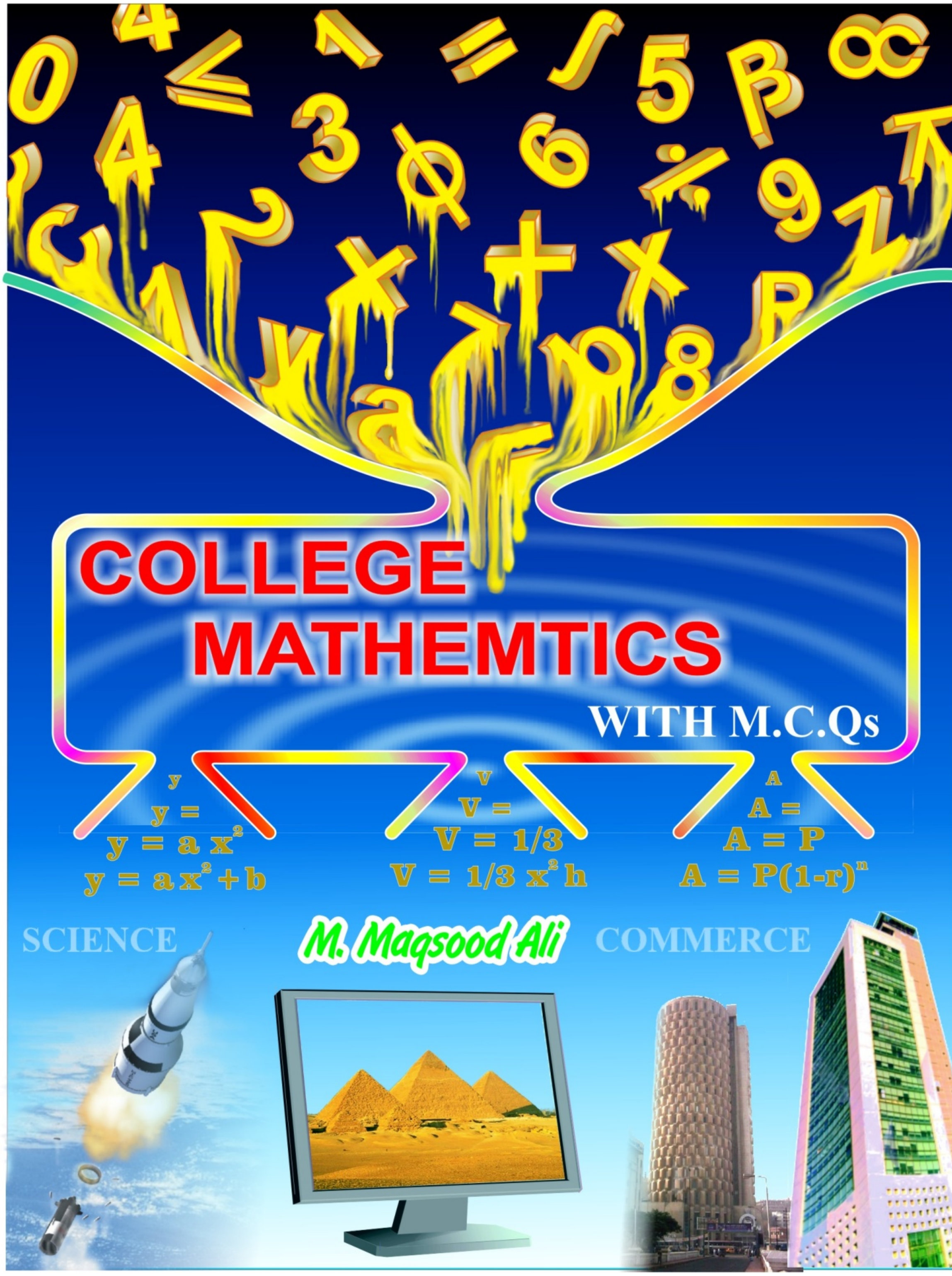

COLLEGE
MATHEMTICS
WITH M.C.Qs
y
y =
y = a x^2
y = a x^2 + b
V
V =
V = 1/3
V = 1/3 x^2 h
A
A =
A = P
A = P(1-r)^n
SCIENCE
M. Maqsood Ali
COMMERCE

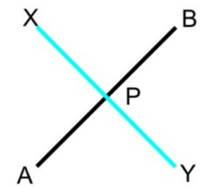
SECTION D

GEOMETRY

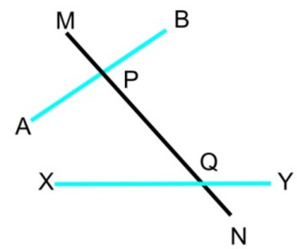
Chapter 11

ANGLES BETWEEN STRAIGHT LINES

In this section we will discuss the angles between two straight lines. These straight lines lie in a plane. The common point of two straight lines is said to be point of intersection of the lines. In the figure, AB and XY are two straight lines and P is the point of intersection.



A straight line which intersects two straight lines is called transversal . A straight line MN is transversal, it cuts two straight lines AB and XY at points P and Q, as shown in the figure.



Now we discuss the properties of angles of

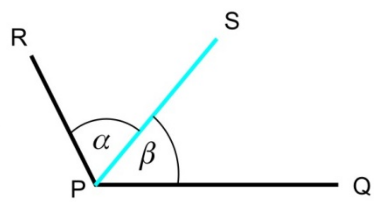
(a) angles of two straight lines intersect at a point.

(b) angles of a transversal making with two straight lines.

ANGLES AT A POINT

(i) Adjacent Angles (adj <s):

Adjacent angles are two angles that share a common vertex and a common side. Since α and β are adjacent angles with common vertex P and common side $\overline{PS}$, as shown in the figure.

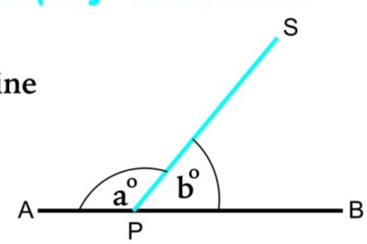


(ii) Adjacent Angles on a Straight Line (adj <s on a str line):-

a^{o} and b^{o} are adjacent angles on a straight line (adj <s on a str line).

The sum of a^{o} and b^{o} is 180^{o}.

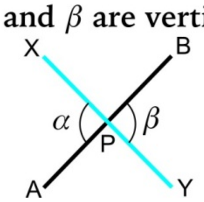
$$a^{o} + b^{o} = 180^{o}$$



(iii) Vertically Opposite Angles: (vert opp <s):

Two straight lines AB and XY interset at point P. α and β are vertically opposite angles.

The angles $X\hat{P}B$ and $A\hat{P}Y$ are also vertically opposite angle.



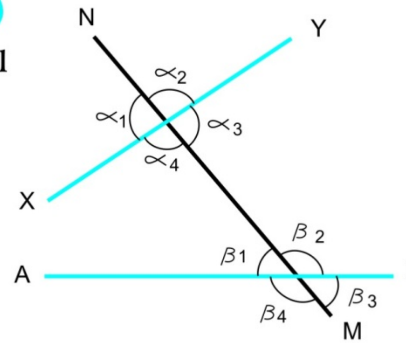
Property:

Vertically opposite angles are equal. So

$$\alpha = \beta \qquad \text{and} \qquad X\hat{P}B = A\hat{P}Y$$

ANGLES BY TRANSVERSAL

(i) Corresponding Angles: (corr <s)



Angles on the same side of the transversal MN either both above the lines AB and XY or below the lines.

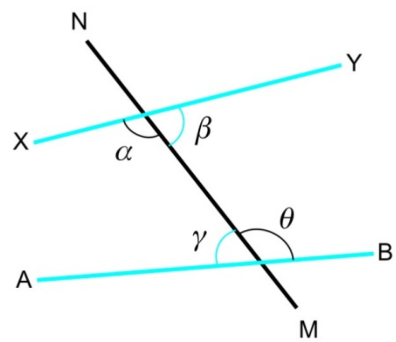
Pairs of corresponding angle are:

(a) α_1 , β_1 (b) α_2 , β_2

(c) α_3 , β_3 (d) α_4 , β_4

(ii) Alternate Angles: (alt <s)

Two angles on opposite side of the transversal MN included between the lines AB and XY are said to be alternate angle.



Following are the pairs of alternate angles.

(a) α , θ (b) β , γ

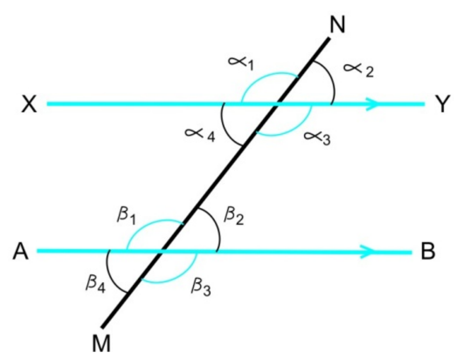
(iii) Interior Angles: (int <s)

Two angles on same side of the transversal MN included between the lines AB and XY are interior angles, as shown in the diagram.

Following are the pairs of interior angles.

(a) α , γ (b) β , θ

PROPERTIES OF ANGLES FORM BY PARALLEL LINES AND TRANSVERSAL:



A transversal MN cuts two parallel lines AB and XY, as shown in the figure.

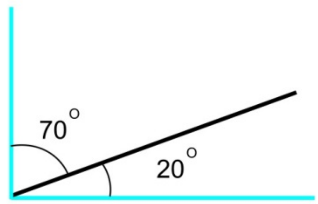
The properties of angles which makes transversal with the parallel lines are given below.

SUM OF TWO ANGLES

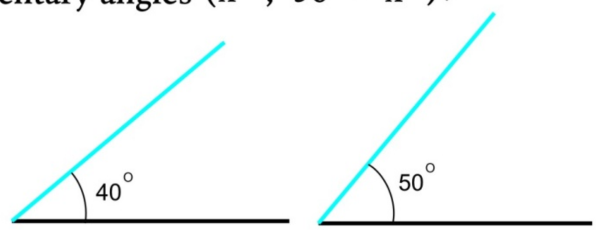
(i) Complementary Angles:

A pair of angles is said to be complementary if the sum of the angles is 90^o.

Following pairs are complementary angles (x^o , $90^o - x^o$):



(a) 20^o , 70^o

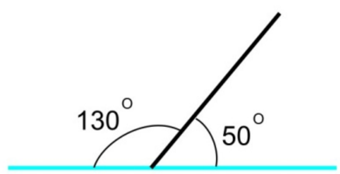


(b) 40^o , 50^o

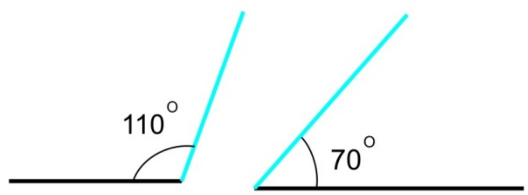
(ii) Supplementary Angles:

A pair of angles is said to be supplementary if the sum of the angles is 180^o.

Following pairs are the examples of supplementary angles (x^o , $180^o - x^o$):



(a) 50^o , 130^o

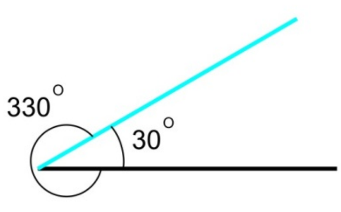


(b) 110^o , 70^o

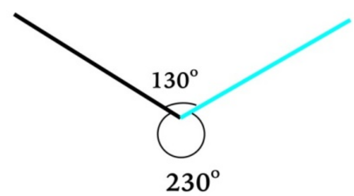
(iii) Conjugate Angles:

A pair of angles is said to be conjugate angles if the sum of the angles is 360^o.

Following pairs are said to be conjugate angles (x^o , $360^o - x^o$):



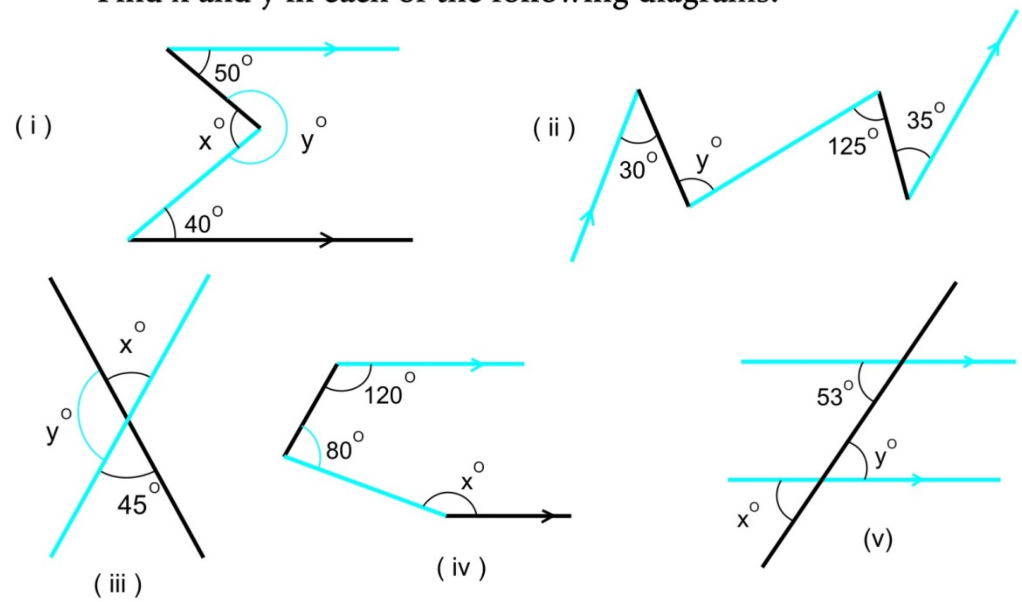
(a) 30^o , 330^o



(b) 130^o , 230^o

Example 1:

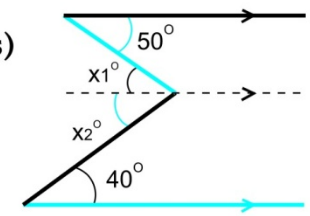
Find x and y in each of the following diagrams.



Solution:-

(i) $x_1 = 50^\circ$ (alt <s) and $x_2 = 40^\circ$ (alt <s)

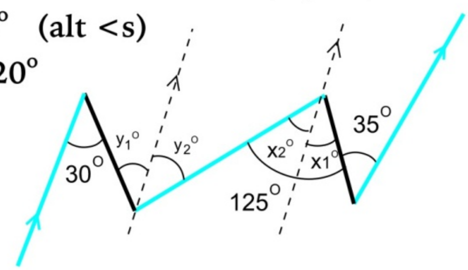
$x = x_1 + x_2 \Rightarrow x = 90^\circ$



(ii) $x_1 = 35^\circ$ (alt <s) and $x_2 = 125^\circ - 35^\circ = 90^\circ$ (adj <s)

$y_1 = 30^\circ$ (alt <s) and $y_2 = x_2 = 90^\circ$ (alt <s)

$y = y_1 + y_2$ (adj <s) $\Rightarrow y = 120^\circ$



(iii) $x = 45^\circ$ (vrt opp <s)

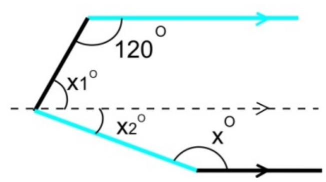
$y = 180^\circ - 45^\circ = 135^\circ$ (adj <s on a str line)

(iv)

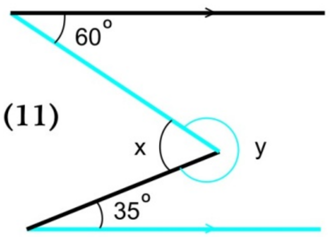
$x_1 = 180^\circ - 120^\circ = 60^\circ$ (int <s)

$x_2 = 80^\circ - 60^\circ = 20^\circ$ (adj <s)

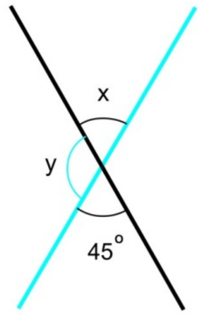
$x = 180^\circ - 20^\circ = 160^\circ$ (int <s)



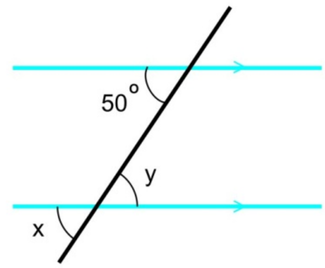
(11)



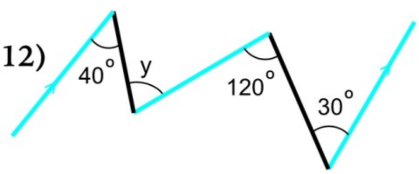
(13)



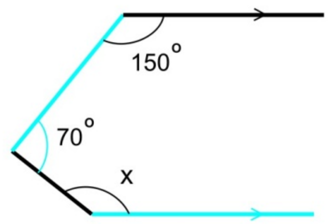
(15)



(12)



(14)

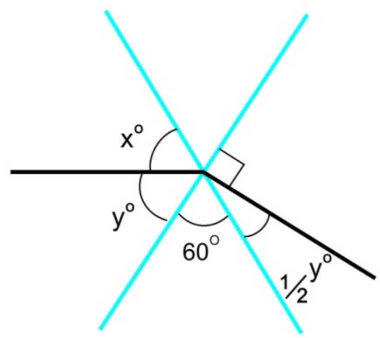


M.C.Q'S D-1

(1) What is x?

(a) 105 (b) 60

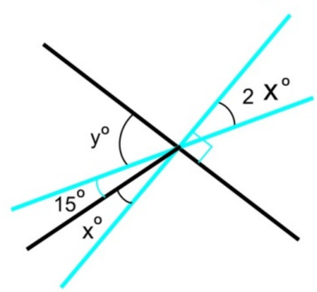
(c) 30 (d) 50



(2) What is y?

(a) 55 (b) 70

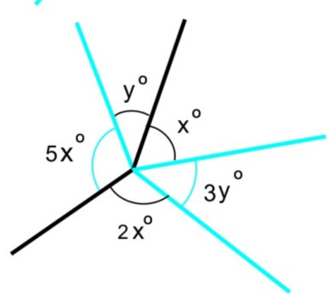
(c) 40 (d) 60



(3) What is x if y = 20?

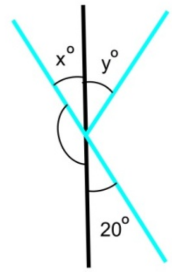
(a) 40 (b) 280

(c) 35 (d) 50



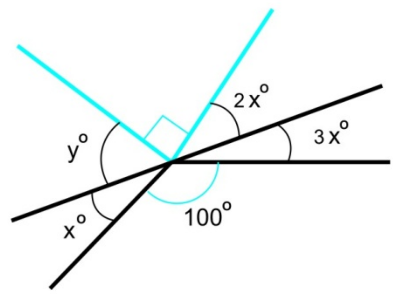
(4) x° and y° are complementry. What is y?

(a) 90 (b) 70
(c) 160 (d) 30



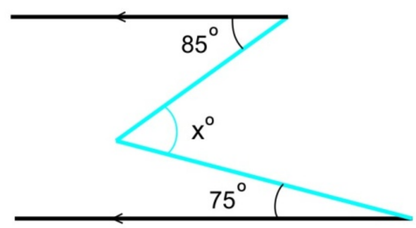
(5) What is y?

(a) 30 (b) 70
(c) 60 (d) 50



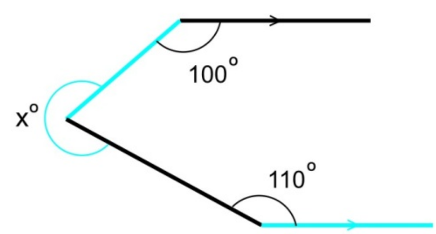
(6) What is the value of x?

(a) 170 (b) 160
(c) 200 (d) 240



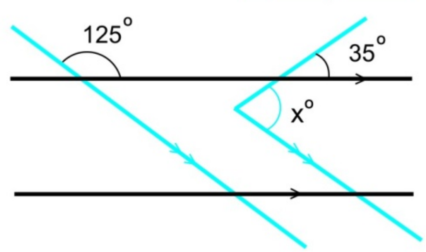
(7) What is x?

(a) 210 (b) 300
(c) 150 (d) 250



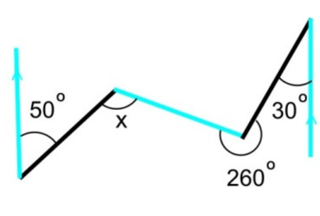
(8) What is x?

(a) 200 (b) 160
(c) 120 (d) 90



(9) What is x?

(a) 120 (b) 80
(c) 100 (d) 150




COLLEGE
MATHEMTICS
WITH M.C.Qs
y
y =
$y = a x^2$
$y = ax^2+b$
V
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V = 1/3
$V = 1/3\ x^2 h$
A
A =
A = P
$A = P(1-r)^n$
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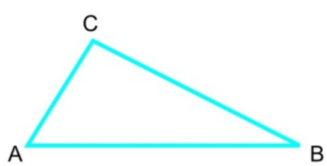
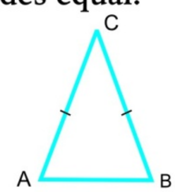
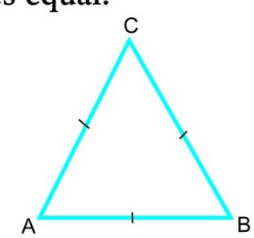
Chapter 12

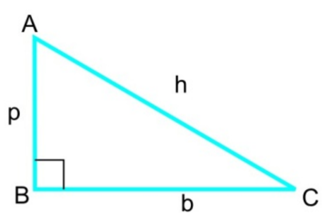
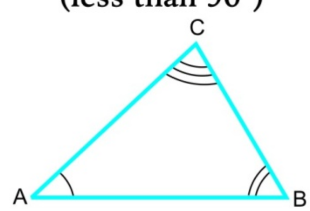
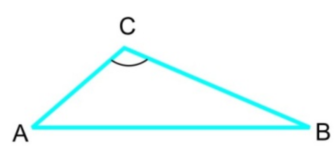
TRIANGLES

A three-sided polygon is called triangle.

CLASSIFICATION OF TRIANGLES

Triangles are classified according to the number of equal sides and also the types of angles.

Scalene Triangle	*Isosceles Triangle*	*Equilateral Triangle*
A triangle with all its sides unequal.  $AB \neq BC \neq AC$	A triangle with two of its sides equal.  $BC = AC$ Two angles are also equal.	A triangle with all three sides equal.  $AB = BC = AC$ All angles are also equal.

Rightangled Triangle	*Acute-angled Triangle*	*Obtuse-angled Triangle*
A triangle with one of its angles rightangle.  $m\angle ABC = 90^\circ$	A triangle with all three angles acute (less than 90^o)  $C\hat{A}B < 90^\circ, A\hat{B}C < 90^\circ$ and $B\hat{C}A < 90^\circ$	A triangle with one of its angles obtuse (greater than 90^o).  $A\hat{C}B > 90^\circ$

Note:-

(i) Two angles of an isosceles triangle opposite to the equal sides are equal.

(ii) All three angles of an equilateral triangle are euqal.

SUM OF INTERIOR ANGLES

Sum of interior angles of a triangle is 180°.

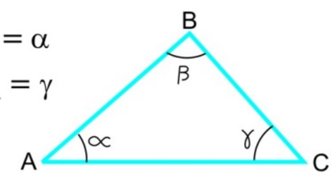
Proof:

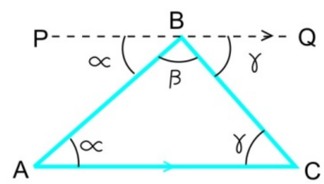
Let α, β and γ be the interior angles of a triangle ABC. Draw a straight line $\overline{PQ}$ passes through vertex B and parallel to $\overline{AC}$.

$$m\angle BAC = m\angle PBA = \alpha$$

and $$m\angle ACB = m\angle CBQ = \gamma$$

so that $$\alpha + \beta + \gamma = 180^\circ$$

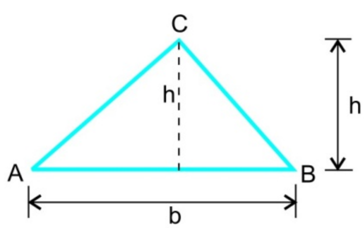




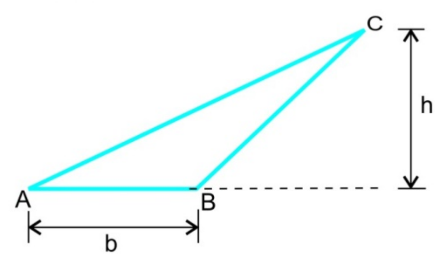
SUM OF EXTERIOR ANGLES

Sum of exterior angles of any polygon is 360 °. So that sum of exterior angles of a triangle is 360°.

AREA OF A TRIANGLE



(a)



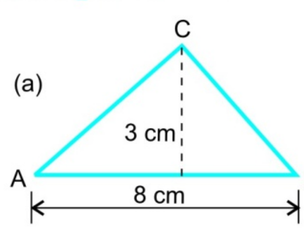
(b)

$$\text{Area of a triangle} = \frac{1}{2} \times \text{base} \times \text{height}$$

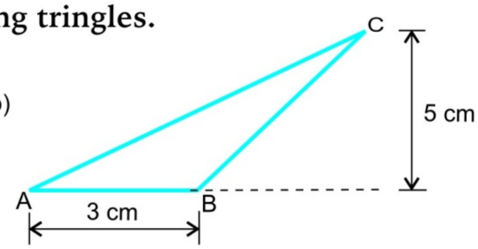
$$= \frac{1}{2}\,bh$$

Example 1: Find the area of the following tringles.

(a)



(b)



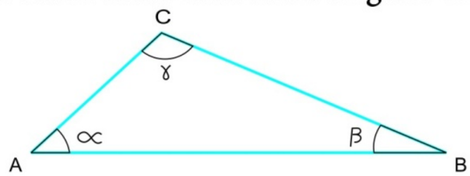
(a) Area = 1/2 (8 . 3) = 12 sq. cm

(b) Area = 1/2 (3 . 5) = 7.5 sq. cm

RELATION BETWEEN ANGLES AND SIDES

(1) Included Angles and Sides of a Triangle:

A triangle has three sides and three angles. Consider the triangle ABC.

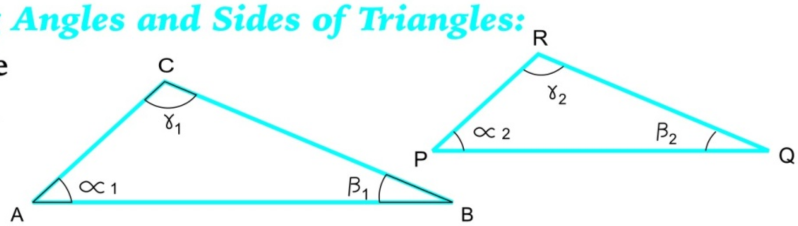


	Sides	Included Angle
(i)	$\overline{AB}$ and $\overline{AC}$	α
(ii)	$\overline{AB}$ and $\overline{BC}$	β
(iii)	$\overline{AC}$ and $\overline{BC}$	γ

	Angles	Included Side
(i)	α and β	$\overline{AB}$
(ii)	β and γ	$\overline{BC}$
(iii)	α and γ	$\overline{AC}$

(2) Corresponding Angles and Sides of Triangles:

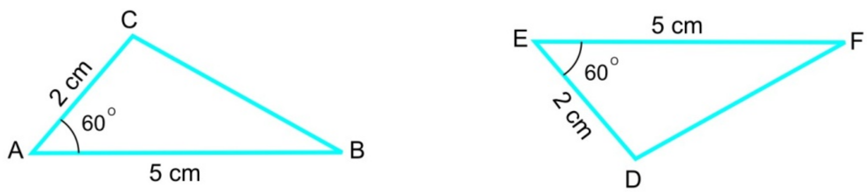
ABC and PQR are two triangles, as shown in the figure.



	Sides	Corresponding Angles (opposite to the sides)
(i)	$\overline{AB}$ and $\overline{PQ}$	γ_1 and γ_2
(ii)	$\overline{AC}$ and $\overline{PR}$	β_1 and β_2
(iii)	$\overline{BC}$ and $\overline{QR}$	α_1 and α_2

	Angles	Corresponding Sides
(i)	α_1 and α_2	$\overline{BC}$ and $\overline{QR}$
(ii)	β_1 and β_2	$\overline{AC}$ and $\overline{PR}$
(iii)	γ_1 and γ_2	$\overline{AB}$ and $\overline{PQ}$

For example:

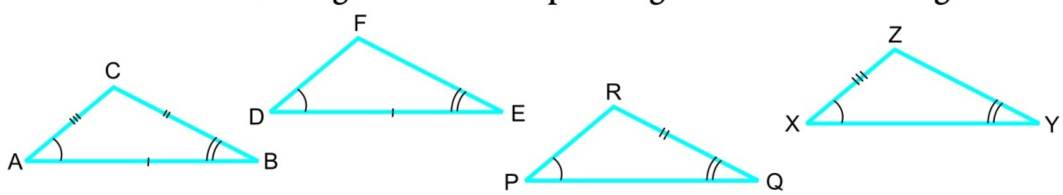


Since $AB = EF = 5cm$, $AC = DE = 2cm$ and $\hat{A} = \hat{E} = 60^o$.

So ΔABC and ΔDEF are congruent ($\Delta ABC \equiv \Delta DEF$)

Property 3: Two angles and one side (AAS or ASA property).

Two triangles are congruent if two angles and one side of a triangle are equal to the two angles and corresponding side of other triangle.

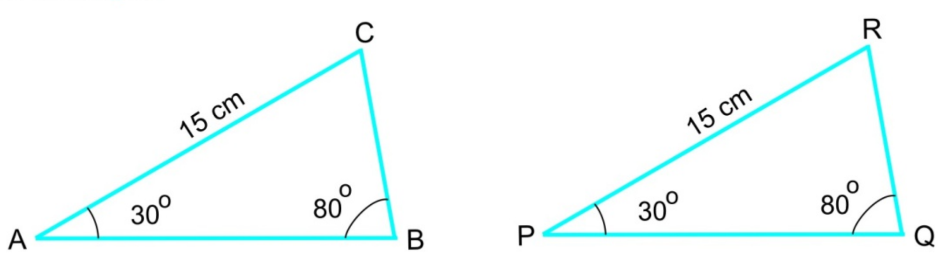


(1) $\hat{A} = \hat{D}$, $\hat{B} = \hat{E}$ and $AB = DE$. So $\Delta ABC \equiv \Delta DEF$.

(2) $\hat{A} = \hat{P}$, $\hat{B} = \hat{Q}$ and $BC = QR$. So $\Delta ABC \equiv \Delta PQR$.

(3) $\hat{A} = \hat{X}$, $\hat{B} = \hat{Y}$ and $AC = XZ$. So $\Delta ABC \equiv \Delta XYZ$.

For example:-



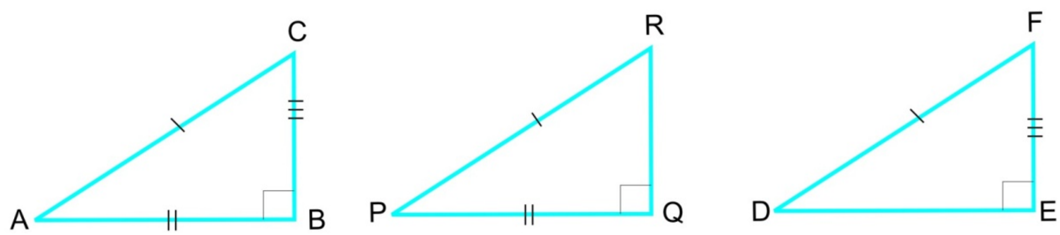
Since $\hat{A} = \hat{P} = 30^o$, $\hat{B} = \hat{Q} = 80^o$

$AC = PR = 15$ cm (corresponding sides).

So triangles ABC and PQR are congruent ($\Delta ABC \equiv \Delta PQR$)

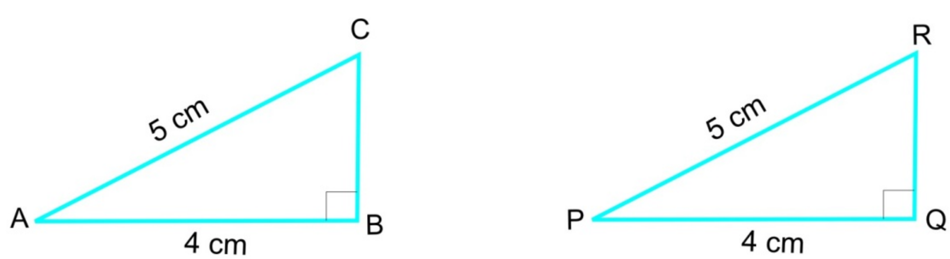
Property 4: (Rightangle, Hypotenuse and one side (RHS))

Two rightangled triangles are congruent if hypotenuse and a side of a rightangled triangle are equal to hypotenuse and corresponding side respectively of other rightangled triangle.



Case 1: **AC = PR and AB = PQ , So $\Delta ABC \equiv \Delta PQR$**
***Case 2*:** **AC = DF and BC = EF , So $\Delta ABC \equiv \Delta DEF$**

For example:



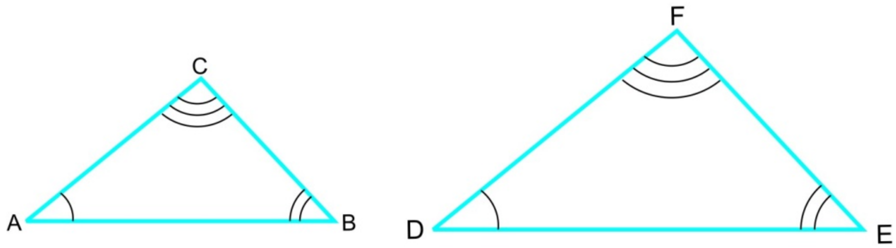
AC = PR = 5cm and AB = PQ = 4 cm
So, ΔABC and ΔPQR are congruent.

SIMILAR TRIANGLES

Two triangles are similar if all the corresponding angles of the triangles are equal and all the corresponding sides are proportional.

Explanation:

Two triangles ABC and DEF are given below.



$$\hat{A} = \hat{D} \;,\; \hat{B} = \hat{E} \text{ and } \hat{C} = \hat{F}$$

$$\text{and} \quad \frac{AB}{DE} = \frac{BC}{EF} = \frac{CA}{FD}$$

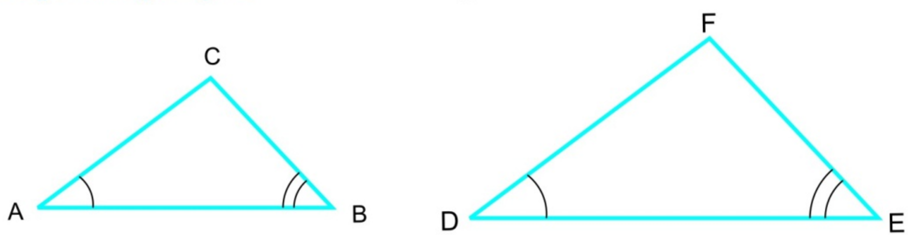
So ΔABC and ΔDEF are similar.

PROPERTIES OF SIMILAR TRIANGLES

If two triangles are given and you want to check whether the triangles are similar or not. It is not necessary to measure all the angles of both triangles and calculate the ratios of all the corresponding sides. There are some properties are given. If one of these properties Satisfy, the triangles are similar.

Property 1: (Two Angles)

Two triangles are similar if two angles of a triangle are Equal to the corresponding angles of other triangle.



$\hat{A} = \hat{D}$ and $\hat{B} = \hat{E}$

So, triangles ABC and DEF are similar.

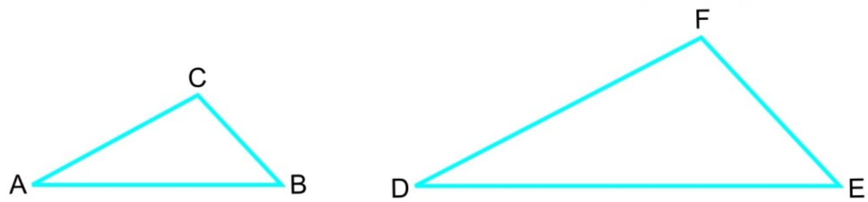
For example:

$$\hat{A} = \hat{D} = 30^\circ \quad \text{and} \quad \hat{B} = \hat{E} = 40^\circ$$

So, ΔABC and ΔDEF are similar.

Property 2: (Ratio of Corresponding Sides)

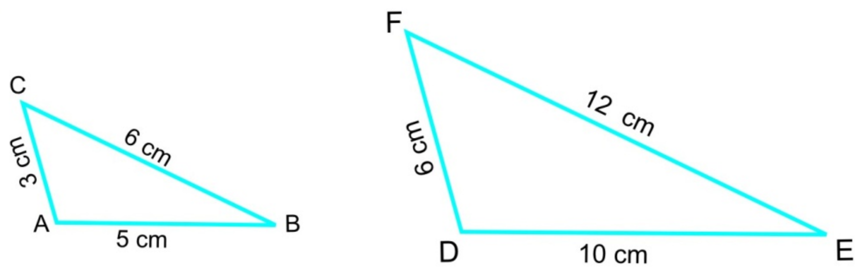
Two triangles are similar if ratios of all corresponding sides are equal.



$$\frac{AB}{DE} = \frac{BC}{EF} = \frac{CA}{FD} \quad \text{or} \quad \frac{DE}{AB} = \frac{EF}{BC} = \frac{FD}{CA}$$

So triangles ABC and DEF are similar.

Example:

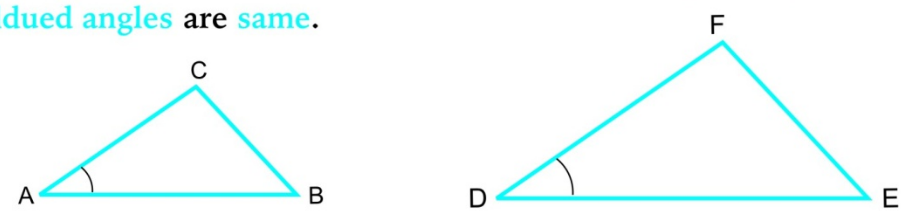


$$\frac{AB}{DE} = \frac{1}{2}, \quad \frac{BC}{EF} = \frac{1}{2} \quad \text{and} \quad \frac{CA}{FD} = \frac{1}{2}$$

So ΔABC and ΔDEF are similar.

Property 3: (Ratio of two Corresponding Sides & Included Angles)

Two triangles are similar if the ratios of corresponding side are equal and incldued angles are same.

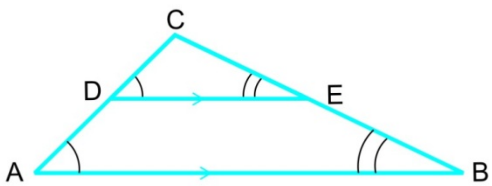


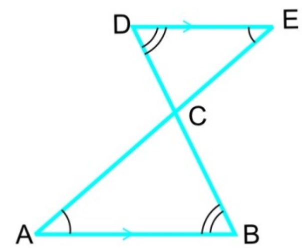
$$\frac{AB}{DE} = \frac{CA}{FD} \quad \text{and} \quad \hat{A} = \hat{D}$$

So ΔABC and ΔDEF are similar.

SIMILAR TRIANGLES FORMED BY TWO PARALLEL LINES

There are two cases.

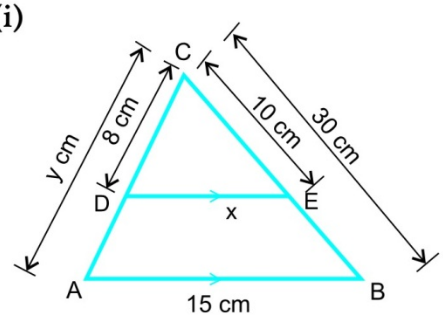
<table>
<tr><th>Case 1</th><th>Case 2</th></tr>
<tr><td>


ΔABC and ΔDEC are similar triangles
because $C\hat{D}E = C\hat{A}B$
and $C\hat{E}D = C\hat{B}A$
Thus $\dfrac{AB}{DE} = \dfrac{BC}{EC} = \dfrac{AC}{DC}$
</td><td>


ΔABC and ΔDEC are similar triangles
because $C\hat{E}D = C\hat{A}B$
and $E\hat{D}C = C\hat{B}A$
Thus $\dfrac{AB}{DE} = \dfrac{BC}{DC} = \dfrac{AC}{CE}$
</td></tr>
</table>

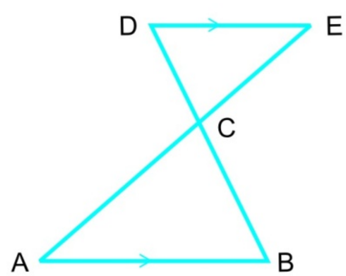
Example 4: Find x and y in the following diagrams.

(i)



AB = 15 cm , DE = x cm
AC = y cm , DC = 8 cm
BC = 30 cm , EC = 10 cm

(ii)



AB = x cm , DE = 7 cm
BC = 12 cm , CD = 3 cm
AC = 4 cm , CE = y cm

Solution:-

(i) Since ΔABC and ΔDEC are similar, so

$$\frac{AB}{DE} = \frac{BC}{EC} = \frac{AC}{DC} \Rightarrow \frac{15}{x} = \frac{y}{8} = \frac{30}{10}$$

$$\Rightarrow \frac{15}{x} = \frac{30}{10} \quad \text{and} \quad \frac{y}{8} = \frac{30}{10}$$

$$\Rightarrow x = 5 \text{ cm} \quad \text{and} \quad y = 24 \text{ cm}$$

(ii) Since ΔABC and ΔDEC are similar, so

$$\frac{DE}{AB} = \frac{CE}{AC} = \frac{CD}{BC} \Rightarrow \frac{7}{x} = \frac{y}{4} = \frac{3}{12}$$

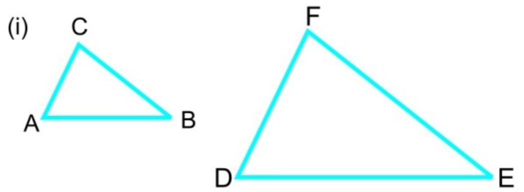
$$\Rightarrow \frac{7}{x} = \frac{3}{12} \quad \text{and} \quad \frac{y}{4} = \frac{3}{12}$$

$$\Rightarrow x = 28 \text{ cm} \quad \text{and} \quad y = 1 \text{ cm}$$

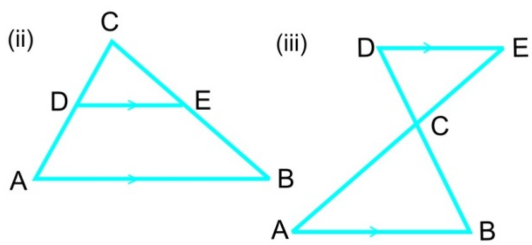
AREAS OF SIMILAR TRIANGLES AND TRIANGLES OF EQUAL HEIGHTS:

<table>
<tr><th>Similar Triangles</th><th>Triangles of Equal Heights</th></tr>
<tr>
<td>

We have discussed the ratio of areas of similar figures. Following triangles are similar triangles.



ΔABC and ΔDEF are similar.



ΔABC and ΔDEF are similar in (ii) and (iii).

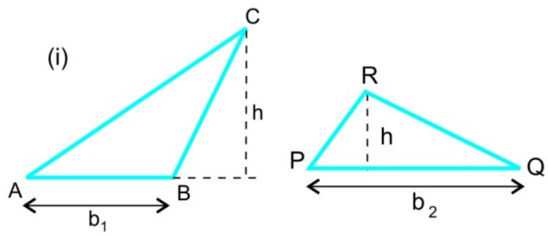
A_1 and A_2 are the areas of similar triangles and l_1 and l_2 are corresponding lengths, so

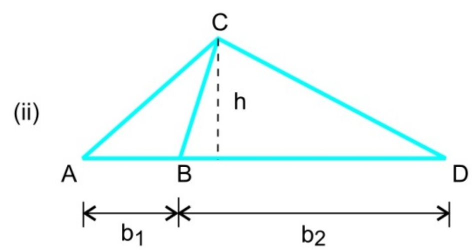
The ratio of areas of similar triangles is equal to the square of the ratio of the length of any two corresponding sides.

$$\frac{A_1}{A_2} = \left(\frac{l_1}{l_2}\right)^2$$

</td>
<td>

Following are the triangles of equal heights.





ΔABC and ΔBCD are of equal heights.

If A_1 and A_2 are the areas of triangles of equal heights h and base b_1 and b_2 respectively, then

The ratio of areas of triangles of same heights are equal to the ratio of the bases.

$$\frac{A_1}{A_2} = \frac{b_1}{b_2}$$

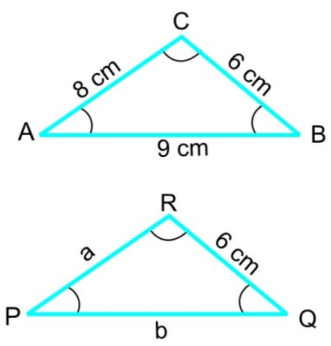
Proof :

$$\frac{A_1}{A_2} = \frac{\frac{1}{2}b_1h}{\frac{1}{2}b_2h} = \frac{b_1}{b_2}$$

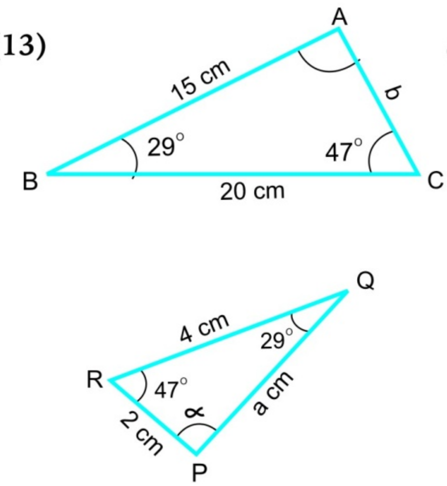
</td>
</tr>
</table>

Find a, b, α and β.

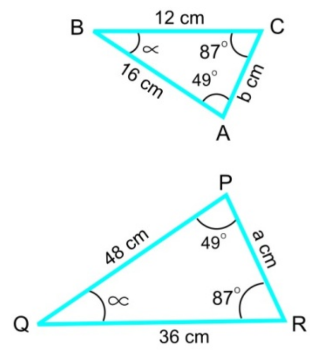
(12)



(13)

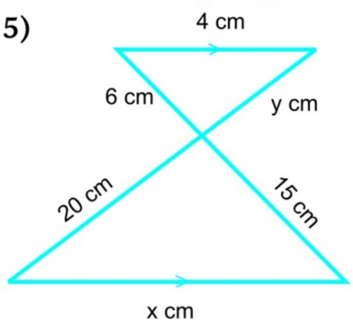


(14)

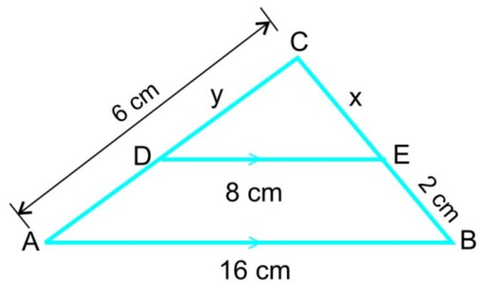


Find the values of x, y and α.

(15)



(16)



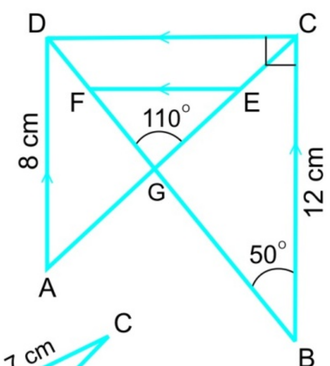
(17) Given that: BC = 12 cm, AD = 8 cm

CD = 15 cm , EF = 3 cm

AG = 6 cm , FG = 2.2 cm

Find*: (*i*) *DG* (*ii*) *BG

(*iii*) $\hat{A}$ (*iv*) $A\hat{C}D$ (*v*) $\dfrac{\text{area of } \Delta BGC}{\text{area of } \Delta AGD}$

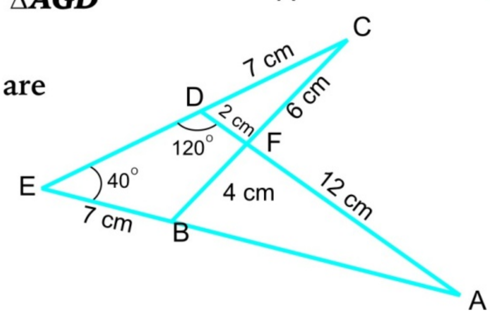


(18) Figure

(i) Prove that AFB and CFD are similar triangles.

(ii) Find AB and DE.

(ii) $\dfrac{\text{area of } \Delta CEB}{\text{area of } \Delta AED}$



M.C.Q's D-2

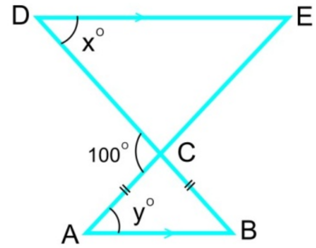
(1) Given that : AB and DE are parallel:

CD = CE and BC = AC

What is the sum of x° and y°?

(a) 100° (b) 80°

(c) 160° (d) 150°

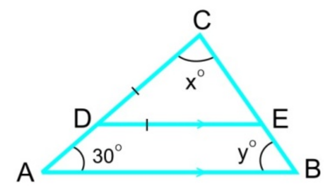


(2) Given that : $\hat{A} = 30^{\circ}$, CD = DE and AC = AB, then

$x^{\circ} + y^{\circ} = ?$

(a) 100° (b) 150°

(c) 210° (d) 190°



(3) Given that : $\overline{AC}$ is parallel to $\overline{DE}$ and $\overline{AB}$ is parallel to $\overline{FG}$.

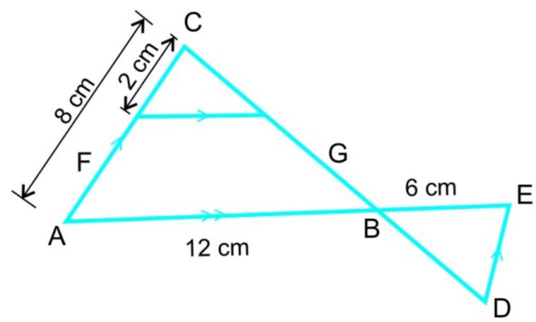
AC = 8 cm , FC = 2 cm ,

AB = 12 cm and BE = 6 cm

What is the sum of FG and DE?

(a) 18 cm (b) 10 cm

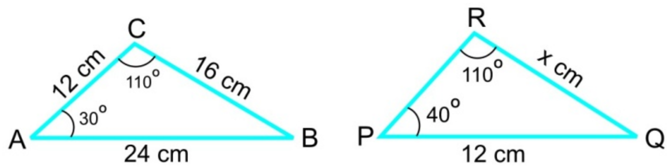
(c) 12 cm (d) 7 cm



(4) What is the value of x?

(a) 4 (b) 6

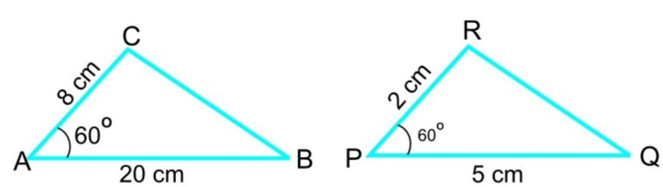
(c) 8 (d) 10



(5) $\dfrac{\text{area of } \Delta PQR}{\text{area of } \Delta ABC} = ?$

(a) $\dfrac{1}{4}$ (c) $\dfrac{1}{16}$

(b) $\dfrac{2}{5}$ (d) $\dfrac{5}{8}$




COLLEGE
MATHEMTICS
WITH M.C.Qs
y
y =
$y = a x^2$
$y = ax^2 + b$
V
V =
V = 1/3
$V = 1/3\ x^2 h$
A
A =
A = P
$A = P(1-r)^n$
SCIENCE
M. Maqsood Ali
COMMERCE

Chapter 13

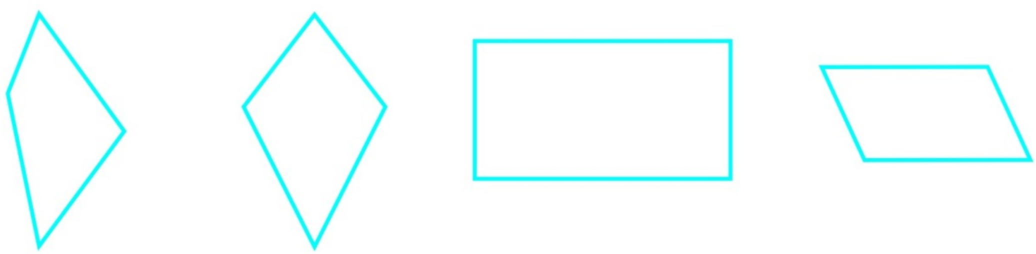
QUADRILATERAL

A four-sided polygon is called quadrilateral.

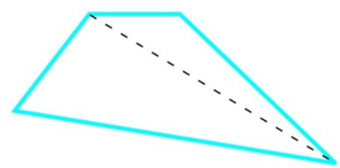
or

A quadrilateral is a plane figure bounded by four straight lines.

Following figures are the example of a quadrilateral.



Sum of Interior Angles:



A quadrilateral can be divided into two triangles.

Sum of interior angles of a triangle = 180°

So that

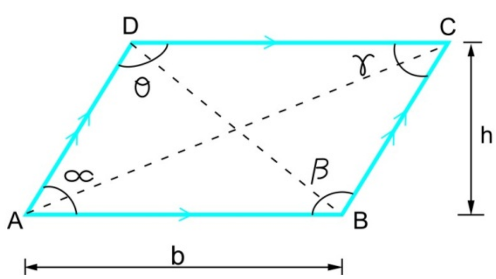
Sum of interiror angles of a quadrilateral = 2 × 180°

= 360°

CLASSIFICATION OF QUADRILATERALS

(1) Parallelogram:

A quadrilateral whose opposite sides are parallel and equal in length.



<u>Diagonals:</u>

The diagonals of a prallelogram bisect each other.

<u>Side :</u> AB = CD and BC = AD , AB ||CD , BC ||AD

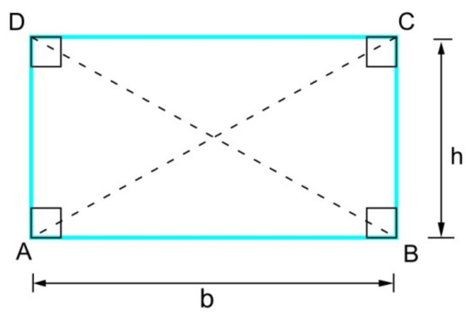
<u>Angles :</u> $\alpha = \gamma$ and $\beta = \theta$

<u>Area :</u> A = base × athitude or A = base × height

A = bh

(2) *Rectangle:*

A parallelogram whose all angles are right angles.



<u>Diagonals:</u>

Diagonals bisect each other and equal in length.

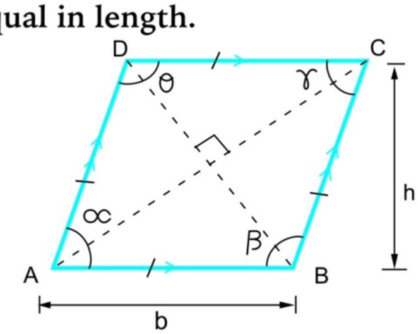
<u>Sides :</u> AB = CD and BC = AD , AB ||DC , BC ||AD

<u>Angles :</u> All angles are right angles.

<u>Area :</u> A = length × width

(3) *Rhombus:*

A parallelogram all of whose sides are equal in length.



<u>Diagonals:</u>

(i) Diagonals bisect each other.

(ii) They are perpendicular to each other.

(iii) Diagonals bisect the interior angles. Diagonal $\overline{AC}$ bisects the angles α and γ and diagonal $\overline{BD}$ bisects the angles β and θ.

<u>Sides :</u> AB = BC = CD = AD , AB ||DC , BC ||AD

<u>Angles :</u> $\alpha = \gamma$ and $\beta = \theta$

<u>Area :</u> A = base × altitude or A = base × height

A = bh

\

ABCD is a parallelogram.

$$x = D\hat{A}B = B\hat{C}E = 60^\circ$$

and $A\hat{B}C = A\hat{D}C = y$

So that

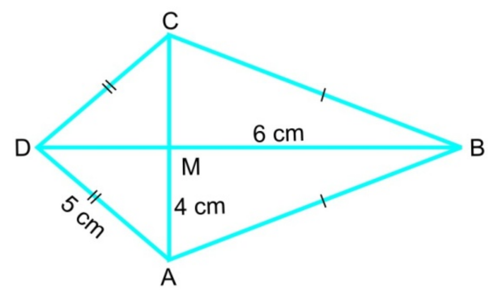
$$2x + 2y = 360^\circ \quad \Rightarrow \quad y = 120^\circ$$

(ii) ABCD is a kite. So $AC \perp BD$.

$$M\hat{A}B = 90^\circ - 50^\circ = 40^\circ \quad \Rightarrow \quad y = 2\,(40^\circ) = 80^\circ$$

$$D\hat{C}M = 90^\circ - 65^\circ = 25^\circ \quad \Rightarrow \quad x = 2\,(25^\circ) = 50^\circ$$

Example 2: Find the area and perimeter of the following diagram.



AD = 5 cm , AM = 4 cm and BM = 6 cm

Solution:-

In right angled triangle AMD

$$5^2 = DM^2 + 4^2 \quad \Rightarrow \quad DM = 3\text{ cm} \quad \Rightarrow \quad BD = 9\text{ cm}$$

Since $\overline{BD}$ bisect $\overline{AC}$.

So that $AC = 2 \times 4\text{ cm} = 8\text{ cm}$

In right angled triangle AMB

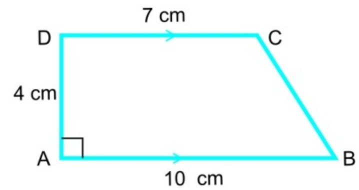
$AB^2 = 4^2 + 6^2 \quad \Rightarrow \quad AB = 7.21$ (correct to 3 significan t figures)

Area $= 1/2 \times BD \times AC = 0.5 \times 9 \times 8 = 36\text{ cm}^2$

Perimeter $= 2\,(AB + AD) = 2\,(7.21 + 5) = 24.42$

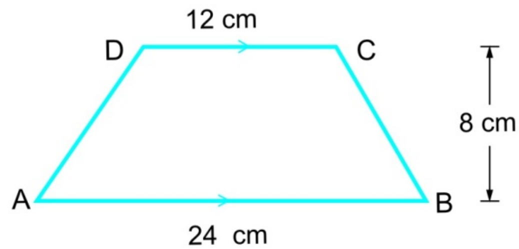
(5) ABCD is trapezium.
What is the perimeter of the trapezium?

(a) 26 (b) 25
(c) 27 (d) 30



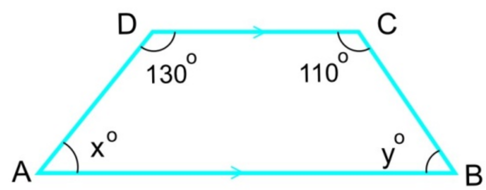
(6) ABCD is isosceles trapezium.
What is the perimeter?

(a) 60 cm (b) 56 cm
(c) 52 cm (d) 54 cm



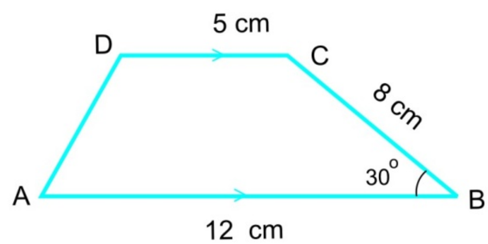
(7) ABCD is trapezium.
What is the sum of x° and y°.

(a) 210° (b) 80°
(c) 150° (d) 120°



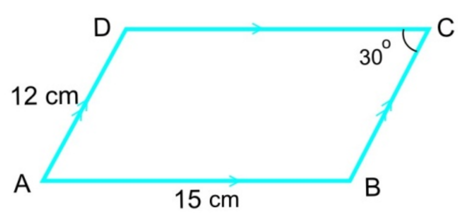
(8) ABCD is trapezium.
What is the area in cm^2 of the trapezium?

(a) 34 (b) 46
(c) 68 (d) 64



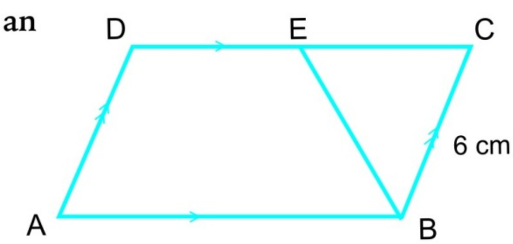
(9) ABCD is parallelogram.
What is the area in cm^2, of the parallelogram.

(a) 220 (b) 180
(c) 90 (d) 75

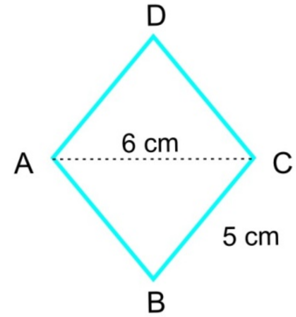


(10) ABCD is parallelogram. E is the mid-point of $\overline{CD}$ and BCE is an equilateral triangle.
What is the perimeter of the parallelogram in cm?

(a) 42 (b) 30
(c) 36 (d) 48

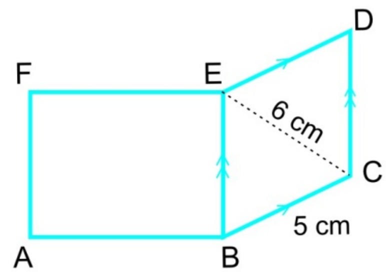


(11) ABCD is a rhombus.
BC = 5 cm and AC = 6 cm
What is the area in cm^2 of the rhombus.



(a) 60 (b) 48
(c) 36 (d) 30

(12) ABEF and BCDE are square and rhombus respectively. What is the area enclosed by the figure.

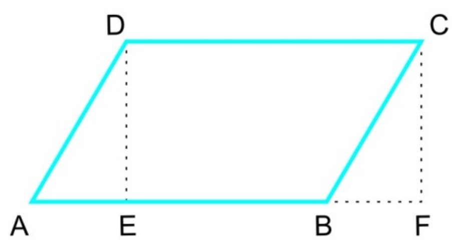


(a) 85 (b) 55
(c) 98 (d) 73

(13) ABCD is a parallelogram and EFCD a rectangle. 6 cm and 4 cm are the dimensions of the rectangle.
What is the area in cm^2 of the parallelogram.

(a) 24 (b) 30
(c) 36 (d) 48

(14) ABCD is a rhombus and EFCD a square. The length of a side of the square is 10 cm. What is the area of the rhombus.



(a) 80 (b) 50
(c) 100 (d) 120

COLLEGE
MATHEMTICS
WITH M.C.Qs
y
y =
$y = a x^2$
$y = ax^2+b$
V
V =
V = 1/3
$V = 1/3\ x^2 h$
A
A =
A = P
$A = P(1-r)^n$
SCIENCE
M. Maqsood Ali
COMMERCE

Chapter 14

POLYGONS

A polygon is a plane figure bounded by three or more straight lines. The lines are called sides of the polygone.

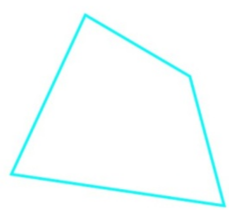
Names of the Polygons:

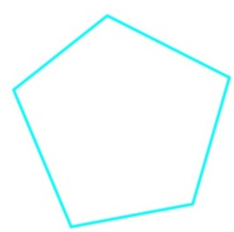
Names of the polygons depend upon the number of sides of the polygons. For example

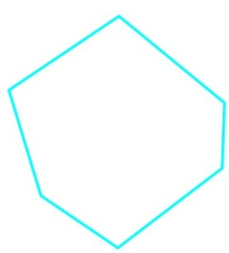
S. No.	No. of Sides	Name of the Polygon
1	3	triangle
2	4	quadrilateral
3	5	pentagon
4	6	hexagon
5	7	heptagon
6	8	octagon
7	9	nonagon
8	10	decagon

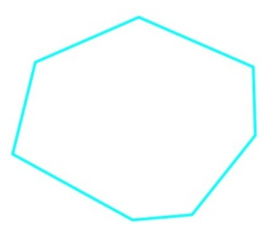
Following are the figures of the Polygons:


Triangle


Quadrilateral


Pentagon

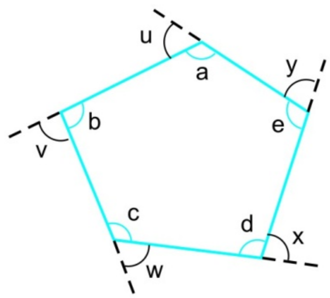

Hexagon


Heptagon

SUM OF EXTERIOR ANGLES OF A POLYGON

Sum of exterior angles of any polygon is 360°.

Proof:



Suppose that a, b, c, d and e are interior angles of a pentagon and u, v, w, x and y respectively are exterior angles. So

$(a+u) + (b+v) + (c+w) + (d+x) + (e+y) = 180^\circ+180^\circ+180^\circ+180^\circ+180^\circ$

$(a+b+c+d+e) + (u+v+w+x+y) = 900^\circ$

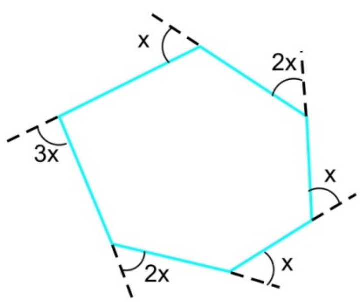
Since sum of the interior angles of pentagon = $a+b+c+d+e = 540^\circ$

$540^\circ + (u+v+w+x+y) = 900^\circ$

Sum of exterior angles = 360°

Example 3: Find x.

Solution:-



Sum of exterior angles of a polygon = 360°

$x + x + 2x + x + 3x + 2x = 360^\circ$

$x = 36^\circ$

M.C.Q's D-4

(1) How many sides have a octagon?

(a) 6 (b) 7 (c) 8 (d) 9

(2) What is an interior angle of a regular nonagon?

(a) 80° (b) 140° (c) 135° (d) 120°

(3) An inerior angle of a regular polygon is 120°. What is the name of the polygon.

(a) octagon (b) hyptagon

(c) pentagon (d) hexagon

(4) What is the sum of the interior angles of a decagon?

(a) 1440° (b) 1620° (c) 1800° (d) 1260°

(5) What is the name of a polygon whose sum of interior angles is 540°?

(a) quadrilateral (b) hexagon

(c) pentagon (d) hyptagon

(6) An exterior angle of a regular polygon is 30°. How many sides the polygon have?

(a) 6 (b) 8 (c) 10 (d) 12

(7) What is an exterior angle of a regular octagon?

(a) 30° (b) 45° (c) 60° (d) 42°

(8) What is the sum of exteror angles of a regular polygon?

(a) 720° (b) 240° (c) 540° (d) 360°

(9) What is the sum of exterior angles of a regular hexagon?

(a) 240° (b) 360° (d) 720° (d) 900°

(10) What is the sum of interior angles of a pentagon?

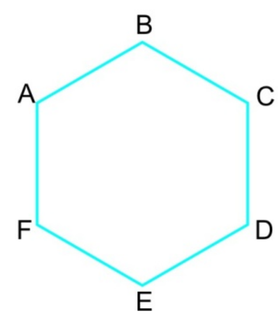
(a) 400° (b) 360° (d) 540° (d) 900°

(11) What is the sum of exterior angles of a triangle?

(a) 360° (b) 240° (c) 180° (d) 540°

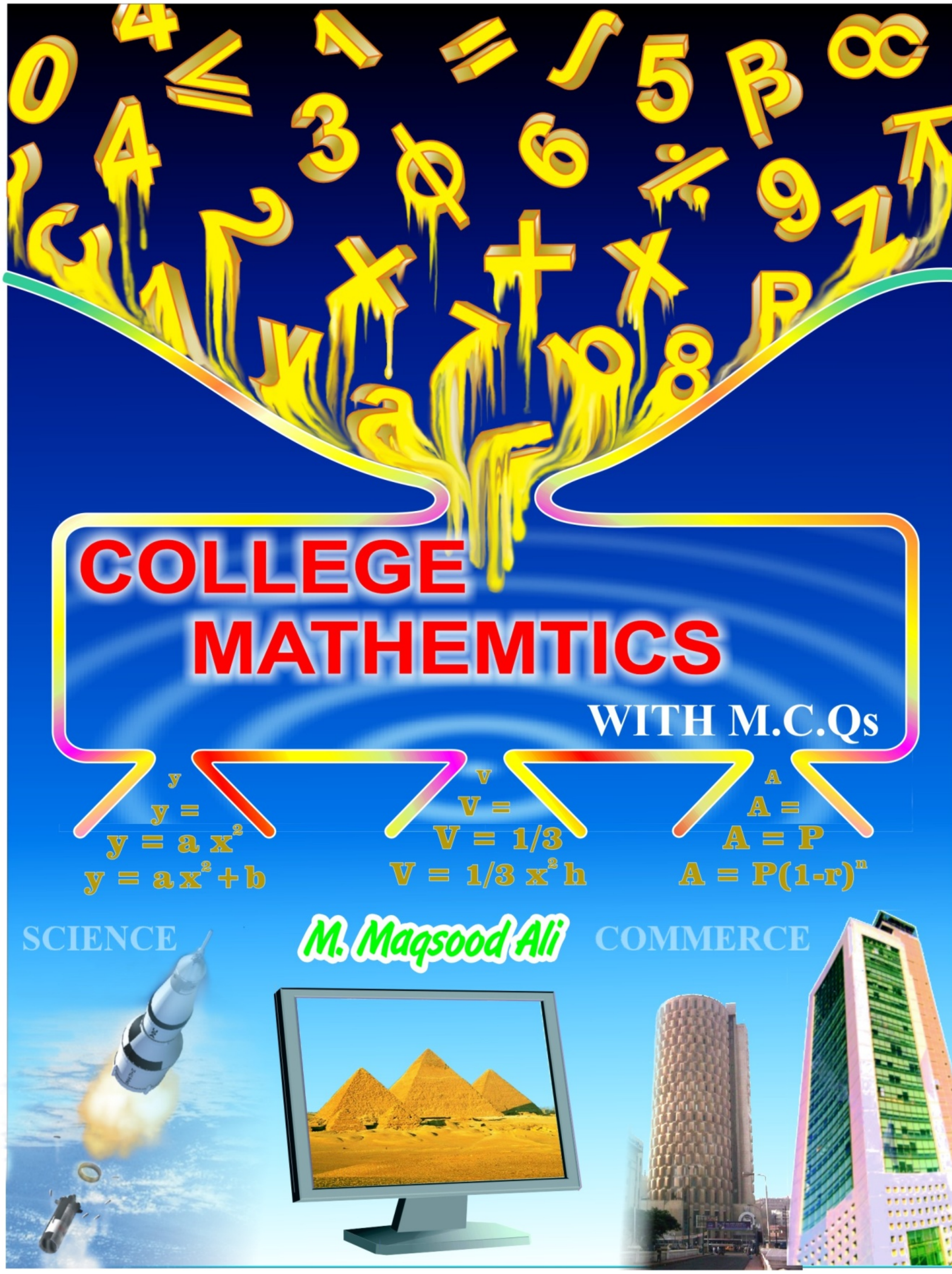
(12) ABCDEF is a regular hexagon.

$F\hat{A}B = ?$



(a) 100° (b) 150°

(c) 60° (d) 120°


COLLEGE
MATHEMTICS
WITH M.C.Qs
y
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$y = a x^2$
$y = ax^2 + b$
V
V =
V = 1/3
$V = 1/3\ x^2 h$
A
A =
A = P
$A = P(1-r)^n$
SCIENCE
M. Maqsood Ali
COMMERCE

Chapter 15

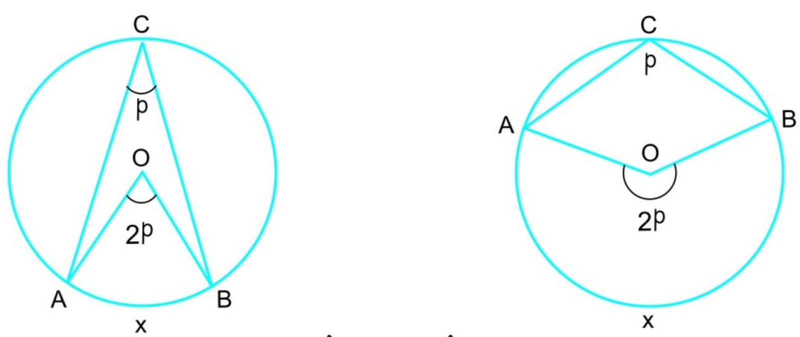
ANGLE PROPERTIES IN CIRCLE

Property: (1) (∠ at centre = 2 ∠ at circumference)

An angle at the centre of the circle is twice any angle at the circumference subtended by the same arc (or chord).

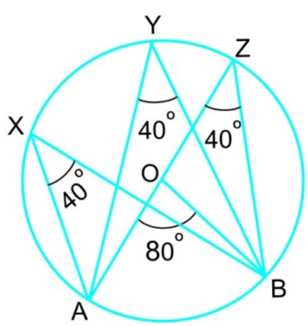
Explaination:-

Angles at the centre O of circle and at the circumference subtended by the arc AXB or chord $\overline{AB}$ are shown in the figure.



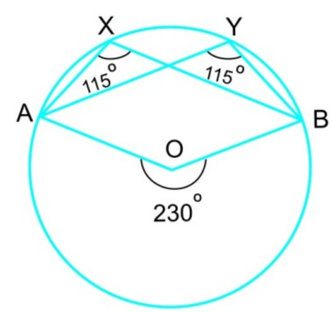
$$A\hat{O}B = 2A\hat{C}B$$

For example:



∵ $A\hat{O}B = 80°$

∴ $A\hat{X}B = A\hat{Y}B = A\hat{Z}B = 40°$



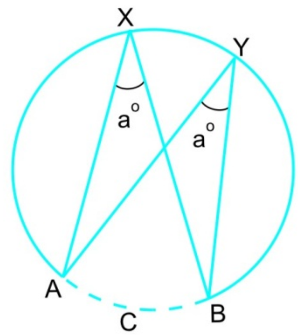
∵ Reflex $A\hat{O}B = 230°$

∴ $A\hat{X}B = A\hat{Y}B = 115°$

Property : (2) (∠ in the same seg.)

Angles in the same segment of a circle are equal.

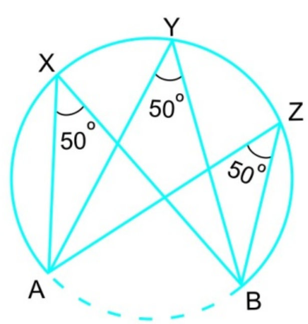
Explanation:-



The angles $A\hat{X}B$ and $A\hat{Y}B$ in the segment AXYB subtended at the circumference of the circle by the arc ACB (or by the chord $\overline{AB}$) are equal.

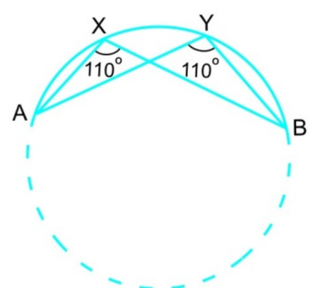
$$A\hat{X}B = A\hat{Y}B = a^\circ$$

For example:



Angles in major segment.

$$A\hat{X}B = A\hat{Y}B = A\hat{Z}B = 50^\circ$$

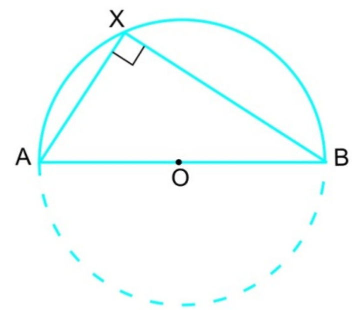


Angles in minor segment.

$$A\hat{X}B = A\hat{Y}B = 110^\circ$$

Property : (3) ($\angle$ in semicricle)

The angle in a semi-circle is a right angle.



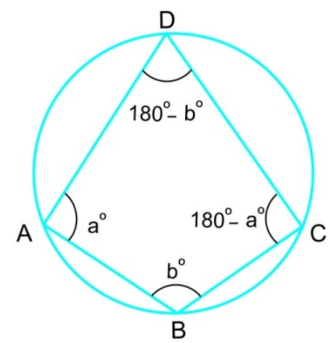
Explanation:-

$\overline{AB}$ is the diameter of the circle. So $A\hat{X}B = 90^\circ$.

Property : (4) (Opp. $\angle$s of cyclic quad.)

The sum of opposite angles of a cyclic quadrilateral is 180°.

Explanation:



ABCD is a cyclic quadrilateral.

$$D\hat{A}B = a^\circ \Rightarrow B\hat{C}D = 180^\circ - a^\circ$$

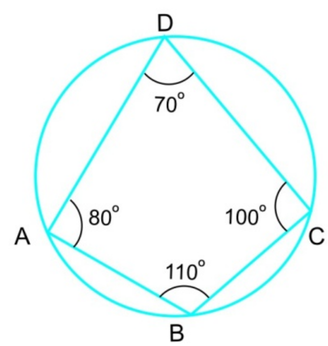
and $\quad A\hat{B}C = b^\circ \Rightarrow A\hat{D}C = 180^\circ - b^\circ$

Thus,

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

and $\quad A\hat{B}C + A\hat{D}C = 180^\circ$

For example:

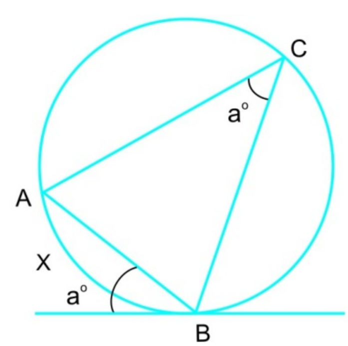


$$D\hat{A}B = 80^\circ \Rightarrow B\hat{C}D = 180^\circ - 80^\circ = 100^\circ$$

and $\quad A\hat{B}C = 110^\circ \Rightarrow A\hat{D}C = 180^\circ - 110^\circ = 70^\circ$

Property : (5) ($\angle$ in alternate seg.)

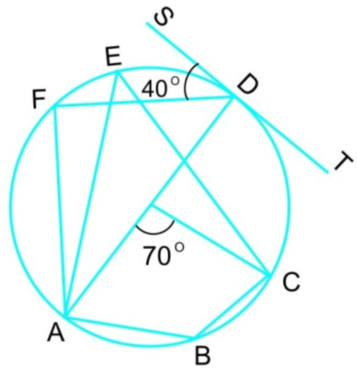
The angles between a tangent to a circle and a chord through the point of contact is equal to the angle in the alternate segment.



Explaination:-

The tangent to the circle at B makes angle a° with chord $\overline{AB}$, where AB

Example 1:



The points A, B, C, D, E and F lie on a circle centre O. A tangent $\overline{ST}$ is drawn at D, such that $S\hat{D}F = 40°$. If $A\hat{O}C = 70°$, calculate

(i) $A\hat{E}C$ (ii) $A\hat{B}C$ (iii) $F\hat{A}D$ (iv) $A\hat{D}F$

Solution:-

(i) $A\hat{E}C = \frac{1}{2}(A\hat{O}C) = 35°$ ($\angle$ at O = 2 $\angle$ at circumference)

(ii) $A\hat{B}C = 180° - A\hat{E}C = 145°$ (Opp. $\angle$s of cyclic quad.)

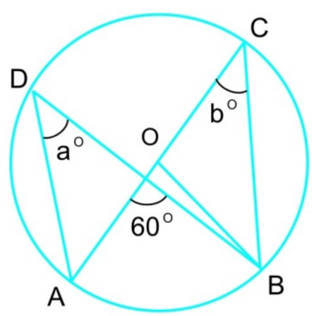
(iii) $F\hat{A}D = S\hat{D}F = 40°$ ($\angle$s in alternate seg.)

(iv) $A\hat{D}F = 90° - F\hat{A}D = 50°$ ($\angle$ in semi circle)

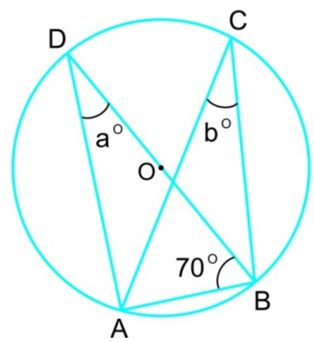
EXERCISE D-3

The points A, B, C and D lie on the circles centre O. Calculate a°, b° and c° in the following.

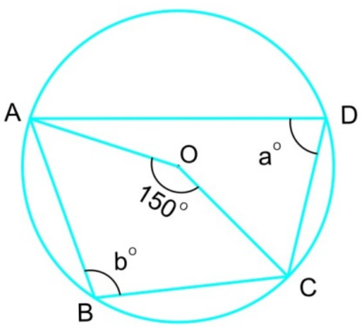
(1)



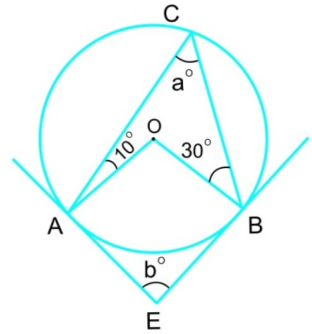
(2)



(3)

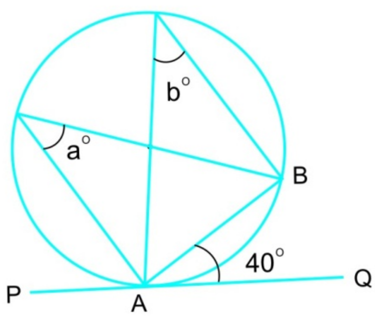


(7)



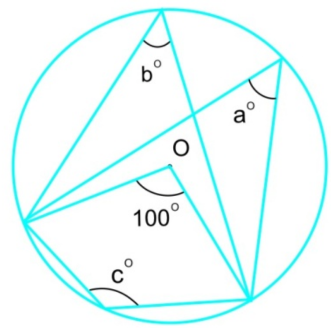
$\overline{AE}$ and $\overline{BE}$ are tangents

(4)

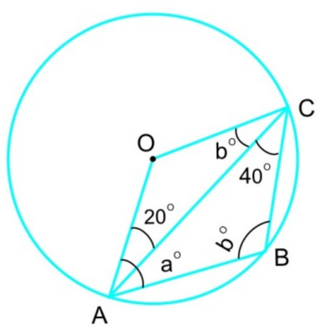


($\overline{PQ}$ is a tangent at A)

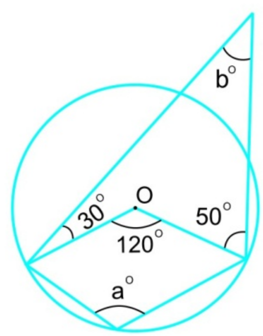
(8)



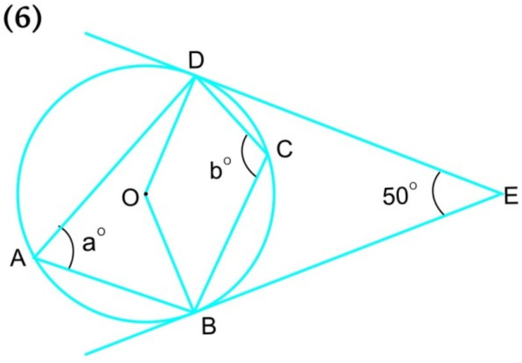
(5)



(9)

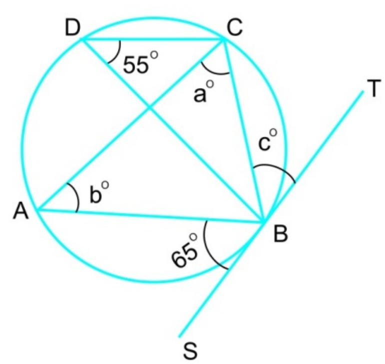


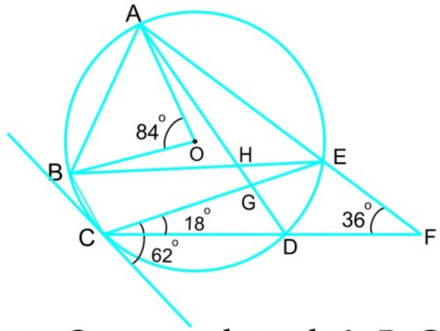
(6)



$\overline{BE}$ and $\overline{DE}$ are tangents

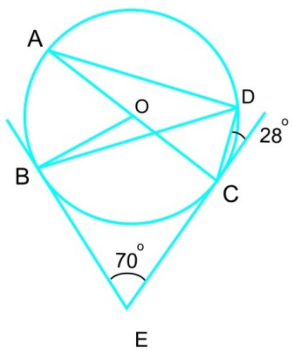
(10)





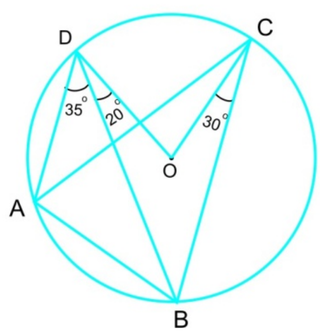
(17) The circle, centre O, passes through A, B, C and D. Two tangents drawn at B and C meet at E. The diameter of the circle is $\overline{AC}$. Given $B\hat{E}C = 70^\circ$ and tangent at C makes an angle 28° with $\overline{CD}$. Calculate

(i) $B\hat{D}C$ (ii) $D\hat{A}C$ (iii) $O\hat{B}D$



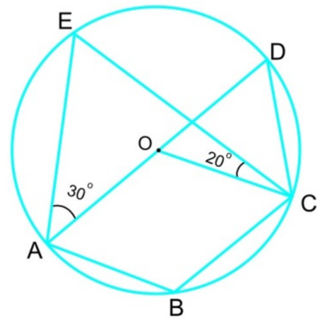
(18) The circle, centre O, passes through A, B, C and D. Given $O\hat{D}B = 20^\circ$ $O\hat{C}B = 30^\circ$ and $A\hat{D}B = 35^\circ$. Calculate

(i) $C\hat{B}D$ (ii) $C\hat{A}D$ (iii) $A\hat{B}D$



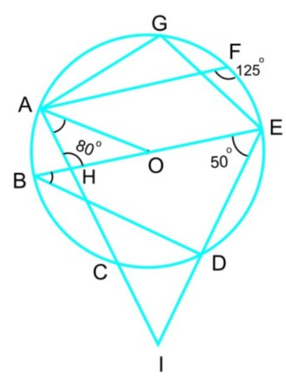
(19) The circle, centre O, passes through the points A, B, C, D and E . Given $E\hat{C}O = 20^\circ$, $E\hat{A}O = 30^\circ$ and $\overline{AD}$ is the diameter of the circle. Calculate

(i) $A\hat{E}C$ (ii) $A\hat{B}C$ (iii) $E\hat{C}D$



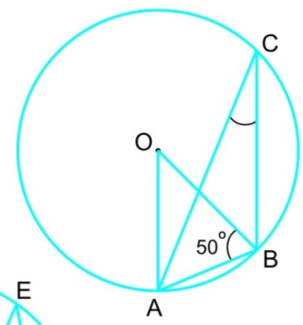
(20) The circle, centre O, passes through A, B, C, D, E, F and G. The diameter of the circle is $\overline{BE}$. AC produced meets ED produced at I and $\overline{AC}$ intersects $\overline{BE}$ at H. Given $B\hat{E}D = 50^\circ$, $A\hat{H}O = 80^\circ$, and $E\hat{F}A = 125^\circ$. Calculate

(i) $A\hat{G}E$ (ii) $O\hat{A}H$ (iii) $E\hat{B}D$ (iv) $C\hat{I}D$



(6) $A\hat{B}O = 50^{o}$

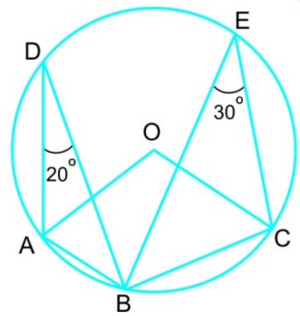
$A\hat{C}B = ?$



(a) 30° (b) 50°
(c) 40° (d) 80°

(7) $A\hat{D}B = 20^{o}$ and $C\hat{E}B = 30^{o}$

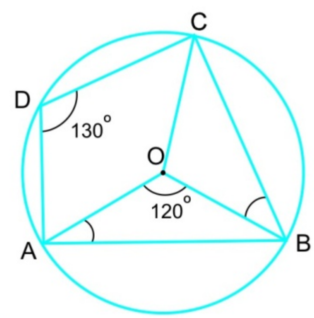
$A\hat{B}C = ?$



(a) 40° (b) 130°
(c) 120° (d) 140°

(8) $A\hat{D}C = 130^{o}$ and $A\hat{O}B = 120^{o}$

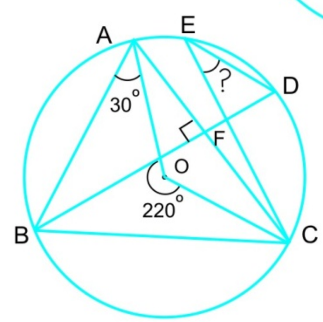
$O\hat{B}C = ?$



(a) 20° (b) 30°
(c) 40° (d) 50°

(9) $A\hat{F}B = 90^{o}$ and $B\hat{A}O = 30^{o}$

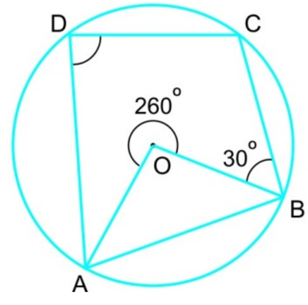
$C\hat{E}D = ?$



(a) 60° (b) 50°
(c) 40° (d) 30°

(10) $O\hat{B}C = 30^{o}$

$A\hat{D}C = ?$

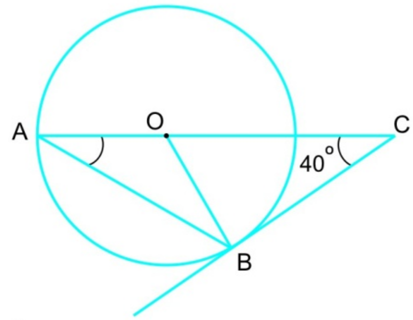


(a) 120° (b) 110°
(c) 150° (d) 130°

(11) $\overline{BC}$ touches the circle at B.

$B\hat{C}O = 40^{o}$

$O\hat{A}B = ?$

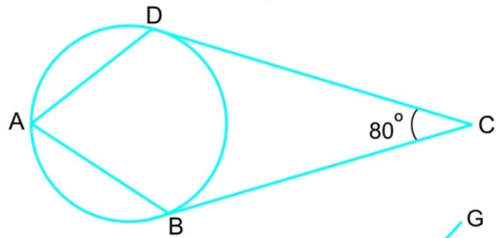


(a)	50°	(b)	45°
(c)	25°	(d)	30°

(12) $\overline{BC}$ and $\overline{CD}$ are two tangnets.

$B\hat{C}D = 40^{o}$

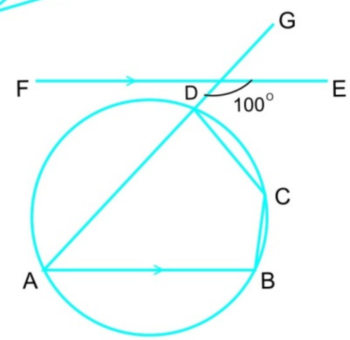
$D\hat{A}B = ?$



((a)	50°	(b)	100°
(c)	40°	(d)	60°

(13) $E\hat{D}A = 100^{o}$

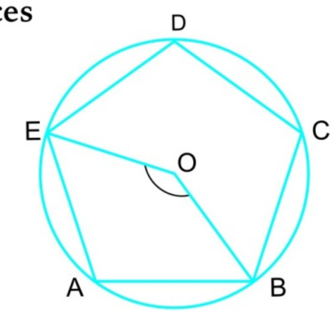
$B\hat{C}D = ?$



(a)	120°	(b)	100°
(c)	80°	(d)	160°

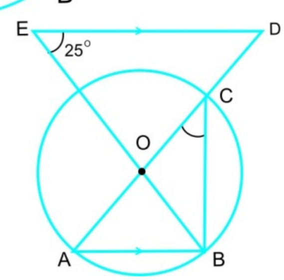
(14) The circle passes through the vertices of a regular pentagon ABCDE.

$B\hat{O}E = ?$



(a)	216°	(b)	108°
(c)	144°	(d)	120°

(15) $A\hat{C}B = ?$



(a)	20°	(b)	50°
(c)	25°	(d)	65°