Mount Abu Public School

H-Block, Sector-18, Rohini, New Delhi-110085

SUBJECT:- MATHEMATICS

CLASS-VII

Week : 11 January 2021 to 16 January 2021

CHAPTER-11 : PROPERTIES OF TRIANGLE(part-1)

Sub-Topics:

- Triangle
- Properties of triangle
- Types of Triangle
- Classification with angles
- Classification with sides

Learning Outcomes:

Each student will be able to:

- define a triangle
- list the different types of triangles
- identify the triangles on the basis of their properties
- apply the knowledge gained in real life

Teaching Aids Used:

Presentation of E-lesson, YouTube videos by screen sharing, white board and marker using laptop/mobile

GUIDELINES:

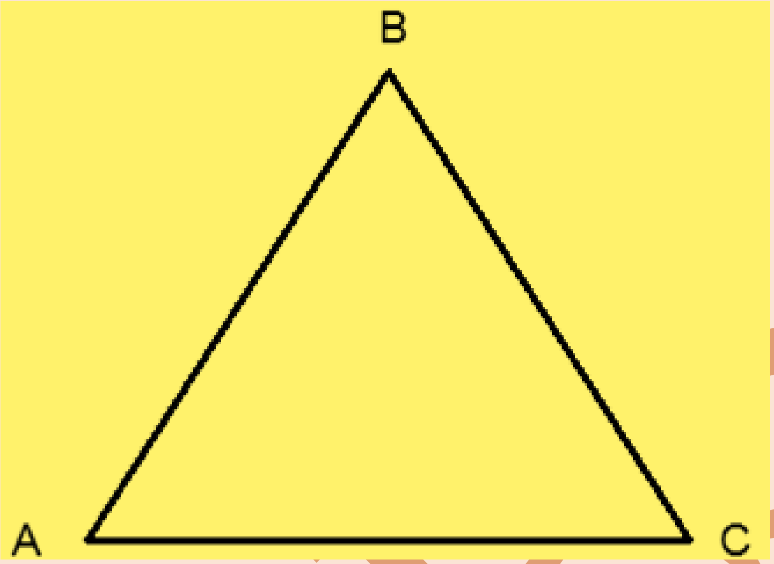
Dear students,

Kindly read the content given below and view the links shared for better understanding.

Solve the given questions in math notebook.

LESSON DEVELOPMENT

TRIANGLE



A triangle is a closed plane figure bounded by three line segments.

The symbol 'Δ' is used to represent the triangle. The triangle shown here is written as ΔABC.

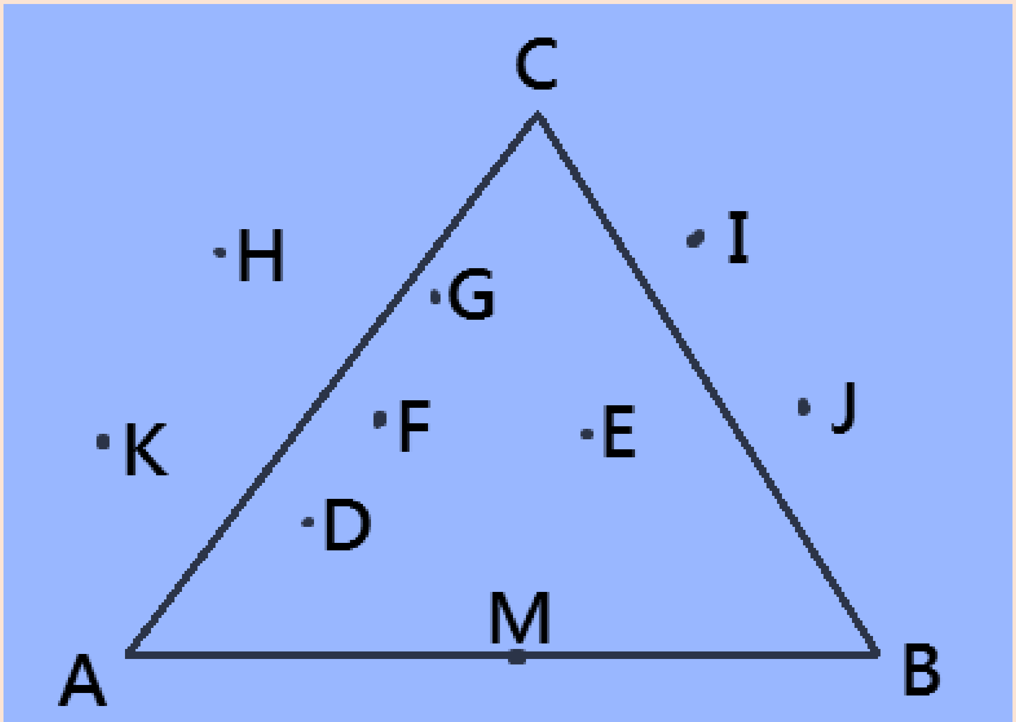
A triangle has three sides, three angles and three vertices.

PART	NUMBER	NAME
Sides	3	AB, BC, CA
Vertices	3	A, B, C
Angles	3	$\angle BAC$ or $\angle A$, $\angle ABC$ or $\angle B$, $\angle ACB$ or $\angle C$

Link:

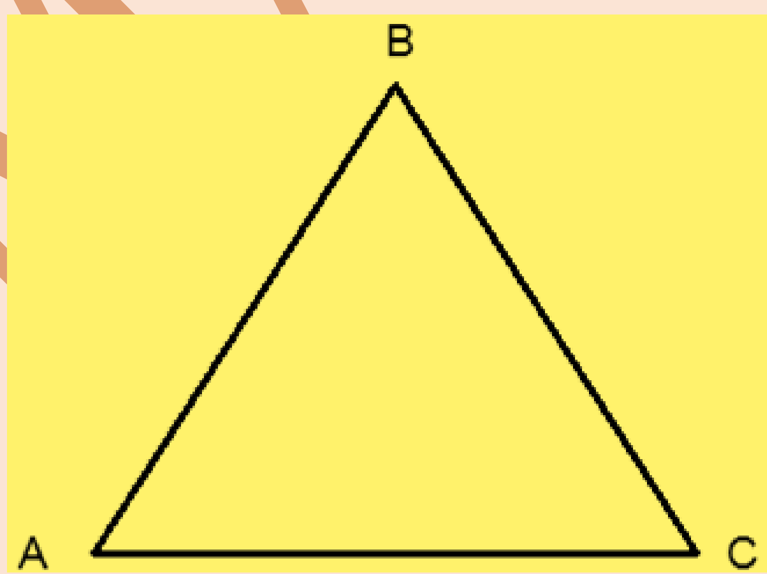
https://www.youtube.com/watch?v=QfowPELLSSI

REGIONS OF A TRIANGLE



- **Interior Region: Points D , F , G , E**
- **Exterior Region: Points K , H , I , J**
- **Boundary Region: Points A , B , C , M**

SIDE OPPOSITE TO VERTEX



The side which does not contain the particular vertex is known as side opposite to the vertex. In the above figure, side YZ is opposite to vertex X.

Similarly, the angle which does not lie on a side is the angle opposite to that side. In the above figure,

$\angle Y$ is the angle opposite to side XZ

$\angle X$ is the angle opposite to side YZ

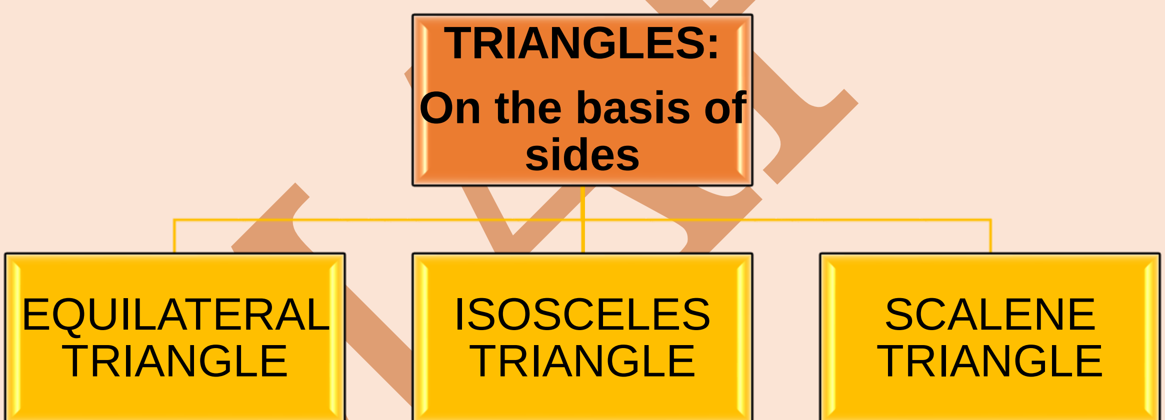
$\angle Z$ is the angle opposite to side XY

<u>TYPES OF TRIANGLE</u>

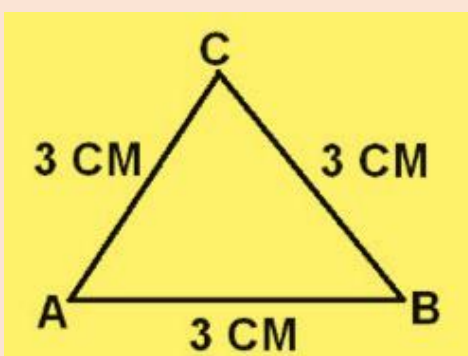
We know that a triangle has three sides and three angles. Hence, triangles can be divided on two basis:

(a) On the basis of sides
(b) On the basis of angles

<u>TYPES OF TRIANGLES – ON THE BASIS OF SIDES</u>

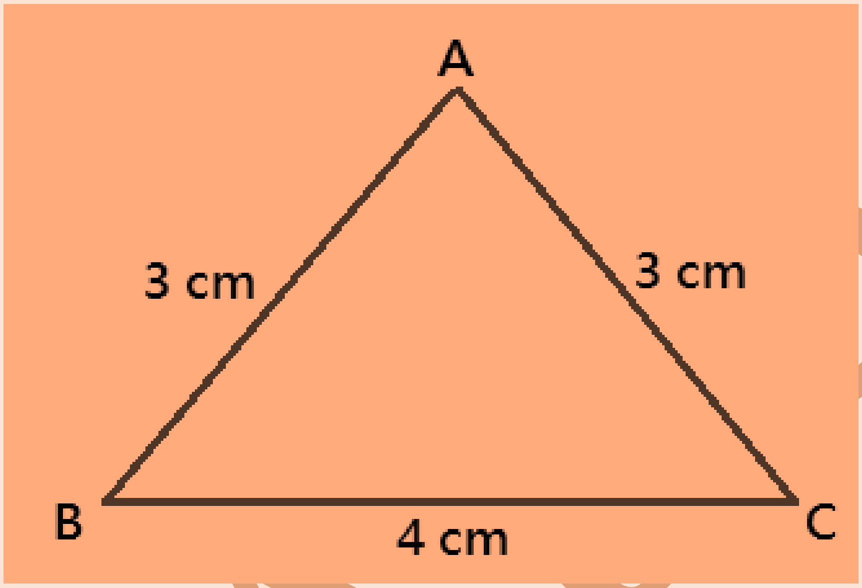


<u>EQUILATERAL TRIANGLE</u>



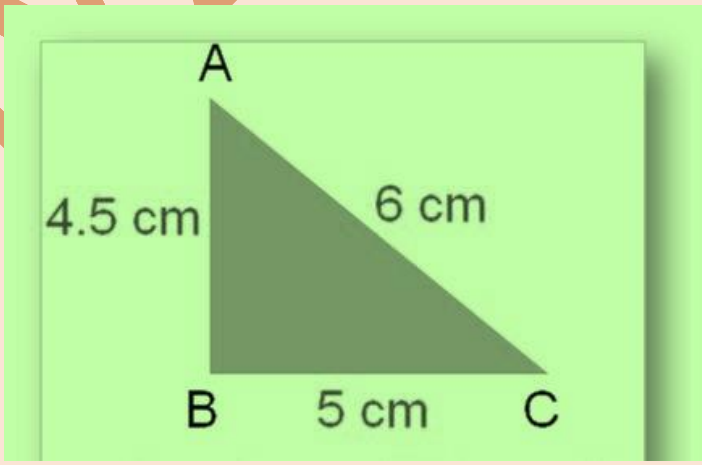
- A triangle whose all three sides are equal is called an equilateral triangle.
- In the given figure, ΔABC is an equilateral triangle since $AB = BC = CA = 3\ cm$
- Equilateral triangles have all the angles equal , that is $\angle A = \angle B = \angle C = 60°$

ISOSCELES TRIANGLE



- A triangle whose two sides are equal is called an isosceles triangle.
- In the given figure, ΔABC is an isoscelese triangle since $AB = AC = 3\ cm$ and $BC = 4\ cm$
- Isosceles triangles the angles opposite to equal sides are also equal, that is $\angle B = \angle C$

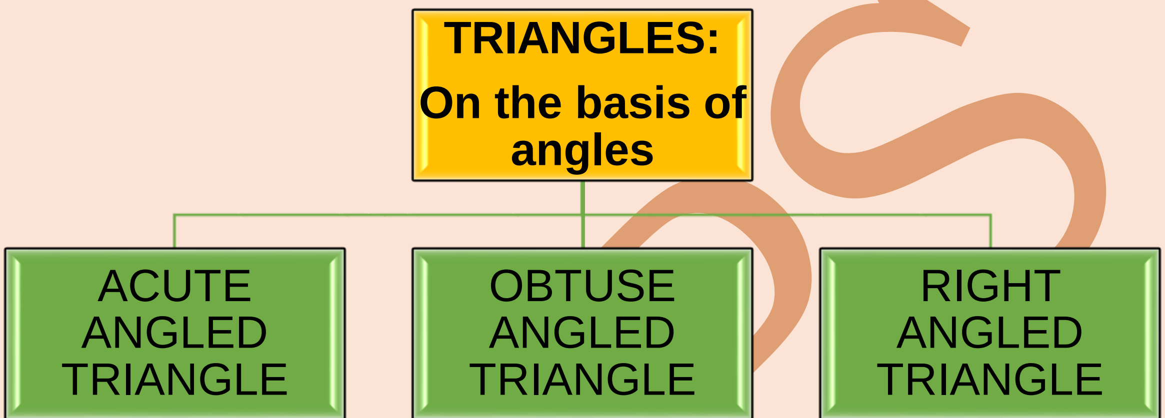
SCALENE TRIANGLE



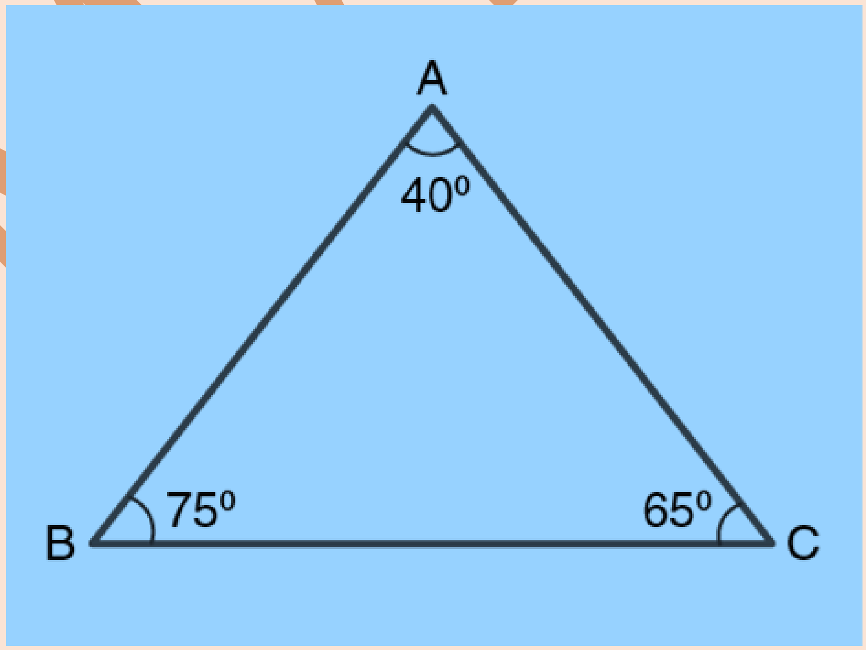
- A triangle which has three unequal sides is called an scalene triangle.

- In the given figure, ΔABC is an scalene triangle since $AB = 4.5\ cm\ , BC = 5\ cm,\ CA = 6\ cm$
- All the angles in a scalene triangle are of different measures

<u>TYPES OF TRIANGLES – ON THE BASIS OF ANGLES</u>

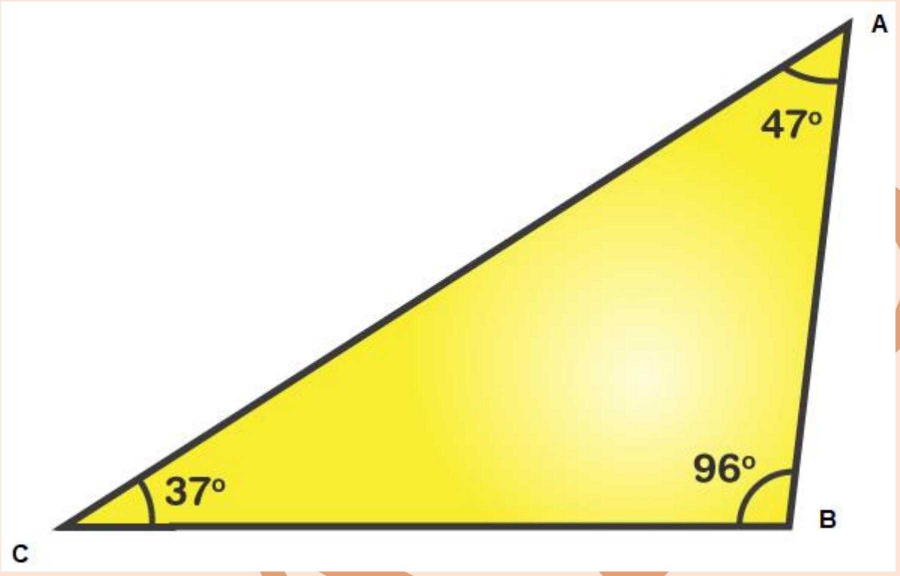


<u>ACUTE ANGLED TRIANGLE</u>



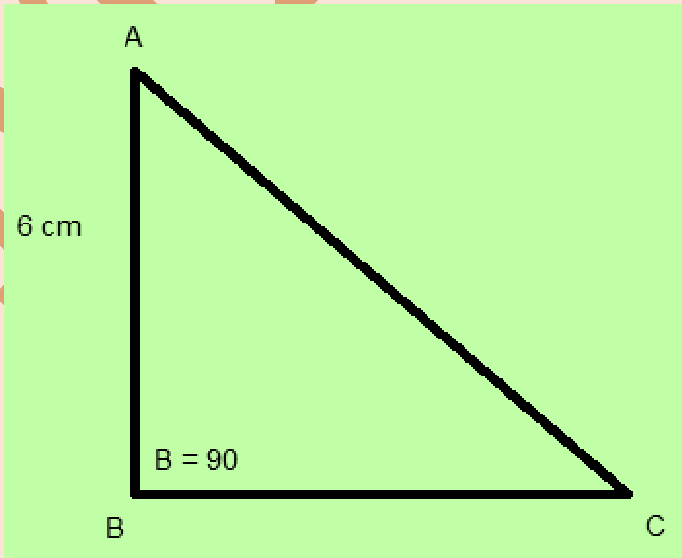
- A triangle whose all three angles are less than $90°$ is called an **acute angled triangle.**
- In the given figure, ΔABC is an acute angled triangle since $\angle A, \angle B, \angle C$ are all less than $90°$

OBTUSE ANGLED TRIANGLE



- A triangle which has one obtuse angle is called an **obtuse angled triangle.**
- In the given figure, ΔABC is an obtuse angled triangle since $\angle B$ is an obtuse angle

RIGHT ANGLED TRIANGLE



- A triangle which has one right angle is called an **right angled triangle.**

- In the given figure, ΔABC is an right angled triangle since $\angle B$ is a right angle

Link:

https://www.youtube.com/watch?v=0EdUJDiNB7A

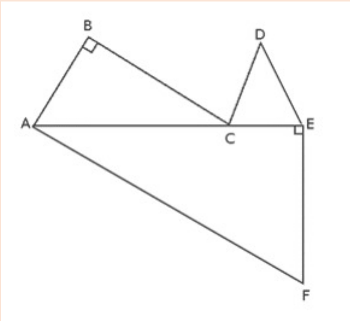
ASSIGNMENT:

Complete the following questions from Exercise 11.1 of your book(page 155)

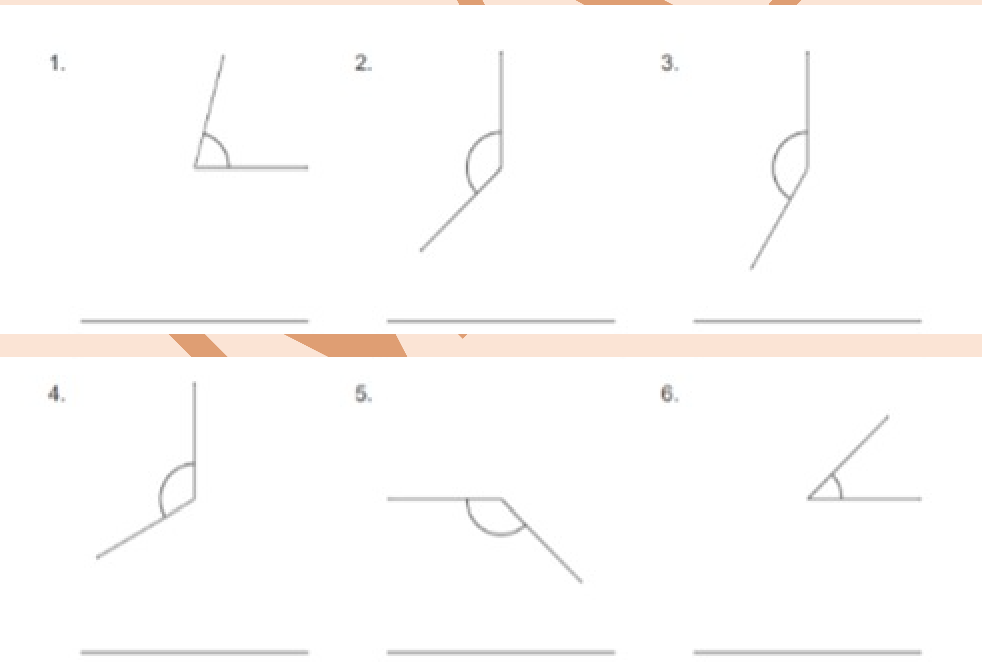
Q1, 2, 3, 4, 5

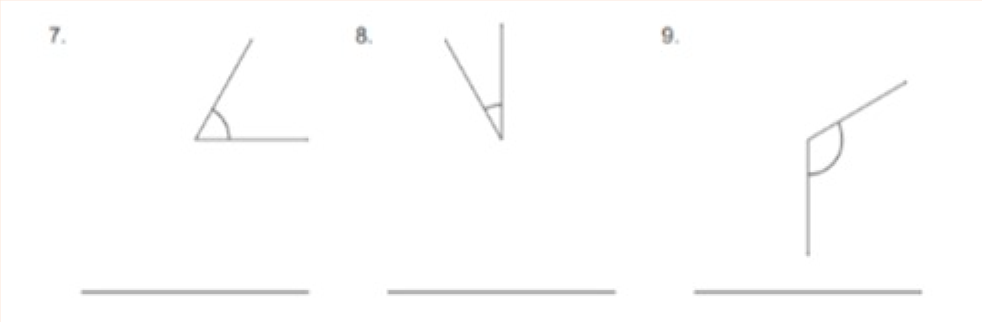
EXTRA QUESTIONS:

Q1) Find the number of triangles in the following figure and name them.

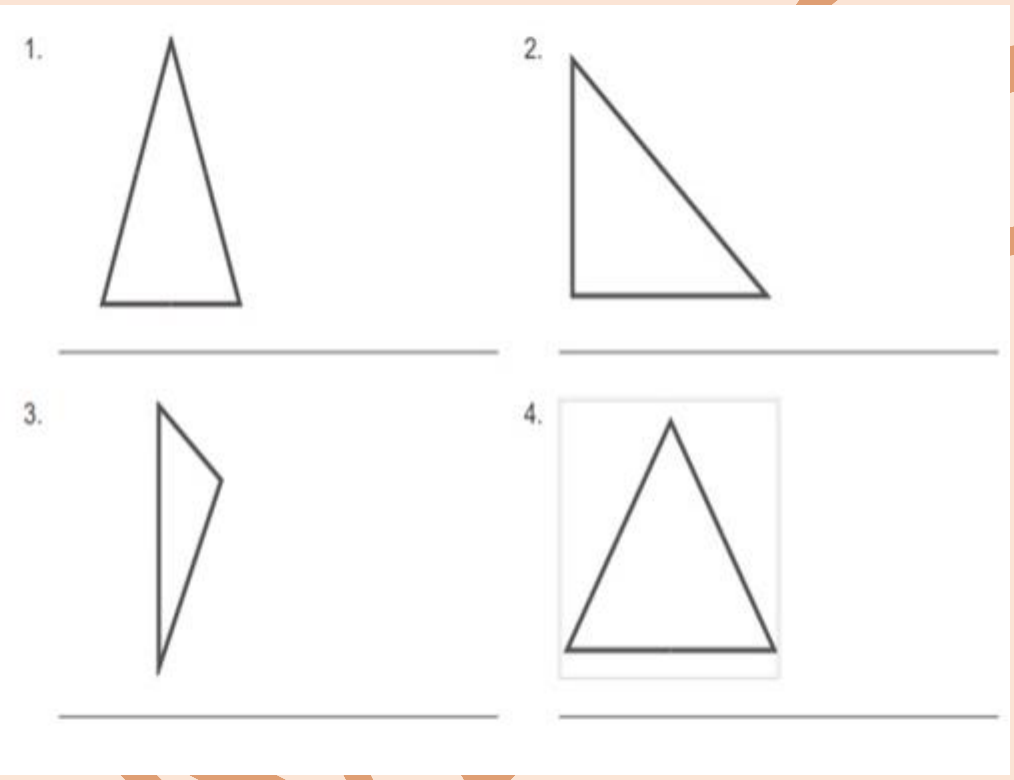


Q2) Classify the angles





Q3) Classify the triangles



Q4) Fill in the banks:

(i) Triangle is formed by joining three _______________ points.

(ii) A point where two sides of a triangle meet is known as _______________ of a triangle.

(iii) Each angle of an equilateral triangle is of _______________ measure.

(iv) A _______________ triangle has one angle of 90°.

(v) A triangle has _______________ vertices and _______________ sides.

(vi) In an obtuse triangle, the remaining two angles are _______________

(vii) The sum of the measure of three angles of a triangle is _______________

(viii) A triangle whose two sides are of equal length is known as _______________ triangle.

Q5) Which of the following cannot be the measure of three angles of a triangle?

(i) ∠A = 60°, ∠B = 60°, ∠C = 60°

(ii) ∠A = 70°, ∠B = 20°, ∠C = 100°

(iii) ∠A = 90°, ∠B = 90°, ∠C = 90°

(iv) ∠A = 72°, ∠B = 30°, ∠C = 78°

Q6) Find the measure of the third angle of a triangle:

(i) ∠A = 60°, ∠B = 60°

(ii) ∠A = 70°, ∠B = 80°

(iii) ∠A = 90°, ∠B = 10°

(iv) ∠A = 95°, ∠B = 25°

Q7) Look at the triangle given below and answer the following:

(i) What is the measure of ∆ABC?

(ii) What type of triangle ∆ABC?

(iii) What type of triangle ∆PQR?

(vi) What type of triangle ∆LMN?

(v) What is the measure of ∠L?

Q8) Classify the following triangle:

(i) Sides of triangle are 4 cm, 4 cm and 7 cm

(ii) Angles of triangle is 90°, 60° and 30°

(iii) Angles of triangle is 110°, 40° and 30°

(iv) Sides of triangle are 5 cm, 13 cm and 12 cm

(v) Angles of triangle is 60°, 60° and 60°

Q9) Take three non - collinear points L, M, N. Join LM, MN and NL. What figure do you get?

Name:

(a)The side opposite to ∠L.

....

(b) The angle opposite to side LN.

....

(c) The vertex opposite to side MN.

....

(d) The side opposite to angle N.

....

Q10) Say whether the following statements are true or false:

(a) All the angles of an isosceles triangle are equal.

(b) If one angle of a triangle is obtuse, the other two angles must be acute.

(c) A right triangle can be equilateral.

(d) Equiangular triangle has its three sides also equal.

(e) A triangle can have two obtuse angles.

Q11) Classify the triangle into acute triangle, obtuse triangle and right triangle with the following angles:

(a) 90°, 45°, 45°

(b) 60°, 60°, 60°

(c) 80°, 60°, 40°

(d) 130°, 40°, 10°

(e) 90°, 35°, 55°

(f) 92°, 38°, 50°

Q12) Classify the triangle according to sides, that is, equilateral, isosceles and scalene triangles

(a) 6 cm, 3 cm, 5cm.

(b) 6 cm, 6 cm, 6 cm.

(c) 7 cm, 7 cm, 5 cm.

(d) 8 cm, 12 cm, 10 cm.

(e) 3 cm, 4 cm, 5 cm.

(f) 3.5 cm, 3.5 cm, 4.5 cm.

Week : 18 January 2021 to 23 January 2021

CHAPTER-11 : PROPERTIES OF TRIANGLE(part-2)

Sub-Topics:

- Angle Sum property of triangle
- Exterior Angle property
- Triangle inequality property
- Isosceles triangle property
- Pythagoras theorem

Learning Outcomes:

Each student will be able to:

- state isosceles triangle property
- prove angle sum property of triangle
- identify exterior angle of a triangle
- solve the questions on the basis of Pythagoras theorem
- apply the knowledge gained in real life

Teaching Aids Used:

Presentation of E-lesson, YouTube videos by screen sharing, white board and marker using laptop/mobile

GUIDELINES:

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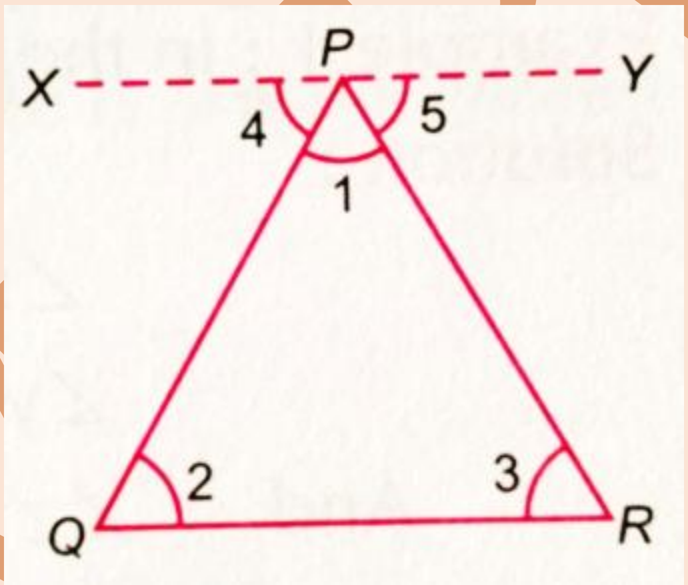
LESSON DEVELOPMENT

PROPERTIES OF A TRIANGLE

1. ANGLE SUM PROPERTY:

The sum of all three angles of a triangle is $180°$



Proof:

In $\Delta PQR,$ draw $XY||QR$ and mark $\angle 1$ to $\angle 5$ as shown in figure

As $XY||QR$ and $\overline{PQ}$ being transversal

$\angle 4 = \angle 2$ (Alternate Interior Angles)

$\angle 3 = \angle 5$ (Alternate Interior Angles)

$\angle 4 + \angle 1 + \angle 5 = 180°$ (Straight Angles)

$\angle 2 + \angle 1 + \angle 3 = 180°$ (Substituting $\angle 4 = \angle 2; \angle 5 = \angle 3$)

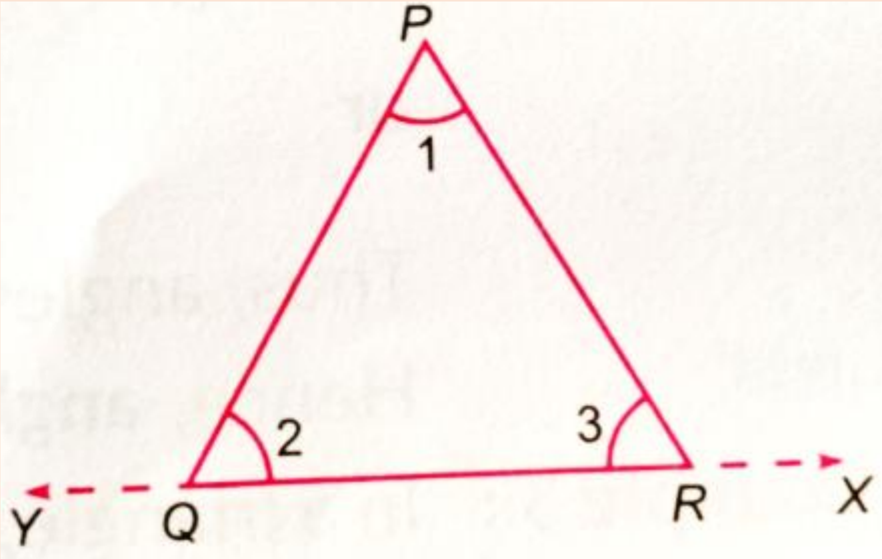
Thus, sum of angles of a triangles is $180°$

Link:

https://www.youtube.com/watch?v=EAW-37u6WXw

2. **EXTERIOR ANGLE PROPERTY:**

In a triangle, the exterior angle is equal to the sum of two interior opposite angles



Proof:

Consider ΔPQR in the figure. Produce its side $\overline{QR}$ to X and $\overline{RQ}$ to Y

Now, $\angle PRX$ is an exterior angle at R and $\angle 1$ and $\angle 2$ are its two interior opposite angles

Similarly, $\angle PQY$ is an exterior angle at Q and $\angle 1$ and $\angle 3$ are its two interior opposite angles

$\angle 1 + \angle 2 + \angle 3 = 180°$ (Angle-Sum property)

$\angle PRX + \angle 3 = 180°$ (Linear Pair)

$$\angle PRX = \angle 1 + \angle 2$$

Exterior angle at R = Sum of interior opposite angles

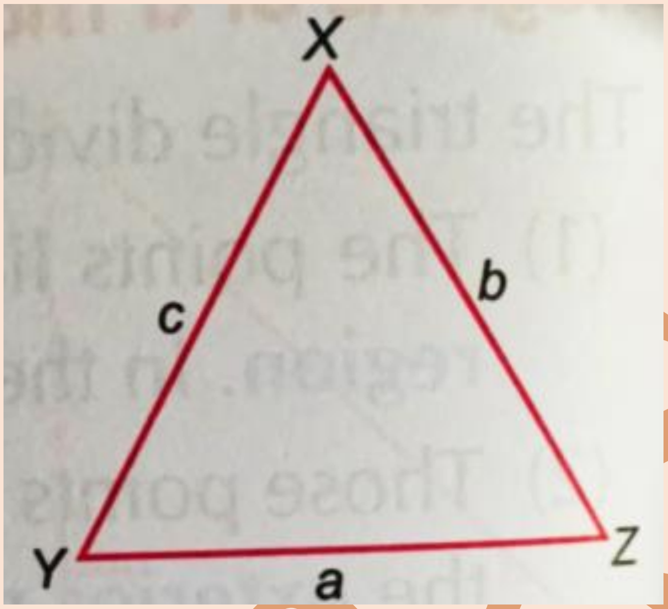
$$\angle PQY = \angle 1 + \angle 3$$

Link:

https://www.youtube.com/watch?v=OQE6mXgUFI4

https://www.youtube.com/watch?v=YyaMekLcgNw

3. **TRIANGLE INEQUALITY PROPERTY:**



The sum of any two sides in a triangle is greater than the third side

Consider ΔXYZ, in the above figure,

The side opposite $\angle X = a$

The side opposite $\angle Y = b$

The side opposite $\angle Z = c$

$$a + b > c; b + c > a; c + a > b$$

Thus, the sum of two sides of a triangle is always greater than the third side

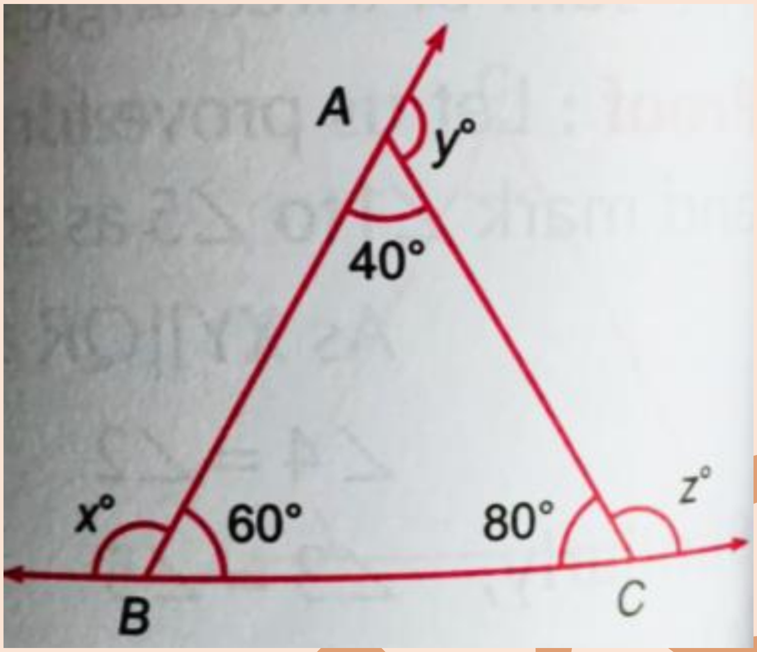
There does not exist a triangle, if the sum of its two sides is less than or equals to the third side

Link:

https://www.youtube.com/watch?v=BiagrTl2y4o

EXAMPLE:

In the adjoining figure, find $\angle z°, \angle x° and\ \angle y°$. Also find $\angle x° + \angle y° + \angle z°$



SOLUTION:

$$\angle x° = \angle BAC + \angle ACB = 40° + 80° = 120°$$

$$\angle y° = \angle ABC + \angle ACB = 60° + 80° = 140°$$

$$\angle z° = \angle ABC + \angle BAC = 60° + 40° = 100°$$

$$\angle x° + \angle y° + \angle z° = 120° + 140° + 100° = 360°$$

EXAMPLE:

Show that 1 cm, 3 cm and 2 cm cannot be the three sides of a triangle.

SOLUTION:

In a triangle, we know that sum of two sides of a triangle is always greater than the third side

$1\ cm + 3\ cm > 2\ cm \Rightarrow 4\ cm > 2\ cm$ true

$3\ cm + 2\ cm > 1\ cm \Rightarrow 5\ cm > 1\ cm$ true

$1\ cm + 2\ cm = 3\ cm$ not true

$\Rightarrow 3 = 3$ is not true, hence they cannot represent the three sides of a triangle

EXAMPLE:

The three angles of triangle are $3x°, 4x° and\ 5x°$. Find the value of x and degree measure of each angle

SOLUTION:

By angle sum property,

$$3x° + 4x° + 5x° = 180°$$

$$12x° = 180°$$

$$x° = \frac{180°}{12} = 15°$$

$$3x° = 3 \times 15° = 45°$$

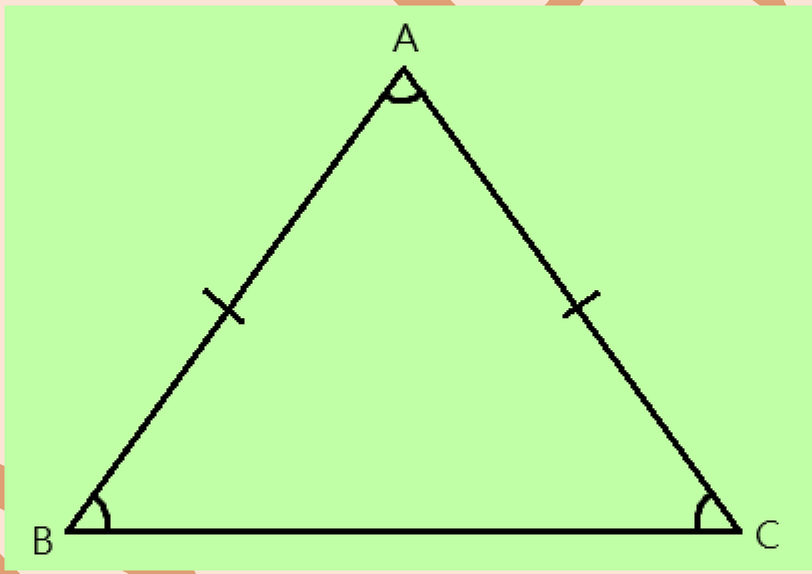
$$4x° = 4 \times 15° = 60°$$

$$5x° = 5 \times 15° = 75°$$

Hence,
$x° = 15°$ and angles are $45°, 60°, 75°$

ISOSCELES TRIANGLE PROPERTY

Isosceles triangle is the triangle which has two equal sides,



In the figure, AB = AC

The third side BC is known as **base** of the triangle

The angles contained by the base are known as **base angles**,

i.e. $\angle B \text{ and } \angle C$

The angle opposite to the base is known as **vertex** i.e. $\angle A$

In a triangle, if two sides are equal, then angles opposite to them are also equal

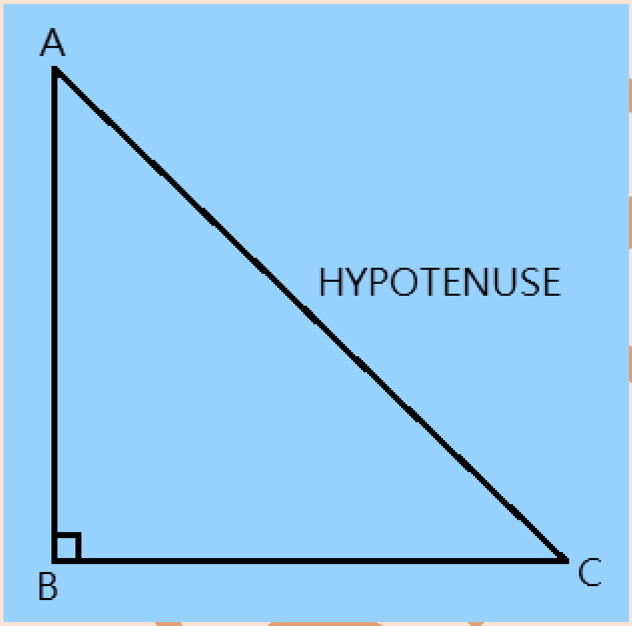
Conversely, if two angles of a triangle are equal, then opposite sides to them are also equal

Link:

https://www.youtube.com/watch?v=V2iK77V-Q_g

PYTHAGORAS THEOREM

In a right angled triangle, the side opposite to the right angle is known as hypotenuse and it is the longest side



Pythagoras was a Greek Mathematician and gave an important theorem known as **Pythagoras Theorem**.

It states that, in a right – angled triangle the square described on the hypotenuse is equal to the sum of squares described on the sides containing the right angle

In a right angled triangle, the square of the hypotenuse equals the sum of the squares of its sides

$$AC^2 = AB^2 + BC^2$$

The relation between the lengths of the sides of a right triangle is known as **Pythagoras Theorem**

Conversely, if the sides of a triangle are such that

$$AC^2 = AB^2 + BC^2$$

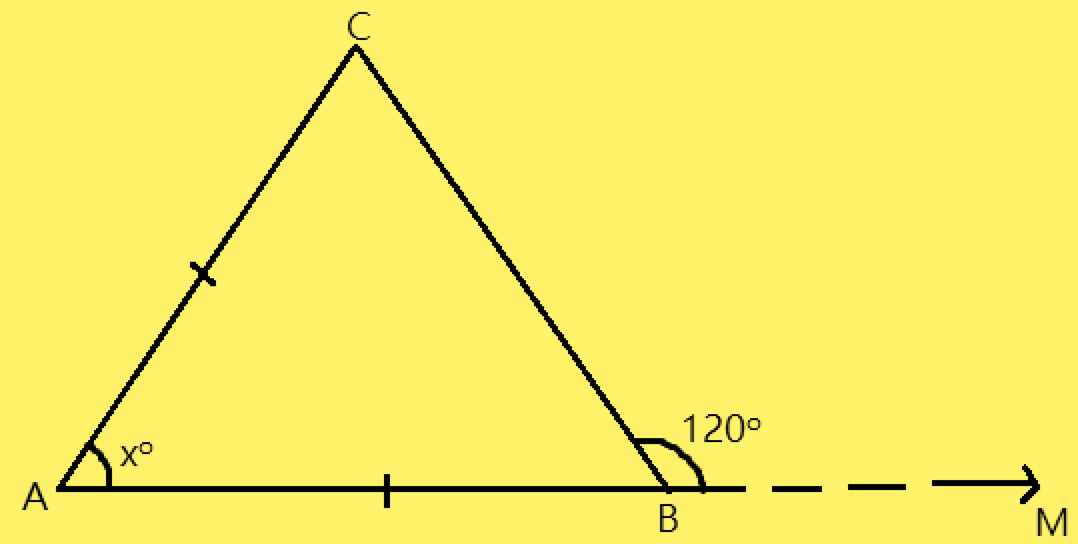
Then it is a right angled triangle with AC as hypotenuse

Link:

https://www.youtube.com/watch?v=dl6Iw1X4NQo

EXAMPLE:

In the adjoining figure, AB = AC, find the value of x



Given, $AB = AC \Rightarrow \angle ABC = \angle ACB$

Also, $\angle ABC = 180° - 120° = 60°$ (Linear Pair)

Now, using exterior angle property

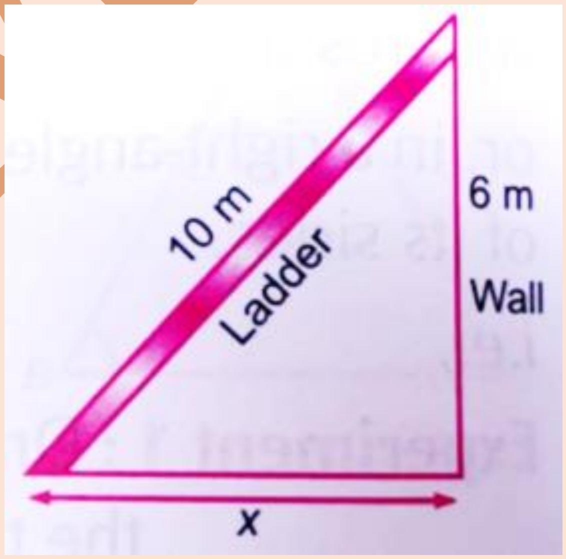
$$\angle CBM = \angle CAB + \angle ACB$$

$$120° = x° + 60°$$

$$x° = 120° - 60° = 60°$$

EXAMPLE:

A ladder of length 10 m rest on the top of wall 6 m high. Find the distance of foot of the ladder from the wall



SOLUTION:

Let distance of foot of ladder from the wall be x metre

Using Pythagoras theorem,

$$(10\ m)^2 = (6\ m)^2 + x^2$$

$$x^2 = 10^2m^2 + 6^2m^2$$

$$x^2 = 100m^2 - 36m^2$$

$$x^2 = 64\ m^2$$

$$x = 8\ m$$

Hence, the distance of foot of the ladder from the wall = 8 m

PYTHAGOREAN TRIPLET

Three positive integers, a, b and c in this particular order are said to be **Pythagorean triplets**, if $c^2 = a^2 + b^2$

For example,

(5, 12, 13) is a Pythagorean triplet, as

$$13^2 = 5^2 + 12^2 \Rightarrow 169 = 25 + 144 \Rightarrow 169 = 169$$

ASSIGNMENT:

Complete the following questions from Exercise 11.1 of your book(page 155)

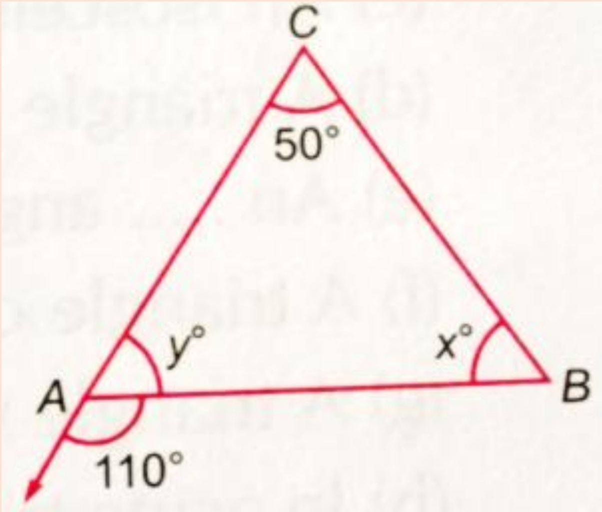
Q1, 2, 3, 4, 5

EXTRA QUESTIONS:

Q1) in an isosceles triangle, the vertex angle is half of each of the equal angles. Find the degree measure of each angle

Q2) In a triangle, the exterior angle is four times of the following interior angle. If the two interior opposite angles are equal in magnitude, find their degree measure.

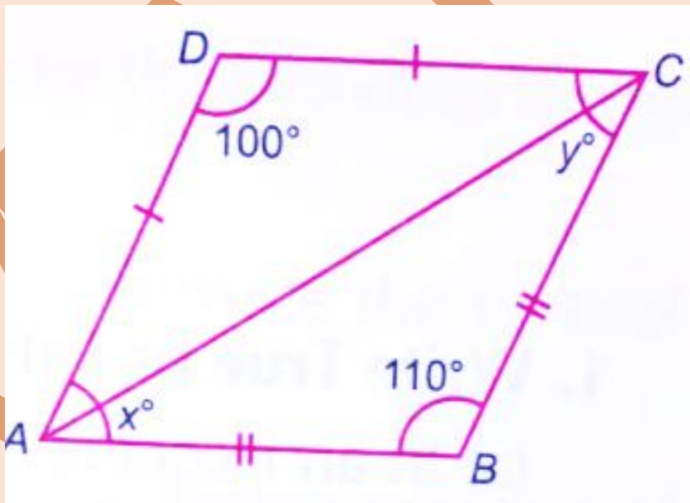
Q3) in the following figure, find the value of $x°$ and $y°$



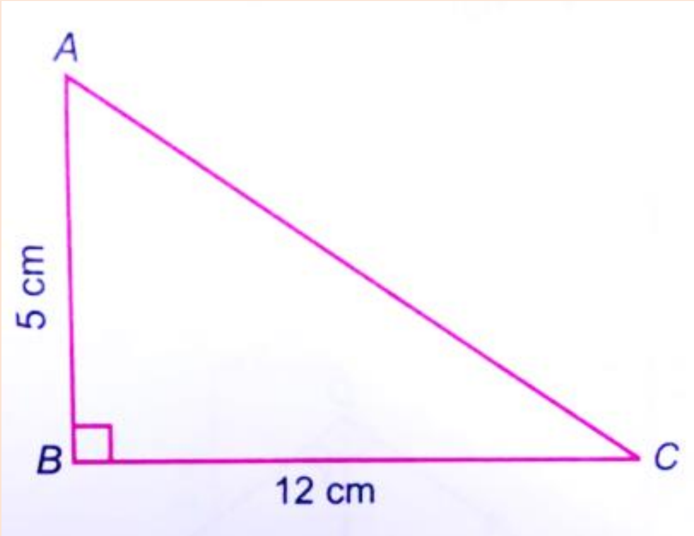
Q4) Show that 1 cm, 3 cm and 2 cm cannot be the three sides of a triangle

Q5)Find the length of the maximum long rod which can be placed in a rectangular box of 5 m ×12 m

Q6) In the given figure, Find $x°$ and $y°$, if given that AD = DC and AB = BC



Q7) In the adjoining figure, find the length of AC



Q8) In an isosceles triangle, if each of the base angles is half the vertical angle, find the degree measure of each angle

Week : 25 January 2021 to 30 January 2021

CHAPTER-14 : CONGRUENCE OF TRIANGLES(part-1)

Sub-Topics:

- congruency
- super imposition
- congruency of triangles
- criterion of congruency of triangles

Learning Outcomes:

Each student will be able to:

- define congruency
- find congruent figures
- prove that any two triangles are congruent
- apply the knowledge gained in real life

Teaching Aids Used:

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GUIDELINES:

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DAY-1

LESSON DEVELOPMENT

INTRODUCTION

Every geometrical figure has a fixed shape, size and position. If two geometrical figures have same shape and size irrespective of the position, then they are known as congruent figures and are said to exhibit congruence properties.

Objects which have the same shape and size are called congruent objects.

The relation of two objects being congruent is called congruence

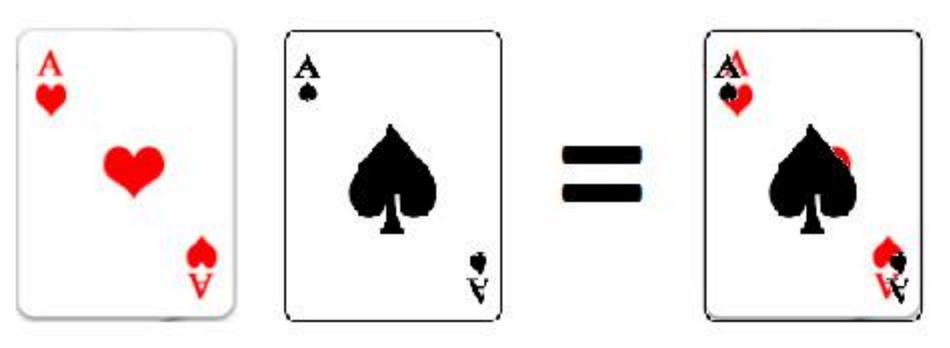
METHOD OF SUPERPOSITION

To compare two figures, we cut them and put one over the other. If they overlap each other, exactly, they are said to be congruent figures. This method, is known as method of super position.

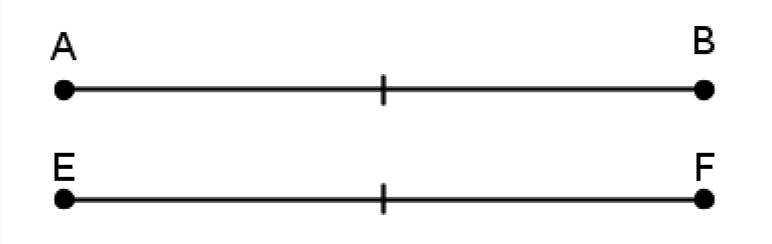
For congruent figure, we use the symbol ‘$\cong$’

Examples of congruent figures are:

A figure and its carbon copy, a picture and its mirror image, a figure and its photocopy of the same size



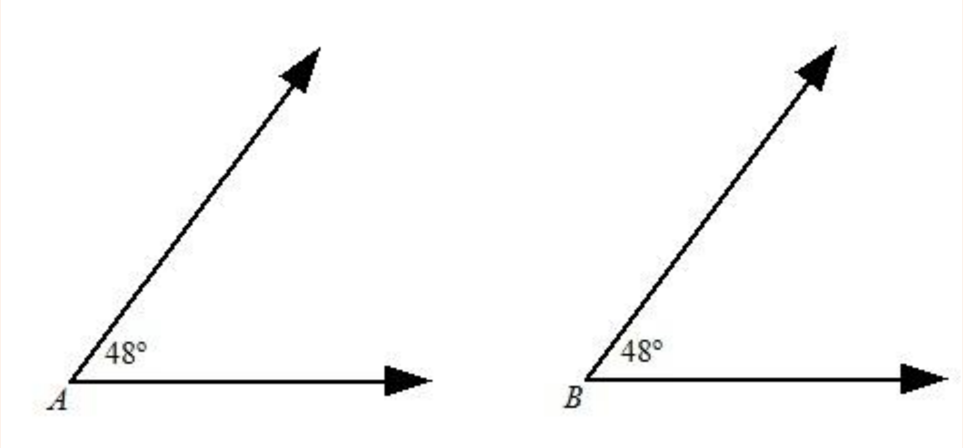
CONGRUENT LINES



Consider two line segments AB and EF. By method of super position, it is found that they cover each other exactly, if they are of equal length. Thus, we can say that two line segments are congruent, if they have same length

$$AB \cong EF$$

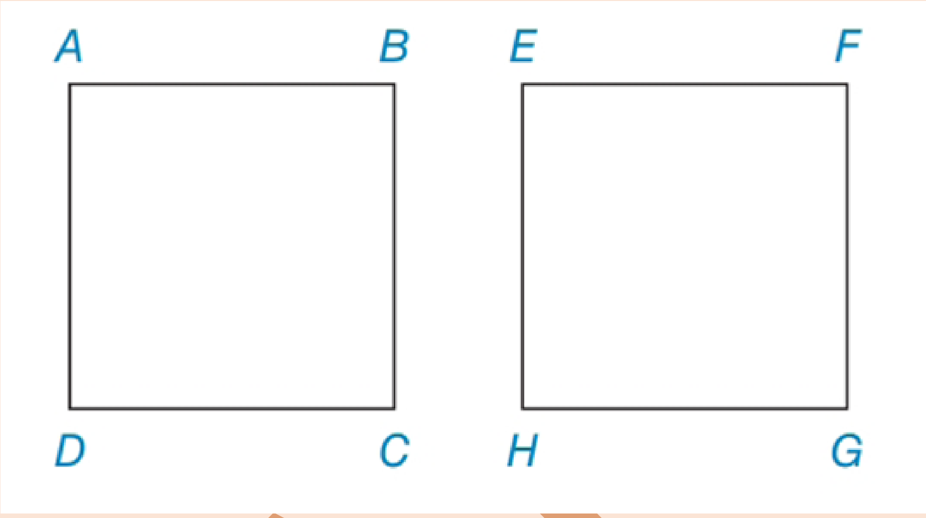
CONGRUENT ANGLES



Consider two angles $\angle A$ and $\angle B$. If we put them over one another, it is found that they exactly super-impose, if they have same degree measure. Here, we do not take the length of the arms into account.

$$\angle A \cong \angle B$$

<u>CONGRUENT SQUARES</u>



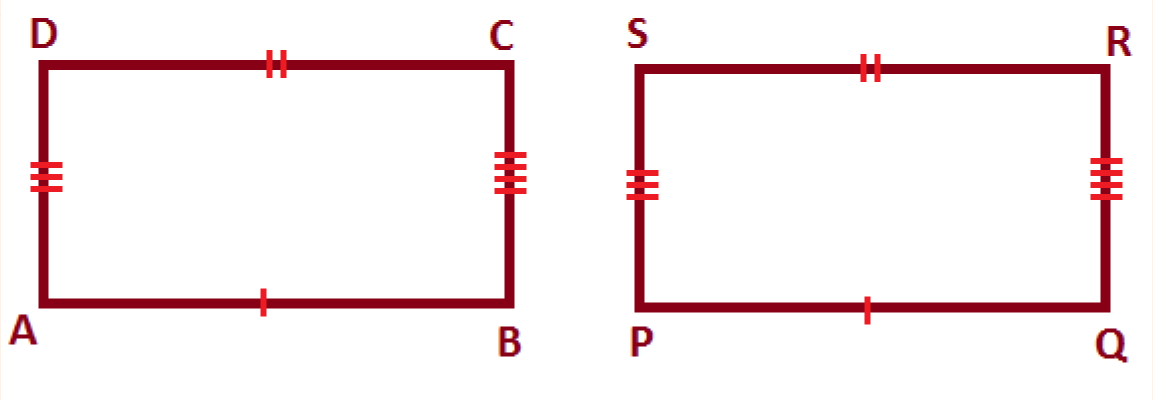
Every square has the same shape but the size may differ.

Consider any two squares ABCD and EFGH. On super imposing, if they have the same side length, they cover each other exactly and are congruent.

Thus, two squares are said to be congruent, if they have the same side length.

$$square\ ABCD \cong square\ EFGH$$

<u>CONGRUENT RECTANGLES</u>

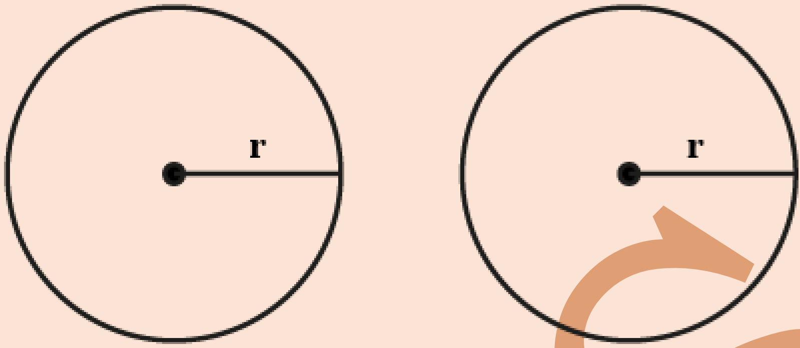


Consider any two rectangles ABCD and PQRS. On super imposing, if they have the same length and breadth, they cover each other exactly and are congruent.

Thus, two squares are said to be congruent, if they have the same length and breadth.

$$rectangle\ ABCD \cong rectangle\ PQRS$$

CONGRUENT CIRCLES



The size of the circle depends upon its radius. All the circles have same shape but different size. Let us consider two circles C_1 and C_2. They cover each other exactly if and only if they have the same radii.

Thus, two circles are congruent, if they have same radii,

$$C_1 \cong C_2$$

Link:

https://www.youtube.com/watch?v=86iU3fypTd4

ASSIGNMENT:

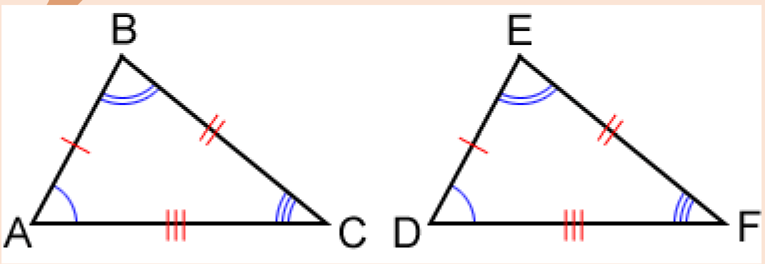
Complete the following questions from Exercise 14.1 of your book(page 188)

Q1, 2 , 3

DAY-2

LESSON DEVELOPMENT

CONGRUENT TRIANGLES



Triangle has 6 elements i.e., three sides and three angles. If two triangles are congruent means, on super-imposing they cover each other exactly.

In this case, the six elements of the other triangle, i.e., the three vertices of a triangle coincides with the three vertices of other triangle on super imposing.

If we superpose one triangle over other triangle and they cover each other properly, then they must be congruent triangles.

In case of congruent triangles-

- All the sides of one triangle must be equal to the corresponding sides of another triangle.
- All the angles of one triangle must be equal to the corresponding angles of another triangle.
- All the vertices of one triangle must be corresponding to the vertices of another triangle.

Let us consider two triangles ΔABC and ΔDEF

For comparison of these triangles, we can have six possible matchings such as:

(a) A : B : C
D : E : F

$$\Delta ABC \leftrightarrow \Delta DEF$$

(b) A : B : C
D : F : E

$$\Delta ABC \leftrightarrow \Delta DFE$$

(c) A : B : C
F : D : E

$$\Delta ABC \leftrightarrow \Delta FDE$$

(d) A : B : C
F : E : D

$$\Delta ABC \leftrightarrow \Delta FED$$

(e) A : B : C
E : F : D

$$\Delta ABC \leftrightarrow \Delta EFD$$

(f) A : B : C
E : D : F

$$\Delta ABC \leftrightarrow \Delta FDE$$

If two triangles are congruent, then at least one of the above matchings will exist.

Let us say, the first matching

$$\Delta ABC \leftrightarrow \Delta DEF$$

Exist, then it concludes to :

(A) $\angle A = \angle D$
(B) $\angle B = \angle E$
(C) $\angle C = \angle F$
(D) $AB = DE$
(E) $BC = EF$
(F) $\angle AC = DF$

Thus, all six elements of one triangle are matched with their corresponding matches of the other triangle.

We can write

$$\Delta ABC \cong \Delta DEF$$

When we write

$$\Delta ABC \cong \Delta DEF$$

Her order of the letters is important. If

$$\Delta ABC \cong \Delta DFE$$

Vertices A, B and C are matched with D, F and E respectively.

Similarly, the sides AB = DF , BC = FE , AC = DE

If

$$\Delta ABC \cong \Delta DEF \Rightarrow \Delta BAC \cong \Delta EDF \Rightarrow \Delta CAB \cong \Delta FDE$$

ASSIGNMENT:

Complete the following questions from Exercise 14.1 of your book(page 188)

Q1 , 2, 3, 4

EXTRA QUESTION

1. Complete the following statements:
   (a) Two line segments are congruent if ___________.
   (b) Among two congruent angles, one has a measure of 70°; the measure of the other angle is ___________.
   (c) When we write $\angle A = \angle B$, we actually mean ___________.
2. Give any two real-life examples for congruent shapes.
3. If $\Delta ABC \cong \Delta FED$ under the correspondence $ABC \leftrightarrow FED$, write all the corresponding congruent parts of the triangles.
4. If $\Delta DEF \cong \Delta BCA$, write the part(s) of ΔBCA that correspond to

   (i) $\angle E$ (ii) $\overline{EF}$ (iii) $\angle F$ (iv) $\overline{DF}$

DAY-3

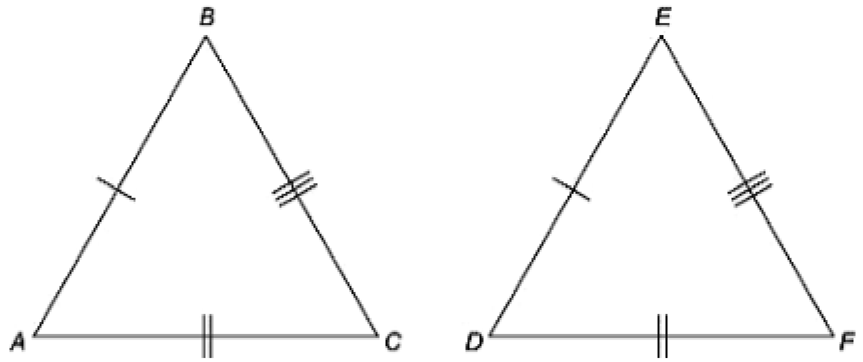
LESSON DEVELOPMENT

It is equally sufficient for two triangles to be congruent if even if only three pairs out of the six elements are equal provided one of them is a pair of sides.

Here, other three pairs automatically match. There are four general ways to find out the congruency of two triangles.

1. **SSS Congruency**
   Two triangles are said to be congruent, if all the three sides of one triangle are respectively equal to all the three sides of other triangle. This is also called the SSS congruence condition.

This criterion says that the two triangles will be congruent if their corresponding sides are equal.



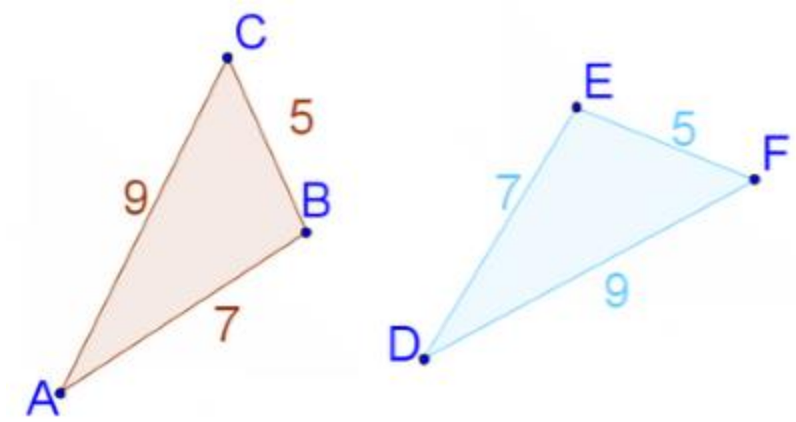
If **S**ide AB = DE
Side BC = EF

Side AC = DF

Then, ∆ABC ≅ ∆DEF

Example

In the two given triangles, ∆ABC and ∆DEF AB = 7 cm, BC = 5 cm, AC = 9 cm, DE = 7 cm, DF = 9 cm and EF = 5 cm. Check whether the two triangles are congruent or not.



Solution

In ∆ABC and ∆DEF,

AB = DE = 7 cm,

BC = EF = 5 cm,

AC = DF = 9 cm

This show that all the three sides of ∆ABC are equal to the sides of ∆DEF.

Hence with the SSS criterion of congruence, the two triangles are congruent.

∆ABC ≅ ∆DEF

Link:

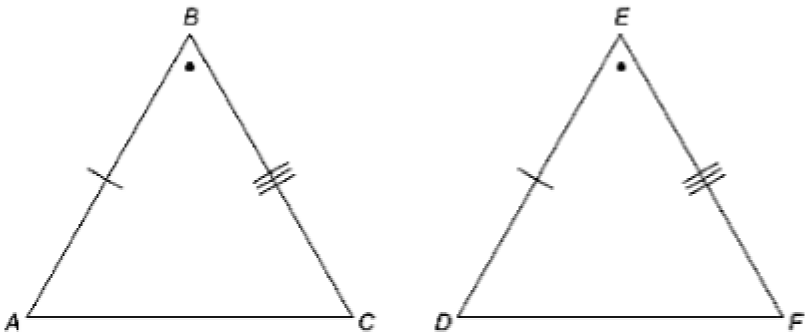
https://www.youtube.com/watch?v=3wjLGV9ibII

2. **SAS Congruency**

Two triangles are said to be congruent, if the two sides and the included angle of one triangle are respectively equal to the two sides and the angle included of the other triangle.

We cannot take SSA or ASS conditions instead of SAS

This criterion says that the two triangles will be congruent if their corresponding two sides and one included angle are equal.



If **S**ide AB = DE
Angle ∠B = ∠E
Side BC = EF

Then, △ABC ≅ △DEF

Link:

https://www.youtube.com/watch?v=Ie3j2MDuuA0

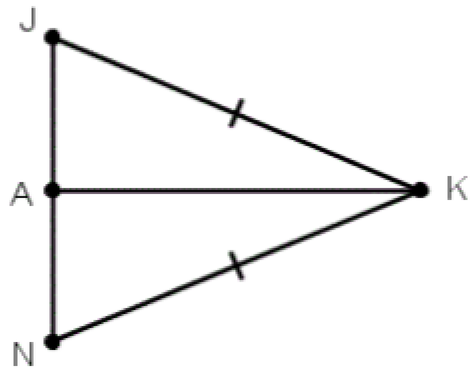
Example

In △JKN, JK = KN and AK is the bisector of ∠JKN, then

1. Find the three pairs of equal parts in triangles JKA and AKN.

2. Is ΔJKA ≅ ΔNKA? Give reasons.

Is ∠J = ∠N? Give reasons.



Solution

1. The three pairs of equal parts are:

JK = KN (Given)

∠JKA = ∠NKA (KA bisects ∠JKN)

AK = AK (common)

2. Yes, ΔJKA ≅ ΔNKA (By SAS congruence rule)

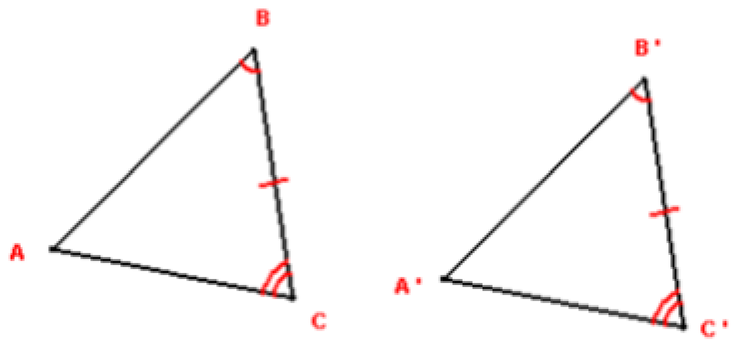
3. ∠J = ∠N(Corresponding parts of congruent triangles)

3. ASA Congruency

Two triangles are said to be congruent if the two angles and the included side of one is respectively equal to the two angles and the included side of the other.

We cannot take AAS or SAA in place of ASA

This criterion says that the two triangles are congruent if the two adjacent angles and one included side of one triangle are equal to the corresponding angles and one included side of another triangle.



If **A**ngle ∠B = ∠B'
Side BC = EF
Angle ∠C = ∠C'

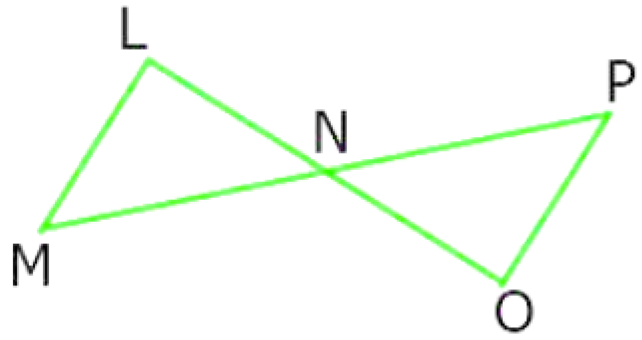
Then, ∆ABC ≅ ∆A'B'C'

Link:

https://www.youtube.com/watch?v=DvCsRs6sSRQ

Example

In ∆LMN and ∆OPN, if LMN = ∆NPO = 60°, LNM = 35° and LM = PO = 4 cm.Then check whether the triangle LMN is congruent to triangle PON or not.



Solution

In the two triangles ∆LMN and ∆OPN,

Given,

LMN = NPO = 60°

LNM = ∠PNO = 35° (vertically opposite angles)

So, ∠L of ΔLMN = 180° – (60° + 35°) = 85° (by angle sum property of a triangle) similarly,

∠O of ΔOPN =180° – (60° + 35°) = 85°

Thus, we have ∠L = ∠O, LM = PO and ∠M = ∠P

Now, side LM is between ∠L and ∠M and side PO is between ∠P and ∠O.

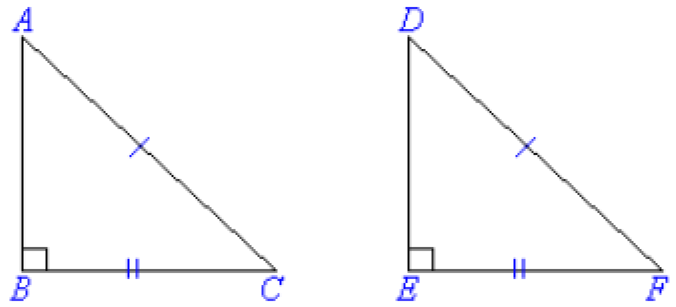
Hence, by ASA congruence rule,

∆LMN ≅ ∆OPN.

4. **RHS Congruency**

Two right angled triangles are congruent, if the hypotenuse and one of the sides of one triangle is respectively equal to the hypotenuse and one of the sides of the other triangle.

This criterion says that the two right-angled triangles will be congruent if the hypotenuse and one side of one triangle are equal to the corresponding hypotenuse and one side of another triangle.



If **R**ight angle ∠B = ∠E
Hypotenuse AC = DF
Side BC = EF

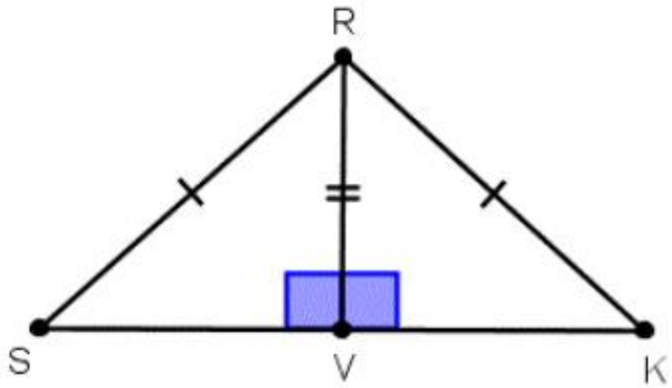
Then, ΔABC ≅ ΔDEF

Link:

https://www.youtube.com/watch?v=8HJ9jWmkyuU

Example

Prove that ΔRSV ≅ ΔRKV, if RS = RK = 7 cm and RV = 5 cm and is perpendicular to SK.



Solution

In ΔRSV and ΔRKV,

Given

RS = RK = 7 cm

RV = RV = 5 cm (common side)

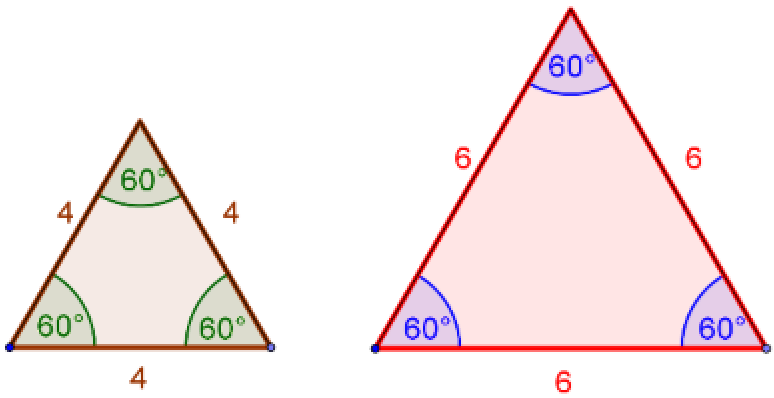
If RV is perpendicular to SK then

∠RVS = ∠RVK = 90°.

Hence, ΔRSV ≅ ΔRKV

As in the two right-angled triangles, the length of the hypotenuse and one side of both the sides are equal.

Remark: AAA is not the criterion for the congruent triangles because if all the angles of two triangles are equal then it is not compulsory that their sides are also equal. One of the triangles could be greater in size than the other triangle.



In the above figure, the two triangles have equal angles but their length of sides is not equal so they are not congruent triangles.

Link:

https://www.youtube.com/watch?v=U7SDnAnnFU8

ASSIGNMENT:

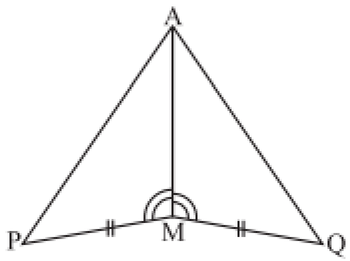
Complete the questions from Exercise 14.1 of your book(page 188)

EXTRA QUESTIONS

Q1)

3. You have to show that $\Delta AMP \cong \Delta AMQ$.

In the following proof, supply the missing reasons.



	Steps		Reasons
(i)	$PM = QM$	(i)	...
(ii)	$\angle PMA = \angle QMA$	(ii)	...
(iii)	$AM = AM$	(iii)	...
(iv)	$\Delta AMP \cong \Delta AMQ$	(iv)	...

Q2)

In a squared sheet, draw two triangles of equal areas such that

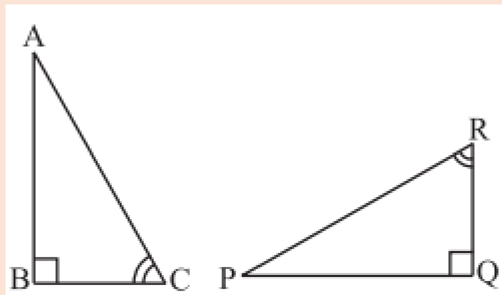
(i) the triangles are congruent.

(ii) the triangles are not congruent.

What can you say about their perimeters?

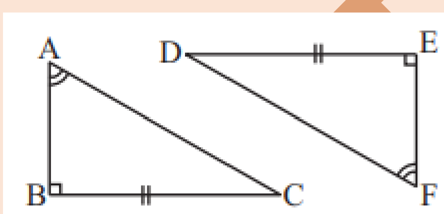
Q3)

If ΔABC and ΔPQR are to be congruent, name one additional pair of corresponding parts. What criterion did you use?



Q4)

Explain, why $\Delta ABC \cong \Delta FED$.



Q5)

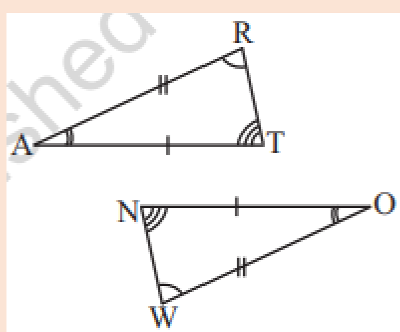
In ΔABC, $\angle A = 30°$, $\angle B = 40°$ and $\angle C = 110°$

In ΔPQR, $\angle P = 30°$, $\angle Q = 40°$ and $\angle R = 110°$

A student says that $\Delta ABC \cong \Delta PQR$ by AAA congruence criterion. Is he justified? Why or why not?

Q6)

In the figure, the two triangles are congruent. The corresponding parts are marked. We can write $\Delta RAT \cong$?



Q7)

You want to show that $\Delta ART \cong \Delta PEN$,

(a) If you have to use SSS criterion, then you need to show

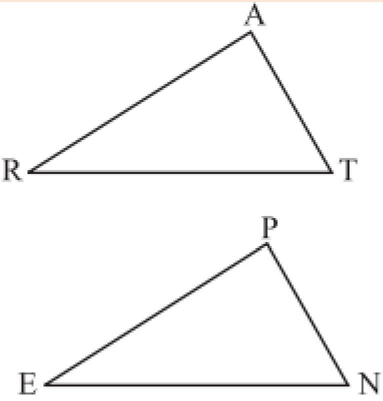
(i) $AR =$ (ii) $RT =$ (iii) $AT =$

(b) If it is given that $\angle T = \angle N$ and you are to use SAS criterion, you need to have

(i) $RT =$ and (ii) $PN =$

(c) If it is given that $AT = PN$ and you are to use ASA criterion, you need to have

(i) ? (ii) ?



Q8)

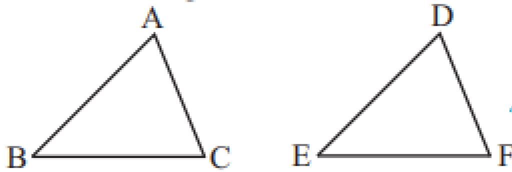
Which congruence criterion do you use in the following?

(a) **Given:** $AC = DF$

$AB = DE$

$BC = EF$

So, $\Delta ABC \cong \Delta DEF$

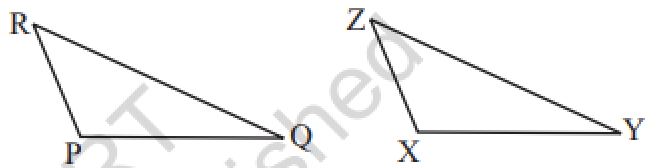


(b) **Given:** $ZX = RP$

$RQ = ZY$

$\angle PRQ = \angle XZY$

So, $\Delta PQR \cong \Delta XYZ$

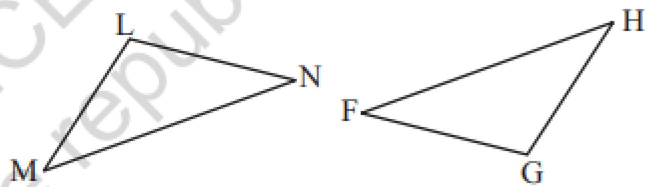


(c) **Given:** $\angle MLN = \angle FGH$

$\angle NML = \angle GFH$

$ML = FG$

So, $\Delta LMN \cong \Delta GFH$

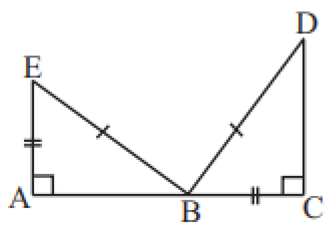


(d) **Given:** $EB = DB$

$AE = BC$

$\angle A = \angle C = 90°$

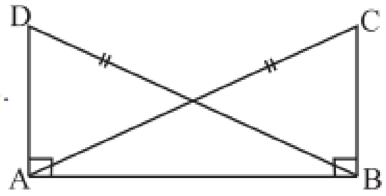
So, $\Delta ABE \cong \Delta CDB$



Q9)

In Fig 7.31, DA $\perp$ AB, CB $\perp$ AB and AC = BD.
State the three pairs of equal parts in ΔABC and ΔDAB.
Which of the following statements is meaningful?

(i) $\Delta ABC \cong \Delta BAD$ (ii) $\Delta ABC \cong \Delta ABD$



Q10)

In Fig 7.26, can you use ASA congruence rule and conclude that $\Delta AOC \cong \Delta BOD$?

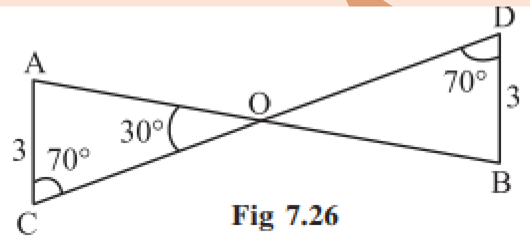


Fig 7.26