MBA PRO 2024

QUANTITATIVE APTITUDE

DPP: 20

Circles 3

Q1 What if one circle lie completely outside the other circle then the number of direct common tangent (D) and Transverse common tangent (T) will be :

(A) D = 2, T = 2 (B) D = 1, T = 2
(C) D = 2, T = 1 (D) D = 0, T = 1

Q2 What if two other circle touch each other externally then the number of direct common tangent and transverse common tangent will be :

(A) D = 2, T = 2 (B) D = 2, T = 1
(C) D = 2, T = 0 (D) D = 0, T = 0

Q3 What if two circles touch each other internally then the number of direct and transverse common tangent will be :

(A) D = 1, T = 0
(B) D = 2, T = 1
(C) D = 2, T = 2
(D) D = 0, T = 0

Q4 What if two circles intersect each other at two points then the number of direct and transverse common tangent will be :

(A) D = 2, T = 0 (B) D = 1, T = 1
(C) D = 2, T = 2 (D) D = 0, T = 0

Q5 What if one circle is entirely inside the other circle without touching the outer circle then the number of direct and transverse common tangent.

(A) D = 0, T = 0 (B) D = 1, T = 1
(C) D = 2, T = 2 (D) D = 2, T = 1

Q6 Ritesh a Mathematician draw a pair of circle whose radius are $9cm$ and $5cm$. The distance of the center of the circle is $18cm$ then the length of transverse tangent will be :

(A) $6\sqrt{3}cm$
(B) $8\sqrt{2}cm$
(C) $4\sqrt{3}cm$
(D) $4\sqrt{2}cm$

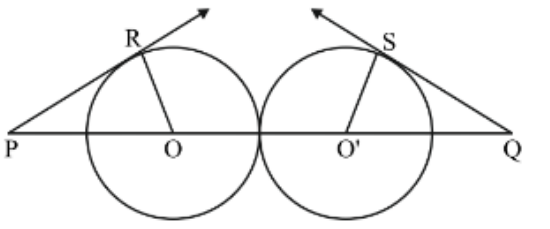
Q7 Ritesh a Mathematician draw a pair of circle of radius 13 cm and 15 cm. The distance between the centre of the circle is 35 cm. Find the length of direct common tangent (in cm)

(A) 17√21 (B) 12√21
(C) √1221 (D) √1421

Q8 Ritesh a Mathematician draw a pair of circle whose direct common tangent and transverse common tangent are 35 and 25 respectively. Find the product of radius of bigger circle to the smaller circle.

(A) 100 cm (B) 150 cm
(C) 180 cm (D) 210 cm

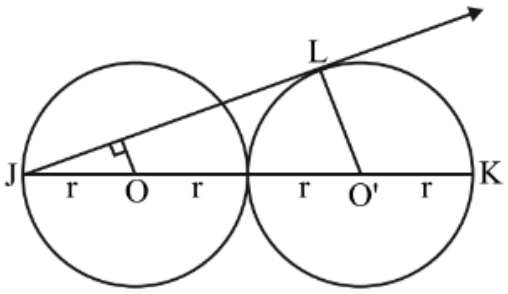
Q9



Find the length of PQ (in cm) if we have OR = 5 cm, PR = 12 cm, O'S = 7 cm and QS = 24 cm. Also,

it is given that O and O' are the centres of the two circles respectively.

Q10



Two equal circle in which JL is a tangent. Find the ratio between the length of JL and JO'.

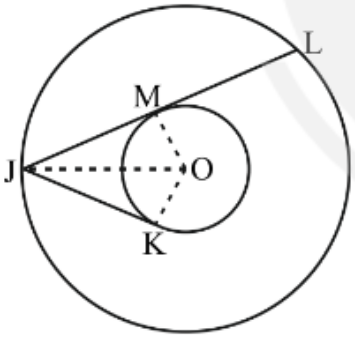
(A) $2\sqrt{2} : 1$

(B) $2\sqrt{2} : \sqrt{3}$

(C) $2\sqrt{2} : 5$

(D) $2\sqrt{2} : 2$

Q11 Rahul draws two concentric circles in such a way that the tangent drawn from a point lying at outer circle, to the inner circle. Find JL if the radius of inner circle and distance between centre (O) and point J is $5cm$ and $12cm$ respectively.



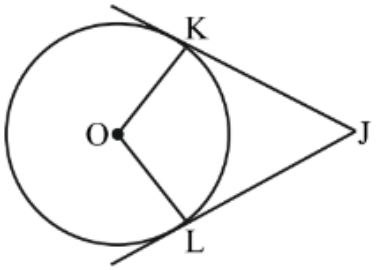
(A) $24cm$

(B) $25cm$

(C) $2 \times \sqrt{119}cm$

(D) $27cm$

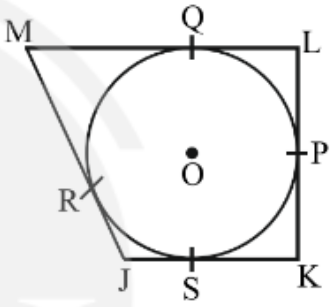
Q12 Sujeet draw a circle in which tangent from point J is draw as shown in the figure. If $OK = 7.5cm$ and KJ and JL are perpendicular to each other. Find the length of JK given that O is the centre of the circle.



(A) $7.5cm$ (B) $8cm$

(C) $8.5cm$ (D) $9cm$

Q13 Praful billore drawn a quadrilateral to circumscribe a circle as shown in figure then which of the following is true :



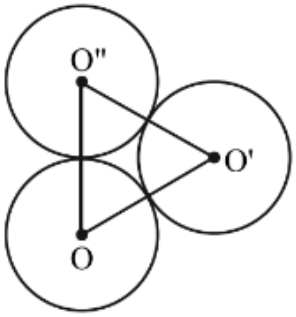
(A) JK + LM = JM + KL

(B) JK = LK

(C) JS – LP = MR

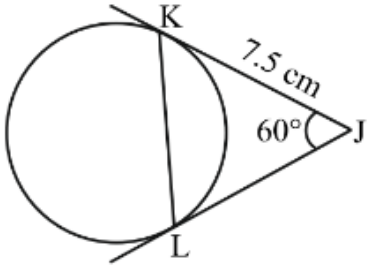
(D) MR + SK = PL

Q14 Aniket draws three circles which touch each other externally as shown in figure. Find the radius of the circle (in cm) with center O' if $OO' = 11cm, O'O'' = 12cm$ and $O''O = 13cm$.



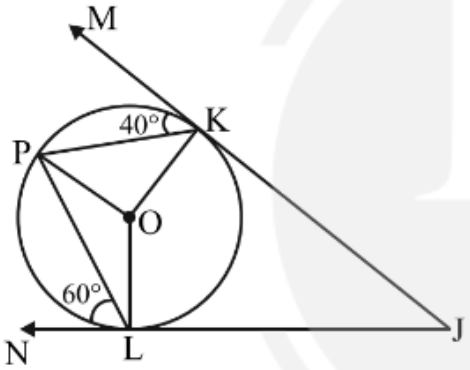
(A) 5 (B) 6
(C) 7 (D) 8

Q15 JK and JL are tangents to the circle given below. Find the length of KL.



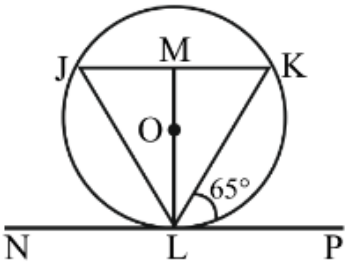
(A) 7.5 cm (B) 6 cm
(C) 8 cm (D) 9.5 cm

Q16 In the figure, JM and JN are tangent at K and L respectively. ∠MKP = 40° and ∠NLP = 60°. Find the measure of ∠LPK.



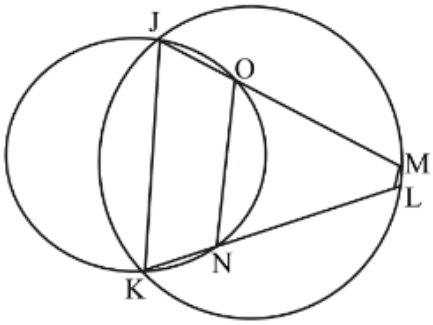
(A) 60° (B) 70°
(C) 80° (D) 90°

Q17 In the given figure NLP is a tangent and $\angle KLP = 65^\circ$ then find the value of $\angle JLK$ if JK $||NP$ given that OM is perpendicular to JK.



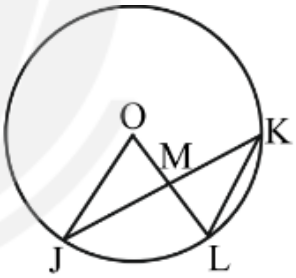
(A) 25° (B) 30°
(C) 40° (D) 50°

Q18 Kiran draw the above figure in which JKLM is a cyclic quadrilateral. A small circle passing through J and K meets JM and KL at O and N respectively, then which of the following is true.



(A) $ON||ML$
(B) $\angle JON = \angle JML$
(C) $JO = ML$
(D) Both (a) and (b)

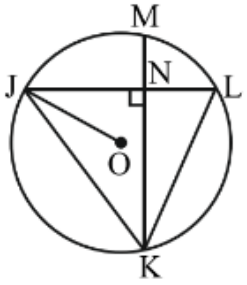
Q19 Barsha draw the following figure in which $\angle JOL = 50^\circ$ and $\angle LMK = 105^\circ$. Find $\angle MLK$.



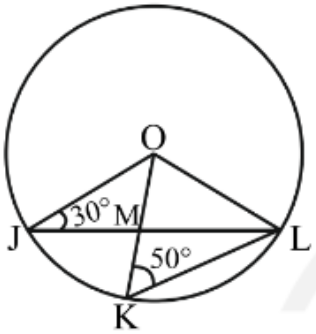
(A) 40° (B) 50°
(C) 60° (D) 70°

Q20 In the following figure, chord JL and MK intersect each other at point N. If $\angle OJK$ is

30°. Find the value of $\angle NKL$ in degrees.

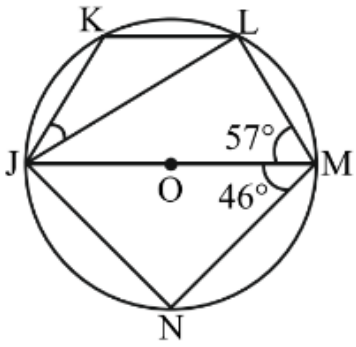


Q21 In the figure, O is the centre of the circle, $\angle OJL = 30^\circ$ and $\angle OKL = 50^\circ$, find $\angle JOK$.



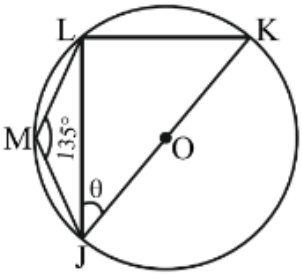
(A) 20°
(B) 30°
(C) 45°
(D) 40°

Q22 Sunil draw the above circle in which JM is the diameter of the circle with centre O. $\angle JML = 57^\circ$, $\angle JMN = 46^\circ$ then find the sum of $\angle MJN, \angle MJL, \angle JLK$ if $KL \| JM$.



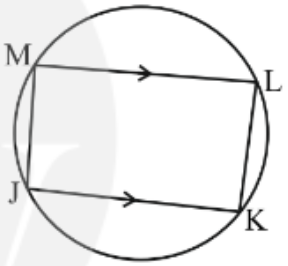
(A) 105°
(B) 112°
(C) 117°
(D) 110°

Q23 Sundar draw the below figure in which JKLM is a cyclic quadrilateral in which JK is the diameter and $\angle JML = 135^\circ$. Find the value of $\angle LJK$.



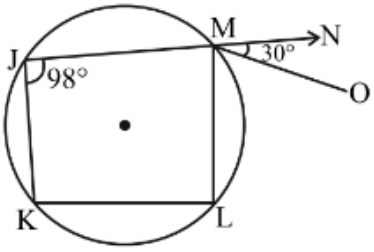
(A) 40° (B) 55°
(C) 50° (D) 45°

Q24 Suket draw this figure in which JKLM in a cyclic quadrilateral in which $JK \| LM$ and $\angle KJM = 96^\circ$ then find the difference of $\angle MLK$ and $\angle JKL$.



(A) 8° (B) 10°
(C) 14° (D) 12°

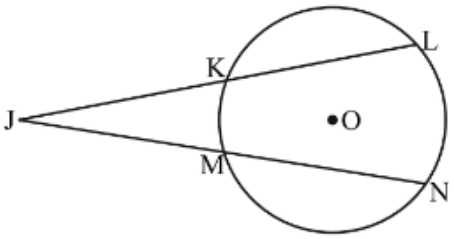
Q25 Alex draw this figure in which JKLM is a cyclic quadrilateral. $\angle NMO = 30^\circ, \angle MJK = 98^\circ$ and $MO \| KL$, then find the value of $\angle JKL$.



(A) 110°
(B) 112°
(C) 114°

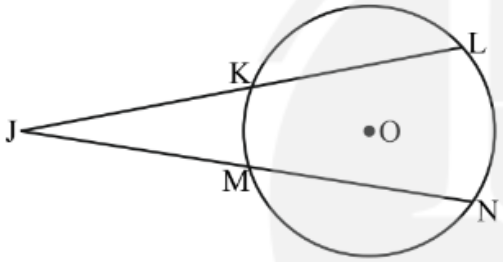
(D) 116°

Q26 In the given figure $JK = 2cm, KL = 6cm, JN = 12\ \ cm$ then find JM.



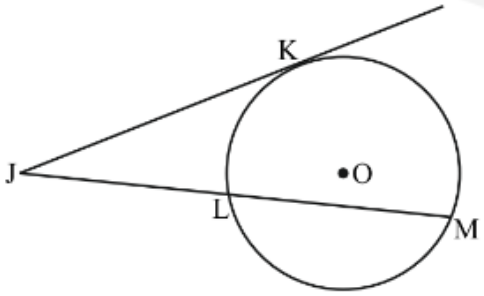
(A) $1.5cm$ (B) $1.72cm$
(C) $1.33cm$ (D) $2cm$

Q27 In the given figure $JL = 12cm, KL = 8cm, JM = \ 4.5cm$ then find the value of JN.



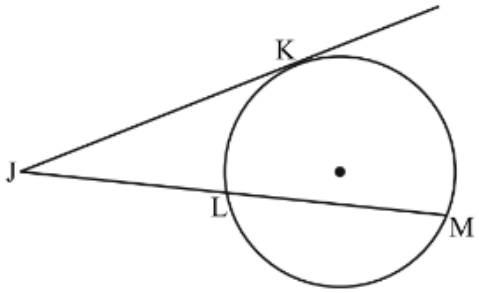
(A) $10.67cm$ (B) $10cm$
(C) $11cm$ (D) $12cm$

Q28 In the given figure, JK is tangent, JM is secant where $JK = a, JL = b$ and $LM = c$ then which of the following is true.



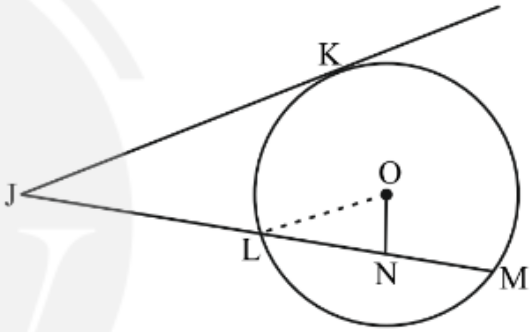
(A) $(a + b)(a - b) = 0$
(B) $a^2 = b \times c$
(C) $(a + b)(a - b) = bc$
(D) $a^2 = \frac{bc}{c}$

Q29 In the given figure, $JK = 3.5cm, JM = 10cm$ then find the length of JL.



(A) $1.025cm$ (B) $2.325cm$
(C) $1.275cm$ (D) $1.225cm$

Q30 In the given figure, $JK = 14cm, JL = 7cm$ and the radius of circle is $14.5cm$ then find the length (in cm) of the perpendicular drawn on chord LM from centre O in cm.



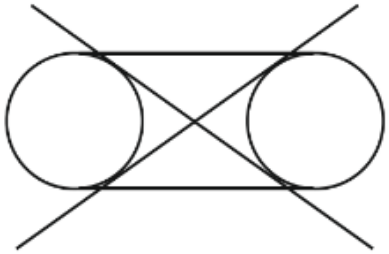
Answer Key

Q1	(A)
Q2	(B)
Q3	(A)
Q4	(A)
Q5	(A)
Q6	(B)
Q7	(C)
Q8	(B)
Q9	50
Q10	(B)
Q11	(C)
Q12	(A)
Q13	(A)
Q14	(A)
Q15	(A)
Q16	(C)
Q17	(D)
Q18	(D)
Q19	(B)
Q20	30
Q21	(D)
Q22	(D)
Q23	(D)
Q24	(D)
Q25	(B)
Q26	(C)
Q27	(A)
Q28	(C)
Q29	(D)
Q30	10

Hints & Solutions

Q1 Text Solution:

The figure looks like that,

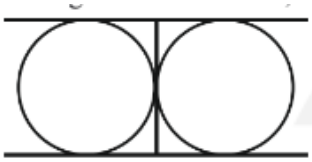


Here direct tangent (D) = 2

Transverse tangent (T) = 2

Q2 Text Solution:

The figure looks like that,



Direct tangent = 2

Transverse tangent = 1

Q3 Text Solution:

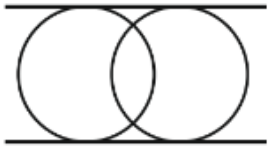
The figure looks like that,

Direct common tangent = 1

Transverse common tangent = 0

Q4 Text Solution:

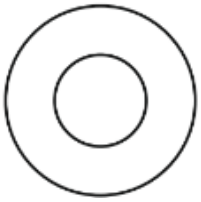
The figure looks like that,



Direct tangent = 2

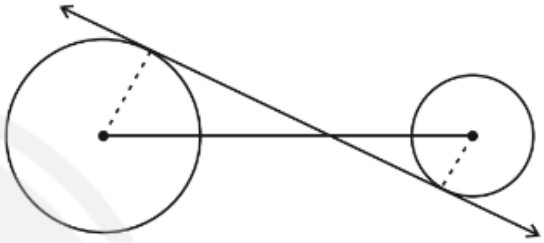
Transverse = 0

Q5 Text Solution:



In this case there is no direct or transverse common tangent.

Q6 Text Solution:



Here we have a direct formula to find the length of transverse common tangent.

$$\Rightarrow \sqrt{d^2-(r_2+r_1)^2}$$

Where $d =$ distance between the centres

$r_2 =$ radius of smaller circle

$r_1 =$ radius of bigger circle

$r_1 = 9cm$

$r_2 = 5cm$

$d = 18cm$

$$\Rightarrow \sqrt{(18)^2-(9+5)^2}$$

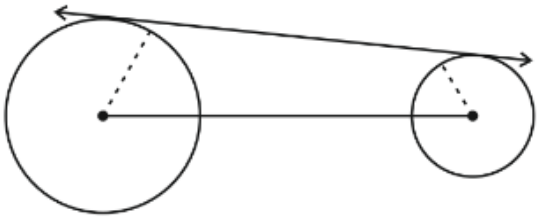
$$\Rightarrow \sqrt{(18)^2-(14)^2}$$

$$\Rightarrow \sqrt{324-196}$$

$$= \sqrt{128}$$

$$= 8\sqrt{2}cm$$

Q7 Text Solution:



Length of direct common tangent,

$$\Rightarrow \sqrt{(d)^2-(r_1-r_2)^2}$$

where $d=$ distance between the centre,

$r_1=$ radius of bigger circle
$r_2=$ radius of smaller circle
$\Rightarrow \sqrt{(d)^2-(r_1-r_2)^2}$
$\Rightarrow \sqrt{(35)^2-(15-13)^2}$
$\Rightarrow \sqrt{1225-4}$
$=\sqrt{1221}$

Q8 Text Solution:

For direct common tangent

$$=\sqrt{d^2-(R-r)^2}$$

For transverse common tangent

$$=\sqrt{d^2-(R+r)^2}$$

on sq. both equation and subtract second from 1 we get,

$\left(\sqrt{d^2-(R-r)^2}\right)^2-\left(\sqrt{d^2-(R+r)^2}\right)^2$
$\Rightarrow 4Rr \Rightarrow (35)^2-(25)^2$
$\Rightarrow 4Rr=1225-625$
$\Rightarrow 4Rr=600$
$\Rightarrow Rr=150cm$

Q9 Text Solution:

Topic - Circles

In $\triangle POR$

$PO^2=PR^2+OR^2=12^2+5^2=169$
$PO=13cm$

In $\triangle QSO'$

$QO'^2=QS^2+O'S^2=7^2+24^2=625$
$QO'=25cm$
$PQ=PO+OO'+O'Q$
$=13+(5+7)+25$
$=13+12+25=50cm$

Q10 Text Solution:

In $\triangle JO'L$,

$JL^2+O'L^2=JO'^2$
$JL^2+r^2=(3r)^2$
$JL^2=9r^2-r^2$
$JL^2=8r^2$

$JL=2\sqrt{2}r$
Required ratio $=JL:JO' \Rightarrow 2\sqrt{2}r:3r$
$=2\sqrt{2}:3$

Q11 Text Solution:

In $\triangle JOK$,

$JO^2=OK^2+JK^2$
$JK^2 \Rightarrow 12^2-5^2=119$
$JK=\sqrt{119}cm$
$JK=JM(\text{ Tangent })$
$OM \perp JL$
$So, JM=ML=13cm$
$JL=JM+ML$
$JL=2\times\sqrt{119}cm$

Q12 Text Solution:

Here $KJ \perp JL$,
OK and OL are radius and perpendicular to the tangent.

$\angle OKJ + \angle KJL + \angle JLO + \angle LOK = 360$
$90 + 90 + 90 + \angle LOK = 360$
$\angle LOK = 360 - 270 = 90$

All angles are equal, so it can be a square or a rectangle but $OK = OL$ as radius. So now we can say that $OKJL$ is a square.
So, $OK = OL = KJ = JL = 7.5cm$

Q13 Text Solution:
Here, MQ = MR, LQ = LP, JR = JS, KS = KP.
JK + LM = JS + SK + LQ + MQ
JK + LM = JR + KP + LP + MR
JK + LM = JM + KL

Q14 Text Solution:
Let the radius with centre O, O' and O" are a, b and
c. then
a + b = 11 cm
b + c = 12 cm
c + a = 13 cm
2(a + b + c) = 36
a + b + c = 18
Here we have to find the value of b.
b = (a + b + c) – (a + c)
b = 18 – 13
b = 5

Q15 Text Solution:
In the figure, JK and JL are tangent and are equal so in $\triangle JKL$,

$$\angle JKL + \angle JLK + \angle KJL = 180^\circ$$
$$2\angle JKL = 180 - 60$$
$$\angle JKL = 60 = \angle JLK$$

each angle of the triangle is equal (60°) so $KL = 7.5\ cm.$

Q16 Text Solution:
OL and OK are radius and $\perp$ to JM and NJ.

$\angle PKO = 90 - 40^\circ = 50^\circ$
$\angle PLO = 90 - 60^\circ = 30^\circ$
$\angle PKO = \angle OPK = \text{ radius } = 50^\circ$
$\angle PLO = \angle OPL = \text{ radius } = 30^\circ$
$\angle LPK = 30^\circ + 50^\circ = 80^\circ$

Q17 Text Solution:
Here JK $\|LP$, So $\angle JKL = \angle KLP = 65^\circ$
$OM \perp JK$ So, JM $= MK$
$\Delta LKM \cong \Delta LMJ$ So, $\angle KLM = \angle MLJ$
$\angle KLM = 90 - 65^\circ = 25^\circ$
$\angle MLJ = 25^\circ$
$\angle JLK = 25 + 25 = 50^\circ$

Q18 Text Solution:
In cyclic quadrilateral JKNO

$$\angle JKN + \angle JON = 180^\circ$$

In cyclic quadrilateral JKLM,

$$\angle JKL + \angle JML = 180^\circ$$

From eq. (1) and (2) we get

$$\angle JKN + \angle JON = \angle JKL + \angle JML$$
$$\Rightarrow \angle JON = \angle JML$$

It is only possible if $ON \| ML$

Q19 Text Solution:
$\angle JOL = 50^\circ$
$\angle JKL = \frac{1}{2} \times 50 = 25^\circ$
$\angle LMK = 105^\circ$
In $\triangle MLK$,

$\angle MLK + \angle LMK + \angle MKL = 180^\circ$
$\angle MLK + 105 + 25 = 180^\circ$
$\angle MLK = 180 - 130$
$\angle MLK = 50^\circ$

Q20 Text Solution:

Meet O to K

Then $OJ = OK$ (radius)

$$\angle OJK = \angle OKJ = 30^\circ$$
$$\angle JOK = 180 - 2 \times 30^\circ = 120^\circ$$
$$\angle JLK = \frac{1}{2} \times \angle JOK = \frac{1}{2} \times 120 = 60^\circ$$

In $\triangle NKL$,

$$\angle NKL = 180 - 90 - 60^\circ$$
$$\angle NKL = 30^\circ$$

Q21 Text Solution:

$OJ = OL =$ (radius)

$\angle OJL = \angle OLJ = 30^\circ$

$\angle JOL = 180^\circ - 2 \times 30 = 120^\circ$

$OK = OL =$ (radius)

$\angle OKL = \angle OLK = 50^\circ$

$\angle KOL = 180 - 2 \times 50 = 80^\circ$

$\angle JOK = \angle JOL - \angle KOL$

$= 120 - 80$

$= 40^\circ$

Q22 Text Solution:

In $\triangle JLM$

$$\Delta MJL = 180 - 90 - 57 \Rightarrow 33^\circ$$

In $\triangle JNM$,

$$\triangle MJN = 180 - 90 - 46 \Rightarrow 44^\circ$$

$KL \| JM$ So, $\angle KLJ = \angle LJM = 33^\circ$

So, required sum $\Rightarrow 33 + 44 + 33$

$$\Rightarrow 110^\circ$$

Q23 Text Solution:

Here JKLM is a cyclic quadrilateral,

$$\angle JML + \angle JKL = 180^\circ$$
$$\angle JKL = 180 - 135 \Rightarrow 45^\circ$$

In $\triangle JLK$,

$$\angle LJK = 180 - 90 - 45$$
$$= 45^\circ$$

Q24 Text Solution:

$\angle KJM = 96^\circ$

$\angle KLM = 180$

$- 96$ (Opposite angle sum in cyclic

$\Rightarrow 84^\circ$ quadrilateral)

$\angle JML = 180 - \angle MJK$ (co-interior)

$= 180 - 96$

$= 84^\circ$

$\angle JML + \angle JKL$

$= 180^\circ$ (Opposite angle sum in cyclic quadrilateral)

$\angle JKL = 180 - 84 = 96^\circ$

required difference $= 96 - 84 = 12^\circ$

Q25 Text Solution:

$\angle KJM + \angle KLM = 180^\circ$

$\angle KLM = 180 - 98 = 82^\circ$

$KL \| MO$ So,

$\angle KLM = \angle LMO = 82^\circ$

$\angle NMO + \angle OML + \angle LMJ$

$= 180^\circ$ (Linear Pair)

$\angle LMJ = 180 - 30 - 82$

$\angle LMJ = 68^\circ$

$\angle JKL + \angle LMJ = 180$

$\angle JKL = 180 - 68$

$\angle JKL = 112^\circ$

Q26 Text Solution:

$\Rightarrow JK \times JL = JM \times JN$

$\Rightarrow 2 \times 8 = JM \times 12$

$\Rightarrow JM = \frac{16}{12} = \frac{4}{3} = 1.33cm$

Q27 Text Solution:

$\Rightarrow JK \times JL = JM \times JN$
$\Rightarrow 4 \times 12 = 4.5 \times JN$
$\Rightarrow JN = \dfrac{4 \times 12}{4.5} = 10.6666\ldots.67$
$\Rightarrow JN = 10.67cm$

Q28 Text Solution:

By Tangent secant theorem

$JK^2 = JL \times JM$
$JK = a, JL = b, JM = (b + c)$
$a^2 = b \times (b + c)$
$a^2 = b^2 + bc$
$a^2 - b^2 = bc$
$(a + b)(a - b) = bc$

Q29 Text Solution:

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By using tangent secant theorem,

$JK^2 = JL \times JM$
$(3.5)^2 = JL \times 10cm$
$12.25 = JL \times 10cm$
$JL = \dfrac{12.25}{10} = 1.225cm$

Q30 Text Solution:

By using tangent secant theorem,

$\Rightarrow JK^2 = JL \times JM$
$\Rightarrow (14)^2 = 7 \times JJ$
$JM = 28cm$
$LM = JM - JL = 28 - 7 = 21cm$
$ON \perp LM$ So $LN = \dfrac{CM}{2} = \dfrac{21}{2} = 10.5cm$
$OL^2 = ON^2 + LN^2$
$(14.5)^2 = ON^2 + (10.5)^2$
$ON = 10cm.$