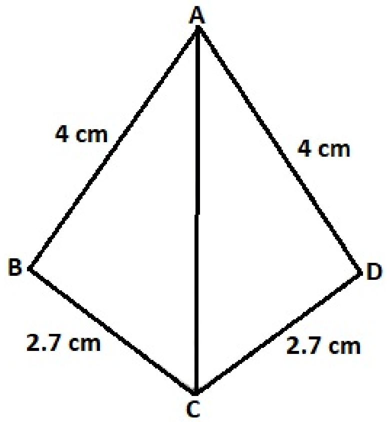
CBSE Test Paper 05

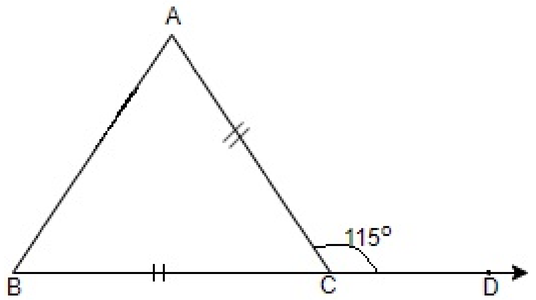
CH-7 Triangles

1. In the adjoining figure, the rule by which $\triangle ABC \cong \triangle ADC$



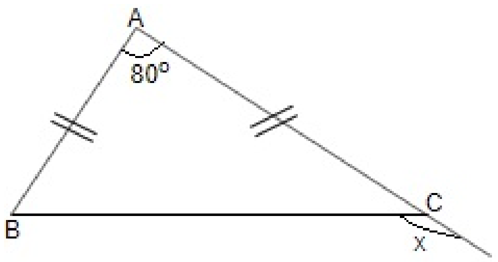
   a. SAS
   b. SSS
   c. AAS
   d. RHS

2. In the adjoining figure, BC = AC. If ∠ACD = 115° , the ∠A is



   a. 50°
   b. 65°
   c. 57.5°
   d. 70°

3. In fig, in $\triangle ABC$, AB = AC, then the value of x is:



   a. 120^{o}

b. 100^0

c. 130^0

d. 80^0

4. In $\triangle ABC$, if $\angle$B = 30° and $\angle$C = 70°, then which of the following is the longest side?

   a. AC

   b. BC

   c. AB

   d. AB or AC

5. If triangle PQR is right angled at Q, then

   a. PR > PQ

   b. PR < QR

   c. PR = PQ

   d. PR < PQ

6. Fill in the blanks:

   The perimeter of a triangle is ________ than the sum of its three medians.

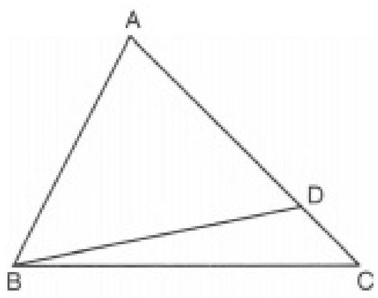
7. Fill in the blanks:

   If the bisector of the vertical angle of a triangle bisects the base, then the triangle is an ________ angle.

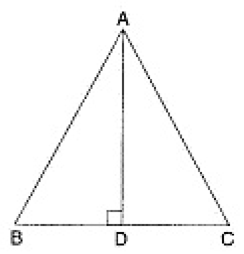
8. Of the three angles of a triangle, one is twice the smallest and another is three times the smallest. Find the angles.

9. If each angle of a triangle is less than the sum of the other two, show that the triangle is acute-angled.

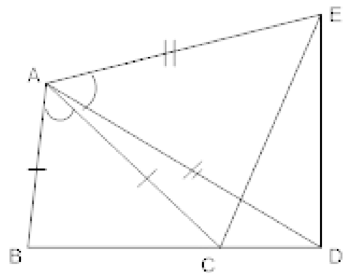
10. In Fig., AC > AB and D is the point on AC such that AB = AD. Prove that BC > CD.



11. $\triangle$ABC, AD is perpendicular bisector of BC. Show that $\triangle$ABC is an isosceles triangle in which AB = AC.



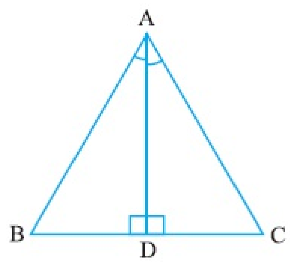
12. If AD = AE, AB = AC and $\angle BAC = \angle EAD$ show that BD = CE.



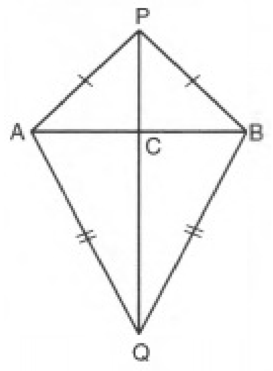
13. Prove that the sum of any two sides of a triangle is greater than twice the median with respect to the third side.

14. AD is an altitude of an isosceles triangle ABC in which AB = AC. Show that:

    i. AD bisects BC.
    ii. AD bisects $\angle A$



15. AB is a line segment. P and Q are points on opposite sides of AB such that each of them is equidistant from the points A and B (See Figure). Show that the line PQ is the perpendicular bisector of AB.



CBSE Test Paper 05

CH-7 Triangles

Solution

1. (b) SSS

   Explanation: In $\triangle$ABC and $\triangle$ADC,we have,

   AB = AD (4cm)

   BC = DC (2.7 cm)

   AC = AC (commom in both)

   Hence ,$\triangle ABC \cong \triangle ADC$, by SSS criterion.
2. (a) 50°

   (c) 57.5°

   Explanation:

   As BC = AC, therefore triangle ABC is an isoscelestriangle.

   Given $\angle$ACD = 115^{o}, $\angle$ACB = 180 - 115 = 65^{o} (Linear Pair)

   As AC = BC, therefore $\angle$A =$\angle$B

   As sum of all the three angles of atriangle is 180°

   Therefore,$\angle$A +$\angle$B +$\angle$ACB = 180^{o}

   $\angle$A =$\angle$B = 57.5
3. (c) 130^{o}

   Explanation: Triangle ABC is an iscosceles triangle and hence in the triangle other two angles are 50 and 50

   Therefore,

   X = 180 - 50 = 130
4. (b) BC

   Explanation:

Since the sum of all sides of a triangle is 180°.

So, angle C=70° ,angle B=30°,angle A=80°.

We have a theorem which states that the side opposite to the greatest angle is the longest.

So, the side opposite to angle A is the longest.

5. (a) PR > PQ

   Explanation: then the hypotnuse should be always greater than the remaining two sides.

6. greater

7. isosceles

8. Let the smallest angle of the given triangle be of x°. Then, the other two angles are 2x° and 3x°.

   So, $x + 2x + 3x = 180$

   $\Rightarrow 6x = 180 \Rightarrow x = \frac{180}{6} = 30$

   Hence, the angles are 30^o, 60^o and 90^o.

9. $\because \angle A < (\angle B + \angle C)$

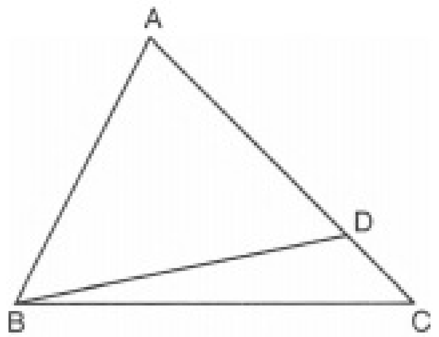
   $\Rightarrow \angle A + \angle A < \angle A + \angle B + \angle C$

   $\Rightarrow 2\angle A < 180^o$ ($\because$ sum of all angles of a triangle is equal to 180^o)

   $\Rightarrow \angle A < 90^o$

   Similarly, $\angle B < \angle 90^o$ and $\angle C < \angle 90^o$.

   Hence, the triangle is acute-angled.

10. 

   Given: In Fig., AC > AB and D is the point on AC such that AB = AD.

   To Prove: BC > CD.

Proof: In $\triangle$ABD, we have

AB = AD ...(i)

In $\triangle$ABC, we have

AB + BC > AC

$\Rightarrow$ AB + BC > AD + CD

$\Rightarrow$ AB + BC > AB + CD [$\because$ AD = AB {from (i)}]

$\Rightarrow$ BC > CD

Hence Proved.

11. Given : AD $\perp$ BC.

To prove : ABC is an isosceles triangle in which AB = AC.

Proof : In $\triangle$ADB and $\triangle$ADC,

DB = DC . . . [As AD $\perp$ bisector of BC]

$\angle$ADB = $\angle$ADC . . . [Each 90°]

AD = AD . . .[Common]

$\therefore$ $\triangle \mathrm{ADB} \cong \triangle \mathrm{ADC}$ . . .[By SAS property]

$\therefore$ AB = AC . . .[c.p.c.t]

$\therefore$ $\triangle$ABC is an isosceles triangle in which AB = AC.

12. $\angle BAC = \angle EAD$ $\angle$BAC = $\angle$EAD [given] ...(1)

$\therefore$ $\angle BAC + \angle CAD = \angle EAD + \angle CAD$ [Adding angle CAD both side]

$\Rightarrow \angle BAD = \angle EAC$ ...(2)

Now in,

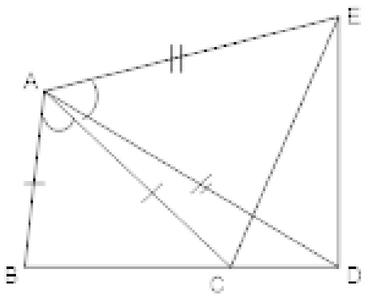
$\triangle$ABD & $\triangle$EAC

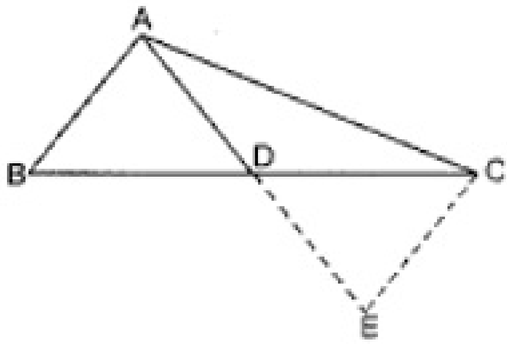
AB = AC [given]

AD = AE [given]

$\angle$BAD = $\angle$EAC.....[from equation (2)]

$\Rightarrow BD = CE \Rightarrow$ BD = CE [CPCT]



13. 

Given: AD is a median in $\triangle ABC$.

To prove: AB + AC > 2AD

Construction: Produce AD to E such that AD = DE. Join EC

Proof: In triangles ADB and EDC, we have

AD = DE........(1) (By construction)

BD = DC ($\because$ AD is the median) and, $\angle$ADB = $\angle$EDC (Vertically opposite angles)

$\therefore$ $\triangle$ADB $\cong$ $\triangle$EDC (SAS congruency criterion)

$\Rightarrow$ AB = EC (CPCT) ...(2)

As sum of two sides in a triangle is greater than the third side. Hence, in $\triangle$AEC, we have

AC + EC > AE.

$\Rightarrow$ AC + AB > AE [from (2)] ....(3)

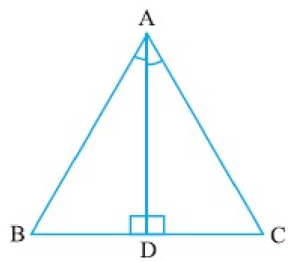
Also, AE = 2AD [from (1)]... ...(4)

Now, from (3) and (4) ,

AC + AB >2AD .Hence, proved.

14. In $\triangle$ABD and $\triangle$ACD, AB = AC [Given]

$\angle$ADB = $\angle$ADC = 90° [AD $\perp$ BC]



AD = AD [Common]

$\therefore \triangle ABD \cong \triangle ACD$ [RHS rule of congruency]

$\Rightarrow$ BD = DC [By C.P.C.T.]

$\Rightarrow$ AD bisects BC

Also $\angle BAD$∠BAD = $\angle CAD$∠CAD [By C.P.C.T.]

$\Rightarrow$AD bisects $\angle$A

15. In $\triangle$PAQ and $\triangle$PBQ,

AP = BP (Given)

AQ = BQ (Given)

PQ = PQ (Common)

So, $\triangle$PAQ $\cong$ $\triangle$PBQ (SSS rule)

Therefore, $\angle$APQ = $\angle$BPQ (CPCT).

Now let us consider $\triangle$PAC and $\triangle$PBC.

You have: AP = BP (Given)

$\angle$APC = $\angle$BPC ($\angle$APQ = $\angle$BPQ proved above)

PC = PC (Common)

So, $\triangle$PAC $\cong$ $\triangle$PBC (SAS rule)

Therefore, AC = BC (CPCT) ....(i)

$\angle$ACP = $\angle$BCP (CPCT)

and $\angle$ACP + $\angle$BCP = 180^o (Linear pair)

So, $2\angle \mathrm{ACP}$ = 180^o

Or, $\angle$ACP = 90^o ......(ii)

From (i) and (ii), we can easily conclude that PQ is the perpendicular bisector of AB.