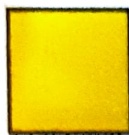




Look at the following pictures —



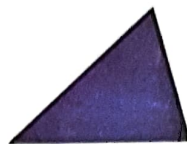
(i)



(ii)



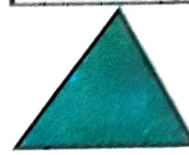
(iii)



(iv)



(v)



(vi)

Identify the triangular shapes in the pictures given above.

Let's see and learn-

- Here, there are three points A, B and C which are not in a straight line.
 - We get a closed figure by joining these three points by line segments.
 - This closed figure is a triangle.
 - There are three sides in this triangle which are formed by joining the three points A, B and C.
 - Such shapes are represented by the symbol ' Δ ' .
- Two conditions are necessary to construct a triangle-
1. It should be a closed figure.
 2. It should have three sides.

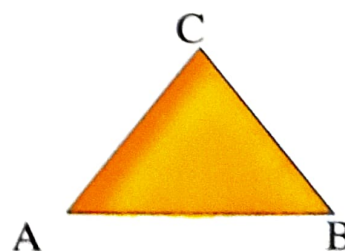
C
•

A •

• B

Let's know this also—

- The area enclosed by the three sides of a triangle is called the interior area of the triangle. The yellow portion of the picture represents the interior area of the triangle.
- The entire outer area of the triangle is called the exterior area of the triangle.





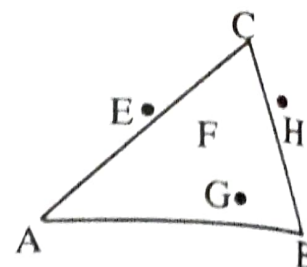
Do it yourself-

- The points in the internal area of the triangle ABC.....
- The points in the external area of the triangle ABC.....



Think—

If there is any point on the sides AB or BC or AC, in which area will it be considered ?



Note- The given points A, B and C are the points on the triangle. These will neither be considered in the inner area nor in the outer area.

Vertices, Sides and Angles of a triangle

Point A, B and C are the three vertices of a triangle.

Side AB is obtained when points A and B are joined by a line segment. In the same way we get side BC by joining points B and C and side AC by joining points A and C.

There are three angles in $\triangle ABC$ — $\angle CAB$, $\angle ABC$, $\angle ACB$.

Angle made on vertex A $\Rightarrow \angle CAB$ or $\angle BAC$

Angle made on vertex B $\Rightarrow \angle ABC$ or $\angle CBA$

Angle made on vertex C $\Rightarrow \angle ACB$ or $\angle BCA$

Angles made on vertices can also be written like this — $\angle A$, $\angle B$, $\angle C$

$\angle A$, $\angle B$, $\angle C$ are formed inside the triangle. Hence, these are called the **interior angles** of the triangle.

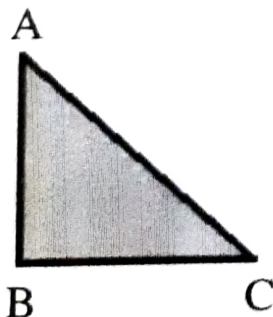
The vertex at which the angle is formed is written in the middle.

Like we write $\angle BAC$ or $\angle CAB$ formed at the vertex A

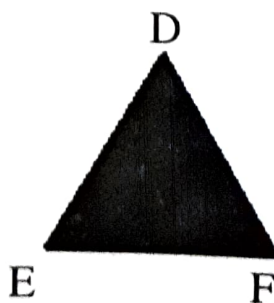


Do it yourself-

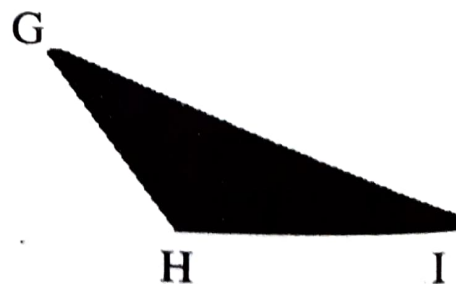
Write the names of the sides, vertices and interior angles of the given triangles—



(i)



(ii)



(iii)



Comparison of the sum of the lengths of the two sides with the length of the third side of a triangle

In the given $\triangle ABC$

$$\text{Side } AB + \text{side } BC = (5 + 6) \text{ cm} = 11 \text{ cm}$$

since, $11 > 7$

Hence, $\text{side } AB + \text{side } BC > \text{side } AC$

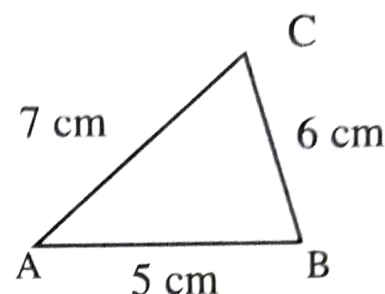
$$\text{side } AC + \text{side } BC = (7+6) \text{ cm} = 13 \text{ cm}$$

since, $13 > 5$

Hence $\text{side } (AC + BC) > AB$

Similarly, $\text{side } AB + \text{side } AC = 12 \text{ cm}$

Which is more than the side BC (6cm)



In a triangle, the sum of the length of any two sides is more than the length of the third side

Finding the difference between the lengths of any two sides of a triangle ABC and comparing it with the length of the third side of the triangle-

$$\text{side } AC - \text{side } AB = 7 \text{ cm} - 5 \text{ cm} = 2 \text{ cm}$$

$$2 \text{ cm} < \text{side } BC$$

$$\text{Hence, } AC - AB < BC$$

In a triangle, the difference in length of any two sides is less than the length of the third side.

Sum of the three interior angles of a triangle

Look at the triangle –

Teacher – Raju, which are the three interior angles of the triangle.

Raju – The three interior angles of the triangle are $\angle A$, $\angle B$ and $\angle C$.

Teacher – Abdul, measure these angles.

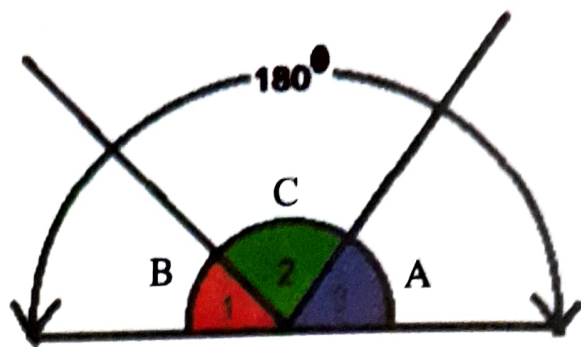
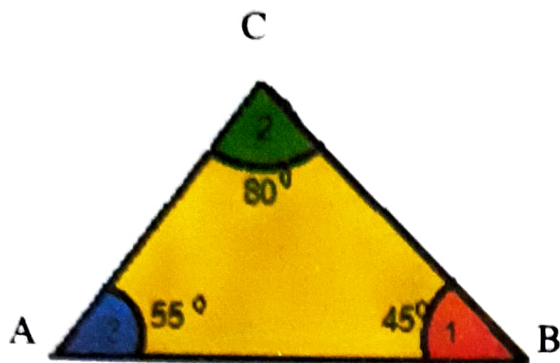


Abdul – $\angle A = 55^\circ$, $\angle B = 45^\circ$ and $\angle C = 80^\circ$

Teacher – Salma, find the sum of the three interior angles of the triangle.

Salma – $\angle A + \angle B + \angle C = 55^\circ + 45^\circ + 80^\circ = 180^\circ$

Let's learn this with the help of the picture also –



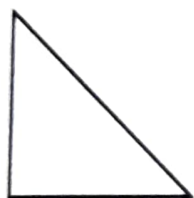
We have seen –

In any triangle, the sum of the three interior angles is always 180° .

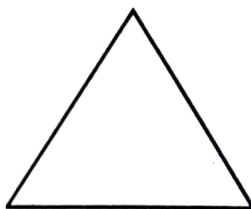


Do it yourself-

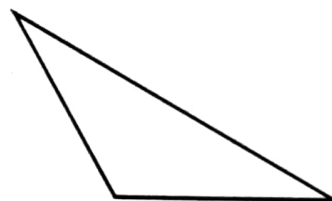
- In the pictures given below- measure the interior angles and find out their sum separately –



(i)



(ii)



(iii)

Types of triangles: On the basis of the sides

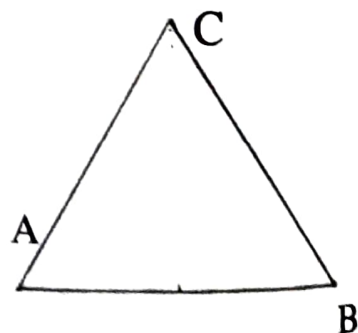
Equilateral Triangle

Teacher – Fareeda, measure the sides of the adjacent figure.

Fareeda – In the given triangle, the length of each side is 4 cm.

Teacher – Very good!

We have seen that in the given triangle, all the three sides are of equal length.



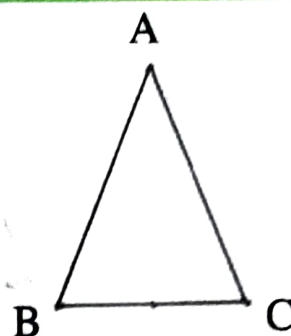
The triangle which have all the three sides equal is called an **equilateral triangle**. Equilateral means- all the sides are equal

Isosceles triangle

Let's see the figure—

Teacher — Rahul, measure the sides of the triangle in the given figure.

Rahul — In the given triangle the lengths of the two sides AB and AC is 3 cm each, whereas the length of the side BC is 2 cm.

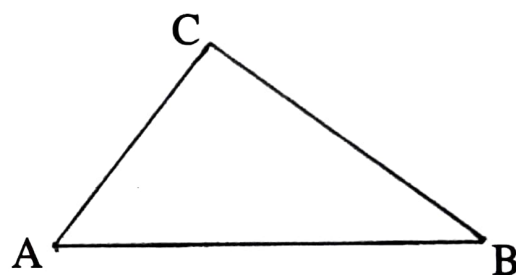


Teacher — Well done!

We have seen that the two sides in the given figure of the triangle are of the same length, whereas the length of the one side is different from the other two sides.

The triangle in which the two sides are of the same length and one side is of different length is called **isosceles triangle**.

Isosceles means- two sides are of equal length.



Scalene triangle

Let's see this picture also —

Teacher — Siddhu, measure the length of each side of the given triangle.

Siddhu — In the given triangle—

Side AB = 5 cm, side AC = 3 cm and side BC = 4 cm

Teacher — Very good !

Siddhu — Here, the lengths of each side of the triangle is different.

The triangle in which all the three sides are of different lengths is called **scalene triangle**. Scalene means- sides of different lengths





Do it yourself -

In $\triangle ABC$,

Side A B	Side B C	Side C A	Type of triangle
4 cm	4 cm	3 cm	Isosceles
10 cm	9 cm	7 cm	
5 cm	5 cm	5 cm	
3 cm	4 cm	5 cm	
11 cm	11 cm	12 cm	

Types of triangles- On the basis of angles

Acute Angled Triangle

Look at the picture –

Teacher – Ritika, tell the measurement of each interior angle of the triangle given in figure (1) –

Ritika – $\angle A = 30^\circ$, $\angle B = 75^\circ$ and $\angle C = 75^\circ$

Teacher – We have seen that all the three interior angles of this triangle are less than 90° which means these are acute angles.

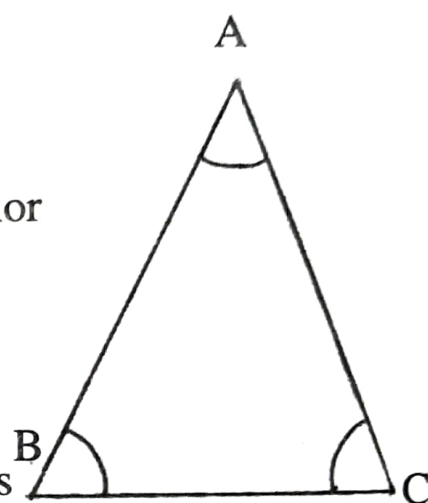


Figure 1

The triangle in which all the interior angles are acute angles is called an acute angled triangle.

Right Angled Triangle

Teacher – Meena, measure all the three angles of the triangle given in figure 2.

Meena – $\angle A = 90^\circ$, $\angle B = 30^\circ$ and $\angle C = 60^\circ$

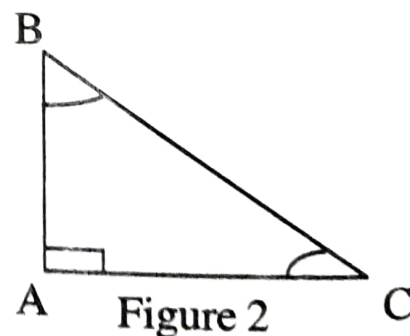


Figure 2



Teacher — Very good! Mahesh please tell, what is the measurement of the biggest angle in this triangle?

Mahesh — 90°

Teacher — We have seen that in the figure 2, one angle of the triangle is right angle or 90° and rest two are acute angle.

The triangle in which any one angle is a right angle is called Right Angled Triangle.

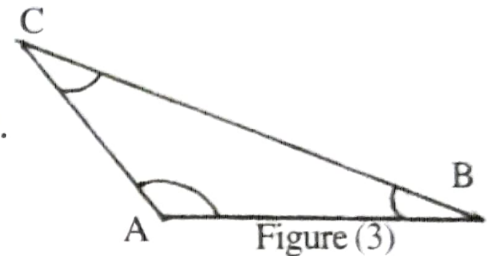
Obtuse Angled Triangle

Teacher — Peter, measure all the three angles of the triangle in the given figure 3.

Peter — $\angle A = 130^\circ$, $\angle B = 20^\circ$ and $\angle C = 30^\circ$

Teacher— Which is the biggest angle of this triangle.

Peter — $\angle A = 130^\circ$ which is an obtuse angle.



Teacher— We have seen that in the triangle given in the figure (3), one angle is an obtuse angle and the rest two are acute angles.

The triangle in which one angle is an obtuse angle is called Obtuse Angled Triangle



Do it yourself -

Fill in the blanks—

Triangle	$\angle A$	$\angle B$	$\angle C$	Type of triangle
A B C	60°	90°	30°	Right angled triangle
A B C	70°	—	40°	---
A B C	20°	30°	---	---
A B C	45°	---	45°	---
A B C	60°	---	75°	---

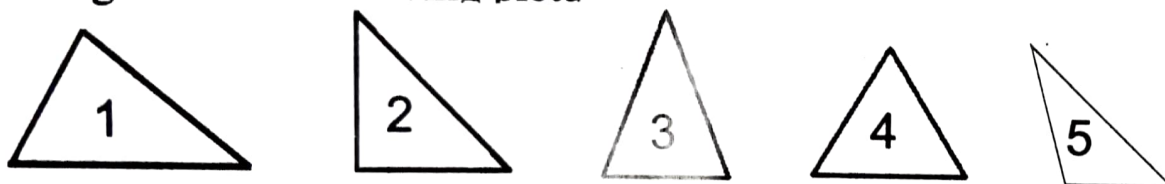


We have learnt

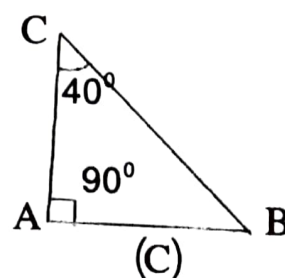
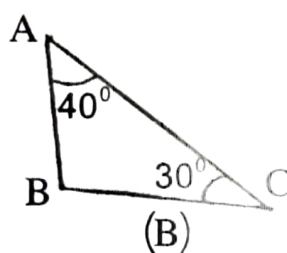
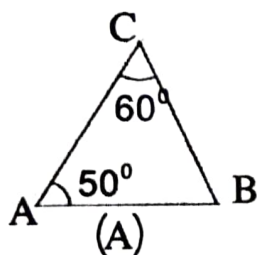
- There are three vertices, three sides and three angles in a triangle.
- The internal angles of a triangle are called interior angles.
- In a triangle, the sum of the length of any two sides is more than the length of the third side.
- In any triangle, the difference of the length of any two sides is less than the length of the third side.
- In a triangle the sum of the three interior angles is 180° or equal to two right angles.
- On the basis of the sides, triangles are of three types –
Equilateral triangle, Isosceles triangle and Scalene triangle
- On the basis of the angles, triangles are of three types –
Acute angled triangle, Right angled triangle and Obtuse angled triangle.

Exercise

1. Identify acute angled, right angled and obtuse angled triangles in the following pictures—



2. Measure the $\angle ABC$ in the following triangles—



3. Fill in the blanks—

- There are vertices, angles and sides in a triangle.
- The sum of all the three angles of a triangle is
- The sum of the lengths of any two sides of a triangle is than the length of the third side.
- The difference of the lengths of two sides of a triangle is than the length of the third side.