1. (i) In $\triangle PQR$, $\angle P = 90°$, $\angle R = 25°$. Name the shortest side.

   (ii) In a $\triangle ABC$, $\angle A = 68°$, $\angle B = 52°$. Which is the largest side?

   (iii) In $\triangle ABC$, $AB = AC$ and $\angle C = 56°$. Which is the longer side, BC or AC?

2. If two angles of a triangle are unequal, the greater angle has the greater side opposite to it. Prove it.

3. If two sides of a triangle are unequal, the greater side has the greater angle opposite to it. Prove it.

4. Prove that any two sides of a triangle are together greater than the third side.

5. Prove that the difference between any two sides of a triangle is less than the third side.

6. Prove that any three sides of a quadrilateral are together greater than the fourth side.
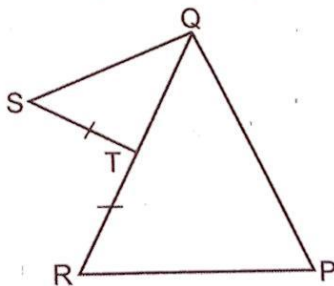
7. AB is the shortest and CD the longest side of a quadrilateral ABCD. Proved that $\angle A$ is greater than $\angle C$.

8. Prove that the perimeter of a quadrilateral is greater than the sum of its diagonals.

9. Prove that the sum of the diagonals of a quadrilateral is greater than the semi-perimeter.

10. In the given figure, BC > AC and DC is the bisector of $\angle C$. Show that $\angle p > \angle q$.

11. In $\triangle ABC$, if $\angle A = 50°$ and $\angle B = 60°$, determine the shortest and the longest side of the triangle.
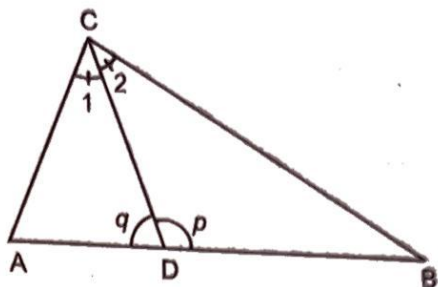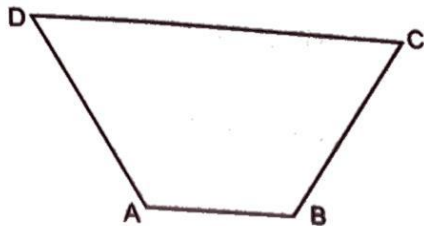
[CBSE 2010]

12. If two sides of a triangle are unequal, the bisector of the vertical angle divides the base into two parts, the greater being towards the greater side. Prove it.

13. In a $\triangle PQR$, A is the mid-point of QR. Prove that PQ + PR > 2AR.

14. Prove that the sum of the medians of a triangle is greater than the semi-perimeter.

15. In the given figure, prove that:
   (i) AB > BD
   (ii) AC > CD and
   (iii) AB + AC > BC

16. In the given figure, O is the centre of a circle, AB is a diameter and AC is a chord. Prove that AB > AC.
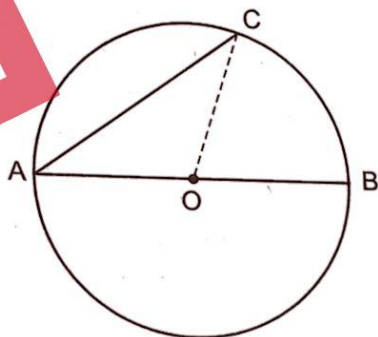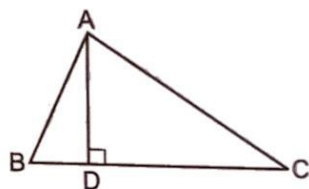
17. In the given figure, T is a point on side QR of $\triangle PQR$ and S is a point such that RT = ST. Prove that PQ + PR > QS.

[**Hint:** In $\triangle PQR$, $\quad PQ + PR > QR$

$QR = QT + TR = QT + ST \qquad [\because TR = ST]$

Now, In $\triangle SQT$, $\quad QT + ST > QS$

$QR > QS \qquad$ ...(2) $[\because QT + ST = QR$ (Proved)$]$

$\Rightarrow$

From (1) and (2), we get $PQ + PR > QS$.]

18. In $\triangle ABC$, $AC > AB$ the bisector of $\angle A$ meets BC at D. Prove that $\angle ADB$ is an acute angle.

19. The sides AB and AC of a $\triangle ABC$ are produced, and the bisectors of the external angles B and C meet at O. If $AB > AC$, prove that $OC > OB$.

20. O is a point in triangle ABC, prove that $AB + AC > OB + OC$. Hence, prove that the perimeter of a triangle is greater than $OA + OB + OC$.

21. O is any point outside the $\triangle PQR$. Prove that

$$OP + OQ + OR > \frac{1}{2} (PQ + QR + RP).$$
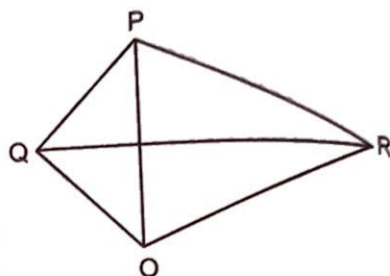
22. Prove that all the straight lines that can be drawn to a given straight line from a point not lying on it, the perpendicular segment is the shortest.

23. In a $\triangle ABC$, $AB > AC$ and O is a point on AB such that $AO = AC$. Prove that

(i) $2\angle ACO = \angle B + \angle C$
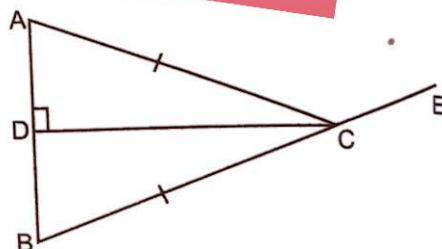
(ii) $\angle BCO = \frac{1}{2} (\angle C - \angle B)$.

24. (a) In the given figure, $AB \perp CD$ and BCE is a straight line and $AC = CB$. Prove that

(i) $EB = EC + CA$

(ii) $ED + DA > EC + CA$

(b) Show that the sum of the three altitudes of a triangle is less than the sum of the three sides of the triangle.

25. (a) Prove that the semi-perimeter of a triangle is less than the sum of its medians.

(b) Prove that the shortest segment from a point to a line is the perpendicular segment.

Answers

1. (i) PQ (ii) BC is the largest side.
   (iii) BC > AC

11. BC shortest; AB longest side.