CBSE Test Paper 01

CH-7 Triangles

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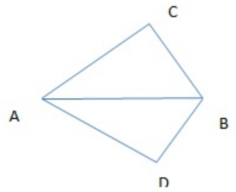
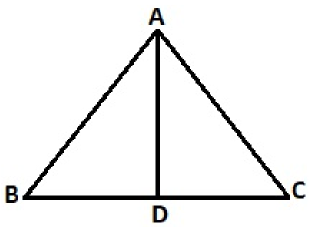
1. If all the altitudes from the vertices to the opposite sides of a triangle are equal, then the triangle is
   a. Equilateral
   b. Isosceles
   c. Scalene
   d. Right-angled
2. 

   In the above quadrilateral ACBD, we have AC = AD and AB bisect the $\angle A$ .Which of the following is true?
   a. $\triangle ABC \cong \triangle ABD$
   b. $\angle C = \angle D$
   c. All are true
   d. BC = BD
3. AD is the median of the triangle. Which of the following is true?

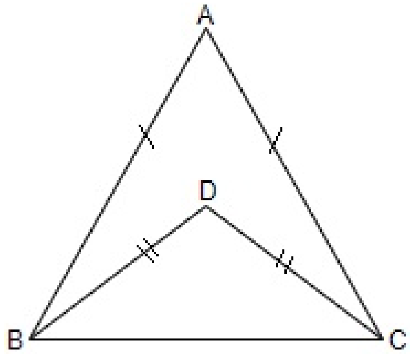
   

   a. AC + CD < AB
   b. AB + BD < AC

c. AB + BC + AC > AD

d. AB + BC + AC > 2AD

4. In the adjoining Figure, AB = AC and BD = CD. The ratio $\angle$ABD : $\angle$ACD is



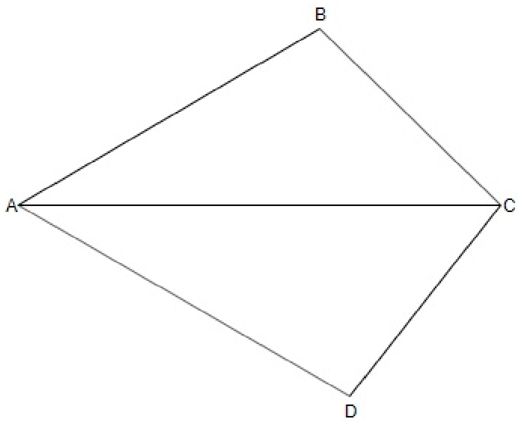
a. It is 1 : 1

b. It is 1 : 2

c. It is 2 : 3

d. It is 2 : 1

5. In the adjoining figure, $\triangle ABC \cong \triangle ADC$. If $\angle$BAC = 30° and $\angle$ABC = 100° then $\angle$ACD is equal to



a. 50°

b. 80°

c. 30°

d. 60°

6. Fill in the blanks:

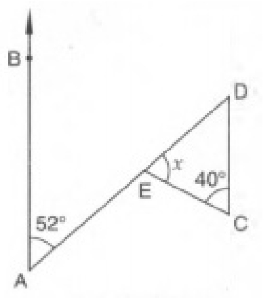
   In a $\triangle ABC$, AB = 5 cm, AC = 5 cm and $\angle B$ equals to _______.

7. Fill in the blanks:

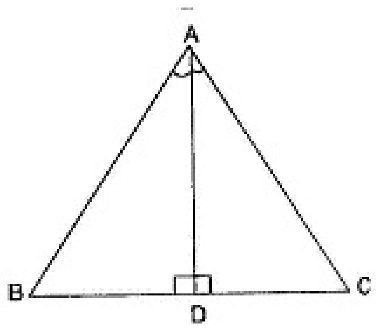
   An angle is 4 time its complement, then the measure of the angle is _______.

8. Find the measure of each exterior angle of an equilateral triangle.

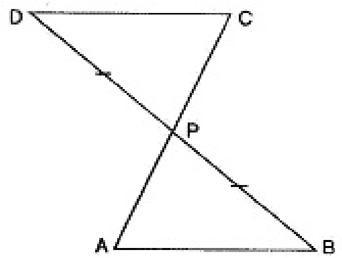
9. Compute the value of x of the following given figure:



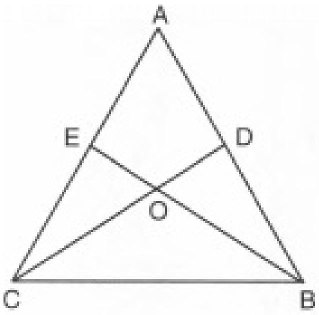
10. Prove that $\triangle$ABC is an isosceles, if Altitude AD bisects ∠BAC.



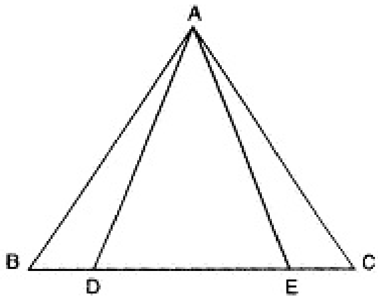
11. In figure, if AB || DC and P is the mid-point of BD, prove that P is also the mid-point of AC.



12. In Fig, it is given that AE = AD and BD = CE. Prove that $\triangle AEB \cong \triangle ADC$.



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



14. Show that the difference of any two sides of a triangle is less than the third side.

15. ABCD is quadrilateral such that AB = AD and CB = CD. Prove that AC is the perpendicular bisector of BD.

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Solution

1. (a) Equilateral
   Explanation: In an equilateral triangle all the altitudes,sides, angles, perpendicular bisectors, medians and angular bisectors are equal.
2. (c) All are true
   Explanation: In triangle ABC and ABD ,we have
   AC = AD
   $\angle$AB = $\angle$BAD
   AB = AB
   By SAS ,we have
   $\angle$ABC $\cong$ $\angle$ABD
   Hence, we have BC = BD and $\angle$C = $\angle$D.
   So,all the given options are true.
3. (d) AB + BC + AC > 2AD
   Explanation:
   In triangle ADB
   AB + BD > AD
   In triangle ADC
   AC+DC > AD
   Adding both
   AB + AC + BD + DC > 2AD
   Now BD + DC = BC
   So, AB + AC + BC > 2AD
4. (a) It is 1 : 1
   Explanation:
   In $\triangle$ABC
   AB = AC
   $\therefore$ $\angle$ABC = $\angle$ACB(angles opposite to equal sides of a triangle are equal)......1
   in ΔDBC,

DB = DC,

$\therefore \angle DBC = \angle DCB$(angles opposite to equal sides of a triangle are equal)......2

subtract 2 from 1

$\angle ABC - \angle DBC = \angle ACB - \angle DCB$(equals subtracted from equals gives equal)

$= \angle ABD = \angle ACD$

divide both the sides by $\angle ACD$

$\Rightarrow \frac{\angle ABD}{\angle ACD} = 1$

$\therefore \angle ABD : \angle ACD = 1 : 1$

5. (a) 50°

Explanation: In triangle ABC, BAC = 30^o and ABC = 100^o (Given)

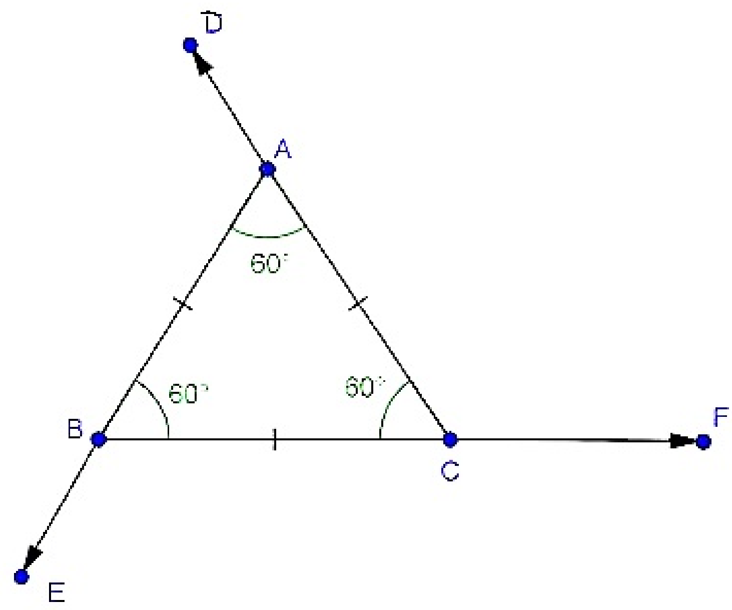
$\angle BAC + \angle ABC + \angle BCA = 180^o$

$\angle BCA = 50^o$

Also $\angle ACD = 50^o$ (Since, $\triangle ABC \cong \triangle ADC$)

6. 65^o

7. 72

8. 

$\angle ACF = \angle ABC + \angle BAC$ [$\because$ Exterior angle = sum of opposite interior angles]

$\Rightarrow \angle ACF = 60^o + 60^o = 120^o$

Similarly, $\angle BAD = 120^o$ and $\angle CBE = 120^o$

9. $\angle BAE = \angle EDC = 52^o$ (alternate angles)

$\therefore \angle DEC = x = 180^o - 40^o - \angle EDC$ (because sum of all angles of a triangle is 180^o)

$= 180^o - 40^o - 52^o$

$= 180^o - 92^o$

$= 88^o$

10. In $\triangle ABD$ and $\triangle ACD$,

$\angle BAD = \angle CAD$ ...... [Given]

AD = AD ...... [Common]

$\angle ADB = \angle ADC$ . . . [Each 90^o]

$\triangle ABD \cong \triangle ACD$ = ... [ASA axiom]

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

$\therefore \triangle ABC$ is an isosceles triangle.

11. AB || DC and DB intersect them

$\angle BDC = \angle DBA$ ...[Alternate angles]

In DPDC and D PBA

PD = PB ...[As P is the mid-point of BD]

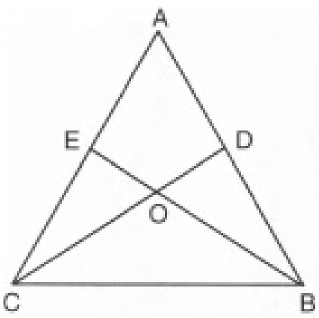
$\angle PDC = \angle PBA$ ...[As proved above]

$\angle DPC = \angle BPA$ ...[Vertically opposite angles]

DPDC $\cong$ DPBA ...[By ASA property]

PC = PA ...[c.p.c.t.]

$\Rightarrow$ P is the mid-point of AC.

12. 

Given: AE = AD and BD = CE.

To Prove : $\triangle AEB \cong \triangle ADC$

Proof: We have

AE = AD and CE = BD

$\Rightarrow$ AE + CE = AD + BD ..... (i)

$\Rightarrow$ AC = AB ...(ii)

Thus, Consider $\triangle AEB$ and ΔADC, we have

AE = AD [Given]

$\angle EAB = \angle DAC$ [Common]

and, AC = AB [From (ii)]

$\triangle AEB \cong \triangle ADC$ [by SAS criterion]

Hence proved

13. In $\triangle$ADE,

AD = AE . . . [Given]

∠AED = ∠ADE . . . .[∠s opposite to equal side of a $\triangle$ADE]

180^{0} – ∠AED = 180^{0} – ∠ADE

∠AEC = ∠ADB

In $\triangle$ADB and $\triangle$AEC,

AD = AE . . . [Given]

BD = EC . . . [Given]

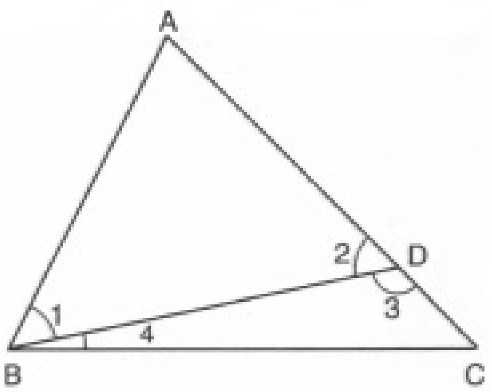
∠ADB = ∠AEC . . . .[From (1)]

$\therefore \triangle ADB \cong \triangle AEC$ .... [By SAS property]

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

14. To Prove:

Construction: Take a point D on AC such that AD = AB. Join BD.



Proof: In $\triangle$ABD, side AD has been produced to C.

$\therefore \angle 3 > \angle 1$ [$\because$ Exterior angle of a $\triangle$ is greater than each of interior opp. angle] ...(i)

In $\triangle$BCD, side CD has been produced to A.

$\therefore \angle 2 > \angle 4$ [$\because$ Exterior angle of a $\triangle$ is greater than each of interior opp. angle] ...(ii)

In $\triangle$ABD, we have

AB = AD

$\Rightarrow \angle 2 = \angle 1$ [Angles opp. to equal sides are equal] ...(iii)

From (i) and (iii), we get

$\angle 3 > \angle 2$ ...(iv)

From (ii) and (iv), we get

$\angle 3 > \angle 2$ and $\angle 2 > \angle 4$

$\Rightarrow \angle 3 > \angle 4$

$\Rightarrow$ BC > CD [Side opp to greater angle is larger]

$\Rightarrow$ CD < BC

$\Rightarrow$ AC - AD < BC

$\Rightarrow$ AC - AB < BC [$\because$ AD = AB]

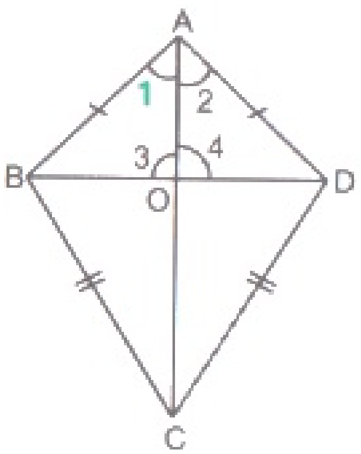
Similarly, BC - AC < AB and BC - AB < AC

i. AC - AB < BC
ii. BC - AC < AB
iii. BC - AB < AC

15. Given: ABCD is a quadrilateral . AB = AD & CB = CD

To prove: AC is the perpendicular bisector of BD.

Proof:



Let diagonals AC & BD intersect at O.

Let, $\angle BAC = \angle 1, \angle DAC = \angle 2, \angle AOB = \angle 3 \; and \; \angle AOD = \angle 4$

In ΔABC & ΔADC, we have :-

AB = AD [Given]

BC = CD [Given]

AC = AC [Common side]

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

$\Delta ABC \cong \Delta ADC$

$\therefore \angle 1 = \angle 2$ [CPCT]

Now, in ΔAOB and ΔAOD , we have :-

AB = AD [Given]

$\angle 1 = \angle 2$ [Proved above]

AO = AO [Common side]

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

$\Delta AOB \cong \Delta AOD$

$\therefore \quad BO = DO$ [CPCT]

And $\angle 3 = \angle 4$ [CPCT]

But, $\angle 3 + \angle 4 = 180^o$ [Linear pair axiom]

$\Rightarrow \angle 3 + \angle 3 = 180^\circ [\because \angle 3 = \angle 4]$

$\Rightarrow 2\angle 3 = 180^\circ$

$\Rightarrow \angle 3 = \frac{180^\circ}{2} = 90^\circ$

$\therefore$ AC is perpendicular bisector of BD. [$\because \angle 3 = 90^\circ$ and BO = DO]

Hence, proved.