Grade 9 Mathematics

Unite :16

Angles of a Triangle

Reading Materials

Angles of a triangle

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By studying this lesson you will be able to

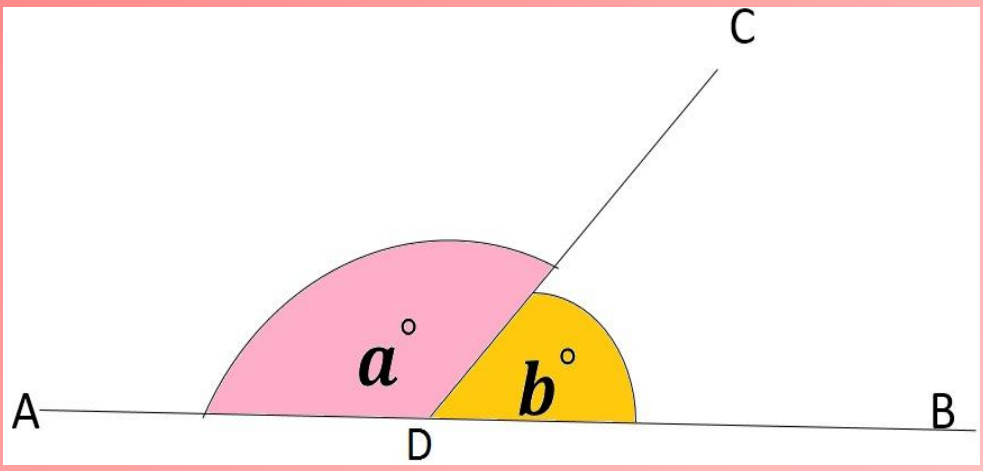
- **Solve simple problems using the theorem**

"The sum of the interior angles of a triangle is 180°"

- **Solve simple problems using the theorem**

"The exterior angles of a triangle is equal to the sum of the interior opposite angles."

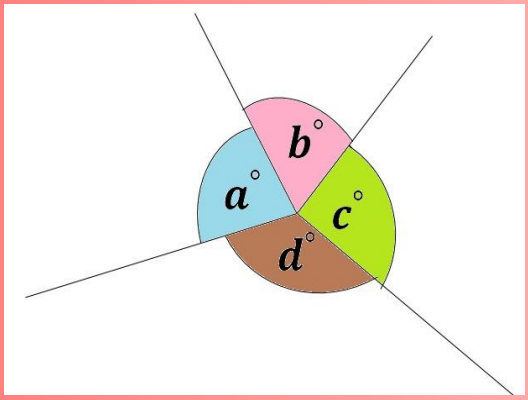
❑ . A pair of adjacent angles on a straight line are supplementary



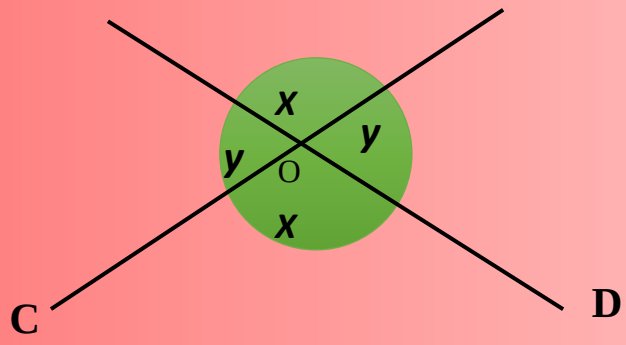
$$a + b = 180°$$

❑ The sum of the angles around a point is 360°

$$a + b + c + d = 360°$$



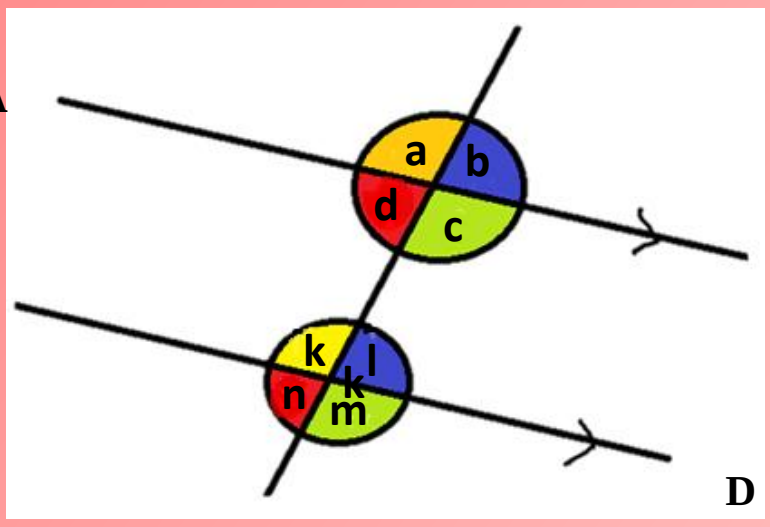
❑The vertically opposite angles formed by the intersection of two straight lines are equal



AÔD = CÔB

AÔC = BÔD .

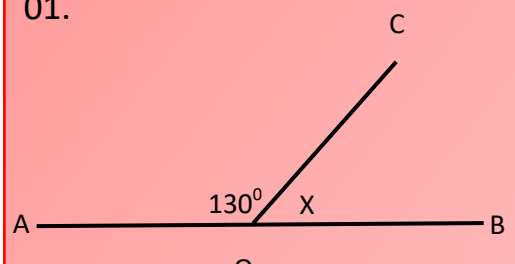
❑Angles related to Parallel lines



- **AB // CD**
- **c = k, d = *l* (Alternate angles)**
- ***a*** **= k , b =** ***l*** **, c = m , d = n (Corresponding angles)**
- **d + k = 180^0 and c +** ***l*** **= 180^0 (Allied angles)**

Example

01.



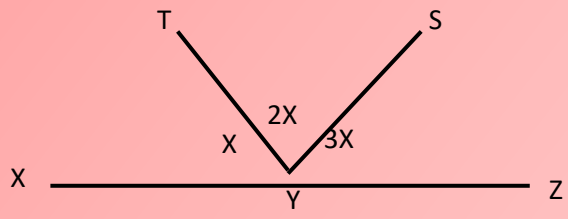
AOBis a straght line.

X + 130 =180(Adjacent angles of a straight line)

X = 180 - 130

X = 50^0

02.



Find the value of x.

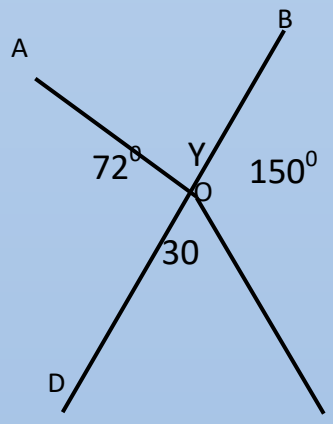
X + 3X + 2X = 180.)

6X = 180

6X / 6 = 180 / 6

X = 30°

03.



Find the value of AÔB.

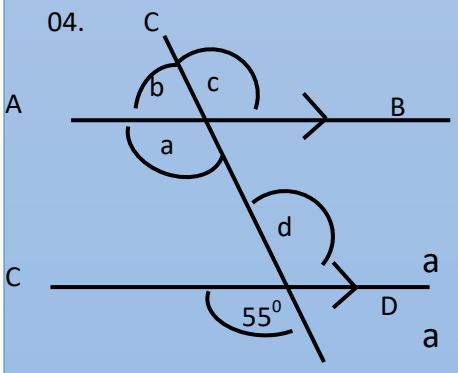
72 + 30 + 150 + Y = 360(Angles arround at a point)

278° + Y = 360

Y = 360 - 278

Y = 82°

04.



Find the magnitude of the angles denoted by the algebric terms using the information given in the figure.

a = 55^0 (corresponding angles, AB // CD)

a = d = 55(Alternate angles, AB // CD)

a = b = 55 (Allied angles)

a + b = 180(Adjacent angles on a straihgt)

55 + b = 180

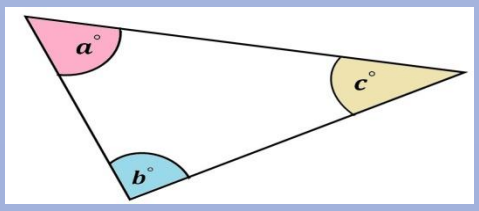
b =180 – 55

b = 125^0

Do the review exercise in page number 85 and 86 in your text book.

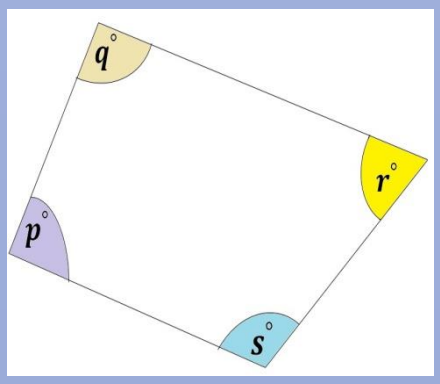
❑ The sum of the interior angles of a triangle is 180°'

$$a + b + c = 180°$$



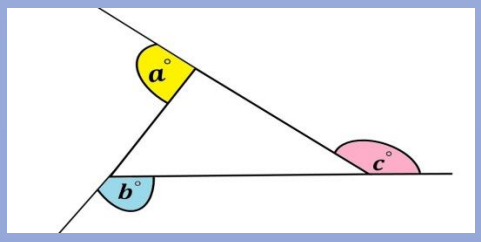
❑ . The sum of the interior angles of a quadrilateral is 360^0 '

$$p + q + r + s = 360°$$

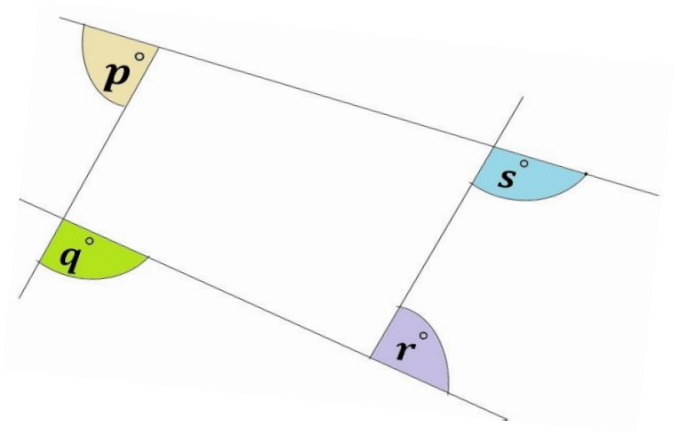


❑ The sum of the exterior angles of a triangle is 360°'

$$a + b + c = 360°$$



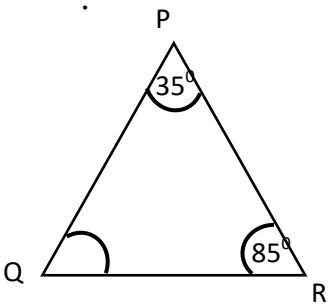
❑ The sum of the exterior angles of a quadrilateral is 360°'



$p+q+r+s = 360^0$

Examples

01.Find the value of PQR angle using the information provided



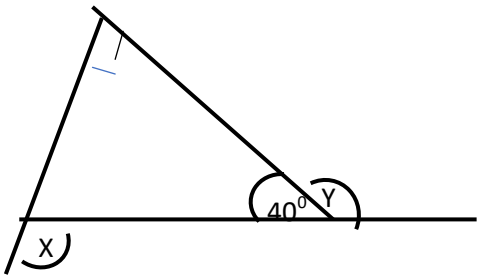
$35 + 85 + \hat{PQR} = 180$(Interior angles of a triangle)

$120 + \hat{PQR} = 180$

$\hat{PQR} = 180 - 120$

$\hat{PQR} = 60°$

02 Find the magnitude of x and y using the informations provided in the following figure.



i. Y + 40 = 180(Adjacent angles on a straight line)

Y = 180 + 40

Y = 140°

ii. x+ Y + 90 = 360 (Exterior angles of a triangles)

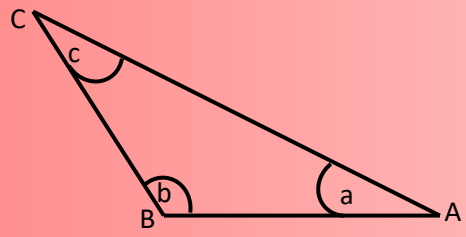
X + 140 + 90 = 360

X + 230 =360

X =360 - 230

X = 130^0

Interior angles of a Triangle



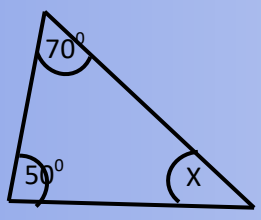
Theorem:

The Sum of the three interior angles of a Triangle is 180°

$A\hat{B}C + B\hat{C}A + C\hat{A}B = 180^0$

Example

i.



Find the value of X.

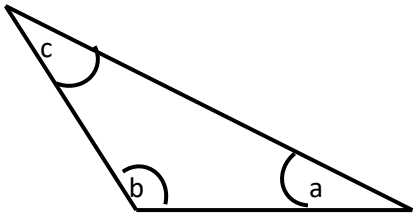
50 + 70 + X = 180(Interior angles of a triangle)

120 + X= 180

X = 180 – 120

X = 60^0

02



X + 3X + 2X = 180(Interior angles of a Triangle)

6X = 180

6X /6 =180

X $=30^0$

03 The ratio between two interior angles of a triangle is 1:3 .sum of the two interior angles are 128°.Find the value of three angles separately.

if the two angles are a and b

Ratio between a and b = 1:3

sum of the parts = 1 + 3

= 4

Magnitude of angle a $= \frac{1}{4} * 128^0$

$= 32^0$

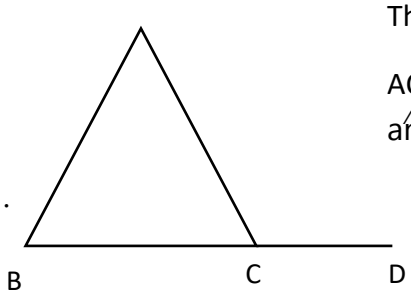
Magnitude of angle b $= \frac{3}{4} * 128^0$

$= 96^0$

Magnitude of the remaining angle $= 180^0 - (128^0)$

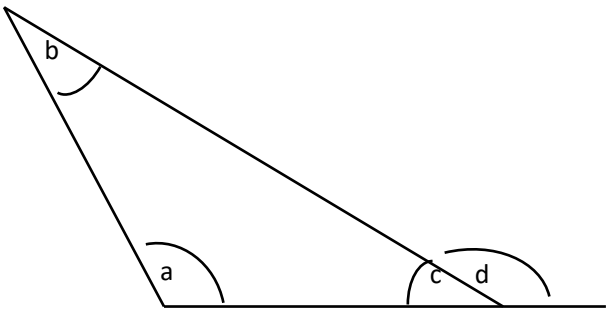
$= 52^0$

Exterior angles of a Triangle

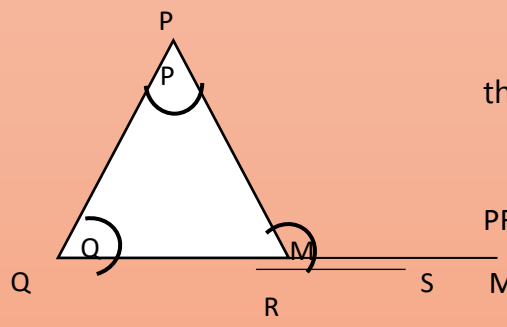


The side BC has produced up to D in the triangle .

ACD is the exterior angle of the triangle.The interior opposite angles relevant to the exterior angle $A\hat{C}D$ are $CA\hat{B}$ and $A\hat{B}C$.



- The interior angle relevant to the exterior angle d are a and b



The relationship between the exterior angle and the interior opposite angles can be given as follow.

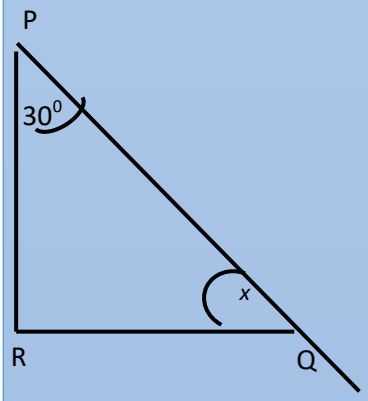
PRS = RQP + QPR

M = Q + P

Theorem

If a side of a triangle is produced ,the exterior angle so formed is equal to the sum of he two interior opposite angles.

Examples

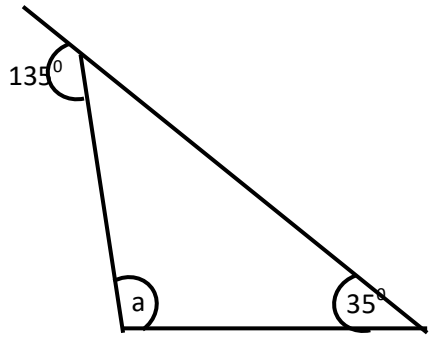


In PQR Triangle PQ side has produced up to S

x is the exterior angle in triangle PQR

x = 90 + 30

x = 120°

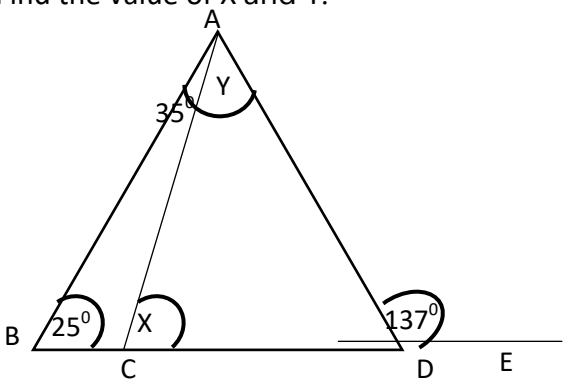


Find the Value of a

135 - 35 = a

100° = a

Find the value of X and Y.



In △ ABC

X = 25+ 35

X = 60^0

△ ACD

137 = X + Y

137 = 60+ Y

137 – 60 =Y

77^0 = Y