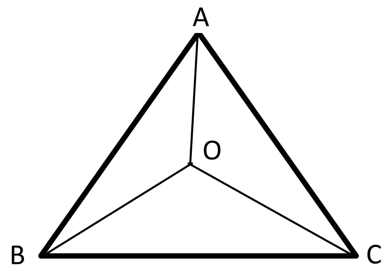
ST. KAREN'S SECONDARY SCHOOL

SUB – MATHS

TOPIC – TRIANGLES

CLASS – 10 **SOLUTION OF ASSIGNMENT 3** **DATE -26.7.20**

1- **GIVEN - In an isosceles triangle ABC, with AB = AC, the bisectors of ∠ B & ∠ C intersect each other at O.**



TO PROVE -

(i) **OB = OC.**

(ii) **AO bisects ∠ A.**

PROOF – **(i)** In Δ ABC,

$\because$ AB = AC

$\Rightarrow \quad \angle B = \angle C$ (Opposite angles of equal sides)

$\Rightarrow \quad \frac{\angle B}{2} = \frac{\angle C}{2}$

$\Rightarrow \angle OBC = \angle OCB$ (Half of equal angles are equal)

$\Rightarrow \quad OB = OC$ ■ ($\because$ opposite angles of equal sides are equal)

Hence, proved.

(ii) In Δ AOB and Δ AOC,

$AB = AC$ (Given)

$\angle ABO = \angle ACO$ (Half of equal angles)

$OB = OC$ (Proved above)

By SAS congruence rule,

$\Delta AOB \cong \Delta AOC$

$\Rightarrow \angle BAO = \angle CAO$ (c.p.c.t.)

$\therefore$ OA bisects ∠ A ■ Hence, proved.

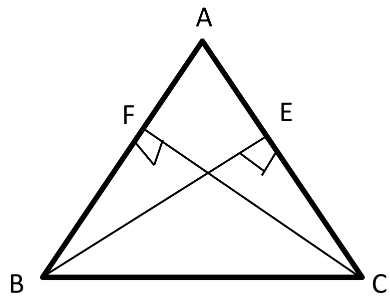
2. GIVEN – BE⊥AC, CF⊥AB, BE = CF

TO PROVE - (i) $\Delta ABE \cong \Delta ACF$

(ii) $AB = AC$.

B C

PROOF –**(i)** In Δ AEB & Δ AFC,



∠ A = ∠ A (common)

∠ AFC = ∠ AEB (90°)

BE = CF (given)

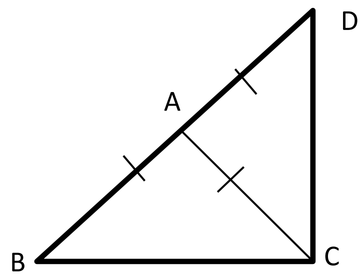
By AAS congruence rule,

Δ ABE ≅ Δ ACF ∎

(ii) ∵ Δ ABE ≅ Δ ACF

∴ AB = AC (C.p.c.t.) Hence, proved.

3. **GIVEN** – AB = AC, AD = AB



TO PROVE - ∠ BCD = 90°

PROOF - In Δ ABC,

∵ AB = AC

⇒ ∠ ACB = ∠ ABC …………(i) (opposite angles of equal sides)

In Δ ADC,

∵ AD = AC

⇒ ∠ ACD = ∠ ADC …………..(ii)

Adding equation (i) and (ii),

∠ ACB + ∠ ACD = ∠ ABC + ∠ ADC

⇒ ∠ BCD = ∠ ABC + ∠ ADC

Now,

In Δ BCD,

∵ ∠ BCD +∠ ABC + ∠ ADC = 180°

⇒ ∠ BCD + ∠ BCD = 180° (∵ ∠ BCD = ∠ ABC + ∠ ADC)

2∠ BCD = 180°

∠ BCD = 90° ∎ Hence, proved.

4. ABC is an equilateral triangle in which

AB = AC = BC.

TO PROVE – $\angle A = \angle B = \angle C = 60°$

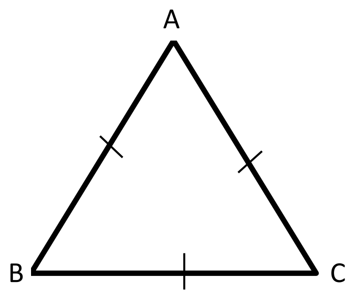
In Δ ABC,

$\because AB = AC$

$\Rightarrow \quad \angle C = \angle B$ …….. (i) (opposite angles of equal sides are equal)

$\because$ AB = BC

$\Rightarrow \angle C = \angle A$ ……..(ii)



From equation (i) and (ii) ,

$\angle A = \angle B = \angle C = x$(let)

Now, $\because \angle A + \angle B + \angle C = 180°$

$\Rightarrow \quad x + x + x = 180°$

$\Rightarrow \quad x = 60°$

$\therefore \angle A = \angle B = \angle C = 60°$. Hence, Proved.

5. In Δ ABC, $\angle A = 90°$ &

AB = AC (Given)

$\therefore \angle C = \angle B$ …….. (i) (Opposite angles of equal sides are equal)

Now, $\because \angle A + \angle B + \angle C = 180°$

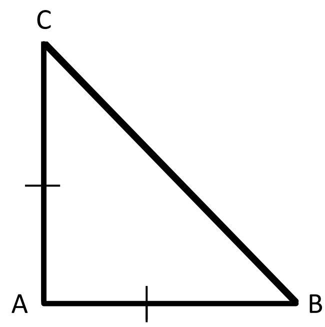
$\Rightarrow \angle A + \angle B + \angle B = 180°$

$\Rightarrow \quad 90° + 2\angle B = 180°$

$\Rightarrow \quad 2\angle B = 90°$

$\Rightarrow \quad \angle B = 45°$

$\therefore \angle C = \angle B = 45°$



6. In Δ ABC,

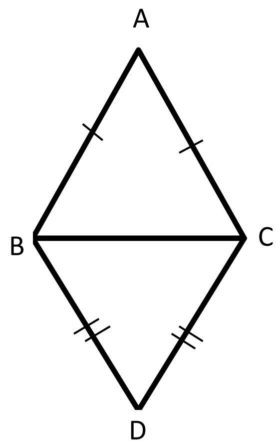
$\because AB = AC$

$\Rightarrow \quad \angle ABC = \angle ACB$ …….. (i)

In Δ DBC,

$\because AB = AC$

$\Rightarrow \quad \angle DBC = \angle DCB$ …….. (ii)



Adding equation (i) and (ii),

$$\angle ABC + \angle DBC = \angle ACB + \angle DCB$$

$$\Rightarrow \qquad \angle ABD = \angle ACD.$$

St. Karen's Secondary School

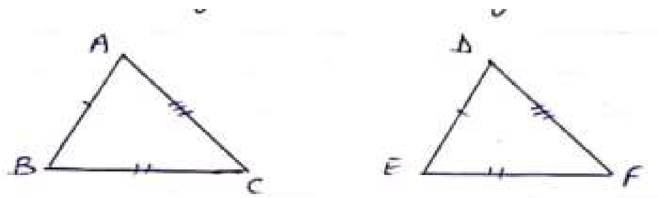
2020 – 2021

Class – 9 **Subject** – MATHEMATICS

"CONTENT - 4"

CH-7 – CONGRUENCE (SUB TOPIC – S.S.S. CRITERIA)

S.S.S. CRITERIA: If the three sides of one triangle are equal to the corresponding three sides of another triangle then the two triangles are congruent.



In a $\triangle ABC$ and $\triangle DEF$

If $AB=DE$

$BC=EF$

$AC=DF$

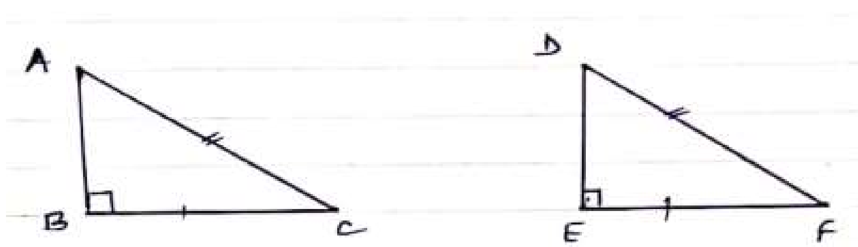
$\therefore$ $\triangle ABC \cong \triangle DEF$ (By S.S.S. criteria)

$\therefore$ $\angle A=\angle D$

$\angle B=\angle E$

$\angle C=\angle F$ {BY C.P.C.T}

R.H.S. CRITERIA: 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 triangles are congruent.



In a $\triangle ABC$ and $\triangle DEF$

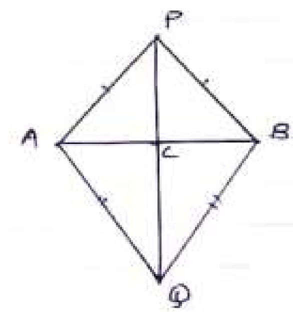
$\angle ABC = \angle DEF=90^0$

$AC=DF$

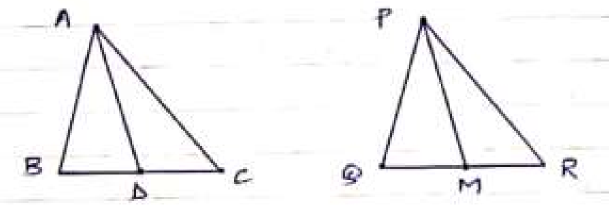
$BC=EF$

$\therefore \triangle ABC \cong \triangle DEF$ {By R.H.S. criteria}

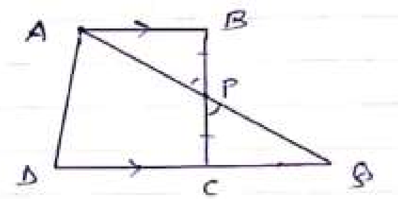
1. In the given figure, AB is a line segment. P and Q are points on opposite sides of AB such that each of them is equidistant from the points A and B. show that the line PQ is the perpendicular bisector of AB.



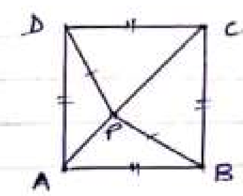
2. In the given figure, the two sides AB and BC and the median AD of ΔABC are correspondingly equal to the two sides PQ and QR, and the median PM of ΔPQR, prove that ΔABC≅ ΔPQR.



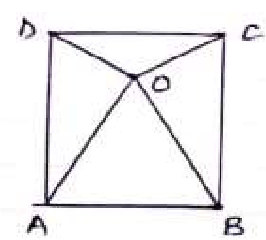
3. In the given figure, ABCD is a quadrilateral in which AB||DC and P is the midpoint of BC. On producing, AB and DC meet at Q. prove that
   (i) AB = CQ
   (ii) DQ = DC + AB



4. In the given figure ABCD is a square and p is a point in-side it such that PB = PD, prove that CPA is a straight line.



5. In the given figure, O is a point in the interior of square ABCD such that ΔOAB is an equilateral triangle. Show that ΔOCD is an isosceles triangle.



6. AD is an altitude of an isosceles triangle ABC in which AB = AC. Show that
   (i) AD bisects BC

(ii) AD bisects ∠A

7. BE and CF are two equal altitudes of a triangle ABC. Using RHS congruence rule. Prove that the triangle ABC is isosceles.

ACTIVITY

Taking two triangle, in which all corresponding sides are equal, verify that corresponding angles are equal.

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<u>ST. KAREN'S SECONDARY SCHOOL</u>

<u>SUB – MATHEMATICS</u>

<u>CH 7- TRIANGLES</u>

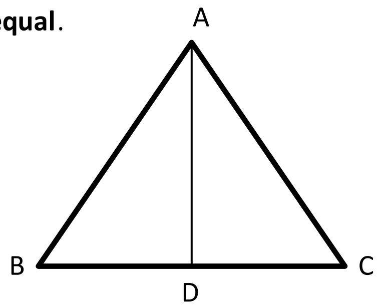
<u>CLASS – 9</u> **<u>PAGE NO. 1</u>**

<u>CONTENT NO. 3</u> **<u>DATE – 22.7.20</u>**

<u>SOME PROPERTIES OF TRIANGLES</u>

<u>ISOSCELES TRIANGLES</u> - A triangle in which two sides are equal is called an Isosceles triangle.

<u>THEOREM</u> – Angles opposite to equal sides of an isosceles triangle are equal.



<u>GIVEN</u> – ABC is an isosceles triangle in which AB = AC.

<u>TO PROVE</u> - ∠ B = ∠ C.

<u>CONSTRUCTION</u> – Draw the bisector AD of ∠ A which intersect BC at D.

<u>PROOF</u> – In Δ ABD & Δ ACD,

AB = AC (Given)

∠BAD = ∠CAD (Construction)

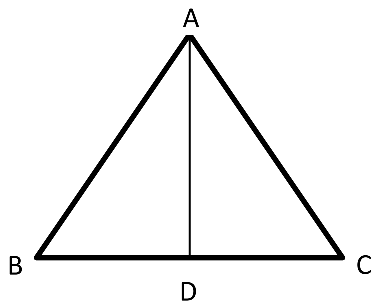
AD = AD (Common)

By SAS congruence rule,

Δ ABD ≅ Δ ACD

∴ ∠ B = ∠ C (C.P.C.T) Hence, proved.

<u>THEOREM</u> – The sides opposite to equal angles of a triangle are equal.



<u>GIVEN</u> – ABC is a triangle in which ∠ B = ∠ C.

<u>TO PROVE</u> – $AB = AC$.

<u>CONSTRUCTION</u> – Draw the bisector AD of ∠ A which intersect BC at D.

<u>PROOF</u> – In Δ ABD & Δ ACD,

∠ B = ∠ C (Given)

$\angle BAD = \angle CAD$ (Construction)

$AD = AD$ (Common)

By AAS congruence rule,

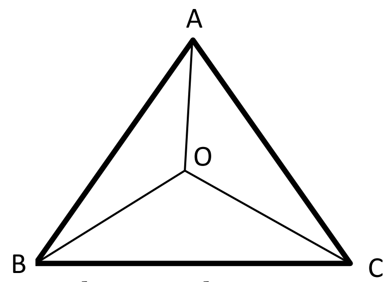
$\Delta\ ABD \cong \Delta\ ACD$

$\therefore AB = AC$ (C.P.C.T) Hence, proved.

ASSIGNMENT 3

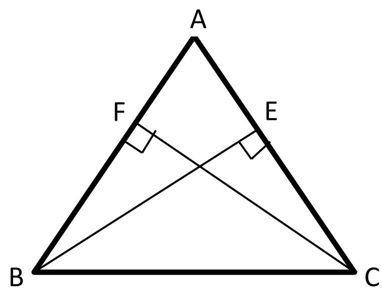
QUESTION NO. 1- In an isosceles triangle ABC, with AB = AC, the bisectors of ∠ B & ∠ C intersect each other at O. Prove that

(i) OB = OC.
(ii) AO bisects ∠ A.

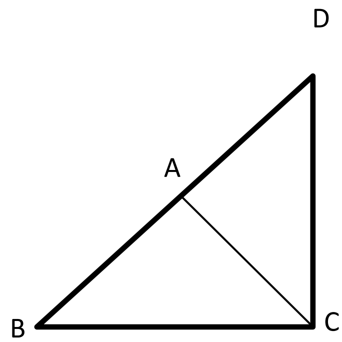


QUESTION NO. 2 – ABC is a triangle in which altitudes BE and CF to sides AC and AB are equal. Prove that

(i) $\Delta\ ABE \cong \Delta\ ACF$
(ii) $AB = AC$.



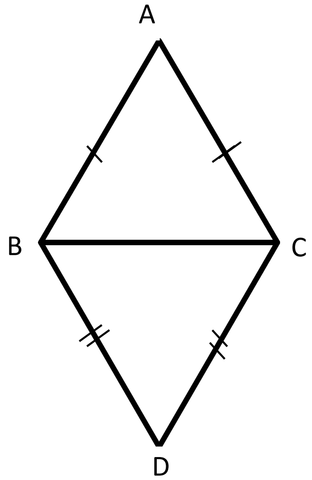
QUESTION NO. 3 - Δ ABC is an isosceles triangle in which $AB = AC$. Side BA is produced to D such that $AD = AB$. Show that $\angle BCD$ is a right angle.



QUESTION NO. 4 – Show that the angles of an equilateral triangle are 60° each.

QUESTION NO. 5 – ABC is a right angled triangle in which ∠ A = 90° and AB = AC. Find ∠ B and ∠ C.

QUESTION NO. 6 – ABC and DBC are two isosceles triangles on the same base BC. Show that ∠ABD = ∠BCD.



ACTIVITY – Construct an isosceles triangle taking it's any two sides equal. Then using protractor verify that opposite angles of equal sides are equal or not. Now construct an equilateral triangle taking it's all three sides equal and verify that it's each angle are equal are not.

NOTE – FOR EXPLANATION OF TOPIC, FOLLOW THE GIVEN LINK : -

https://drive.google.com/file/d/1BlZNNubyfhzxB8y4doGXU896UyTfxRh1/view?usp=drivesdk

ONE MORE LINK IS –

https://youtu.be/H0AvUg3H6vo