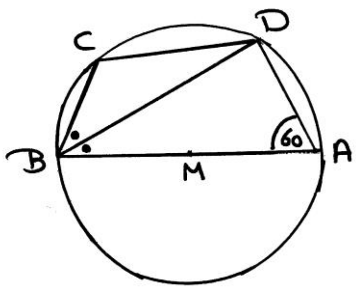
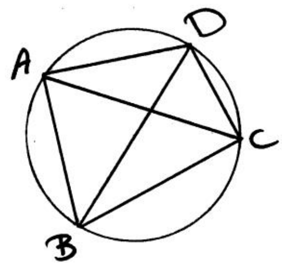
Final revision

[1] **In the opposite figure**



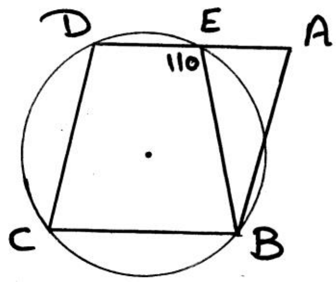
ABCD is a cyclic quadrilateral in which :
$\overline{AB}$ is a diameter and $\overrightarrow{BD}$ bisects ∠ABC
If m(∠A) = 60°
Find with proof : m(∠CDB)

[2] **In the opposite figure**



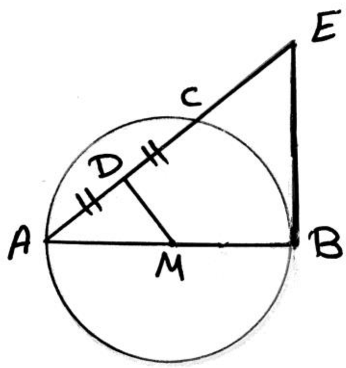
ABCD is a cyclic quadrilateral such that :
AC = BD
Proof that : AB = CD

[3] **In the opposite figure**



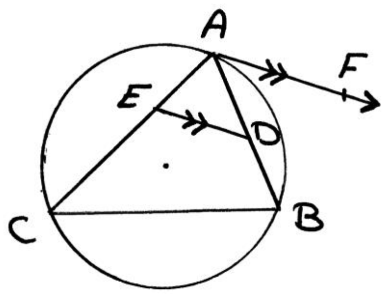
ABCD is a parallelogram
$E \in \overline{AD}$, m(∠BED) = 110°
(**i**) **Proof that :** AB = EB
(**ii**)**Find :** m(∠ABE) , $m(\overset{\frown}{EBC})$

[4] **In the opposite figure**



$\overline{AB}$ is a diameter in the circle M.
$\overrightarrow{BE}$ is a tangent to the circle at B
D is the midpoint of $\overline{AC}$
Proof that : (i) MBED is a cyclic quad.
(ii) $\overline{MD} \parallel \overline{BC}$

[5] **In the opposite figure**



$\overleftrightarrow{FA}$ is a tangent to the circle at A
, $\overline{DE} \parallel \overline{FA}$
Proof that : DBCE is a cyclic quad.

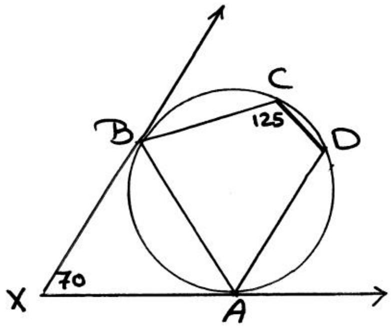
[6] **In the opposite figure**

$\overrightarrow{XA}$ and $\overrightarrow{XB}$ are two tangents to the circle at A and B

$m(\angle AXB) = 70°, m(\angle DCB) = 125°$

Proof that : (i) $\overrightarrow{AB}$ bisects $\angle DAX$

(ii) $\overrightarrow{AD} // \overleftrightarrow{XB}$

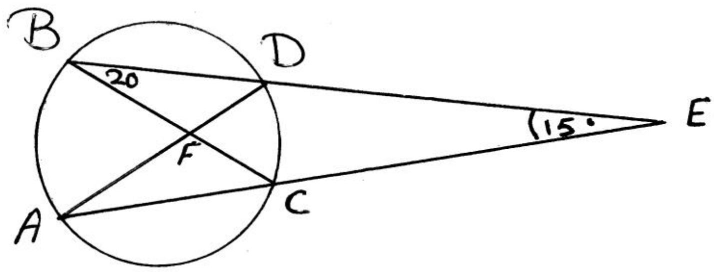


[7] **In the opposite figure**

$m(\angle DBC) = 20°$

$, m(\angle E) = 15°$

Find : $m(\angle AFB)$

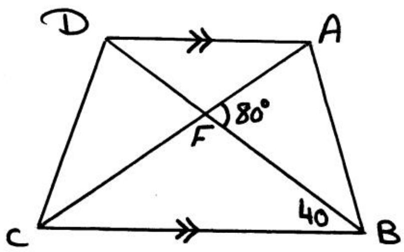


[8] **In the opposite figure**

$m(\angle AFB) = 80°, m(\angle DBC) = 40°$

$, \overline{AD} // \overline{BC}$

Proof that : ABCD is a cyclic quad.



[9] **In the opposite figure**

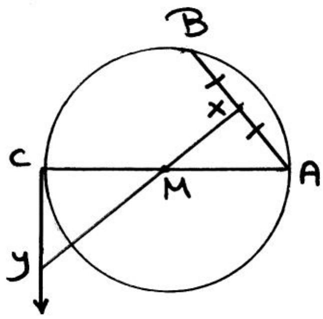
$\overline{AC}$ is a diameter in the circle M.

X is the midpoint of $\overline{AB}$

$\overrightarrow{CY}$ is a tangent to the circle at C and cuts $\overrightarrow{XM}$ at Y

Proof that : (i) AXCY is a cyclic quad.

(ii) $m(\angle BMC) = 2m(\angle MYC)$



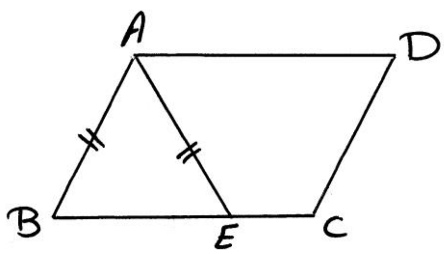
[10] **In the opposite figure**

ABCD is a parallelogram

$E \in \overline{BC}$ such that : $AB = AE$

Proof that : (i) AECD is a cyclic quad.

(ii) $\overrightarrow{AD}$ is a tangent to the circumcircle of Δ ABE



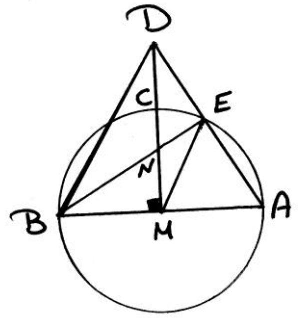
[11] **In the opposite figure**

$\overline{AB}$ is a diameter in the circle M.

$\overline{MX} \perp \overline{AB}$, $\overline{BE} \cap \overrightarrow{MC} = \{N\}$

Proof that : (i) DEMB is a cyclic quad.

(ii) $\overleftrightarrow{EM}$ is a tangent to the circumcircle of Δ NDE

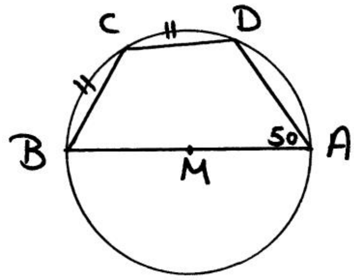


[12] **In the opposite figure**

$\overline{AB}$ is a diameter in the circle M.

m(∠A) = 50° , m(BC) = $m(CD)$

Find : m(∠CDA)



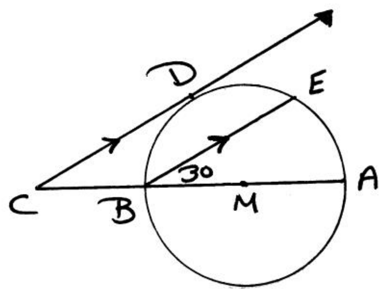
[13] **In the opposite figure**

$\overrightarrow{CD}$ is a tangent to the circle M

, $\overrightarrow{CD}$ // $\overline{BE}$

If m(∠ABE) = 30°

Find : m(∠AME) , $m(BD)$



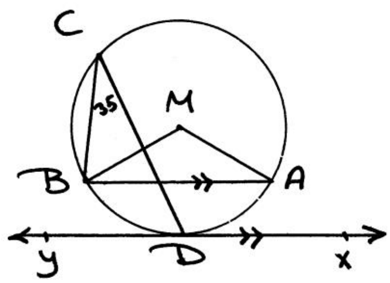
[14] **In the opposite figure**

$\overleftrightarrow{XY}$ touches the circle M at D

, $\overleftrightarrow{XY}$ // $\overline{AB}$

If m(∠BCD) = 35°

Find : m(∠ABM)



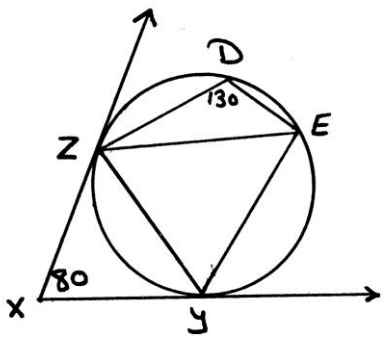
[15] **In the opposite figure**

$\overleftrightarrow{XY}$ and $\overleftrightarrow{XZ}$ are two tangents to the circle at Y and Z

If m(∠YXZ) = 80° , m(∠EDZ) = 130°

Proof that : (i) ZE = ZY

(ii) $\overline{XZ}$ // $\overline{YE}$



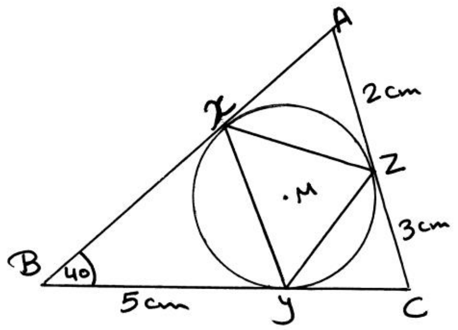
[16] In the opposite figure

M is a circle touching the sides of the triangle ABC at X, Y and Z

If AX = 2cm., YB = 5cm., CZ = 3 cm. m(∠B) = 40°

Find : (i) the perimeter of ΔABC

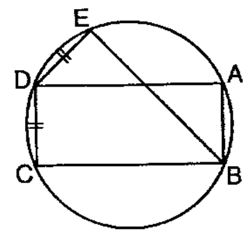
(ii) m(∠XZY)



[17] In the opposite figure

ABCD is a rectangle inscribed in a circle and DE = DC

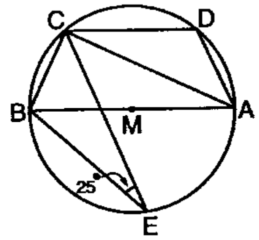
Prove that : AD = BE



[18] In the opposite figure

$\overline{AB}$ is a diameter and m(∠BEC) = 25°

Find : m(∠BAC) , *m*(∠ABC) *and m*(∠ADC)

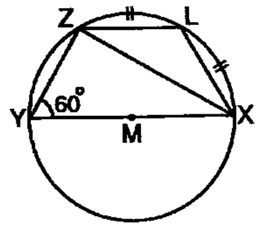


[19] In the opposite figure

$\overline{XY}$ is a diameter in circle M ,

m(*XL*) = m(*LZ*) and m(∠Y) = 60°

Find : m(∠L) , *m*(∠XZY) *and m*(∠LXZ)



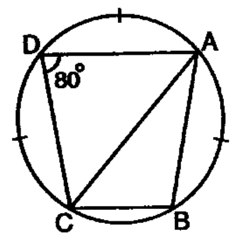
[20] In the opposite figure

The length of *AB* = the length of *AD*

= the length of *DC*

and m(∠ADC) = 80°

Find : m(∠ACB) *and m*(*BC*)

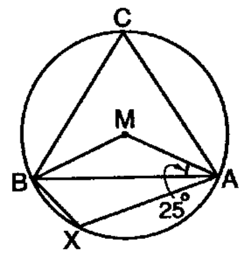


[21] In the opposite figure

ABC is a triangle inscribed in a circle M and m(∠MAB) = 25°

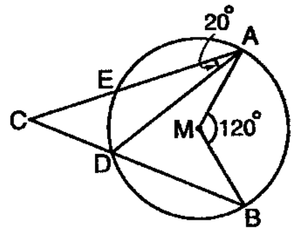
Find : (1) m(∠AMB) (2) m(∠ACB)

(3) m(∠AXB) (4) *m*(*AB*)



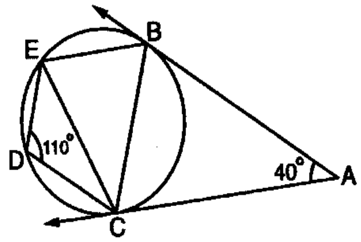
[22] **In the opposite figure**

$\overrightarrow{BD} \cap \overrightarrow{AE} = \{C\}$, m(∠AMB) = 120°
and m(∠DAC) = 20°
Find : m(∠C)



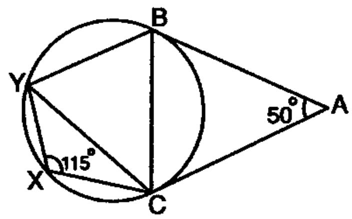
[23] **In the opposite figure**

$\overrightarrow{AB}$ and $\overrightarrow{AC}$ are two tangents to a circle
at B and C , m(∠BAC) = 40°
and m(∠CDE) = 110°
Prove that : (i) CB = CE
(ii) $\overline{BE} \,//\, \overline{AC}$



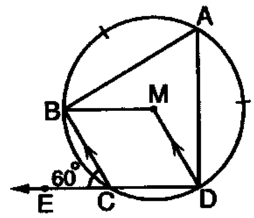
[24] **In the opposite figure**

$\overline{AB}$ and $\overline{AC}$ are two tangents to a circle
at B and C , m(∠A) = 50° and m(∠CXY) = 115°
Prove that : (i) $\overrightarrow{BC}$ bisects ∠ABY
(ii) CB = CY



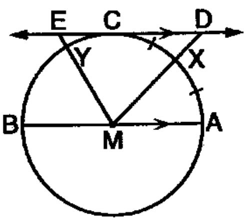
[25] **In the opposite figure**

m(∠BCE) = 60° , $\overline{BC} \,//\, \overline{MD}$
and A is the midpoint of $\overset{\frown}{BD}$ the major
Prove that : (i) BMDC is a rhombus.
(ii) $\overline{AC}$ is a diameter of the circle.



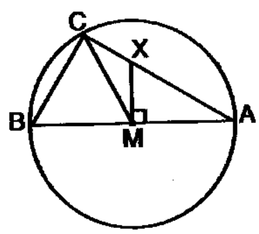
[26] **In the opposite figure**

$\overline{AB}$ is a diameter in the circle M.
$\overleftrightarrow{DE}$ is a tangent to it at C , $\overline{AB} \,//\, \overleftrightarrow{DE}$
, X is the midpoint of $\overset{\frown}{AC}$ and
m($\overset{\frown}{BY}$) = 2m($\overset{\frown}{CY}$)
Find : The measures of the angles of the triangle MDE



[27] **In the opposite figure**

$\overline{AB}$ is a diameter in the circle M.
$\overline{MX} \perp \overline{AB}$
Prove that : m(∠AXM) = $\frac{1}{2}$m(∠AMC)

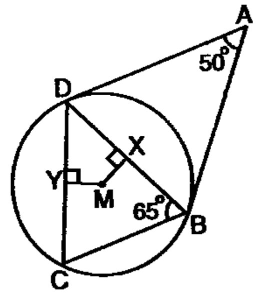


[28] **In the opposite figure**

$\overline{AB}$ and $\overline{AC}$ are two tangents to a circle M at B and D , $\overline{MX} \perp \overline{BD}$, $\overline{MY} \perp \overline{CD}$

$m(\angle A) = 50°$, $m(\angle DBC) = 65°$

Prove that : $MX = MY$



[29] **In the opposite figure**

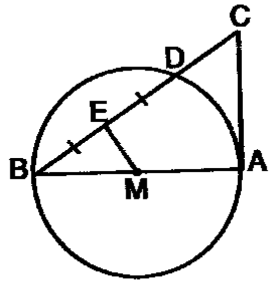
$\overline{AB}$ is a diameter of the circle M

$\overrightarrow{AC}$ is a tangent to it at A

and E is the midpoint of $\overline{BD}$

Prove that : (i) ACEM is a cyclic quad.

(ii) $\overline{ME} // \overline{AD}$

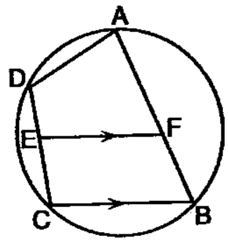


[30] **In the opposite figure**

ABCD is a cyclic quad.

and $\overrightarrow{FE} // \overline{BC}$

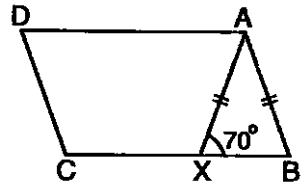
Prove that : AFED is a cyclic quad.



[31] **In the opposite figure**

ABCD is a parallelogram , $AB = AX$ and $m(\angle AXB) = 70°$

Prove that : AXCD is a cyclic quad.

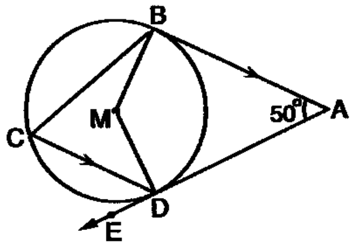


[32] **In the opposite figure**

$\overline{AB}$ and $\overline{AC}$ are two tangents to a circle M at B and D , $m(\angle A) = 50°$ and $\overline{AB} // \overline{DC}$

(i) **Prove that :** ABMD is a cyclic quad.

(ii) **Find :** $m(\angle ABC)$

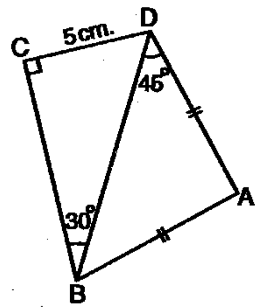


[33] **In the opposite figure**

$AB = AD$, $m(\angle ADB) = 45°$, $m(\angle C) = 90°$, $m(\angle CBD) = 30°$ and $DC = 5$ cm.

(i) **Prove that :** ABCD is a cyclic quad.

(ii) **Clculate** the radius length of the circle passing through the vertices of the figure ABCD



[34] **In the opposite figure**

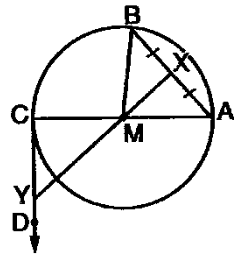
$\overline{AB}$ is a diameter of the circle M

, $\overleftrightarrow{CD}$ is a tangent to it

and X is the midpoint of $\overline{AB}$

Prove that : (i) AXCY is a cyclic quad.

(ii) m(∠BMC) = 2 m(∠MYC)



[35] **In the opposite figure**

$\overline{AB}$ is a diameter of the circle M

, $\overleftrightarrow{BD}$ is a tangent to it at B

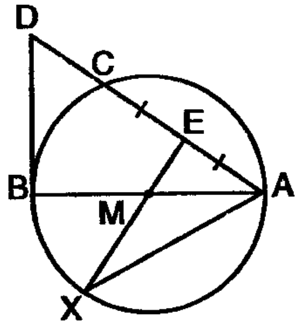
and E is the midpoint of $\overline{AC}$

Prove that :

(i) MEDB is a cyclic quad.

(ii) $m(\angle BAX) = \frac{1}{2} m(\angle D)$

(iii) $\overleftrightarrow{AB}$ is a tangent to the circle passing through the points B, C and D



[36] **In the opposite figure**

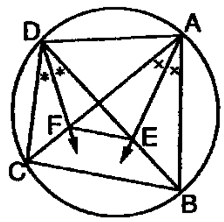
ABCD is a cyclic quad.

, $\overrightarrow{AE}$ bisects ∠BAC

and $\overrightarrow{DF}$ bisects ∠BDC

Prove that : (i) AEFD is a cyclic quad.

(ii) $\overline{EF}$ // $\overline{BC}$

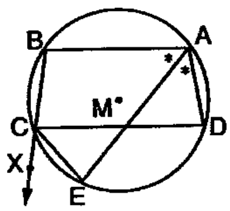


[37] **In the opposite figure**

ABCD is a cyclic quad.

and $\overrightarrow{AE}$ bisects ∠A

Prove that : $\overrightarrow{CE}$ bisects ∠XCD

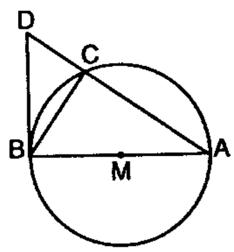


[38] **In the opposite figure**

$\overline{AB}$ is a diameter of the circle M

, $\overleftrightarrow{BD}$ is a tangent to it at B

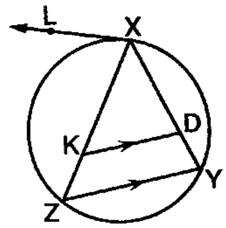
Prove that : $\overleftrightarrow{AB}$ is a tangent to the circle passing through the vertices of ΔBCD



[39] **In the opposite figure**

$\overleftrightarrow{XY}$ is a tangent to the circle at X $\overline{DK}$ // $\overline{YZ}$

Prove that : $\overleftrightarrow{XL}$ is a tangent to the circle passing through the vertices of ΔXDK

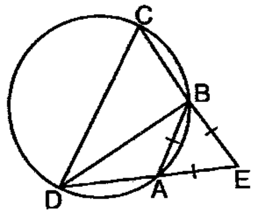


[40] **In the opposite figure**

ABCD is a cyclic quad.

, BE = EA = AB and $\left(\overset{\frown}{BC}\right) = 60°$

Prove that : $\overline{CD}$ is a diameter of the circle

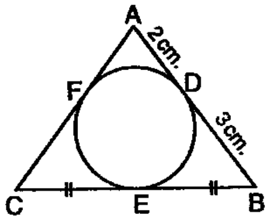


[41] **In the opposite figure**

AD = 2cm. , DB = 3 cm.

and E is the mid point of $\overline{BC}$

Calculate : The perimeter of Δ ABC

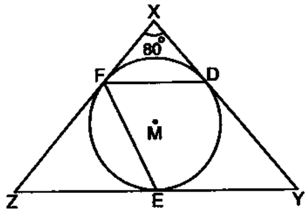


[42] **In the opposite figure**

XYZ is a triangle in which : m(∠YXZ) = 80°

, The circle M touches its sides $\overline{XY}$, $\overline{YZ}$ and $\overline{ZX}$ at the points D , E and F respectivelyIf XY = XZ

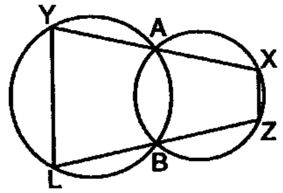
Find : m(∠DFE)



[43] **In the opposite figure**

Two circles intersect at A and B

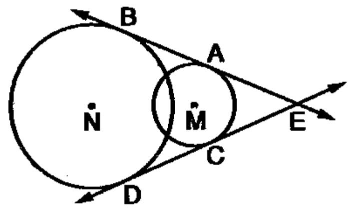
Prove that : $\overline{XZ}$ // $\overline{YL}$



[44] **In the opposite figure**

$\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ are two tangents to the two circles M and N , $\overleftrightarrow{AB} \cap \overleftrightarrow{CD} = \{E\}$

Prove that : AB = CD

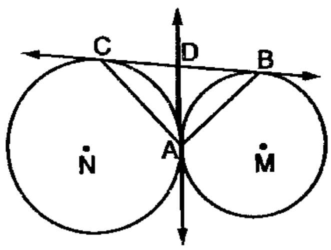


[45] **In the opposite figure**

M and N are two touching externally circles at A , $\overleftrightarrow{BC}$ is a common tangent to the two circles at B and C

and $\overleftrightarrow{AD}$ is a common tangent to them at A

Prove that : m(∠BAC) = 90°



Model answer

[1] $\because \overline{AB}$ *is a diameter*

$\therefore m(\angle ADB) = 90°$ [*inscribed angle drawn in a semi circle*]

In ΔABD

$m\,(\angle ABD) = 180° - (90° + 60°) = 30°$

$\because \overrightarrow{BD}$ *bisects* $\angle ABC$

$\therefore m\,(\angle CBD) = m\,(\angle DBA) = 30°$

$\because ABCD$ *is a cyclic quad.*

$\therefore m\,(\angle A) + m\,(\angle C) = 180°$ [*two opposite angles*]

$\therefore m\,(\angle C) = 180° - 60° = 120°$

In ΔBCD

$m\,(\angle CDB) = 180° - (30° + 120°) = 30°$

[2]

$\because AC = BD$

$\therefore AC = BD$

by subtracting $m\left(BC\right)$ *from both terms*

$\therefore m\left(AB\right) = m\left(CD\right)$

$\therefore AB = CD$

[3]

$\because BCDE$ *is a cyclic quad.*

$\therefore m\,(\angle C) + m\,(\angle BED) = 180°$ [*two opposite angles*]

$\therefore m\,(\angle C) = 180° - 110° = 70°$

$\because ABCD$ *is a parallelogram*

$\therefore m\,(\angle A) = m\,(\angle C) = 70°$ [*two opposite angles*]

$\because m\,(\angle AED) = 180°$ (*st. angle*)

$\therefore m\,(\angle AEB) = 180° - 110° = 70°$

In ΔABE

$\because m\,(\angle BAE) = m\,(\angle BEA) = 70°$

$\therefore \Delta ABE$ *is an isos. triangle*

$\therefore m\,(\angle ABE) = 180° - (70° + 70°) = 40°$

$\because ABCD$ *is a parallelogram*

$\therefore m\,(\angle A) + m\,(\angle D) = 180°$ [*two consecutive angles*]

$\therefore m\,(\angle D) = 180° - 70° = 110°$

$\therefore m\left(EBC\right) = 2m\,(\angle D) = 2 \times 110° = 220°$ [*inscribed angle and opposite arc*]

[4]

Const.: *Draw* $\overline{BC}$

$\because \overrightarrow{BE}$ *is a tangent to the circle at B*

$\therefore \overline{EB} \perp \overline{AB}$

$\therefore m\,(\angle EBA) = 90°$

$\because D$ *is a midpoint of* $\overline{AC}$

$\therefore \overline{MD} \perp \overline{AC}$

$\therefore m\,(\angle MDE) = 90°$

$\because m(\angle EBA) + m(\angle MDE) = 90° + 90° = 180°$
$\therefore$ *MBED is a cyclic quad.*
$\because m(\angle ACB) = 90°$ [inscribed angle drawn in a semi circle]
$\because m(\angle ACB) = m(\angle ADM) = 90°$ [and they are in position of corresponding angles]
$\therefore \overline{MD} \,//\, \overline{BC}$

[5]

$\because \overleftrightarrow{FA}$ *is a tangent to the circle*
$\therefore m(\angle FAB) = m(\angle ACB) \rightarrow (1)$ [angle of tangecy and inscribed angle subtended by AB]
$\because \overline{DE} \,//\, \overline{FA}$
$\therefore m(\angle FAB) = m(\angle ADE) \rightarrow (2)$ [alt. angles]
From (1) and (2)
$\therefore m(\angle ACB) = m(\angle ADE)$ [Exterior angle and interior angle at opposite vertex]
$\therefore$ *DBCE is a cyclic quad.*

[6]

$\because \overrightarrow{XA}$ and $\overrightarrow{XB}$ *iare two tangents drawn from X*
$\therefore XA = XB$
In ΔXAB
$\because XA = XB$ (proved)
$\therefore m(\angle XAB) = m(\angle XBA) = \frac{180° - 70°}{2} = 55° \rightarrow (1)$
$\because$ *ABCD is a cyclic quad.*
$\therefore m(\angle A) + m(\angle C) = 180°$ [two opposite angles]
$\therefore m(\angle BAD) = 180° - 125° = 55° \rightarrow (2)$
From (1) and (2)
$\therefore m(\angle XAB) = m(\angle BAD) = 55°$
$\therefore \overrightarrow{AB}$ *bisects* $\angle DAX$
$\because m(\angle DAX) + m(\angle X) = 110° + 70° = 180°$ [and they are in position of interior supp. angles]
$\therefore \overline{AD} \,//\, \overrightarrow{XB}$

[7]

$\because m(\angle CBD) + m(\angle CAD) = 20°$ [two inscribed angles subtended by the same arc CD]
$\therefore$ In ΔADE
$m(\angle ADE) = 180° - [15° + 20°] = 145°$
$\because m(\angle BDE) = 180°$ (st. angle)
$\therefore m(\angle ADB) = 180° - 145° = 35°$
$\because \angle AFB$ *is an exterior angle to* ΔBDF
$\therefore m(\angle AFB) = m(\angle FDB) + m(\angle FBD) = 35° + 20° = 55°$

[8]

$\because \overline{AD} \,//\, \overline{BC}$
$\therefore m(\angle ADB) = m(\angle DBC) = 40°$ [alt. angles]
$\because \angle AFB$ *is an exterior angle to* ΔAFD
$\therefore m(\angle DAC) = 80° + 40° = 40°$
$\because m(\angle DAC) + m(\angle DBC) = 40°$ [and they drawn on the same base $\overline{CD}$ and in the same side of it]
$\therefore$ *ABCD is a cyclic quad.*

[9]

$\because \overline{AC}$ *is a diameter and* $\overrightarrow{CY}$ *is a tangent to the circle*
$\therefore \overrightarrow{CY} \perp \overline{AC}$

$\therefore m(\angle ACY) = 90°$
$\because X$ *is a midpoint of* $\overline{AB}$
$\therefore \overline{MX} \perp \overline{AB}$
$\therefore m(\angle AXY) = 90°$
$\because m(\angle ACY) = m(\angle AXY) = 90°$ [*and they drawn on the same base* $\overline{AY}$ *and in the same side of it*]
$\therefore AXCY$ *is a cyclic quad.*
$\therefore m(\angle MYC) = m(\angle BAC) \rightarrow (1)$ [*drawn on the same base* $\overline{XC}$ *and in the same side of it*]
$\therefore m(\angle BMC) = 2m(\angle BAC) \rightarrow (2)$ [*Central and inscribed angles sub. by* $\widehat{BC}$]
From (1) *and* (2)
$\therefore m(\angle BMC) = 2m(\angle MYC)$
[10]
$\because ABCD$ *is a parallelogram*
$\therefore m(\angle B) = m(\angle D) \rightarrow (1)$
In ΔABE
$\because AB = AE$
$\therefore m(\angle B) = m(\angle AEB) \rightarrow (2)$
From (1) *and* (2)
$\therefore m(\angle AEB) = m(\angle D)$ [*Exterior angle and interior angle at opposite vertex*]
$\therefore AECD$ *is a cyclic quad.*
$\because ABCD$ *is a parallelogram*
$\therefore \overline{AD} // \overline{BC}$
$\therefore m(\angle DAE) = m(\angle AEB) \rightarrow (3)$ [*alt. angles*]
From (2) *and* (3)
$\therefore m(\angle DAE) = m(\angle B)$
$\therefore \overline{AD}$ *is a tangent to the circumcircle of* ΔABE
[11]
$\because \overline{MC} \perp \overline{AB}$
$\therefore m(\angle DMB) = 90° \rightarrow (1)$
$\because \overline{AB}$ *is a diameter*
$\therefore m(\angle AEB) = 90°$ [*inscribed angle drawn in a semi circle*]
$\therefore m(\angle DEB) = 180° - 90° = 90° \rightarrow (2)$ [*st. angle*]
From (1) *and* (2)
$\therefore m(\angle DMB) = m(\angle AEB) = 90°$ [*and they drawn on the same base* $\overline{BD}$ *and in the same side of it*]
$\therefore DEMB$ *is a cyclic quad.*
$\therefore m(\angle EBM) = m(\angle EDM) \rightarrow (3)$ [*drawn on the same base* $\overline{ME}$ *and in the same side of it*]
In ΔMEB
$\because MB = ME$ (2 *radii*)
$\therefore m(\angle EBM) = m(\angle MEB) \rightarrow (4)$
From (3) *and* (4)
$\therefore m(\angle MEB) = m(\angle EDM)$
$\therefore \overline{EM}$ *is a tangent to the circumcircle of* ΔNDE
[12]
Const.: Draw $\overline{BD}$
$\because \overline{BD}$ *is a diameter*
$\therefore m(\angle ADB) = 90°$
$\because ABCD$ *is a cyclic quad.*
$\therefore m(\angle BCD) + m(\angle A) = 180°$ [*two opposite angles*]

$\therefore m(\angle BCD) = 180° - 50° = 130°$

$\because m(\overset{\frown}{BC}) = m(\overset{\frown}{CD})$

$\therefore BC = CD$

In ΔBCD

$\because BC = CD$ (proved)

$\therefore m(\angle CDB) = m(\angle CBD) = \frac{180° - 130°}{2} = 25° \quad \rightarrow (2)$

From (1) and (2)

$\therefore m(\angle CDA) = 90° + 25° = 115°$

[13]

$\because m(\angle ABE) = 30°$

$\because m(\overset{\frown}{AE}) = 2 \times 30° = 60°$ [opposite arc]

$\because \overline{BD}$ is a diameter

$\therefore m(\overset{\frown}{AEB}) = 180°$ [semi circle]

$\therefore m(\overset{\frown}{EDB}) = 180° - 60° = 120°$

$\because \overline{CD}$ is a tangent and $\overrightarrow{CD} // \overline{BE}$

$\therefore m(\overset{\frown}{BD}) = m(\overset{\frown}{DE}) = \frac{1}{2} m(\overset{\frown}{BE}) = 120° \div 2 = 60°$

[14]

$\because m(\angle BCD) = 35°$

$\because m(\overset{\frown}{BD}) = 2 \times 35° = 70°$ [opposite arc]

$\because \overline{XY}$ is a tangent and $\overrightarrow{AB} // \overline{XY}$

$\therefore m(\overset{\frown}{AD}) = m(\overset{\frown}{BD}) = 70°$

$\therefore m(\overset{\frown}{ADB}) = 2 \times 70° = 140°$

$\because \angle AMB$ is a central angle subtended by $\overset{\frown}{ADB}$

$\therefore m(\angle AMB) = 140°$

In ΔAMB

$\because AM = BM$ (2 radii)

$\therefore m(\angle ABM) = m(\angle BAM) = \frac{180° - 140°}{2} = 20°$

[15]

$\because \overrightarrow{XZ}$ and $\overrightarrow{XY}$ are two tangents drawn from X

$\therefore XZ = XY$

In ΔXYZ

$\because XY = XZ$ (proved)

$\therefore m(\angle XZY) = m(\angle XYZ) = \frac{180° - 80°}{2} = 50°$

$\because m(\angle ZEY) = m(\angle XYZ) = 50° \rightarrow (1)$ [angle of tangecy and inscribed angle subtended by $\overset{\frown}{ZY}$]

$\because EDZY$ is a cyclic quad.

$\therefore m(\angle Y) + m(\angle D) = 180°$ [two opposite angles]

$\therefore m(\angle EYZ) = 180° - 130° = 50° \quad \rightarrow (2)$

From (1) and (2)

[16]

$\because \overline{AZ}, \overline{AX}$ are two tangent – segment to the circle

$\therefore AZ = AX = 2$ cm.

$\because \overline{BY}, \overline{BX}$ are two tangent – segment to the circle

$\therefore BY = BX = 5$ cm.

$\because \overline{CY}, \overline{CZ}$ are two tangent – segment to the circle

$\therefore CY = CZ = 3$ cm.

$\therefore$ The per. of $\Delta ABC = 2 + 3 + 3 + 5 + 5 + 2$
$= 20$ cm.

Const : Draw $\overline{MX}$ and $\overline{MY}$

$\because \overline{MX}$ is a radius, $\overline{BX}$ is a tangent – segment to the circle at X

$\therefore \overline{MX} \perp \overline{BX}$

$\therefore m(\angle BXM) = 90°$

similarly $\therefore m(\angle BYM) = 90°$

$\because m(\angle BXM) + m(\angle BYM) = 90° + 90° = 180°$

$\therefore BXMY$ is a cyclic quad.

$\therefore m(\angle XMY) + m(\angle XBY)$
$= 180°$ [two opp. angles]

$\therefore m(\angle XMY) = 180° - 40° = 140°$

$\therefore m(\angle XZY) = \frac{1}{2} m(\angle XMY) = \frac{1}{2} \times 140° = 70°$

[inscribed angle and central angle subtended by $\overset{\frown}{xy}$]

In ΔEYZ

$\therefore\ m\,(\angle EYZ) + m\,(\angle ZEY)$

$\therefore\ ZE = ZY$

$\because\ m\,(\angle ZXY) + m\,(\angle XYE) = 80 + 50 + 50 = 180°$ [and they are in position of interior supp. angles]

$\therefore\ \overline{YE} \,//\, \overrightarrow{XZ}$

[17]

$\because$ ABCD is a rectangle

$\therefore$ AB = DC (two opposite sides)

$\because$ DE = DC (given)

$\therefore$ DE = AB

$\therefore\ m\left(\widehat{DE}\right) = m\left(\widehat{AB}\right)$

By adding $m\left(\widehat{AE}\right)$ for both terms

$\therefore\ m\left(\widehat{AD}\right) = m\left(\widehat{BE}\right)$

$\therefore$ AD = BE

[18]

$\because\ m\,(\angle BAC) = m\,(\angle BEC)$ [two inscribed angles sub. by the same arc $\widehat{BC}$]

$\therefore\ m\,(\angle BAC) = 25°$

$\because\ \overline{AB}$ is a diameter

$\therefore\ m(\angle ACB) = 90°$ [inscribed angle drawn in a semi circle]

In ΔABC

$m\,(\angle ABC) = 180° - (90° + 25°) = 65°$

$\because$ ABCD is a cyclic quad.

$\therefore\ m\,(\angle ABC) + m\,(\angle ADC) = 180°$ [two opposite angles]

$\therefore\ m\,(\angle ADC) = 180° - 65° = 115°$

[19]

$\because$ XYZL is a cyclic quad.

$\therefore\ m\,(\angle L) + m(\angle Y) = 180°$ [two opposite angles]

$\therefore\ m(\angle L) = 180° - 60° = 120°$

$\because\ \overline{XY}$ is a diameter

$\therefore\ m(\angle XZY) = 90°$

In ΔXYZ

$m(\angle ZXY) = 180° - (90° + 60°) = 30°$

In ΔLXZ

$\therefore$ LX = LZ

$\therefore\ m(\angle LXZ) = m(\angle LZX) = \frac{180° - 120°}{2} = 30°$

[20]

$\because$ length of $\widehat{AB}$ = length of $\widehat{AD}$ = length of $\widehat{CD}$

$\therefore$ AB = AD = CD

In ΔACD

$\because$ AD = CD

$\therefore\ m(\angle ACD) = m(\angle CAD) = \frac{180° - 80°}{2} = 50°$

$\therefore\ m\left(\widehat{AB}\right) = m\left(\widehat{AD}\right) = m\left(\widehat{CD}\right) = 2 \times 50° = 100°$ [arc and opp. inscribed angles]

$\therefore m(\angle ACB) = \frac{1}{2} m\left(\overset{\frown}{AB}\right) = 50°$ [inscribed angle and opp. arc]

$\therefore m\left(\overset{\frown}{BC}\right) = 360° - (100° + 100° + 100°) = 60°$

[21]

In Δ AMB

$\because$ AM = BM [2 radii]

$\therefore m(\angle MAB) = m(\angle MBA) = 25°$

$\therefore m(\angle AMB) = 180 - (25° + 25°) = 130°$

$\because m(\angle ACB) = \frac{1}{2} m(\angle AMB)$ $\left[\text{inscribed angle and central angle subtended by } \overset{\frown}{AXB}\right]$

$\therefore m(\angle ACB) = \frac{1}{2} \times 130 = 65°$

$\because$ AXBC is a cyclic quad.

$\therefore m\,(\angle AXB) + m\,(\angle ACB) = 180°$ [two opposite angles]

$\therefore m\,(\angle ADC) = 180° - 65° = 115°$

$\because m\left(\overset{\frown}{AB}\right) = m(\angle AMB)$ [opposite central angle]

$\therefore m\left(\overset{\frown}{AB}\right) = 130°$

[22]

$\because m(\angle ADB) = \frac{1}{2} m(\angle AMB)$ $\left[\text{inscribed angle and central angle subtended by } \overset{\frown}{AB}\right]$

$\therefore m(\angle ACB) = \frac{1}{2} \times 120 = 60°$

$\because \angle ADB$ *is an exterior angle to* ΔACD

$\therefore m\,(\angle C) = m\,(\angle ADB) - m(\angle DAC)$

$\therefore m\,(\angle C) = 60° - 20° = 40°$

[23]

In Δ ABC

$\because$ AB = AC [two tangent − segments drawn from A]

$\therefore m(\angle ABC) = m(\angle ACB) = \frac{180° - 40°}{2} = 70°$

$\because \overrightarrow{AC}$ is a tangent.

$\therefore m(\angle ACB) = m(\angle BEC) = 70°$ [inscribed angle and angle of tangency subtended by $\overset{\frown}{BC}$]

$\because$ BCDE is a cyclic quad.

$\therefore m\,(\angle CBE) + m\,(\angle CDE) = 180°$ [two opposite angles]

$\therefore m\,(\angle CBE) = 180° - 110° = 70°$

In $\Delta\, CBE$

$\because m\,(\angle CBE) = m\,(\angle CEB) = 70°$

$\therefore$ CB = CE [isos. triangle]

$\because m\,(\angle ACB) = m\,(\angle CBE) = 70°$ [and they are in position of alt. angles]

$\therefore \overline{BE} \,//\, \overline{AC}$

[24]

In Δ ABC

$\because$ AB = AC [two tangent − segments drawn from A]

$\therefore m(\angle ABC) = m(\angle ACB) = \frac{180° - 50°}{2} = 65°$

$\because \overrightarrow{AC}$ is a tangent.

$\therefore m(\angle ACB) = m(\angle CYB) = 65°$ [inscribed angle and angle of tangency subtended by $\overset{\frown}{BC}$]

∵ BCXY is a cyclic quad.
∴ m (∠CXY) + m (∠CBY) = 180° [two opposite angles]
∴ m (∠CBE) = 180° − 115° = 65°
∵ m(∠ABC) = m(∠CBY) = 65°
∴ $\overrightarrow{BC}$ bisects ∠ABY
In Δ CBY
∵ m (∠CBY) = m (∠CYB) = 65°
∴ CB = CY [isos. triangle]
[25]
∵ $\overline{BC}$ // $\overline{MD}$ → (1)
∴ m (∠BCE) = m (∠MDC) [corresponding. angles]
∵ ABCD is a cyclic quad.
∴ m (∠BCY) = m (∠DAB) = 60° [an exterior angle at opp. vertex]
∵ m(∠BMD) = 2m(∠DAB) [central angle and inscribed angle subtended by $\overset{\frown}{BD}$]
∴ m(∠ACB) = 2 × 60° = 120°
∵ m(∠BMD) + m (∠MDC) = 120° + 60° = 180° [and they are in position of interior supp. angles]
∴ m (∠ADC) = 180° − 65° = 115°
∴ $\overline{MB}$ // $\overline{DC}$ → (2)
From (1) and (2)
∴ BMDC is a parallelogram
∵ MD = MB [two radii]
∴ BMDC is a rhombus
∴ $m(\angle A) = m(\angle C) = 70°$
∵ $m\left(\overset{\frown}{BCD}\right)$ = m(∠BMD) = 120° [central angle and opp. arc]
∵ $BC = CD$ [two adjacent sides of rhombus]
∴ $m\left(\overset{\frown}{BC}\right) = m\left(\overset{\frown}{CD}\right) = \frac{1}{2} \times 120° = 60°$
∵ $\text{m}\left(\overset{\frown}{BAD}\right) = 360° - 120° = 240°$

∵ A is a mid point of $\overset{\frown}{BAD}$
∴ $m\left(\overset{\frown}{BA}\right) = m\left(\overset{\frown}{AD}\right) = \frac{1}{2} \times 240° = 120°$
∵ $\text{m}\left(\overset{\frown}{AC}\right) = m\left(\overset{\frown}{BC}\right) + m\left(\overset{\frown}{BA}\right) = 60° + 120° = 180°$
∴ $\overline{AC}$ is a diameter of the circle
[26]
∵ $\overline{AB}$ is a diameter
∴ $\text{m}\left(\overset{\frown}{ACB}\right) = 180°$ [semi circle]
∵ $\overline{AB}$ // $\overleftrightarrow{DE}$
∴ $m\left(\overset{\frown}{AC}\right) = m\left(\overset{\frown}{BC}\right) = \frac{1}{2} \times 180° = 90°$

∵ X is a mid point of $\overset{\frown}{AC}$
∴ $\text{m}\left(\overset{\frown}{AX}\right) = \text{m}\left(\overset{\frown}{CX}\right) = \frac{1}{2} \times 90° = 45°$
∵ $\text{m}\left(\overset{\frown}{BY}\right) = 2m\left(\overset{\frown}{CY}\right)$

$\therefore m\left(\overset{\frown}{BY}\right) = 60°$

$\therefore m\left(\overset{\frown}{CY}\right) = 30°$

$\because m\left(\overset{\frown}{XY}\right) = m\left(\overset{\frown}{CX}\right) + m\left(\overset{\frown}{CY}\right) = 45° + 30° = 75°$

$\because m(\angle XMY) = m\left(\overset{\frown}{XY}\right) = 75°$ [Central angle and opposite arc]

$\because m(\angle AMX) = \frac{1}{2} m\left(\overset{\frown}{AX}\right) = \frac{1}{2} \times 45° = 22.5°$ [inscribed angle and opposite arc]

$\because \overline{AB} // \overleftrightarrow{DE}$

$\therefore m(\angle CDM) = m(\angle AMD) = 22.5°$ [alt. angles]

In Δ MDE

$\therefore m(\angle DEM) = 180 - (75° + 22.5°) = 82.5°$

[27]

$\because \overline{AB}$ is a diameter

$\therefore m(\angle ACB) = 90°$ [inscribed angle drawn in a semi circle]

$\because m(\angle AMX) = m(\angle ACB) = 90°$ [an exterior angle and interior angle at opp. vertex]

$\therefore$ BCXM is a cyclic quad.

$\therefore m(\angle AXM) = m(\angle ABC) \rightarrow (1)$ [an exterior angle at opp. vertex]

$\because m(\angle ABC) = \frac{1}{2} m(\angle AMC) \rightarrow (2)$ [inscribed angle and central angle subtended by $\overset{\frown}{AC}$]

From (1) and (2)

$\therefore m(\angle AXM) = \frac{1}{2} m(\angle AMC)$

[28] In Δ ABD

$\because AB = AD$ [two tangent – segments drawn from A]

$\therefore m(\angle ABD) = m(\angle ADB) = \frac{180° - 50°}{2} = 65°$

$\because \overrightarrow{AB}$ is a tangent.

$\therefore m(\angle ABD) = m(\angle BCD) = 65°$ [inscribed angle and angle of tangency subtended by $\overset{\frown}{BD}$]

In Δ DBC

$\because m(\angle DBC) = m(\angle DCB) = 65°$

$\therefore DB = DC \rightarrow (1)$ [isos. triangle]

$\because \overline{MX} \perp \overline{BD}, \overline{MY} \perp \overline{CD} \rightarrow (2)$

From (1) and (2)

$\therefore MX = MY$

[29] Const.: Draw $\overline{AD}$

$\because \overrightarrow{AC}$ is a tangent to the circle at A

$\therefore \overline{CA} \perp \overline{AB}$

$\therefore m(\angle CAM) = 90°$

$\because$ E is a midpoint of $\overline{BD}$

$\therefore \overline{ME} \perp \overline{BD}$

$\therefore m(\angle MEC) = 90°$

$\because m(\angle CAM) + m(\angle MEC) = 90° + 90° = 180°$

$\therefore$ ACEM is a cyclic quad.

$\because m(\angle ADB) = 90°$ [inscribed angle drawn in a semi circle]

$\because m(\angle ADB) = m(\angle MEB) = 90°$ [and they are in position of corresponding angles]

$\therefore \overline{ME} // \overline{AD}$

[30]
$\because$ ABCD is a cyclic quad.
$\therefore$ m $(\angle A)$ + m$(\angle C)$ = 180° → (1) [two opposite angles]
$\because \overline{FE} \,//\, \overline{BC}$
$\therefore$ m $(\angle EFC)$ + m$(\angle C)$ = 180° → (2) [interior supp. angles]
From (1) and (2)
$\therefore$ m $(\angle A)$ = m $(\angle EFC)$ [and they are an exterior angle and interior angle at opp. vertex]
$\therefore$ AFED is a cyclic quad.
[31]
In Δ ABX
$\because$ AB = AX [isos. triangle]
$\therefore$ m$(\angle ABX)$ = m$(\angle AXB)$ = 70°
$\because$ *ABCD is a parallelogram*
$\therefore$ $m\ (\angle B) + m\ (\angle D) = 70°$ [*two opposite angles*]
$\because$ m $(\angle AXB)$ = m $(\angle D)$ = 70° [and they are an exterior angle and interior angle at opp. vertex]
$\therefore$ AXCD is a cyclic quad.
[32]
$\because \overline{MB}$ is a radius , $\overline{AB}$ is a tangent − segment to the circle at B
$\therefore \overline{MB} \perp \overline{AB}$
$\therefore$ m$(\angle ABM)$ = 90°
similarly $\therefore$ m$(\angle ADM)$ = 90°
$\because$ m$(\angle ABM)$ + m$(\angle ADM)$ = 90° + 90° = 180°
$\therefore$ ABMD is a cyclic quad.
$\therefore$ m$(\angle BAD)$ + m$(\angle BMD)$ = 180° [two opp. angles]
$\therefore$ m$(\angle BMD)$ = 180° − 50° = 130°
$\therefore$ m$(\angle BCD) = \frac{1}{2}m(\angle BMD) = \frac{1}{2} \times 130° = 65°$ [inscribed angle and central angle subtended by BD]
$\because \overline{AB} \,//\, \overline{DC}$
$\therefore$ m$(\angle ABC)$ + m$(\angle BCD)$ = 180° [interior supp. angles]
$\therefore$ m $(\angle ABC)$ = 180° − 65° = 115°
[33]
In ΔABD
$\because$ AD = AB
$\therefore$ m $(\angle ADB)$ = m $(\angle ABD)$ = 45°
$\therefore$ m $(\angle BAD)$ = 180° − (45° + 45°) = 90°
$\because$ m$(\angle BAD)$ + m$(\angle BCD)$ = 90° + 90° = 180°
$\therefore$ ABCD is a cyclic quad.
$\therefore \overline{BD}$ is the diameter to the circle which passes through ABCD
In ΔABD
$\because$ m$(\angle BCD)$ = 90° and m$(\angle CBD)$ = 30°
$\therefore$ BD = 2CD = 2 × 5 = 10 cm.
[34]
$\because \overline{AC}$ is a diameter and $\overrightarrow{CY}$ is a tangent to the circle
$\therefore \overrightarrow{CY} \perp \overline{AC}$
$\therefore$ m $(\angle ACY)$ = 90°
$\because$ X is a midpoint of $\overline{AB}$
$\therefore \overline{MX} \perp \overline{AB}$
$\therefore$ m $(\angle AXY)$ = 90°

$\because$ m $(\angle ACY)$ = m $(\angle AXY) = 90°$ [and they drawn on the same base $\overline{AY}$ and in the same side of it]
$\therefore$ AXCY is a cyclic quad.
$\therefore$ m $(\angle MYC)$ = m $(\angle BAC) \to (1)$ [drawn on the same base $\overline{XC}$ and in the same side of it]
$\therefore$ m $(\angle BMC)$ = 2m $(\angle BAC) \to (2)$ [Central and inscribed angles sub. by $\widehat{BC}$]
From (1) and (2)
$\therefore$ m $(\angle BMC)$ = 2m $(\angle MYC)$

[35]

$\because$ $\overline{AB}$ is a diameter and $\overrightarrow{BD}$ is a tangent to the circle
$\therefore$ $\overrightarrow{BD} \perp \overline{AB}$
$\therefore$ m $(\angle ABD) = 90°$
$\because$ E is a midpoint of $\overline{AC}$
$\therefore$ $\overline{ME} \perp \overline{AC}$
$\therefore$ m $(\angle MED) = 90°$
$\because$ m $(\angle MBD)$ + m $(\angle MED) = 90° + 90° = 180°$ [and they are two opp. angles]
$\therefore$ MEDB is a cyclic quad.
$\therefore$ m $(\angle BMX)$ = m $(\angle D) \to (1)$ [an exterior and interior angle at opp. vertex]
$\therefore$ m $(\angle BAX) = \frac{1}{2}$m $(\angle BMX) \to (2)$ [Central and inscribed angles sub. by $\widehat{BX}$]
From (1) and (2)
$\therefore$ m $(\angle BAX) = \frac{1}{2}$m $(\angle D)$
$\because$ MEDB is a cyclic quad.
$\therefore$ m $(\angle AME)$ = m $(\angle D) \to (3)$ [an exterior and interior angle at opp. vertex]
In ΔABC
$\because$ E and M are two midpoints of $\overline{AC}$ and $\overline{AB}$
$\therefore$ $\overline{ME}$ // $\overline{BC}$
$\therefore$ m $(\angle AME)$ = m $(\angle ABC) \to (4)$ [corres. angles]
From (3) and (4)
$\therefore$ m $(\angle ABC)$ = m $(\angle D)$
$\therefore$ $\overleftrightarrow{AB}$ is a tangent to the circle passing through the points B, C and D

[36]

$\because$ ABCD is a cyclic quad.
$\therefore$ m$(\angle BAC)$ = m$(\angle BDC)$ (drawn on the same base $\overline{BC}$) $\to (1)$
$\because$ $\overrightarrow{AE}$ bisects $\angle BAC$
$\therefore$ m$(\angle EAF) = \frac{1}{2}m(\angle BAC)$ $\to (2)$
$\because$ $\overrightarrow{DF}$ bisects $\angle BDC$
$\therefore$ m$(\angle EDF) = \frac{1}{2}m(\angle BDC)$ $\to (3)$
From (1) , (2) and (3)
$\therefore$ m$(\angle EAF)$ = m$(\angle EDF)$ (and they are drawn on $\overline{EF}$ and on on side of it)
$\therefore$ AEFD is a cyclic quad.
$\because$ ABCD is a cyclic quad.
$\therefore$ m$(\angle DAC)$ = m$(\angle DBC)$ (drawn on the same base $\overline{DC}$) $\to (4)$
$\because$ AEFD is a cyclic quad.
$\therefore$ m$(\angle DAC)$ = m$(\angle DEF)$ (drawn on the same base $\overline{DF}$) $\to (5)$
From (4) and (5)

$\therefore\ m(\angle DEF) = m(\angle DBC)$ (and they are in position of coressponding angles)

$\therefore\ \overline{EF} \parallel \overline{BC}$

[37]

$\because$ AECB is a cyclic quad.

$\therefore\ m(\angle ECX) = m(\angle EAB) \rightarrow (1)$ [an exterior and interior angle at opp. vertex]

$\because\ m(\angle DAE) = m(\angle DCE) \rightarrow (2)$ [two inscribed angles sub. by DE]

$\because\ \overrightarrow{EA}$ bisects $\angle DAB$

$\therefore\ m(\angle DAE) = m(\angle EAB) \rightarrow (3)$

From (1) , (2) *and* (3)

$\therefore\ m(\angle DCE) = m(\angle ECX)$

$\therefore\ \overrightarrow{CE}$ bisects $\angle XCD$

[38]

$\because\ \overline{AB}$ is a diameter

$\therefore\ m(\angle ACB) = 90^\circ$

$\because\ \overline{AB}$ is a diameter and $\overrightarrow{BD}$ is a tangent to the circle

$\therefore\ \overrightarrow{BD} \perp \overline{AB}$

$\therefore\ m(\angle ABD) = 90^\circ$

$\because\ \overrightarrow{BD}$ is a tangent.

$\therefore\ m(\angle BAD) = m(\angle DBC)$ [inscribed angle and angle of tangency subtended by BC]

In Δ ABC and ΔDBC

$\because\ m(\angle ACB) = m(\angle ABD) = 90^\circ$

$\because\ m(\angle BAD) = m(\angle DBC)$ (*proved*)

$\therefore\ m(\angle ABC) = m(\angle BDC)$

$\therefore\ \overleftrightarrow{AB}$ is a tangent to the circle passing through the vertices of ΔBCD

[39]

$\because\ \overrightarrow{LX}$ is a tangent to the circle

$\therefore\ m(\angle LXZ) = m(\angle XYZ) \rightarrow (1)$ [inscribed angle and angle of tangency subtended by AB]

$\because\ \overline{KD} \parallel \overline{EC}$

$\therefore\ m(\angle XDK) = m(\angle XYZ) \rightarrow (2)$ [*two corresponding angles*]

From (1) and (2)

$\therefore\ m(\angle LXZ) = m(\angle XDK)$

$\therefore\ \overleftrightarrow{XL}$ is a tangent to the circle passing through the vertices of ΔXDK

[40]

In ΔABE

$\because\ AE = EB = AB$

$\therefore\ m(\angle EAB) = m(\angle ABE) = m(\angle AEB) = 60^\circ$

$\because$ ABCD is a cyclic quad.

$\therefore\ m(\angle EAB) = m(\angle C) = 60^\circ$ [an exterior and interior angle at opp. vertex]

$\because\ m(\angle BDC) = \frac{1}{2} m\left(BC \right) = 30^\circ$ [inscribed angle and opp. arc]

$\therefore$ *In* ΔBCD

$m(\angle DBC) = 180^\circ - [60^\circ + 30^\circ] = 90^\circ$

$\therefore\ \overline{CD}$ is a diameter

[41]

$\because\ \overline{AD}, \overline{AF}$ are two tangent – segment to the circle

$\therefore$ AD = AF = 2 cm.
$\because \overline{BD}, \overline{BE}$ are two tangent − segment to the circle
$\therefore$ BD = BE = 3 cm.
$\because$ E is a midpoint of $\overline{BC}$
$\therefore$ BE = EC = 3 cm.
$\because \overline{CE}, \overline{CF}$ are two tangent − segment to the circle
$\therefore$ CE = CF = 3 cm.
$\therefore$ The per. of ΔABC = 2 + 3 + 3 + 3 + 3 + 2 = 16 cm.

[42]

In Δ XDF
$\because$ XD = XF [two tangent − segments drawn from X]
$\therefore m(\angle XDF) = m(\angle XFD) = \frac{180°-80°}{2} = 50°$
In Δ XYZ
$\because$ XY = XZ
$\therefore m(\angle XYZ) = m(\angle XZY) = \frac{180°-80°}{2} = 50°$
In Δ ZFE
$\because$ ZF = ZE [two tangent − segments drawn from X]
$\therefore m(\angle ZFE) = m(\angle ZEF) = \frac{180°-50°}{2} = 65°$
$\because m(\angle XFZ) = 180°$ [st. angle]
$\therefore m(\angle DFE) = 180° - (50° + 65°) = 65°$

[43]

Const.: Draw $\overline{AB}$
$\because$ ABZX is a cyclic quad.
$\therefore$ m (∠ABZ) + m (∠X) = 180° → (1) [two opp. angles]
$\because$ ABLY is a cyclic quad.
$\therefore$ m (∠ABZ) = m (∠Y) → (2) [an exterior and interior angle at opp. vertex]
From (1) *and* (2)
$\therefore$ m (∠Y) + m (∠X) = 180° [and they are in position of interior supp. angles]
$\therefore \overline{XZ} // \overline{LY}$

[44]

$\because \overline{EA}, \overline{EC}$ are two tangent − segment to the small circle
$\therefore$ EA = EC → (1)
$\because \overline{EB}, \overline{ED}$ are two tangent − segment to the big circle
$\therefore$ EB = ED → (2)
By subtracting (1) from (2)
$\therefore$ AB = CD

[45]

$\because \overline{DA}, \overline{DB}$ are two tangent − segment to circle M
$\therefore$ DA = DB
$\therefore$ m (∠DBA) = m (∠DAB) → (1)
$\because \overline{DA}, \overline{DC}$ are two tangent − segment to circle N
$\therefore$ DA = DC
$\therefore$ m (∠DCA) = m (∠DAC) → (2)
By Adding (1) and (2)
$\therefore$ m (∠DBA) + m (∠DBA) = m (∠DAB) + m (∠DAC)
$\therefore$ m (∠DBA) + m (∠DBA) = m (∠BAC)
$\therefore$ m (∠BAC) = 90°

With my best wishes for you
Mr. Michael Gamil