Short Answer Questions – II – 3 Marks

Que 1. The angles of a quadrilateral are in the ratio 1:2:3:4. Find all the angles of the angles of the quadrilateral.

Sol. Let the angles of the quadrilateral be x, 2x, 3x and 4x.

Since the sum of the angles of quadrilateral is 360^o.

Therefore, $x + 2x + 3x + 4x = 360^o$

$$10x = 360^o \quad \Rightarrow \quad x = 36^o$$

Thus, required angles are

36^o, $2 \times 36^o = 72^o$, $3 \times 36^o = 108^o$, $4 \times 36^o = 144^o$

Que 2. D, E and F are the mid-point of the sides BC, CA and AB, respectively of an equilateral triangle ABC. Show that ΔDEF is also an equilateral triangle.

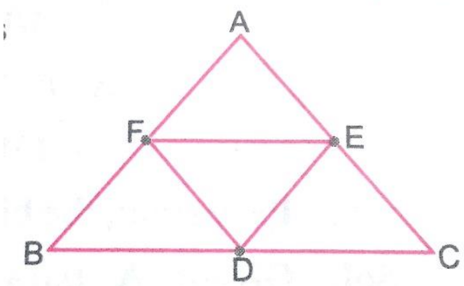

Fig. 8.35

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

$\therefore$ $DE = \frac{1}{2} AB$, $EF = \frac{1}{2} BC$ and $FD = \frac{1}{2} CA$ ...(i)

Now, in equilateral ΔABC

$AB = BC = CA$

$\Rightarrow$ $\frac{1}{2} AB = \frac{1}{2} BC = \frac{1}{2} CA$ $\Rightarrow$ $DE = EF = FD$ [From eq. (i)]

Thus, all the sides of triangle DEF are equal. Hence, triangle DEF is an equilateral triangle.

Que 3. In Fig. 8.36, P is the mid-point of side BC of parallelogram ABCD, such that ∠1 = ∠2. Prove that AD = 2CD.

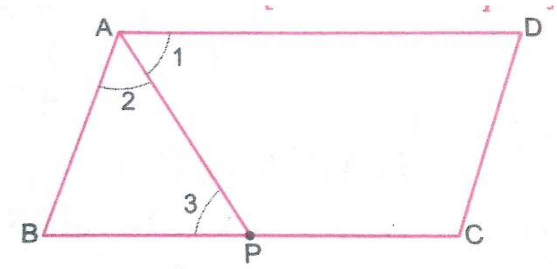

Fig. 8.36

Sol. In parallelogram ABCD, we have AD||BC

Also AP is the transversal

∴ ∠1 = ∠3 (Alternate interior angles)

∠1 = ∠2 (Given)

⇒ ∠2 = ∠3

⇒ AB = BP (sides opposite to equal angles)

Also, BC = 2BP (∵ P is the mid-point)

But AD = BC and BA = CD (Opposite sides of parallelogram)

Now, AD = BC = 2BP = 2AB

∴ AD = 2CD

Que 4. In Fig. 8.37, ABCD is a parallelogram and P, Q are the points on the diagonal BD such that BQ = DP. Show what APWQ is a parallelogram.

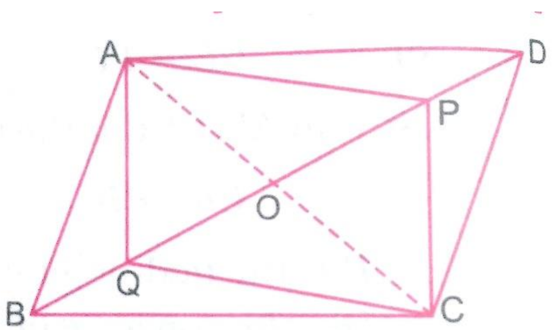

Fig. 8.37

Sol. Join AC, meeting BD to O.

Since the diagonals of a parallelogram bisect each other, we have

OA = OC

And OB = OD

Also BQ = PD (Given)

Now, OB – BQ = OD – PD

⇒ OQ = OP

Now, in quadrilateral APCQ, OA = OC and OP = OQ.

As the diagonals of the quadrilateral APCQ bisect each other.

∴ Quadrilateral APCQ is a parallelogram.

Que 5. In Fig. 8.38, AM and CN are perpendiculars to the diagonal BD of a parallelogram ABCD. Prove that AM = CN.

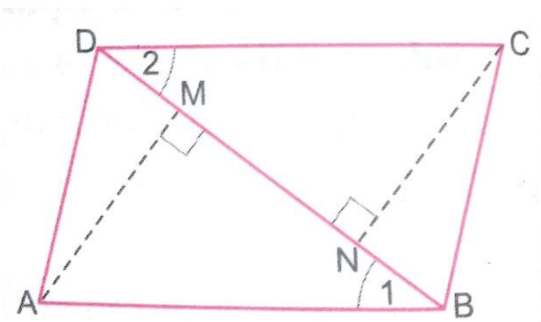

Fig. 8.38

Sol. As ABCD is a parallelogram

∴ AB||DC

Now AB||DC and transversal BD intersects them at B and D.

∴ ∠1 = ∠2 (Alternate interior angles)

Now, in triangle ABM and CDN, we have

∠1 = ∠2 (Prove above)

∠AMB = ∠CND (Each 90°)

AB = DC (Opposite sides of parallelogram)

∴ ΔABM ≅ ΔCDN (By AAS criterion of congruence)

∴ AM = CN (CPCT)

Que 6. Prove that, the bisector of any two consecutive angles of parallelogram intersect at right angle.

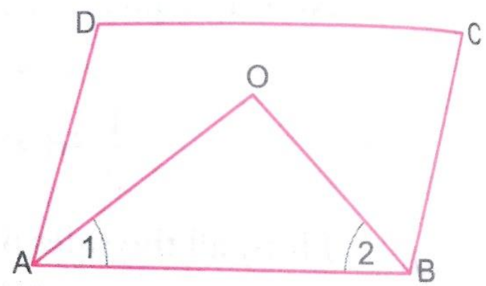

Fig. 8.39

Sol. Given: A parallelogram ABCD, such that the bisectors of consecutive angles A and B intersect at O.

To prove: $\angle AOB = 90^o$

Proof: As ABCD is a parallelogram, therefore AD||BC and AB is the transversal.

∴ $\angle DAB + \angle ABC = 180^o$

(Angles on the same side of the transversal are supplementary)

⇒ $\frac{1}{2}\angle DAB + \frac{1}{2}\angle ABC = \frac{180^o}{2}$ ⇒ $\angle 1 + \angle 2 = 90^o$

In ΔAOB, we have

$\angle 1 + \angle AOB + \angle 2 = 180^o$

⇒ $90^o + \angle AOB = 180^o$ [From (i)]

⇒ $\angle AOB = 90^o$

Que 7. In Fig. 8.40, Point M and N are taken on opposite sides AB and CD, respectively of a parallelogram ABCD such that AM = CN. Show that AC and MN bisect each other.

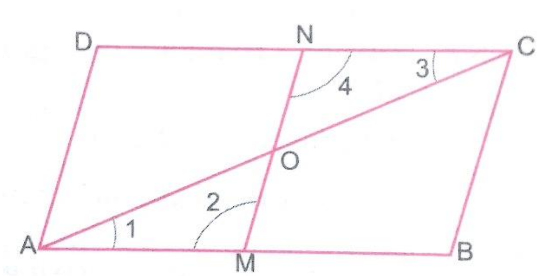

Fig. 8.40

Sol. Since, AB||CD

Therefore, in ΔAOM and ΔCON, we have

$\angle 1 = \angle 3$ (Alternate interior angles)

AM = CN (Given)

$\angle 2 = \angle 4$ (Alternate interior angles)

$\therefore$ $\Delta AOM \cong \Delta CON$ (By ASA congruence criterion)

$\Rightarrow$ AO = OC (CPCT)

And MO = NO (CPCT)

Hence, AC and MN bisect each other.