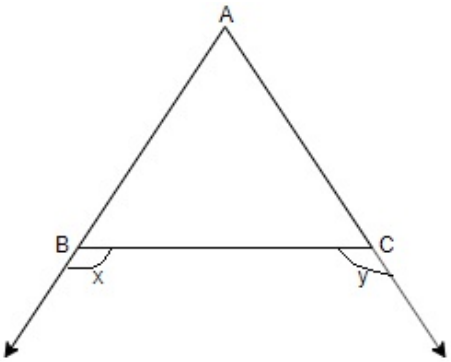
CBSE Test Paper 04

CH-7 Triangles

1. Two sides of a triangle are of lengths 5 cm and 1.5 cm. The length of the third side of the triangle cannot be
   a. 3.8 cm
   b. 3.6 cm
   c. 4 cm
   d. 3.4 cm
2. D is a point on the side BC of a $\triangle ABC$ such that AD bisects $\angle BAC$ then:
   a. BD = CD
   b. BA >BD
   c. CD>CA
   d. BD>BA
3. The length of two sides of a triangle are 7 units and 10 units. Which of the following length can be the length of the third side?
   a. 3 cm
   b. 19 cm
   c. 17 cm
   d. 13 cm
4. In the given figure, ABC is an equilateral triangle. The value of x + y is



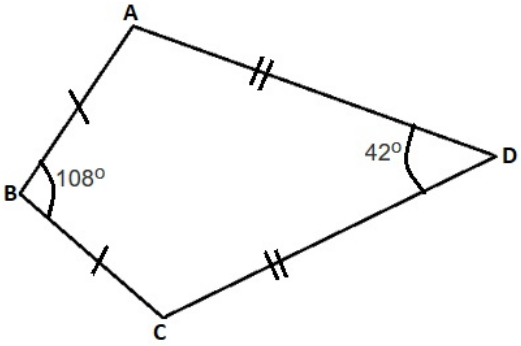
a. 200°

b. 240°

c. 120°

d. 180°

5. In figure, ABCD is a quadrilateral in which AB = BC and AD = DC. The measure of $\angle BCD$ is:



a. 30^o

b. 105^o

c. 150^o

d. 72^o

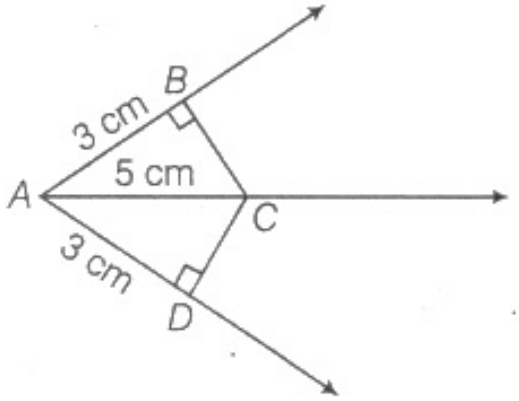
6. Fill in the blanks:

   A triangle is an _____triangle if and only if any two altitudes are equal.

7. Fill in the blanks:

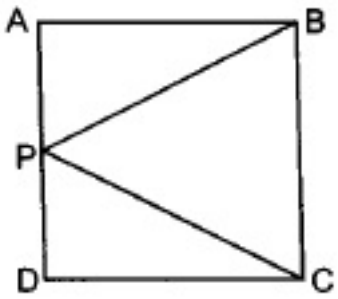
In $\triangle ABC$, if BC = AB and $\angle B$ = 80^o, then $\angle A$ is equal to _____.

8. In the given figure, if AC is bisector of $\triangle$BAD, such that AD = AB =3 cm and AC =5 cm. Show that $\triangle$ABC $\cong \triangle$ ADC and BC = CD.

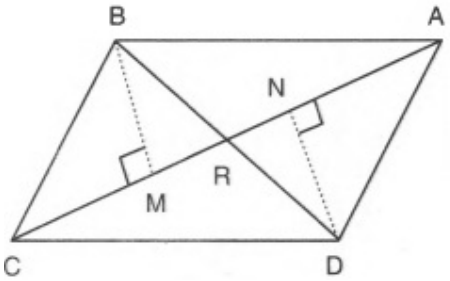


9. In a $\triangle$ABC, if $\angle$A = 55^o, $\angle$B = 40^o, find $\angle$C.

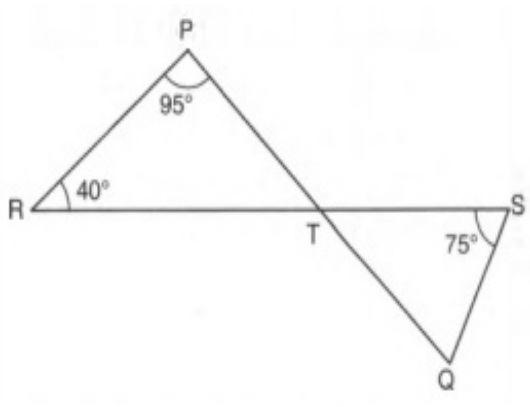
10. In given figure, ABCD is a square and P is the midpoint of AD. BP and CP are joined. Prove that $\angle$PCB = $\angle$PBC.



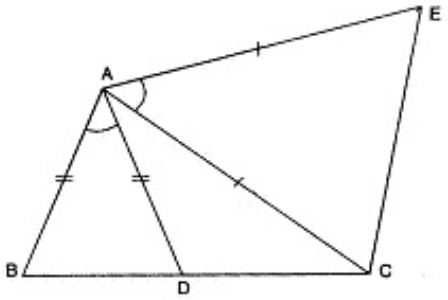
11. In Fig., BM and DN are both perpendiculars to the segments AC and BM = DN. Prove that AC bisects BD.



12. In a given figure, if lines PQ and RS intersect at a point T such that $\angle$PRT = 40^o, $\angle$RPT = 95^o and $\angle$TSQ = 75^o, find $\angle$SQT.



13. In figure, AC = AE, AB = AD and ∠BAD = ∠EAC. Prove that BC = DE.



14. If D is any point on the base BC produced, of an isosceles triangle ABC, prove that AD > AB.

15. ABC is a right angled triangle, right angled at A & with AB = AC. Bisector of ∠ A meets BC at D. Prove that BC = 2 AD.

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CH-7 Triangles

Solution

1. (d) 3.4 cm

   Explanation: Given that: Two sides of triangle are 5 cm and 1.5 cm. We know that the sum of two sides of the triangle is always greater than the third side. Hence, 3.4 cm cannot be the third side. If it is the third side the sum of 3.4 cm and 1.5 cm will be smaller than 5 cm, so, the triangle will not be possible.

2. (b) BA >BD

   Explanation: Since,$\angle BAC$ is bisected by AD, then $\angle BAD$ is less than $\angle ABC$,hence the side opposite $\angle ABC$, i.e. BA is greater than the side opposite to $\angle BAD$ i.e.BD

3. (d) 13 cm

   Explanation: As per the rule in a triangle, sum of any 2 sides should be greater than the third side. So, the lenght of the third side should be 13, Since with 7,10 and 13 we have 7+10>13,7+13>10 and 13+10>7

4. (b) 240°

   Explanation:

   As triangle ABC is an equilateral traingle, therefore all the three angles are equal, that is , 60^o each.

   x = 180 - 60 = 120^o

   y = 180 - 60 = 120^o

   x + y = 120 + 120 = 240

5. (b) 105^o

   Explanation:

   Join AC. We get two isosceles triangles,Δ ABC and Δ ACD

   In Δ ABC,$\angle$ABC= 108^o

   $\therefore \angle$BAC = $\angle$BCA = (180^o - 108^o) / 2 = $\frac{72^\circ}{2}$ = 36^o

   In Δ ACD,$\angle$ADC= 42^o

   $\therefore \angle$DAC = $\angle$DCA = (180^o - 42^o) / 2 = 138^o/2 = 69^o

Now, $\angle$ BCD = $\angle$BCA + $\angle$DCA = $36^o + 69^o = 105^o$

6. isosceles

7. 50^o

8. In $\triangle$ABC and $\triangle$ADC,
   $\angle$ABC = $\angle$ADC [each 90°]
   AB = AD [given]
   and AC = AC [common side]
   $\therefore \triangle ABC \cong \triangle ADC$ [by RHS congruence rule]
   Then, BC = DC [byCPCT]
   Hence proved.

9. In the $\triangle$ABC given that $\angle A = 55^o$, $\angle B = 40^o$
   $\angle A + \angle B + \angle C = 180^o$ (By angles sum property for triangle)
   $\Rightarrow 55^o + 40^o + \angle C = 180^o$
   $\Rightarrow \angle C = 180^o - 55^o - 40^o$
   $\Rightarrow \angle C = 180^o - 95^o$
   $\therefore \angle C = 85^o$

10. Given P is midpoint of AD
    $\therefore$ PA = PD
    AB = CD (sides of square ABCD)
    $\angle$PAB = $\angle$PDC = 90°
    Hence by RHS congruency criteria,
    $\triangle$PAB $\cong$ $\triangle$PDC
    $\Rightarrow PC = PB$ [CSCT]
    $\therefore \angle PCB = \angle PBC$ (Angles opposite to equal sides are equal) Hence, proved

11. In $\triangle$s BMR and DNR, we have
    $\angle$BMR = $\angle$DNR [Each equal to 90^o $\because$ BM $\perp$ AC and DN $\perp$ AC]
    $\angle$BRM = $\angle$DRN [Vertically opposite angles]
    and, BM = DN [Given]

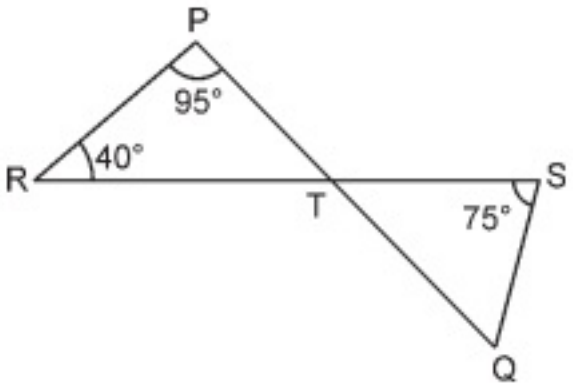
So, by AAS criterion of congruence, we obtain

$\triangle BMR \cong \triangle DNR$

$\Rightarrow$ BR = DR [$\because$ Corresponding parts of congruent triangles are equal]

$\Rightarrow$ R is the mid-point of BD.

Hence, AC bisects BD.

12. 

In $\triangle PRT$ we have

$\angle P + \angle R + \angle PTR = 180°$ [By angle sum property for triangles]

$\Rightarrow 95° + 40° + \angle PTR = 180°$

$\Rightarrow \angle PTR = 180° - 95° - 40°$

$\Rightarrow \angle PTR = 45°$

$\Rightarrow \angle QTS = 45°$ [$\because \angle QTS = \angle PTR$,vertically opposite angles]

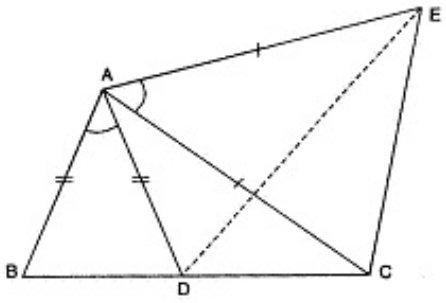
In $\triangle SQT$, we have

$\angle QTS + \angle SQT + \angle TSQ = 180°$ [By angle sum proporty for triangles]

$\Rightarrow 45° + \angle SQT + 75° = 180°$

$\Rightarrow \angle SQT = 180° - 120°$

$\Rightarrow \angle SQT = 60°$

13. 

Join DE

In DABC and D ADE,

AB = AD, AC = AE and $\angle BAD = \angle EAC$ ...[Given]

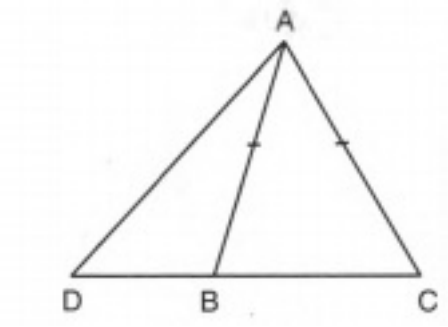
$\angle BAD + \angle DAC = \angle DAC + \angle EAC$ ...[Adding $\angle DAC$ to both sides]

$\angle BAC = \angle DAE$

$DABC \cong DADE$ ...[By SAS property]

BC = DE ...[c.p.c.t.]

14. In $\triangle ABC$, we have



AB = AC

$\Rightarrow \angle ABC = \angle ACB$ [$\because$ Angles opp. to equal sides are equal] ...(i)

In $\triangle ABD$, we have

Ext. $\angle ABC > \angle ADB$ [$\because$ Exterior angle of a $\triangle$ is greater than each of interior opp. angle]

$\Rightarrow \angle ABC > \angle ADB$ ...(ii)

From (i) and (ii), we get

$\angle ACB > \angle ADB$

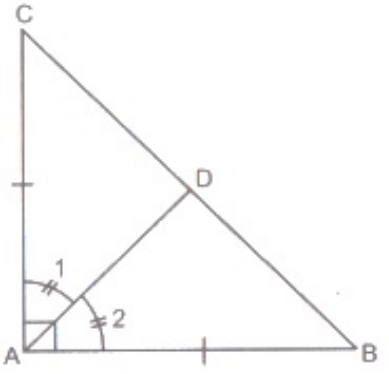
$\Rightarrow \angle ACD > \angle ADC$ [$\because \angle ACB = \angle ACD, \angle ADB = \angle ADC$]

$\Rightarrow$ AD > AC

$\Rightarrow$ AD > AB [$\because$ AB = AC]

15. Given: ΔABC is a right angled triangle. Bisector of $\angle A$ meets BC at D.

Also, given AB = AC & $\angle A = 90^\circ$.....(1)



To prove: BC = 2AD

Proof:

Now, in ΔCAD and ΔBAD , we have :-

AC = AB [from (1)]

$\angle CAD = \angle BAD$ [$\because$ AD is the bisector of $\angle A$]

$\Rightarrow \angle 1 = \angle 2.$ [See figure]

AD = AD [Common side]

So, By SAS criterion of congruency of triangles, we have

$\Delta CAD \cong \Delta BAD$

$\therefore \quad CD = BD$ [CPCT]

Hence , D is midpoint of hypotenuse AC.

Since ,Mid-point of hypotenuse of a rt. Δ is equidistant from the vertices of the Δ .

Hence, AD = BD = CD .....(2)

Now, BC = BD + CD

$\Rightarrow \quad BC = AD + AD$ [Using (2)]

$\Rightarrow BC = 2AD$

Hence, proved.