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EL-MOASSER

Geometry

نماذج امتحانات

الصف 3 الإعـــدادى

الفصل الدراسى الثانى ٢٠٢١

Answer the following questions :

1 Choose the correct answer from those given :

1 The slope of the straight line $3x + 2y = 1$ is .....

(a) $\frac{2}{3}$ (b) $-\frac{3}{2}$ (c) $-\frac{2}{3}$ (d) $\frac{3}{2}$

2 M and N are two intersecting circles , their radii lengths are 3 cm. and 5 cm. , then MN $\in$ .....

(a) $]8 , \infty[$ (b) $]3 , 5[$ (c) $]0 , 2[$ (d) $]2 , 8[$

3 The measurement of any angle of the regular hexagon is .....

(a) 90° (b) 108° (c) 120° (d) 135°

4 ABCD is a cyclic quadrilateral , m ($\angle$ A) = 70° , then m ($\angle$ C) equals .....

(a) 25° (b) 20° (c) 110° (d) 100°

5 In Δ ABC , if $(AB)^2 = (AC)^2 + (BC)^2$, then $\angle$ B is .....

(a) acute. (b) obtuse. (c) right. (d) reflex.

6 The measure of the inscribed angle drawn in a semicircle equals .....

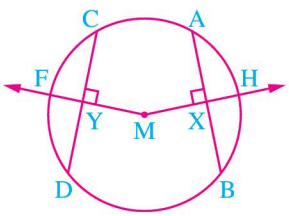
(a) 130° (b) 90° (c) 50° (d) 180°

---

2 [a] In the opposite figure :

$\overline{AB}$ and $\overline{CD}$ are two chords equal in length in the circle M , $\overrightarrow{MX} \perp \overline{AB}$, $\overrightarrow{MY} \perp \overline{CD}$

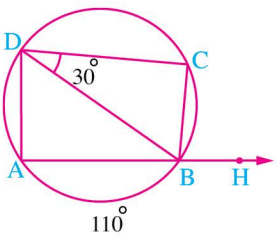
Prove that : HX = FY



[b] In the opposite figure :

$H \in \overrightarrow{AB}$, m ($\overset{\frown}{AB}$) = 110° , m ($\angle$ CDB) = 30°

Find : m ($\angle$ HBC)



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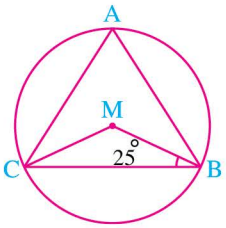
3 [a] In the opposite figure :

ABC is a triangle drawn in the circle M , m ($\angle$ MBC) = 25°

Find : m ($\angle$ BAC)

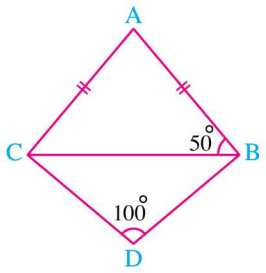


[b] In the opposite figure :

$AB = AC$, $m(\angle D) = 100°$

, $m(\angle ABC) = 50°$

Prove that : ABDC is a cyclic quadrilateral.



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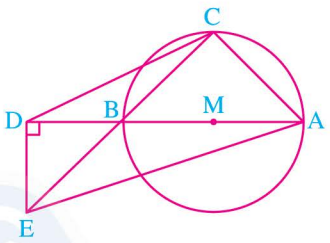
4 [a] In the opposite figure :

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

, $D \in \overrightarrow{AB}$, $D \notin \overline{AB}$, $\overrightarrow{DE} \perp \overrightarrow{AB}$

, $C \in \overset{\frown}{AB}$, $\overrightarrow{CB} \cap \overrightarrow{DE} = \{E\}$

Prove that : ACDE is a cyclic quadrilateral



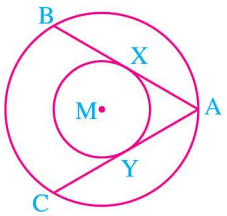
[b] In the opposite figure :

Two concentric circles of centre M

, $\overline{AB}$ and $\overline{AC}$ are two chords in the greater circle

and tangents to the smaller circle at X and Y respectively.

Prove that : $AB = AC$



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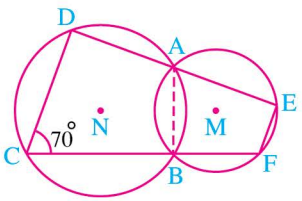
5 [a] In the opposite figure :

M and N are two intersecting circles at A and B

, $\overleftrightarrow{AD}$ is drawn to intersect the circle M at E and

the circle N at D , $\overleftrightarrow{AB}$ is drawn to intersect the circle M at

F and the circle N at C , $m(\angle BCD) = 70°$



1 **Find :** $m(\angle EFB)$

2 **Prove that :** $\overline{CD} // \overline{EF}$

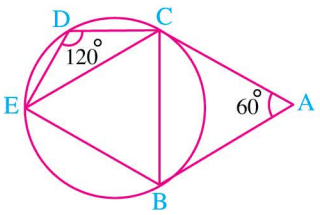
[b] In the opposite figure :

$\overline{AB}$ and $\overline{AC}$ are tangent-segments to the circle at B and C

, $m(\angle BAC) = 60°$, $m(\angle CDE) = 120°$

Prove that : 1 Δ BCE is an equilateral triangle.

2 $\overline{AC} // \overline{BE}$



Answer the following questions :

1 Choose the correct answer from those given :

1 ∠ A and ∠ B are two complementary angles , ∠ B and ∠ C are two supplementary angles , m (∠ A) = 30° , then m (∠ C) = ... °

(a) 30 (b) 60 (c) 90 (d) 120

2 If the surface of the circle M ∩ the surface of the circle N = {A} and the radius length of one of them equals 3 cm. and MN = 8 cm. , then the radius length of the other circle equals ..... cm.

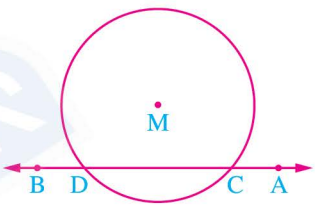
(a) 5 (b) 6 (c) 11 (d) 16

3 **In the opposite figure :**

$\overleftrightarrow{AB}$ ∩ the surface of the circle M = ...

(a) {C , D} (b) $\overline{CD}$

(c) $\overleftrightarrow{CD}$ (d) ∅



4 A circle can be drawn passing through the vertices of a .....

(a) rhombus. (b) parallelogram. (c) trapezium. (d) rectangle.

5 The rhombus whose two diagonal lengths are 12 cm. and 16 cm. , then its side length equals ..... cm.

(a) 6 (b) 8 (c) 10 (d) 20

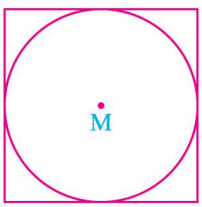
6 **In the opposite figure :**

If the side length of the square = 10 cm.

, then the surface area of the circle = ... cm^2

(a) 100 π (b) 25 π

(c) 50 π (d) 40 π



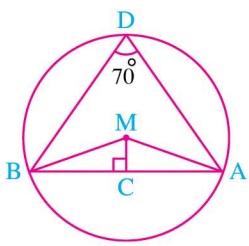
---

2 [a] In the opposite figure :

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

, $\overline{MC} \perp \overline{AB}$, m (∠ ADB) = 70°

Find : m (∠ AMC)

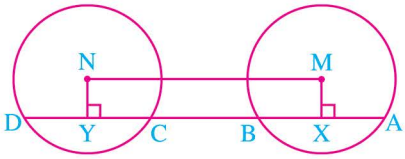


[b] In the opposite figure :

M and N are two congruent circles

, AB = CD , $\overline{MX} \perp \overline{AB}$ and $\overline{NY} \perp \overline{CD}$

Prove that : The figure MXYN is a rectangle.



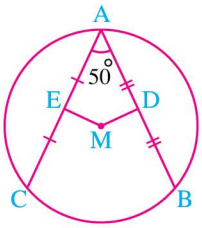
3 **[a] In the opposite figure :**

$\overline{AB}$ and $\overline{AC}$ are two chords

in the circle M , D is the midpoint of $\overline{AB}$

, E is the midpoint of $\overline{AC}$ and m (∠ BAC) = 50°

Find : m (∠ DME)



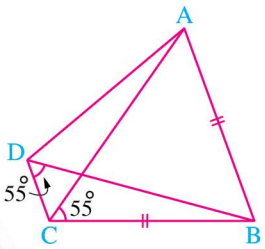
[b] In the opposite figure :

AB = BC

, m (∠ ACB) = 55°

and m (∠ BDC) = 55°

Prove that : The figure ABCD is a cyclic quadrilateral.



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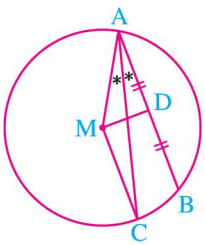
4 **[a] In the opposite figure :**

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

, $\overrightarrow{AC}$ bisects ∠ BAM and intersects the circle M at C

If D is the midpoint of $\overline{AB}$

, **prove that :** $\overline{DM} \perp \overline{CM}$



[b] $\overline{AB}$ is a diameter in the circle M , $\overleftrightarrow{AC}$ and $\overleftrightarrow{BD}$ are two tangents to the circle M , $\overrightarrow{CM}$ intersects the circle M at X and Y respectively and intersects $\overleftrightarrow{BD}$ at E **Prove that :** CX = YE

---

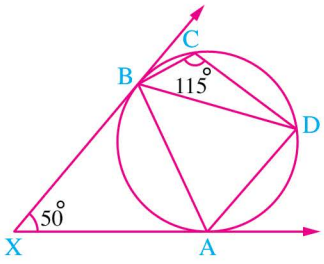
5 **[a] In the opposite figure :**

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

, m (∠ AXB) = 50° , m (∠ DCB) = 115°

Prove that : 1 $\overrightarrow{AB}$ bisects ∠ DAX

2 BD = BA

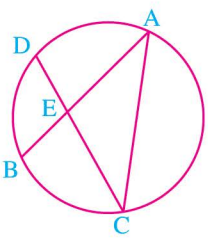


[b] In the opposite figure :

$\overline{AB}$ and $\overline{CD}$ are two equal chords in length in the circle

, $\overline{AB} \cap \overline{CD} = \{E\}$

Prove that : The triangle ACE is an isosceles triangle.



Answer the following questions :

1 Choose the correct answer from those given :

1 The measure of the inscribed angle is ..... the measure of the central angle subtended by the same arc.

(a) half (b) twice (c) quarter (d) third

2 The length of the side opposite to the angle of measure 30° in the right-angled triangle equals ..... the length of the hypotenuse.

(a) $\frac{1}{2}$ (b) $\frac{\sqrt{3}}{2}$ (c) $\sqrt{2}$ (d) 2

3 Two distant circles M and N with radii lengths 6 cm. and 8 cm. respectively , then MN ..... 14 cm.

(a) < (b) > (c) = (d) ≤

4 The angle of measure 40° is the complemented angle of the angle of measure .....°

(a) 320 (b) 140 (c) 60 (d) 50

5 The area of the rhombus with diagonal lengths 6 cm. , 8 cm. is ..... cm^2

(a) 2 (b) 14 (c) 24 (d) 48

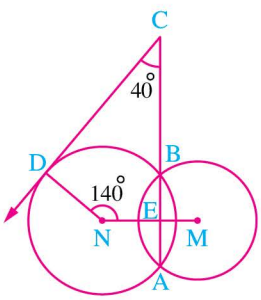
6 In the cyclic quadrilateral ABCD , if m (∠ A) = $\frac{1}{2}$ m (∠ C) , then m (∠ A) = ...°

(a) 20 (b) 30 (c) 60 (d) 120

2 [a] In the opposite figure :

M and N are two intersecting circles at A and B , C ∈ $\overrightarrow{AB}$, $\overline{AC} \cap \overline{MN} = \{E\}$, D ∈ the circle N , m (∠ DNM) = 140° and m (∠ C) = 40°

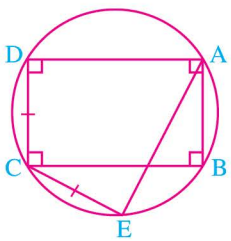
Prove that : $\overrightarrow{CD}$ is a tangent to the circle N at D



[b] In the opposite figure :

ABCD is a rectangle inscribed in a circle , the chord $\overline{CE}$ is drawn where CE = CD

Prove that : AE = BC



3 **[a]** State two cases of the cyclic quadrilateral.

[b] **In the opposite figure :**

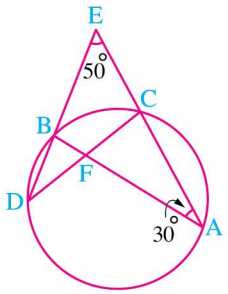
$\overleftrightarrow{AB} \cap \overleftrightarrow{CD} = \{F\}$, $\overleftrightarrow{AC} \cap \overleftrightarrow{DB} = \{E\}$

, m ($\angle$ A) = 30°

, m ($\angle$ E) = 50°

Find : 1 m ($\overset{\frown}{AD}$)

2 m ($\angle$ AFD)



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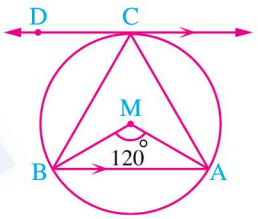
4 **[a]** **In the opposite figure :**

$\overleftrightarrow{CD}$ is a tangent to the circle at C

, $\overleftrightarrow{CD}$ // $\overline{AB}$, m ($\angle$ AMB) = 120°

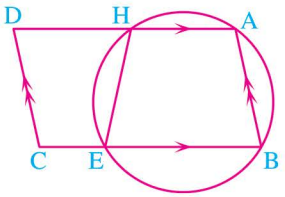
Prove that : The triangle CAB is an equilateral triangle.



[b] **In the opposite figure :**

ABCD is a parallelogram.

Prove that : HDCE is a cyclic quadrilateral.



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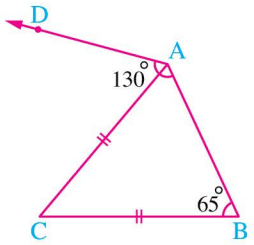
5 **[a]** **In the opposite figure :**

AC = BC , m ($\angle$ ABC) = 65°

, m ($\angle$ DAB) = 130°

Prove that : $\overrightarrow{AD}$ is a tangent to the circle passing through the vertices of the triangle ABC



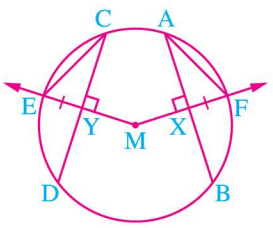
[b] **In the opposite figure :**

$\overline{AB}$ and $\overline{CD}$ are two chords in the circle M

, $\overrightarrow{MX} \perp \overline{AB}$ and intersects the circle at F

, $\overrightarrow{MY} \perp \overline{CD}$ and intersects the circle at E , FX = EY

Prove that : 1 AB = CD 2 AF = CE



إجابات نماذج امتحانات

الصف 3 الإعدادى

الفصل الدراسى الثانى ٢٠٢١

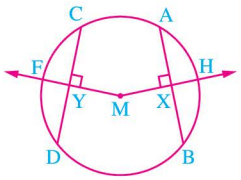
Answers of model 1

1

1 b	2 d	3 c
4 c	5 a	6 b

2

[a] ∵ AB = CD , $\overline{MX} \perp \overline{AB}$, $\overline{MY} \perp \overline{CD}$



∴ MX = MY

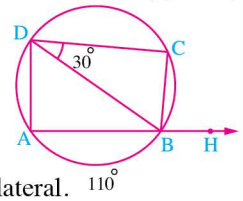
, ∵ MH = MF = r

∴ HX = FY (Q.E.D.)

[b] ∵ $m(\angle ADB) = \frac{1}{2} m(\overset{\frown}{AB})$

$= \frac{1}{2} \times 110°$

$= 55°$



, ∵ ABCD is a cyclic quadrilateral.

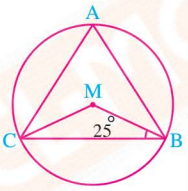
∴ m (∠ HBC) = m (∠ CDB) + m (∠ ADB)

= 30° + 55° = 85° (The req.)

3

[a] In Δ BMC :

∵ MB = MC = r



∴ m (∠ MCB) = m (∠ MBC) = 25°

∴ m (∠ BMC) = 180° – (25° + 25°) = 130°

, ∵ $m(\angle BAC) = \frac{1}{2} m(\angle BMC)$

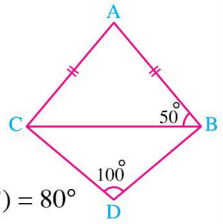
(inscribed and central angles subtended by $\overset{\frown}{BC}$)

∴ $m(\angle BAC) = \frac{1}{2} \times 130° = 65°$ (The req.)

[b] In Δ ABC :

∵ AB = AC

∴ m (∠ ACB) = m (∠ ABC) = 50°



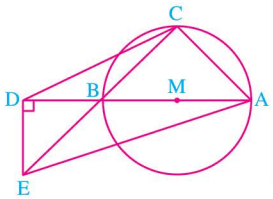
∴ m (∠ A) = 180° – (50° + 50°) = 80°

, ∵ m (∠ A) + m (∠ D) = 80° + 100° = 180°

∴ ABDC is a cyclic quadrilateral. (Q.E.D.)

4

[a] ∵ $\overline{AB}$ is a diameter of the circle.



∴ m (∠ ACB) = 90°

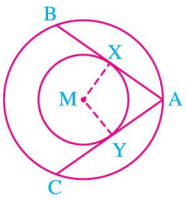
∴ m (∠ ACE) = m (∠ ADE)

and they are drawn on $\overline{AE}$ and on one side of it

∴ ACDE is a cyclic quadrilateral. (Q.E.D.)

[b] Construction :

Draw $\overline{MX}$, $\overline{MY}$



Proof :

∵ $\overline{AB}$, $\overline{AC}$ are two tangents to the smaller circle at X , Y respectively

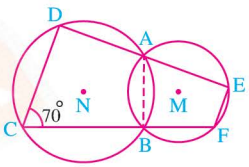
∴ $\overline{MX} \perp \overline{AB}$, $\overline{MY} \perp \overline{AC}$

, ∵ MX = MY = r (radius length of the smaller circle)

∴ AB = AC (Q.E.D.)

5

[a] ∵ ABCD is a cyclic quadrilateral



∴ m (∠ BAD) = 180° – 70° = 110°

, ∵ ABFE is a cyclic quadrilateral and ∠ BAD is exterior of it.

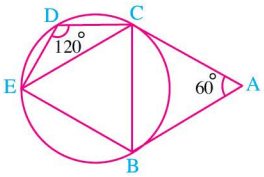
∴ m (∠ EFB) = m (∠ BAD) = 110° (First req.)

∴ m (∠ EFB) + m (∠ BCD) = 110° + 70° = 180°

and they are interior angles in the same side of $\overleftrightarrow{FC}$

∴ $\overline{CD}$ // $\overline{EF}$ (Second req.)

[b] ∵ $\overline{AB}$, $\overline{AC}$ are tangent-segments to the circle



∴ AB = AC

∴ $m(\angle ACB) = \frac{180° - 60°}{2} = 60°$ (1)

∴ m (∠ BEC) (inscribed) = m (∠ ACB) (tangency) = 60° (2)

, ∵ EBCD is a cyclic quadrilateral

∴ m (∠ EBC) = 180° – 120° = 60° (3)

∴ From (2) , (3) in Δ EBC :

∴ m (∠ BCE) = 60°

∴ Δ BCE is equilateral. (Q.E.D. 1)

From (1) , (3) : ∴ m (∠ ACB) = m (∠ EBC) and they are alternate angles

∴ $\overline{AC}$ // $\overline{BE}$ (Q.E.D. 2)

Answers of model 2

1

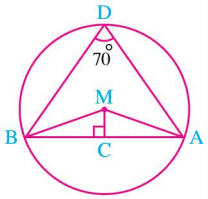
1 d	2 a	3 b
4 d	5 c	6 b

2

[a] $\because m(\angle AMB) = 2\, m(\angle ADB)$

$= 2 \times 70° = 140°$

(central and inscribed angles subtended by $\overset{\frown}{AB}$)



In ΔABM : $\because \overline{MC} \perp \overline{AB}$

, $MA = MB = r$

$\therefore \overrightarrow{MC}$ bisects $\angle AMB$

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

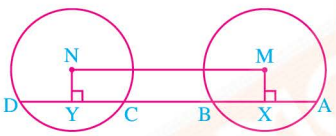
(The req.)

[b] $\because$ M , N are two congruent circles

, $AB = CD$

, $\overline{MX} \perp \overline{AB}$

, $\overline{NY} \perp \overline{CD}$



$\therefore MX = NY$, $\overline{MX} // \overline{NY}$

$\therefore$ MXYN is a rectangle. (Q.E.D.)

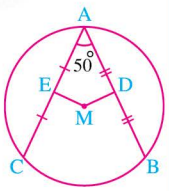
3

[a] $\because$ D is the midpoint of $\overline{AB}$

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

$\therefore m(\angle ADM) = 90°$

, $\because$ E is the midpoint of $\overline{AC}$



$\therefore \overline{ME} \perp \overline{AC}$ $\therefore m(\angle AEM) = 90°$

From the quadrilateral ADME :

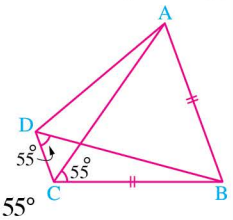
$\therefore m(\angle DME) = 360° - (90° + 90° + 50°) = 130°$

(The req.)

[b] In ΔABC :

$\because AB = BC$

$\therefore m(\angle BAC) = m(\angle ACB) = 55°$

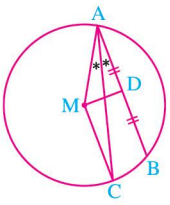


, $\because m(\angle BDC) = m(\angle BAC) = 55°$ and they are drawn on $\overline{BC}$ and on one side of it

$\therefore$ ABCD is a cyclic quadrilateral. (Q.E.D.)

4

[a] In ΔAMC :



$\because AM = MC = r$

$\therefore m(\angle MAC) = m(\angle ACM)$

, $\because m(\angle BAC) = m(\angle MAC)$

$\therefore m(\angle BAC) = m(\angle ACM)$ and they are alternate angles.

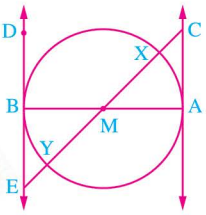
$\therefore \overline{AB} // \overline{CM}$

, $\because$ D is the midpoint of $\overline{AB}$

$\therefore \overline{MD} \perp \overline{AB}$, $\because \overline{AB} // \overline{CM}$

$\therefore \overline{DM} \perp \overline{CM}$ (Q.E.D.)

[b] $\because \overleftrightarrow{AC}$ is a tangent to the circle M at A



$\therefore \overline{MA} \perp \overleftrightarrow{AC}$

$\therefore m(\angle CAM) = 90°$

, $\because \overleftrightarrow{BD}$ is a tangent to the circle M at B

$\therefore \overline{MB} \perp \overleftrightarrow{BD}$ $\therefore m(\angle EBM) = 90°$

$\therefore$ In $\Delta\Delta$ CAM , EBM :

$m(\angle CAM) = m(\angle EBM) = 90°$

$m(\angle AMC) = m(\angle BME)$ (V.O.A.)

$MA = MB$ (lengths of two radii)

$\therefore$ The two triangles are congruent and we deduce that $CM = EM$

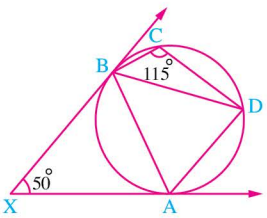
, $\because XM = YM$ (lengths of two radii)

, by subtracting

$\therefore CX = YE$ (Q.E.D.)

5

[a] $\because \overrightarrow{XA}$, $\overrightarrow{XB}$ are two tangents to the circle



$\therefore XA = XB$

$\therefore$ In ΔABX

$m(\angle XAB) = m(\angle XBA) = \frac{180° - 50°}{2} = 65°$

, $\because$ ABCD is a cyclic quadrilateral

$\therefore m(\angle BAD) + m(\angle DCB) = 180°$

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

$\therefore m(\angle XAB) = m(\angle BAD)$

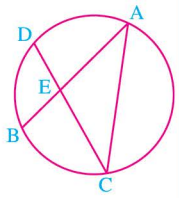
$\therefore \overrightarrow{AB}$ bisects $\angle DAX$ (Q.E.D.1)

, ∵ m (∠ ADB) (inscribed)
= m (∠ XAB) (tangency) = 65°

∴ m (∠ BAD) = m (∠ ADB)

∴ In Δ ABD : BD = BA (Q.E.D.2)

[b] ∵ AB = CD



∴ m $(\overset{\frown}{AB})$ = m $(\overset{\frown}{CD})$

Subtracting m $(\overset{\frown}{BD})$ from both sides

∴ m $(\overset{\frown}{AD})$ = m $(\overset{\frown}{BC})$

∴ m (∠ ACD) = m (∠ BAC)

∴ In Δ ACE : AE = CE

∴ Δ ACE is an isosceles triangle. (Q.E.D.)

Answers of model 3

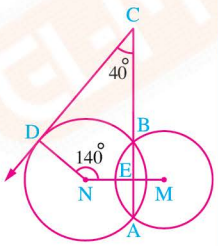
1

1 a	2 a	3 b
4 d	5 c	6 c

2

[a] ∵ $\overleftrightarrow{MN}$ is the line of centres

, $\overline{AB}$ is the common chord.



∴ $\overline{AB} \perp \overline{MN}$

∴ m (∠ BEN) = 90°

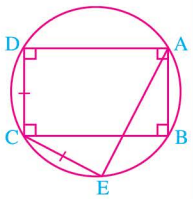
In the quadrilateral CDNE :

∴ m (∠ CDN) = 360° – (140° + 40° + 90°) = 90°

∴ $\overleftrightarrow{ND} \perp \overleftrightarrow{CD}$

∴ $\overleftrightarrow{CD}$ is a tangent to the circle N at D (Q.E.D.)

[b] ∵ AB = CD



(properties of the rectangle)

, ∵ CE = CD

∴ AB = CE

∴ m $(\overset{\frown}{AB})$ = m $(\overset{\frown}{CE})$ and adding m $(\overset{\frown}{BE})$ to both sides.

∴ m $(\overset{\frown}{AE})$ = m $(\overset{\frown}{BC})$

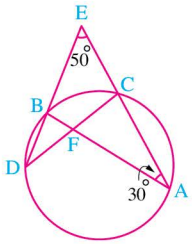
∴ AE = BC (Q.E.D.)

3

[a] State by yourself.

[b] ∵ m $(\overset{\frown}{BC})$ = 2 m (∠ A)

= 2 × 30° = 60°



, ∵ m (∠ E)

$= \frac{1}{2}$ [m $(\overset{\frown}{AD})$ – m $(\overset{\frown}{BC})$]

∴ 50° $= \frac{1}{2}$ [m $(\overset{\frown}{AD})$ – 60°]

∴ 100° = m $(\overset{\frown}{AD})$ – 60°

∴ m $(\overset{\frown}{AD})$ = 160° (First req.)

, ∵ m (∠ AFD) $= \frac{1}{2}$ [m $(\overset{\frown}{AD})$ + m $(\overset{\frown}{BC})$]

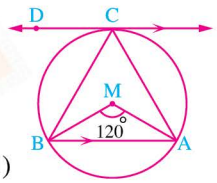
∴ m (∠ AFD) $= \frac{1}{2}$ [160° + 60°] = 110°

(Second req.)

4

[a] ∵ m (∠ ACB)

$= \frac{1}{2}$ m (∠ AMB) = 60°



(inscribed and central angles subtended the same arc $\overset{\frown}{AB}$) (1)

∵ $\overleftrightarrow{CD}$ // $\overline{AB}$

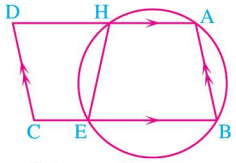
∴ m $(\overset{\frown}{AC})$ = m $(\overset{\frown}{BC})$

∴ AC = BC (2)

From (1) and (2) :

∴ Δ CAB is equilateral. (Q.E.D.)

[b] ∵ $\overline{AB}$ // $\overline{DC}$, $\overleftrightarrow{AD}$ is a transversal to them.



∴ m (∠ A) + m (∠ D) = 180° (1)

but ∠ CEH is an exterior angle of the cyclic quadrilateral ABEH

∴ m (∠ CEH) = m (∠ A) (2)

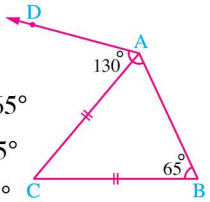
From (1) and (2) :

∴ m (∠ CEH) + m (∠ D) = 180°

∴ HDCE is a cyclic quadrilateral. (Q.E.D.)

5

[a] In Δ ABC :



∵ AC = BC

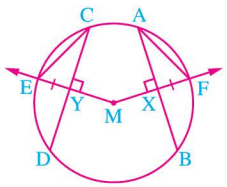
∴ m (∠ BAC) = m (∠ ABC) = 65°

∴ m (∠ CAD) = 130° – 65° = 65°

, ∵ m (∠ B) = m (∠ CAD) = 65°

$\therefore \overrightarrow{AD}$ is a tangent to the circle passing through the vertices of the triangle ABC (Q.E.D.)

[b] $\because$ MF = ME (lengths of two radii)



, XF = YE

$\therefore$ MX = MY

$\because \overline{MX} \perp \overline{AB}$, $\overline{MY} \perp \overline{CD}$

$\therefore$ AB = CD (Q.E.D.1)

$\because \overline{MX} \perp \overline{AB}$

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

$\therefore AX = \frac{1}{2}$ AB , $\because \overline{MY} \perp \overline{CD}$

$\therefore$ Y is the midpoint of $\overline{CD}$

$\therefore CY = \frac{1}{2}$ CD , $\because$ AB = CD

$\therefore$ AX = CY

$\therefore$ In $\Delta\Delta$ AXF , CYE

$$\begin{cases} AX = CY \\ XF = YE \\ m(\angle AXF) = m(\angle CYE) = 90° \end{cases}$$

$\therefore \Delta AXF \equiv \Delta CYE$ $\therefore$ AF = CE (Q.E.D.2)