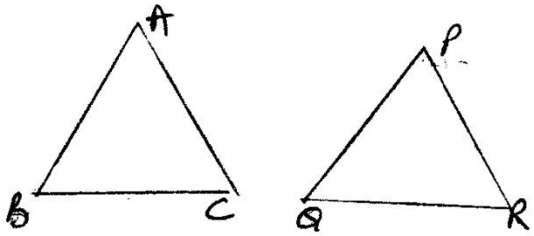
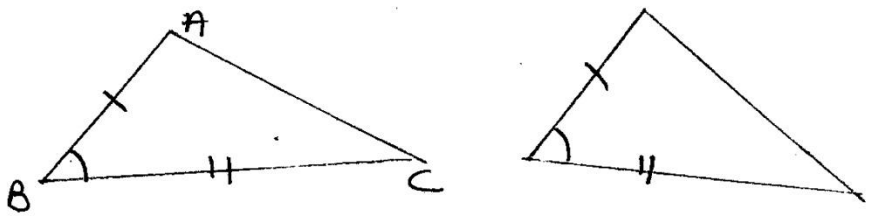
Chapter - 7

(Triangles)

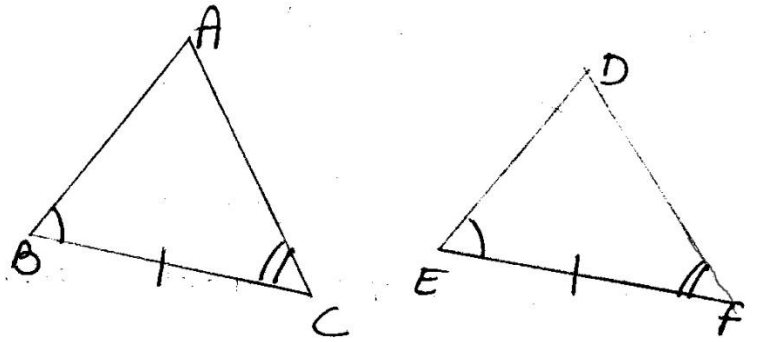
- Triangle - A closed figure formed by three intersecting lines is called a triangle. A triangle has three sides, three angles and three vertices.
- Congruent figures - Congruent means equal in all respects or figures whose shapes and sizes are both the same for example, two circles of the same radii are congruent. Also two squares of the same sides are congruent.
- Congruent Triangles - two triangles are congruent if and only if one of them can be made to superpose on the other, so as to cover it exactly.
- If two triangles ABC and PQR are congruent under the correspondence $A \leftrightarrow P, B \leftrightarrow Q$ and $C \leftrightarrow R$ then symbolically, it is expressed as $\Delta ABC \cong \Delta PQR$



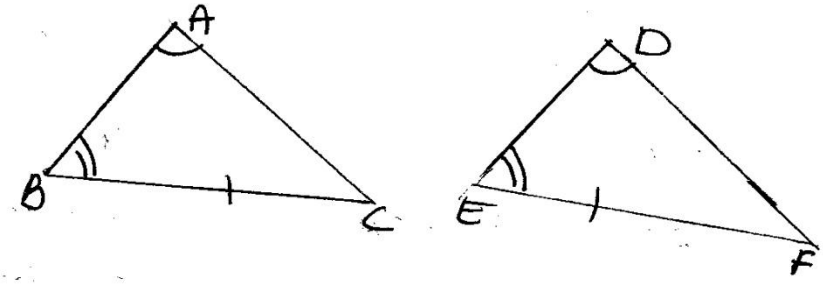
- In congruent triangles corresponding parts are equal and we write 'CPCT' for corresponding parts of congruent triangles.
- SAS congruency rule - Two triangles are congruent if two sides and the included angle of one triangle are equal to the two sides and the included angle of the other triangle. For example $\Delta ABC \text{ and } \Delta PQR$ as shown in the figure satisfy SAS congruent criterion.



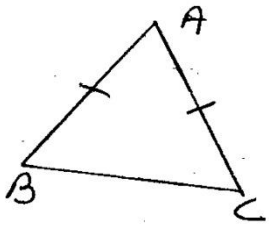
- ASA Congruence Rule - Two triangles are congruent if two angles and the included side of one triangle are equal to two angles and the included side of other triangle. For examples $\Delta ABC \; and \; \Delta DEF$ shown below satisfy ASA congruence criterion.



- AAS Congruence Rule - Two triangle are congruent if any two pairs of angles and one pair of corresponding sides are equal for example $\Delta ABC \; and \; \Delta DEF$ shown below satisfy AAS congruence criterion.

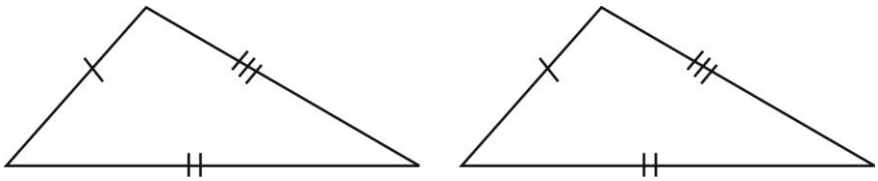


- AAS criterion for congruence of triangles is a particular case of ASA criterion.
- Isosceles Triangle - A triangle in which two sides are equal is called an isosceles triangle. For example ΔABC shown below is an isosceles triangle with AB=AC.

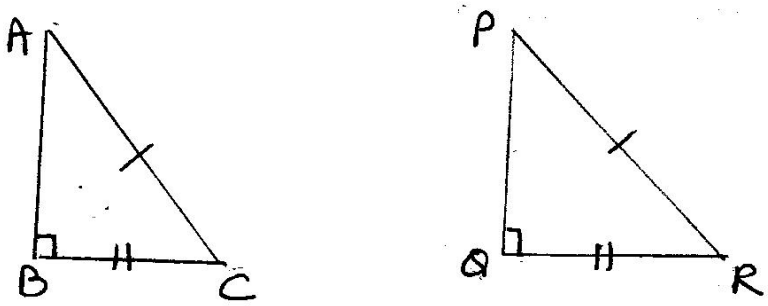


- Angle opposite to equal sides of a triangle are equal.

- Sides opposite to equal angles of a triangle are equal.
- Each angle of an equilateral triangle is 60^0.
- SSS congruence Rule - If three sides of one triangle are equal to the three sides of another triangle then the two triangles are congruent for example $\Delta ABC \; and \; \Delta DEF$ as shown in the figure satisfy SSS congruence criterion.



- RHS Congruence Rule - If in two right triangles the hypotenuse and one side of one triangle are equal to the hypotenuse and one side of the other triangle then the two triangle are congruent. For example $\Delta ABC \; and \; \Delta PQR$ shown below satisfy RHS congruence criterion.



RHS stands for right angle - Hypotenuse side.

- A point equidistant from two given points lies on the perpendicular bisector of the line segment joining the two points and its converse.
- A point equidistant from two intersecting lines lies on the bisectors of the angles formed by the two lines.
- In a triangle, angle opposite to the longer side is larger (greater)
- In a triangle, side opposite to the large (greater) angle is longer.
- Sum of any two sides of a triangle is greater than the third side.

Section - A

Q.1 Which of the following is not a criterion for congruence of triangles?

(a) SAS (b) SSA (c) ASA (d) SSS

Q.2 If AB=QR, BC=PR and CA=PQ then

(a) $\Delta ABC \cong \Delta PQR$ (b) $\Delta CBA \cong \Delta PRQ$

(c) $\Delta BAC \cong \Delta RPQ$ (d) $\Delta PQR \cong \Delta BCA$

Q.3 In Δ PQR, if $\angle R > \angle Q$ then

(a) $QR > PR$ (b) $PQ > PR$ (c) $PQ < PR$ (d) $QR < PR$

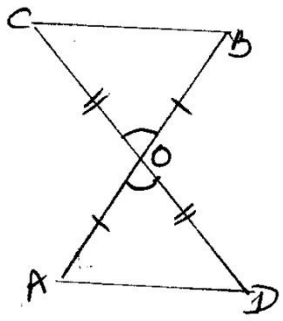
Q.4 $\Delta ABC \cong \Delta DEF \; and \; if \; AB = 3 = DE$ and BC = EF = 4 then necessary condition is

(a) $\angle A = \angle D$ (b) $\angle B = \angle E$ (c) $\angle C = \angle F$ (d) $CA = FD$

Q.5 In the given figure, if OA=OB, OD=OC then $\Delta AOD \cong \Delta BOC$ by congruence rule.

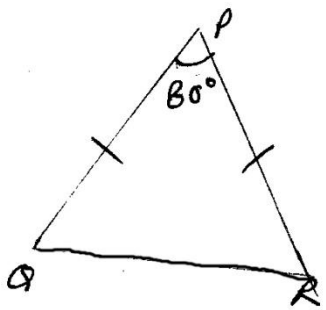
(a) SSS (b) ASA

(c) SAS (d) RHS



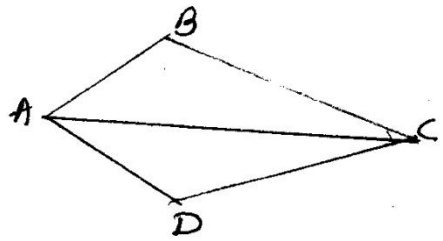
Q.6 In the figure if PQ=PR and $\angle P = 80^0$, then measure of Q is

(a) 100^0 (b) 50^0 (c) 80^0 (d) 40^0



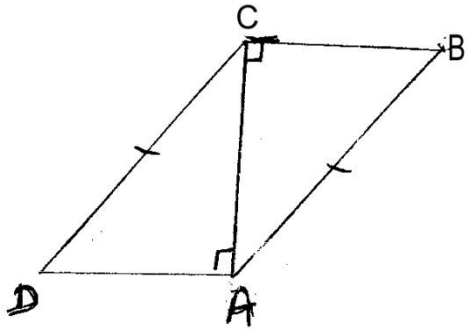
Q.7 In the figure $\Delta ABC \cong \Delta ADC, if\ \angle ACB = 25^0\ and\ \angle B = 125^0, then\ \angle CAD\ is$

(a) 25^0 (b) 65^0 (c) 30^0 (d) 75^0



Q.8 In the figure, if $\Delta ABC \cong \Delta CDA$, the property of congruence is

(a) SSS (b) SAS (c) RHS (d) ASA



Q.9 It is not possible to construct a triangle when its sides are

(a) 8.3cm, 3.4cm, 6.1cm (b) 5.4cm, 2.3cm, 3.1cm

(c) 6cm, 7cm, 10cm (d) 3cm, 5cm, 5cm

Q.10 In a $\Delta\ ABC$, if AB=AC and BC is produced to D such that $\angle ACD = 100^0$ then $\angle A$

(a) 20^0 (b) 40^0 (c) 60^0 (d) 80^0

Q.11 If $\Delta PQR \cong \Delta EFD, then\ \angle E =$

(a) $\angle P$ (b) $\angle Q$ (c) $\angle R$ (d) None of these

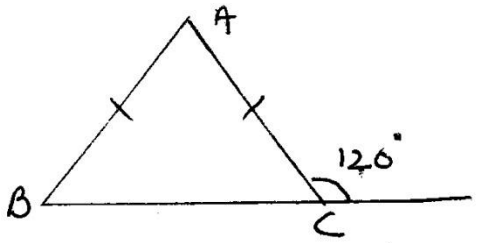
Q.12 If $\Delta PQR \cong \Delta EFD, then\ ED =$

(a) PQ (b) QR (c) PR (d) None of these

Section - B

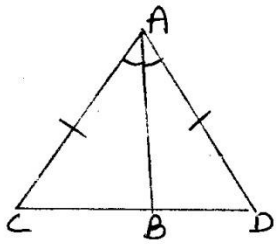
Q.13 In the figure AB=AC and

$\angle ACD = 120^0 \; find \; \angle A$



Q.14 In a $\Delta ABC \; if \; \angle A = 45^0 \; and \; \angle B = 70^0$ determine the shortest and largest sides of the triangle.

Q.15 In the given figure AB is bisector of $\angle A$ and AC=AD Prove that BC=BD and $\angle C = \angle D$



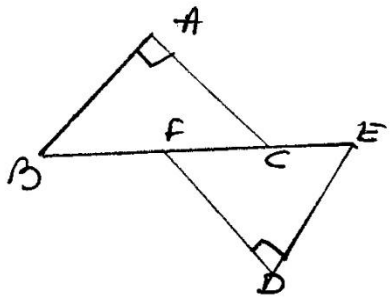
Q.16 AD is an altitude of an isosceles triangle ABC is which AB=AC. Prove that $\angle BAD = \angle DAC$

Q.17 In an acute angled ΔABC , S is any point on BC. Prove that AB+BC+CA > 2AS

Q.18 In the given figure $BA \perp AC, DE \perp DF$

such that BA=DE and BF=EC

show that $\Delta ABC \cong \Delta DEF$

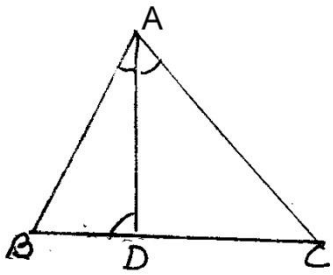


Q.19 Q is a point on the side SR of A ΔPSR such that PQ=PR. Prove that PS>PQ

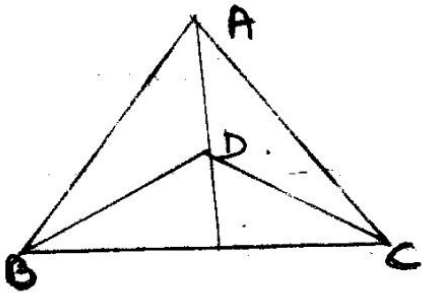
Section - C

Q.20 In the given figure if AD is the bisector of $\angle A$ show that

(i) AB>BD (ii) AC>CD

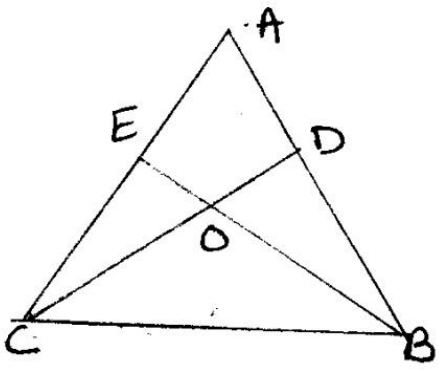


Q.21 In the given figure AB=AC, D is the point is the interior of ΔABC such that $\angle DBC = \angle DCB$ Prove that AD bisects $\angle BAC \ of \ \Delta ABC$



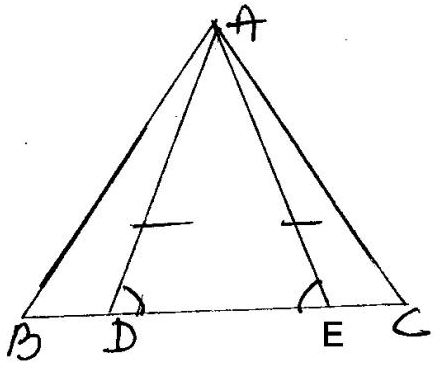
Q.22 Prove that if two angles of a triangle are equal then sides opposite to them are also equal.

Q.23 In the figure, it is given that AE=AD and BD=CE. Prove that $\Delta AEB \cong \Delta ADC$



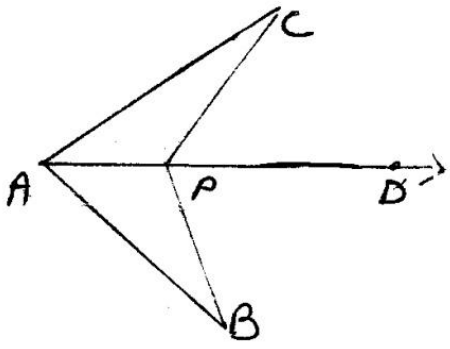
Q.24 Prove that angles opposite to two equal sides of a triangle are equal.

Q.25 In the figure AD=AE and D and E are points on BC such that BD=EC Prove that AB=AC



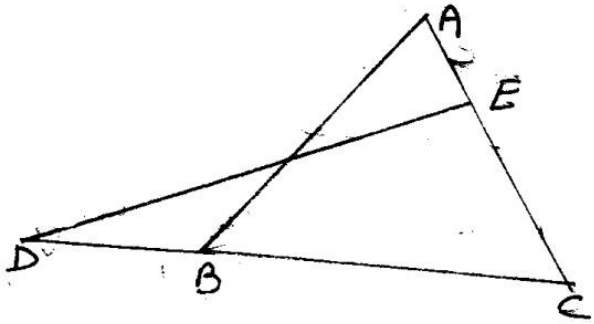
Q.26 Prove that medians of an equilateral triangle are equal.

Q.27 In the given figure $\angle CPD = \angle BPD$ and AD is the bisector of $\angle BAC$. Prove that $\Delta BAP \cong \Delta CAP$ and hence BP=CP

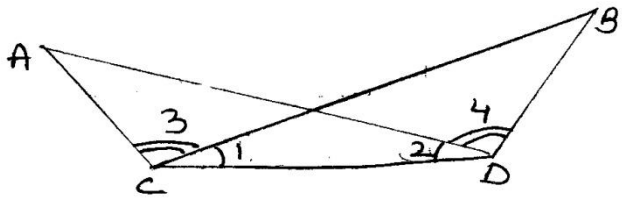


Section - D

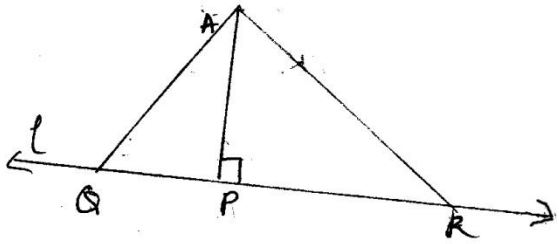
Q.28 In the figure $\angle B = \angle C$ show that AE > AF



Q.29 In the figure $\angle BCD = \angle ADC$ and $\angle ACB = \angle BDA$. Prove that AD=BC and $\angle A = \angle B$

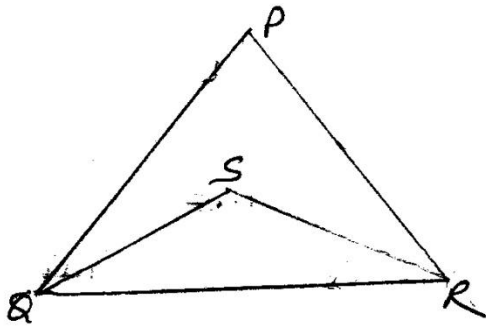


Q.30 In the given figure $AP \perp l$ and PR > PQ. Show that AR > AQ



Q.31 Prove that if in two triangles two angles and the included side of one triangle are equal to two angles and the included side of the other triangle, then the two triangles are congruent.

Q.32 In the given figure PQR is a triangle and S is any point in its interior, show that SQ + SR < PQ + PR



Answers :

(1) b	(2) b	(3) b	(4) b	(5) c	(6) b
(7) c	(8) c	(9) b	(10) a	(11) a	(12) c
(13) 60^0	(14) BC, AC				