelogram. If $\angle C = 60^0$ then $\angle F$ is



Ans : b) 60^0

v) The angles of the quadrilateral are in the ratio 2 : 5 : 4 : 1 which of the following is true?

Ans : d) both the largest angle in the quadrilateral is 150^0 and smallest angle is 30^0

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