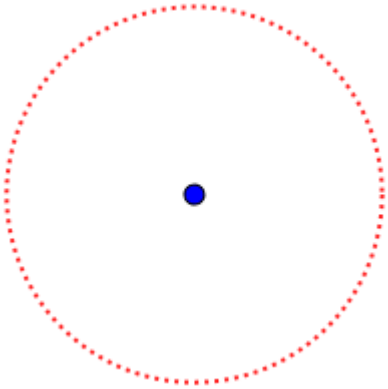
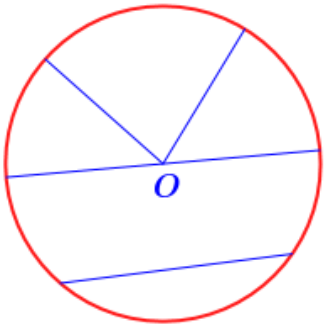
ONLINE MATHS CLASS - X - 19 (17 / 08 /2020)

Chapter – 2 CIRCLES

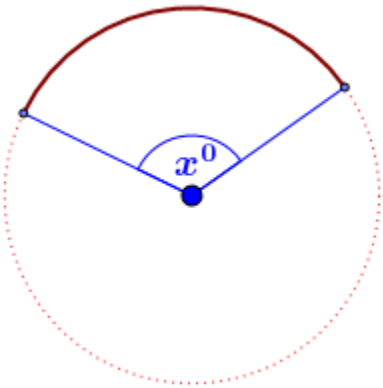
Let's discuss the facts about circles which already we have learned .



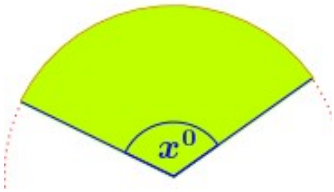
- *Circle is a collection of points which are equidistant from a fixed point in a plane .*
- *This fixed point is known as the centre of the circle .*
- *The distance between the centre of the circle and a point on it is called its radius .*

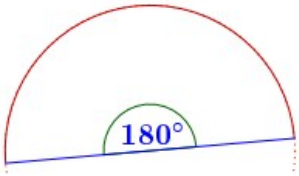


- *The radii of a same circle are equal .*
- *Twice of the radius is the diameter .*
- *A line joining any two points on a circle is called a chord .*
- *The largest chord of a circle is its diameter .*
- *A part of a circle is called an arc .*
- *The angle formed by joining the ends of a chord to the centre of the circle is called the central angle of the chord .*
- *The figure formed by joining an arc and radii through its ends is called a sector .*



- *Arc length and area of a sector is determined by its central angle .*





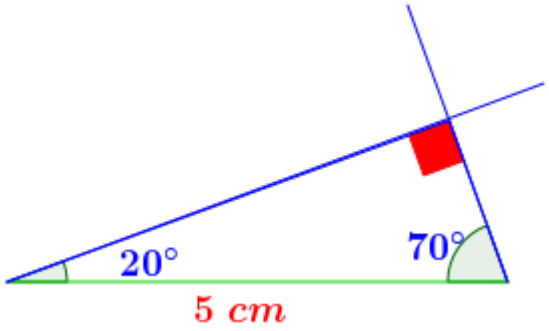
- *If the central angle of a sector is 180^0 , the arc of that sector is called a semicircle .*
- *Area of the circle* = πr^2
- *Perimeter of the circle* = $2\pi r$

Activity

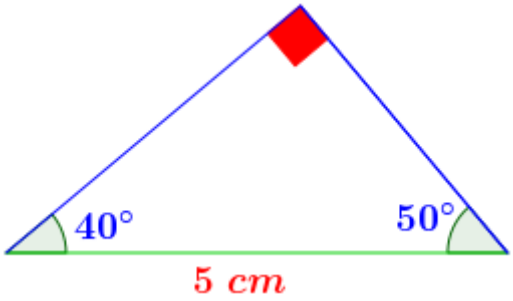
Draw a right angled triangle of hypotenuse 5 cm .

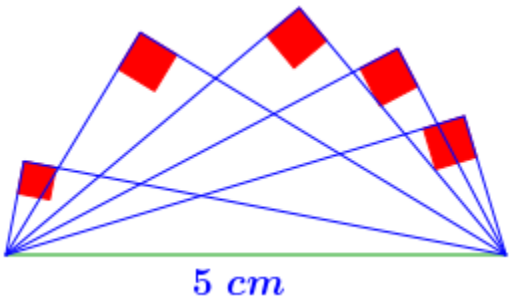
Method 1.

The largest side of a right angled triangle is its hypotenuse . So the angle opposite to the hypotenuse is the largest angle in a right angled triangle .The largest angle in a right angled triangle is 90 ^{0} . So we have to draw a triangle with a side 5 cm and sum of the angles on its both ends is 90 ^{0} , to get a right angled triangle . (Sum of the angles of a triangle is 180 ^{0})



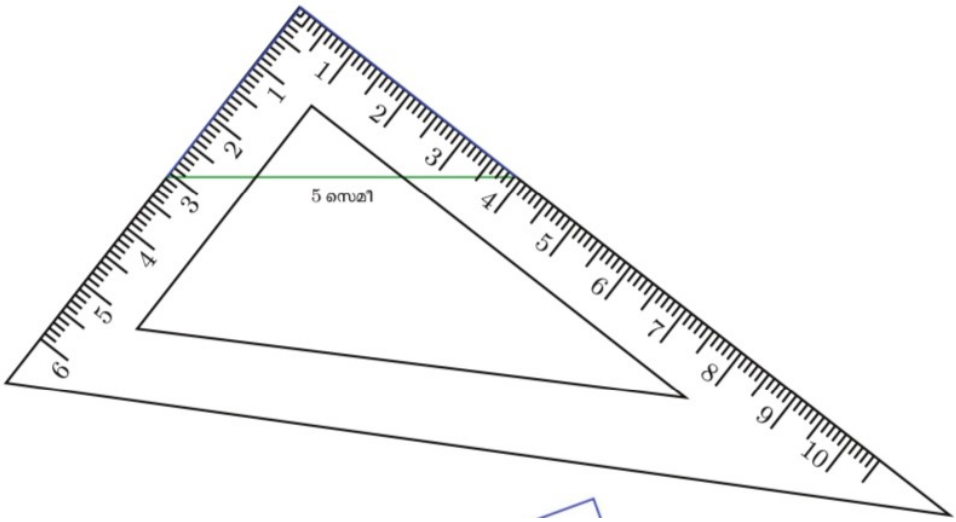
Similarly we can draw so many right angled triangles by changing the angles on the ends of the line such that their sum is 90 ^{0} .





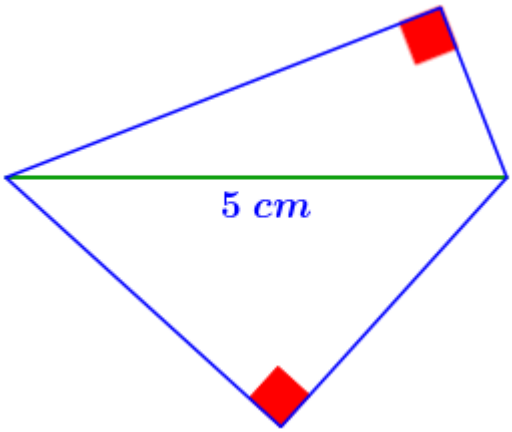
Method 2.

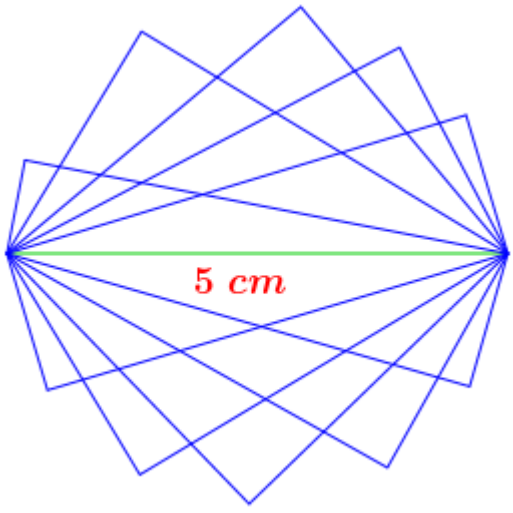
Using set square also we can draw a right angled triangle as shown in the figure.

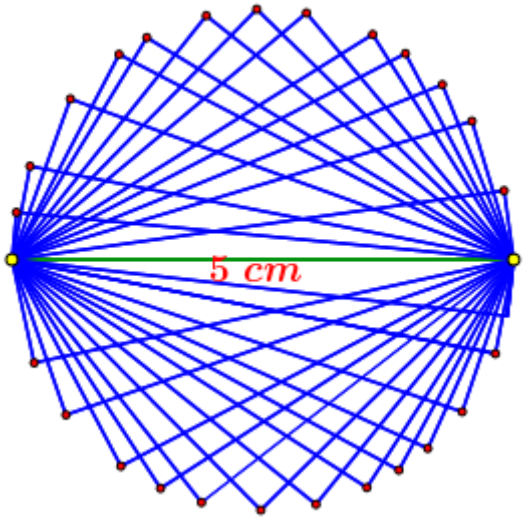


Similarly by adjusting the set square we can draw so many right angled triangles .

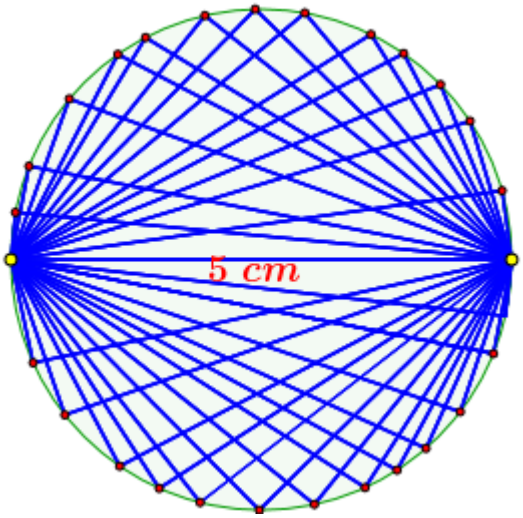
We can draw the triangles at the bottom of the line also .







Let's draw a circle with this line as diameter .



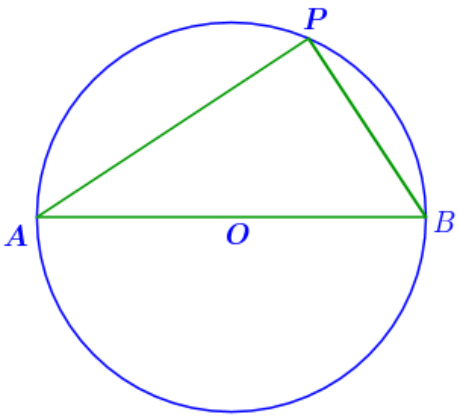
The third vertices of all these triangle are the points on the circle whose diameter is the given line .

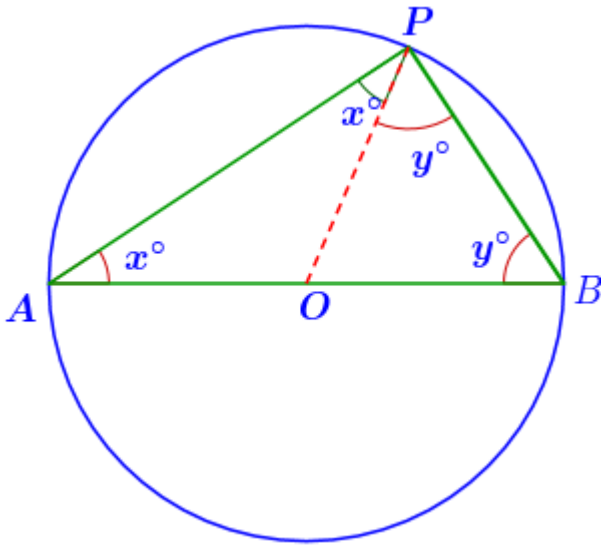
Why do all these points lie on a circle ? . Let's discuss

Prove that the angle got by joining a point on a circle with the ends of a diameter is a right angle ? (We discussed it in class 8)

In the figure O is the centre and P is a point on the circle and AB is the diameter .

Join OP .





OA = OB = OP (*Radii of a same circle are equal*)

Triangle AOP is an isosceles triangle . (OA = OP)

So < OAP = <OPA = x^0

Triangle BOP is an isosceles triangle . (OB = OP)

So < OBP = <OPB = y^0

In APB

< BAP + < ABP + < APB = 180^0 (*Sum of the angles of a triangle is* 180^0)

$x + y + (x + y) = 180^0$

$2x + 2y = 180^0$ ===> $x + y = \frac{180}{2} = 90^0$

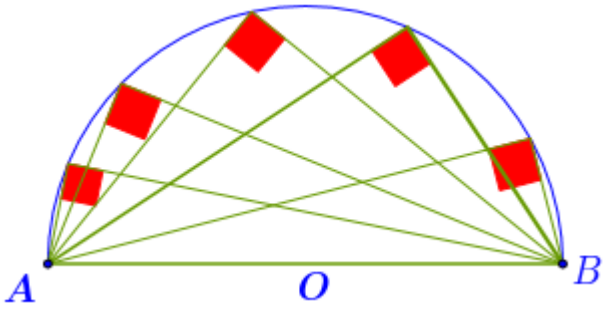
< APB = $x + y = 90^0$

Findings

If we join the ends of a diameter of a circle to a point on the circle , we get a right angle .

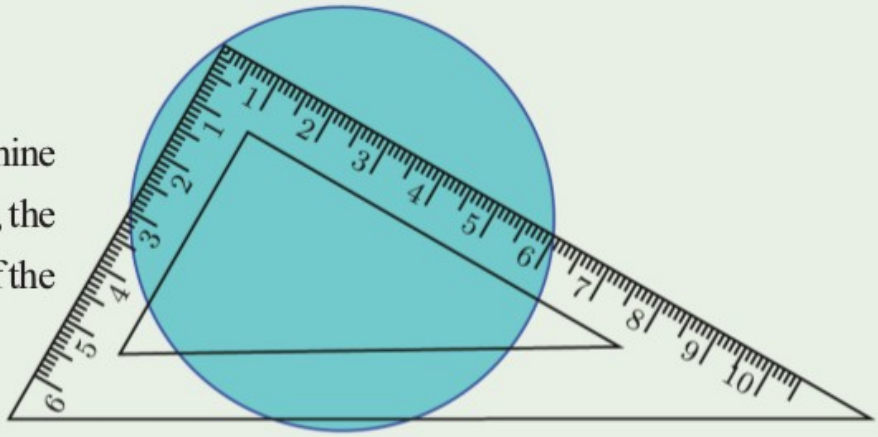
Conclusion

Angle in a semicircle is right



More activity ***(Text book Page 42)***

(5) Use a calculator to determine upto two decimal places, the perimeter and the area of the circle in the picture.



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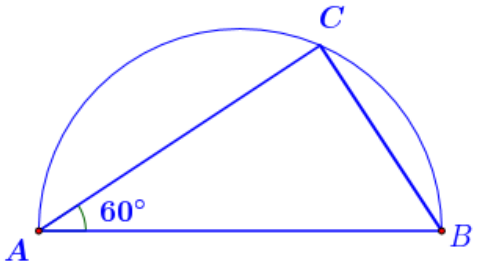
WORK SHEET

1. *In the figure AB is the diameter of the semicircle .*

< A = 60^0

a) *What is the measure of* < C ?

b) *What is the measure of* < B ?



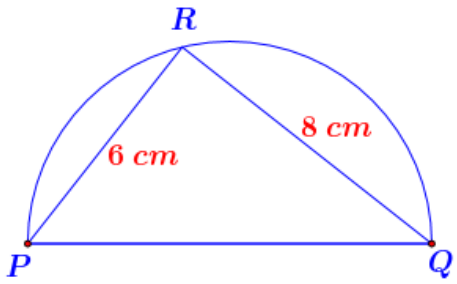
2. *In the figure PQ is the diameter of the semicircle .*

PR = 6 cm ,QR = 8 cm

a) *What is the measure of* < R ?

b) *What is the length of* PQ ?

c) *What is the radius of the semicircle ?*



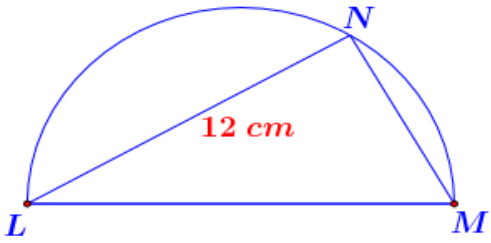
3. *In the figure LM is the diameter of the semicircle .*

LN = 12cm . *Area of the triangle LMN is* 54 cm^2

a) *What is the measure of* < N ?

b) *What is the length of* NM ?

c) *What is the diameter of the semicircle ?*



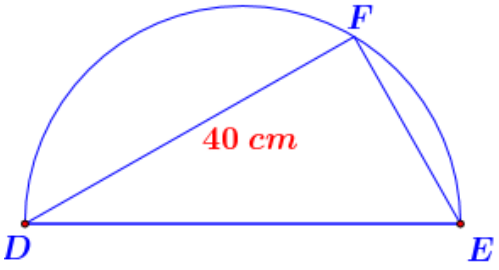
4. *In the figure DE is the diameter of the semicircle .*

radius of the semicircle is 25 cm *and* DF = 40 *cm*

a) *What is the measure of* < F ?

b) *What is the length of* EF ?

c) *What is the area of the triangle DEF ?*



5 . a) *Draw a right angled triangle of hypotenuse* 6 *cm ?*

b) *Draw an isosceles right angled triangle of hypotenuse* 8 *cm ?*

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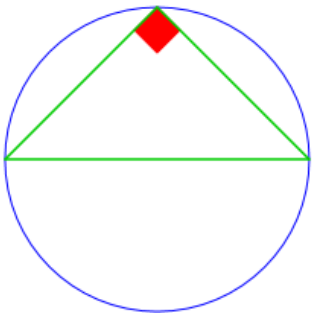


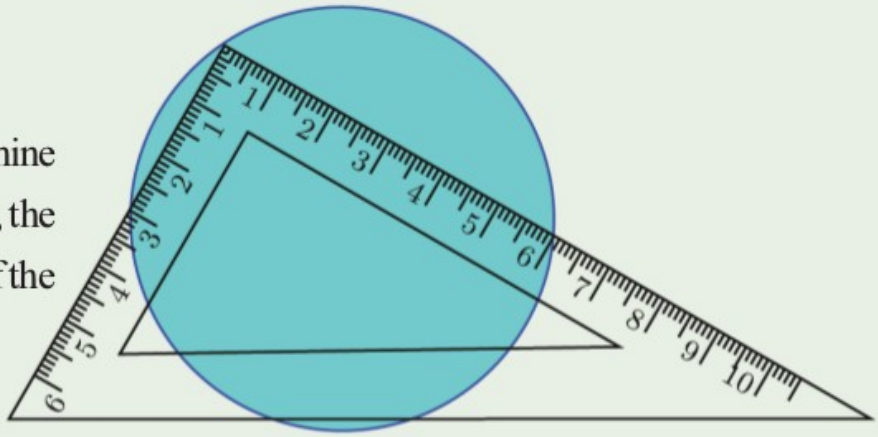
What did we learned in the last class ?

If we join the ends of a diameter of a circle to a point on the circle ,

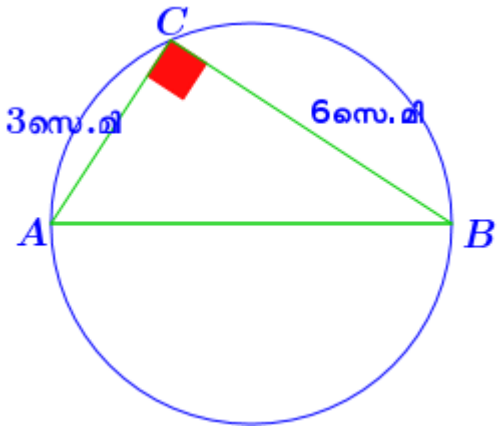
we get a right angle .

Let's discuss the problem which was given as homework .

(5) Use a calculator to determine upto two decimal places, the perimeter and the area of the circle in the picture.



Answer .



In the figure $\angle C = 90^\circ$

So AB is the diameter .

AC = 3 cm , BC = 6 cm

In right angled triangle ABC ,

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

$$= 3^2 + 6^2$$

$$= 9 + 36$$

$$= 45$$

$$AB = \sqrt{45} = 6.71$$

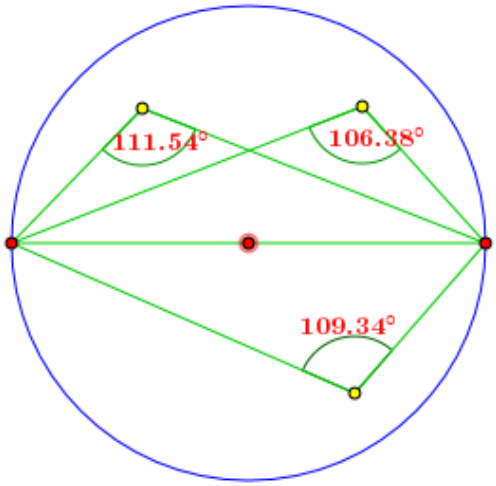
$$radius = \frac{6.71}{2} = 3.36\ cm$$

$$Perimeter = 2\,\pi\,r = 2\,\pi \times 3.36 = 21.1\ cm$$

$$Area = \pi\,r^2 = \pi \times 3.36^2 = 35.45\ cm^2$$

Activity 1

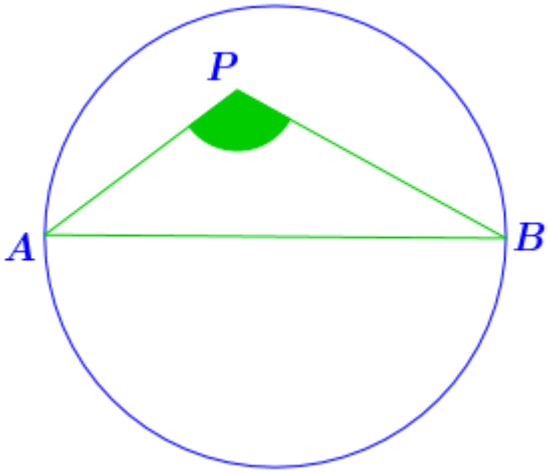
Draw a line of length 5 cm . Draw a circle with this line as diameter .Mark three points inside the circle . Join these points to the ends of the diameter . Measure the angles .



Do these angles have any peculiarity ?

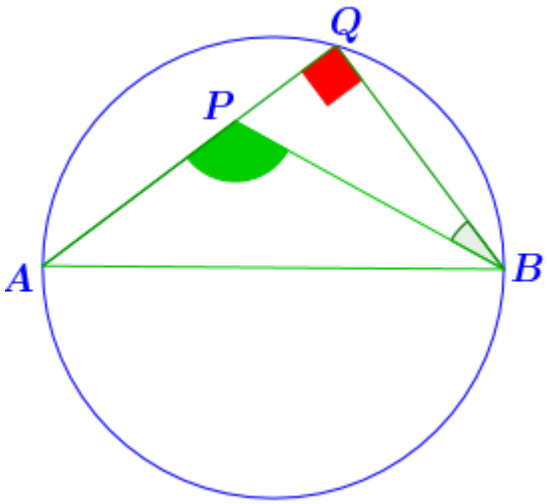
All the angles are greater than 90° .

Let's discuss the nature of the angles obtained by joining the end points of the diameter of a circle to the points inside the circle .



P is a point inside the circle of diameter AB . < APB is the angle obtained by joining the ends of AB to P .

Extend AP so that it meets the circle at Q . Join QB .



< AQB = 90 º (Angle in a semicircle)

Consider the triangle BQP .

< APB is an outer angle of the triangle BQP at the vertex P .

So , < APB = < PQB + < QBP .

(since an outer angle of a triangle at any vertex is the sum of the inner angles at other vertices)

< APB = 90 º + < QBP .

That is , < APB is greater than 90 º .

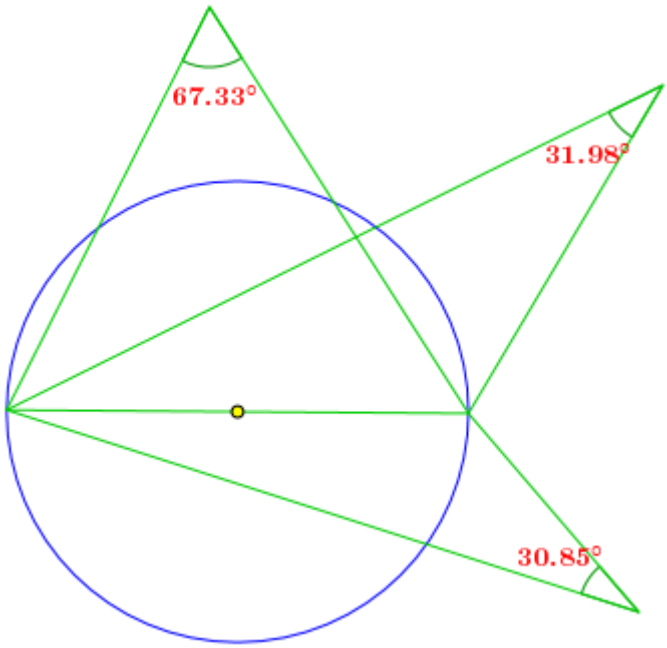
(since < APB is got by adding an angle to 90 º)

Finding

If we join the ends of the diameter of a circle to a point inside the circle gives an angle greater than 90 º .

Activity 2

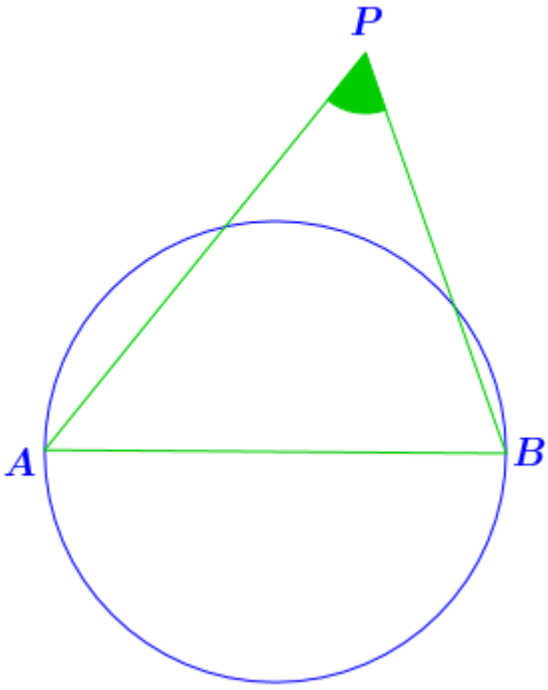
Draw a line of length 5 cm . Draw a circle with this line as diameter . Mark three points outside the circle . Join these points to the ends of the diameter . Measure the angles .



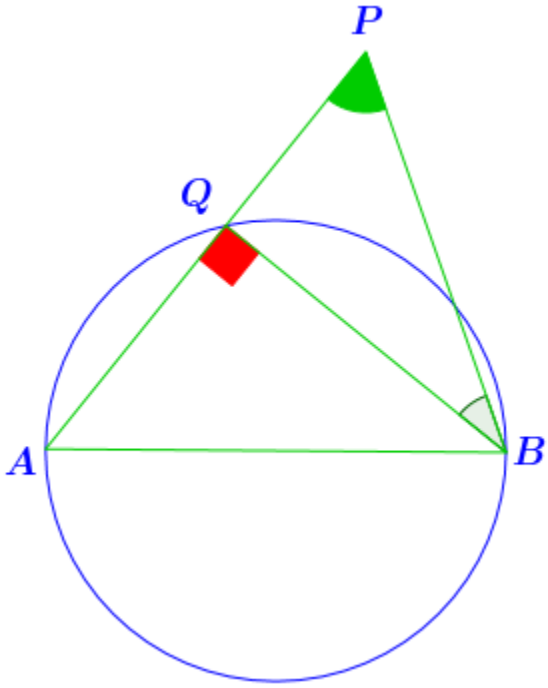
Do these angles have any peculiarity ?

All the angles are smaller than 90° .

Let's discuss the nature of the angles obtained by joining the end points of the diameter of a circle to the points outside the circle .



P is a point outside the circle of diameter AB . < APB is the angle obtained by joining the ends of AB to P . AP cuts the circle at Q . Join QB .



< AQB = 90 º (Angle in a semicircle)

Consider the triangle BQP .

< AQB is an outer angle of the triangle BQP at the vertex Q .

So , < AQB = < QPB + < QBP .

(since an outer angle of a triangle at any vertex is the sum of the inner angles at other vertices)

90 º = < QPB + < QBP .

That is , < QPB is less than 90 º .

(since 90 º is got by adding an angle to < QPB)

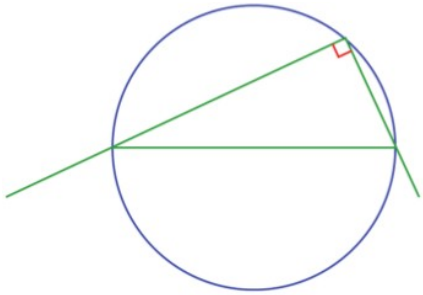
Finding

If we join the ends of the diameter of a circle to a point outside the circle gives an angle less than 90 º .

Three main points already we have learned

The angle formed by joining the end points of diameter of a circle to a point inside the circle is greater than 90 ° , on the circle is 90 ° and outside the circle is less than 90 °

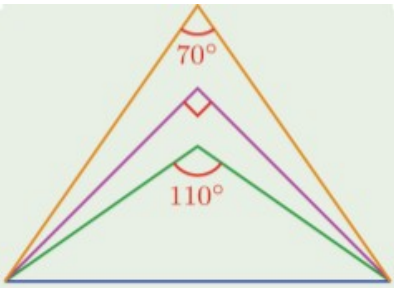
We can say one more result too .



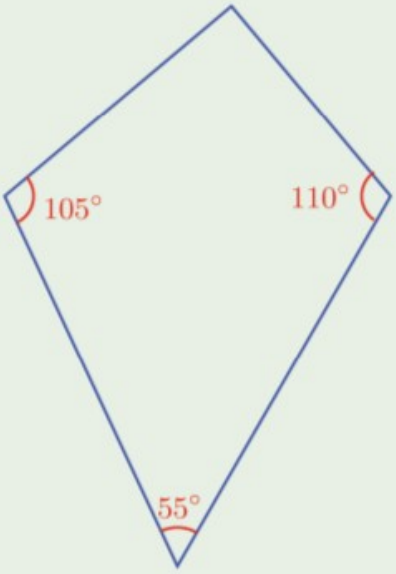
If a pair of lines drawn from the ends of a diameter of a circle are perpendicular to each other , then they meet on the circle

More activities ***(Text book page 42)***

(1) Suppose we draw a circle with the bottom side of the triangles in the picture as diameter. Find out whether the top corner of each triangle is inside the circle, on the circle or outside the circle.



(2) For each diagonal of the quadrilateral shown, check whether the other two corners are inside, on or outside the circle with that diagonal as diameter.



ONLINE MATHS CLASS - X - 20 (19 / 08 /2020)

WORKSHEET

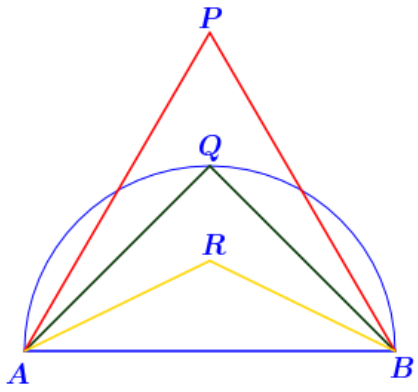
1. *In the figure AB is the diameter of the semicircle .*

The measures of $< P$, $< Q$ and $< R$ are in arithmetic sequence . $< P = 60°$

a) *What is the measure of $< Q$?*

b) *What is the common difference ?*

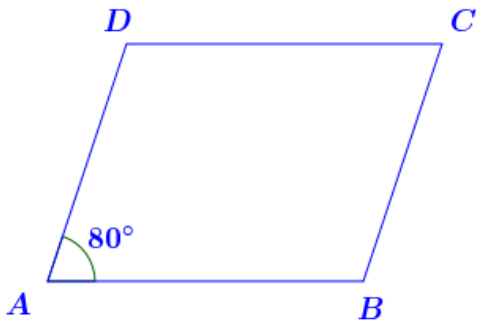
c) *What is the measure of $< R$?*



2. *In the figure ABCD is a parallelogram . $< A = 80°$*

a) *What is the measure of $< B$?*

b) *Find out whether the point C is inside the circle , on the circle or outside the circle if a circle is drawn with BD as diameter ?*



c) *Find out whether the point D is inside the circle , on the circle or outside the circle if a circle is drawn with AC as diameter ?*

3. *In the figure LM is the diameter of the semicircle .*

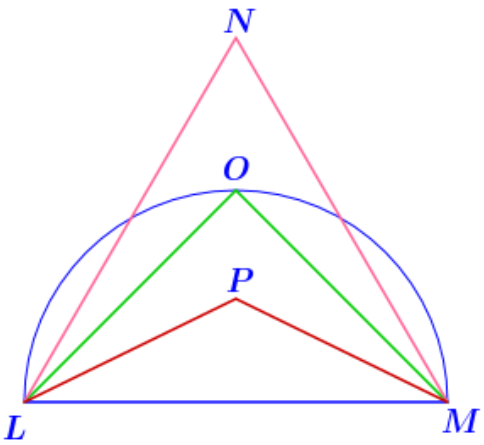
Sum of the angles $< N$,$< O$ and $< P$ is 290° .

Also the measure of $< N$ is 3 times as that of $< P$.

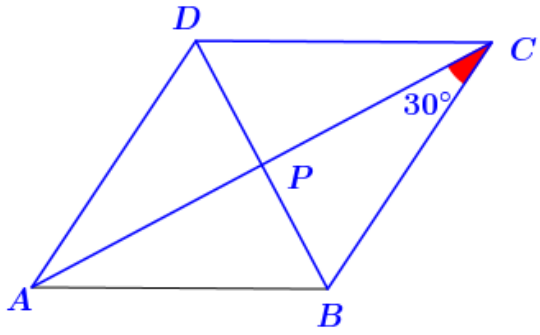
a) *What is the measure of $< O$?*

b) *What is the measure of $< N$?*

c) *What is the measure of $< P$?*



4. *In the figure ABCD is a rhombus and diagonals intersect at P . < ACB = 30 °*



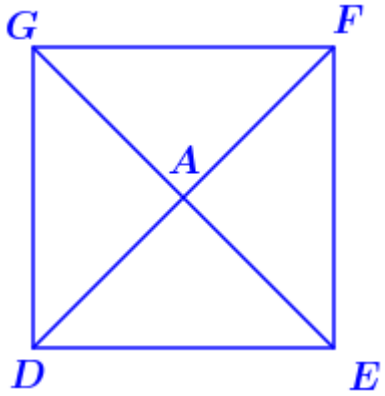
a) *What is the measure of < APD ?*

b) *Find out whether the point P is inside the circle , on the circle or outside the circle if a circle is drawn with AB as diameter ?*

c) *What is the measure of < ACD ?*

d) *Find out whether the point A is inside the circle , on the circle or outside the circle if a circle is drawn with BD as diameter ?*

5. *In the figure DEFG is a square .*



a) *Find out whether the point D is inside the circle , on the circle or outside the circle if a circle is drawn with GE as diameter ?*

b) *What is the measure of < DAE ?*

c) *Find out whether the point A is inside the circle , on the circle or outside the circle if a circle is drawn with DG as diameter ?*

d) *Find out whether the point G is inside the circle , on the circle or outside the circle if a circle is drawn with EF as diameter ?*