SHORT ANSWER QUESTIONS-II [3 marks]

Que 1. In Fig. 7.17, it is given that $AB = CF$, $EF = BD$ and $\angle AFE = \angle CBD$. Prove that $\Delta AFE \cong \Delta CBD$.

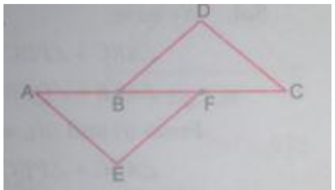


Fig. 7.17

Sol. In triangles AFE and CBD, we have

$AB = CF$

Adding BF on both the sides

$AB + BF = CF + BF$

$AF = BC$

Now in triangles AFE and CBD, we have $AF = CB$ (Proved above)

$\angle AFE = \angle CBD$ (Given)

And $EF = BD$ (Given)

$\therefore$ $\Delta AFE \cong \Delta CBD$ (SAS congruence criterion)

Que 2. Prove that angles opposite to equal sides of a triangle are equal.

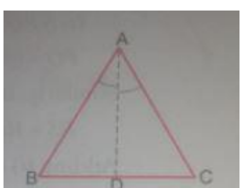


Fig. 7.18

Sol. **Given:** A ΔABC in which $AB = AC$.

To prove: $\angle B = \angle C$

Construction: Draw AD, the bisector of $\angle A$, to meet BC at D.

Proof: In ΔABD and ΔACD, we have

$AB = AC$ (Given)

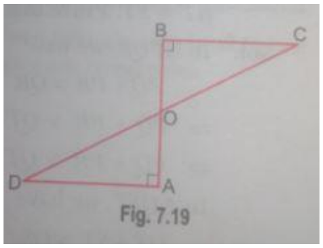
$\angle BAD = \angle CAD$ (By Construction)

$AD = AD$ (Common)

$\therefore \quad \Delta ABD \cong \Delta ACD$ (SAS Congruence criterion)

Hence, $\angle B = \angle C$ (CPCT)

Que 3. In Fig. 7.19, AD and BC are equal perpendicular to a line segment AB. Show that CD bisects AB.



Sol. In ΔOAD and ΔOBC, we have

$\angle AOD = \angle BOC$ (Vertically opposite angles)

$\angle OAD = \angle OBC$ (Each90^0)

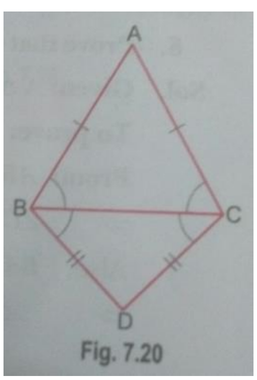
And, $AD = BC$

$\therefore \quad \Delta AOD \cong \Delta \text{BOC}$ (AAS congruence criterion)

$\Rightarrow \quad OA = OB$ (CPCT)

Thus, CD bisects AB.

Que 4. In Fig. 7.20, ABC and DBC are two isosceles triangles on the same base BC. Show that $\angle ABD = \angle ACD$.



Sol. In ΔABC, we have, $AB = AC$

$\Rightarrow \angle ACB = \angle ABC$ (Angles opposite to equal sides) …(i)

In $\Delta\ DBC$, we have

$BD = CD$

$\Rightarrow\ \angle DCB = \angle DBC$ (Angles opposite to equal sides) ...(ii)

Adding (i) and (ii), we get

$$\angle ACB + \angle DCB = \angle ABC + \angle DBC$$

$$\angle ACD = \angle ABD$$

Hence, $\angle ABD = \angle ACD$

Que 5. In Fig. 7.21, sides AB and AC of ΔABC are extended to points P and Q respectively. Also, $\angle PBC < \angle QCB$. Show that $AC > AB$.

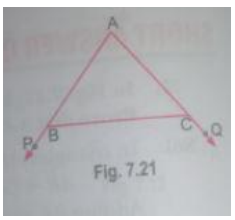


Fig. 7.21

Sol. We have,

$\angle ABC + \angle PBC = 180^0$ (Linear Pair) ...(i)

$\angle ACB + \angle QCB = 180^0$ (Linear Pair) ...(ii)

From (i) and (ii), we have

$\angle ACB + \angle QPBC = \angle ACB + \angle QCB$

But $\angle PBC < \angle QCB$ (Given)

$\therefore$ $\angle ABC > \angle ACB$

$\Rightarrow$ $AC > AB$ ($\because$ Side opposite to greater angle is larger)

Que 6. S is any point on side QR of a ΔPQR. Show that: $PQ + QR + RP > 2PS$.

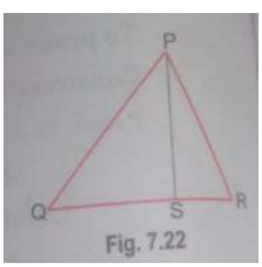


Fig. 7.22

Sol. Since sum of the two sides of a triangle is greater than the third side

$\therefore$ In ΔPQS, we have

$PQ + QS > PS$ ... (i)

Similarly, in ΔPRS, we have

$RS + RP > PS$ ... (ii)

Adding (i) and (ii), we get

$PQ + QS + RS + RP > PS + PS$

$\Rightarrow$ $PQ + (QS + RS) + RP > 2PS$

$\Rightarrow$ $PQ + QR + RP > 2PS$

Que 7. In Fig. 7.23, T is a point on side QR of ΔPQR and S is a point such that $RT = ST$. Prove that $PQ + PR > QS$.

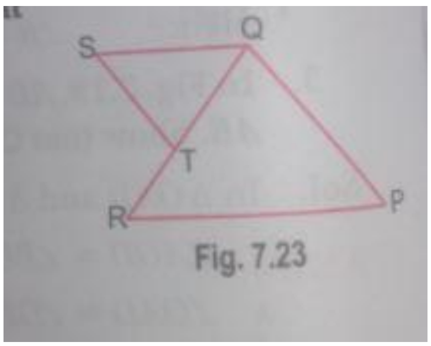


Fig. 7.23

Sol. In ΔPQR, we have

$PQ + PR > QR$

$\Rightarrow$ $PQ + PR > QT + RT$ $(\because QR = QT + RT)$

$\Rightarrow$ $PQ + PR > QT + ST$ $(\because RT = ST)$ ...(i)

In ΔQST, we have

$QT + ST > QS$ ...(ii)

From (i) and (ii), we have

$PQ + PR > QS$

Que 8. Prove that each angle of an equilateral triangle is 60^0.

Sol. **Given:** A ΔABC in which $AB = BC = CA$ (Fig. 7.24)

To prove: $\angle A = \angle B = \angle C = 60^0$

Proof: $AB = AC$

$\Rightarrow$ $\angle C = \angle B$ (Angles opposite to equal sides are equal) ... (i)

Also, $BA = BC$

$\Rightarrow$ $\angle C = \angle A$ (Angles opposite to equal sides are equal) ... (ii)

From (i) and (ii), we have

$\angle A = \angle B = \angle C$

Now, $\angle A + \angle B + \angle C = 180^0$ $\Rightarrow \angle A + \angle A + \angle A = 180^0$

$\Rightarrow$ $3\angle A = 180^0$ $\Rightarrow \angle A = 60^0$

Hence, $\angle A = \angle B = \angle C = 60^0$

Que 9. Show that in a quadrilateral $ABCD$, $AB + BC + CD + DA > AC + BD$.

Sol. Since the sum of any two sides of a triangle is greater than the third side.

Therefore, in ΔABC, we have

$AB + BC > AC$ ...(i)

In ΔBCD, we have

$BC + CD > BD$ ...(iii)

In ΔCDA, we have

$CD + DA > AC$ ... (iv)

Adding: (i), (ii), (iii) and (iv), we get

$2AB + 2BC + 2CD + 2DA > 2AC + 2BD$

$\Rightarrow$ $2(AB + BC + CD + DA) > 2(AC + BD)$

$\Rightarrow$ $AB + BC + CD + DA > AC + BD$