

EUCLIDEAN GEOMETRY MEMO GRADE 11

Practice Questions on Theorem 1

Question 1

Statement	Reason
(a) $AB = BC = 4$	Perp from centre to chord.
(b) $BC = 4$ $OC^2 = (3)^2 + (4)^2$ $\therefore OC^2 = 25$ $\therefore OC = 5$	Proved

Question 2

Statement	Reason
$AB = 8$ $\hat{O}BA = 90^\circ$ $OB^2 = (17)^2 - (8)^2$ $\therefore OB^2 = 225$ $\therefore OB = 15$	Given Line from centre to midpoint of chord Pythagoras

2014 Gauteng Preliminary Paper 2 Q 9

5.1	perpendicular	✓ answer
5.2	OD is perpendicular to AB AD = DB = 9 $CD^2 + DB^2 = CB^2$ $CD = \sqrt{576 - 81}$ $CD = 3\sqrt{55}$	✓ line from center to midpoint of chord ✓ given ✓ Pythagoras theorem ✓ answer
5.3	$3\sqrt{55} = 3DE$ $DE = \sqrt{55}$	✓ expression ✓ answer

Questions on Theorem 2

Question 1 a)

STATEMENT	REASON
$x = 30^\circ$	$\angle$ at centre = $2 \times \angle$ at circumference

Question 1 b)

STATEMENT	REASON
$x = 48^\circ$	$\angle$ at centre = $2 \times \angle$ at circumference

Question 1 c)

STATEMENT	REASON
$x = 20^\circ$	$\angle$ at centre = $2 \times \angle$ at circumference

Question 1 d)

STATEMENT	REASON
$x = 18^\circ$	$\angle$ at centre = $2 \times \angle$ at circumference

Question 1 e)

STATEMENT	REASON
$m = 62^\circ$	$\angle$ opp equal sides
$62^\circ + 62^\circ + x = 180^\circ$ $x = 56^\circ$	Sum of $\angle$ in a Δ
$y = z = 28^\circ$	$\angle$ at centre = $2 \times \angle$ at circumference

Question 1 f)

STATEMENT	REASON
$m = 22^\circ$	Alt $\angle$ s AC OB
$n = 11^\circ$	$\angle$ at centre = $2 \times \angle$ at circumference

Questions on Theorem 3

Question 3 a)

STATEMENT	REASON
$Q = 90^\circ$	$\angle$ s in a semi circle
$55^\circ + 90^\circ + x = 180^\circ$ $x = 35^\circ$	Sum of $\angle$ s in a triangle

Question 3 b)

STATEMENT	REASON
$B = 90^\circ$	$\angle$ s in a semi circle
$52^\circ + x = 90^\circ$ $x = 38^\circ$	

Questions 3 c)

STATEMENT	REASON
$A = x$	$\angle$ s opp equal sides (equal radii)
$A + x + 104 = 180^\circ$ $2x + 104 = 180$ $2x = 76^\circ$ $x = 38^\circ$	sum of $\angle$ s in a triangle

Questions on Theorem 4

Question 4 a)

STATEMENT	REASON
$y = 22^\circ$	$\angle$ s in the same segment
$x = 18^\circ$	$\angle$ s in the same segment

Question 4 b)

STATEMENT	REASON
$y = x = 16^\circ$	$\angle$ s in the same segment

Question 4 c)

STATEMENT	REASON
$E = 35^\circ$	Alt $\angle$ s $DE \parallel GF$
$x = 35^\circ$	$\angle$ s in the same segment

Question 4 d)

STATEMENT	REASON
$k = 24^\circ$	Equal chords subtend equal angles

Question 4 e)

STATEMENT	REASON
$x = 70^\circ$	$\angle$ at centre = $2 \times \angle$ at circumference
$y = x = 70^\circ$	Equal chords subtend equal angles

Question on theorem 5

Question 5 a)

STATEMENT	REASON
$x = 97^\circ$	opp $\angle$ s of a cyclic quad
$y = 75^\circ$	opp $\angle$ s of a cyclic quad

Question 5 b)

STATEMENT	REASON
$x = 88^\circ$	opp $\angle$ s of a cyclic quad
$z + 88^\circ + 62^\circ = 180^\circ$ $z = 30^\circ$	Sum of $\angle$ s in a triangle
$y + 82^\circ + 40^\circ = 180^\circ$ $y = 58^\circ$	Sum of $\angle$ s in a triangle

Question 5 c)

STATEMENT	REASON
$y + 110^\circ = 180^\circ$ $y = 70^\circ$	opp $\angle$ s of a cyclic quad
$\angle PSQ = x$ $x + \angle PSQ + 110^\circ = 180^\circ$ $2x = 70^\circ$ $x = 35^\circ$	$\angle$ s opp equal sides Sum of $\angle$ s in a triangle
$\angle RQQ = m$ $m + \angle RQQ + 70^\circ = 180^\circ$ $2m = 110^\circ$ $m = 55^\circ$	$\angle$ s opp equal sides Sum of $\angle$ s in a triangle

Questions on Theorem 6

Question 6 a)

STATEMENT	REASON
$x = 110^\circ$	Ext $\angle$ of a cyclic quad equal to the interior opp angle

Question 6 b)

STATEMENT	REASON
$x = 85^\circ$	Ext $\angle$ of a cyclic quad equal to the interior opp angle

Question 6 c)

STATEMENT	REASON
$x = 125^\circ$	Ext $\angle$ of a cyclic quad equal to the interior opp angle
$y = 90^\circ$	$\angle$ s in a semi circle
$B_1 + 125^\circ = 180$ $B_1 = 55^\circ$	opp $\angle$ s of a cyclic quad
$90^\circ + 55^\circ + z = 180^\circ$ $z = 35^\circ$	Sum of $\angle$ s in a triangle

Questions on Theorem 7

Questions on Theorem 7 a)

STATEMENT	REASON
$\angle OBT = 90^\circ$ $x + 35^\circ + 90^\circ = 180^\circ$ $x = 55^\circ$	Rad perp to tangent Sum of $\angle$ s in a triangle

Questions on Theorem 7 b)

STATEMENT	REASON
$x + 40^\circ = 90^\circ$ $x = 50^\circ$ $y = 90^\circ$ $50^\circ + 90^\circ + m = 180^\circ$ $m = 40^\circ$	Rad perp to tangent $\angle$ s in a semi circle Sum of $\angle$ s in a triangle

Questions on Theorem 7 c)

STATEMENT	REASON
$y = 70^\circ$ $\angle CBA = 70^\circ$ $\angle CBA + m = 90^\circ$ $70^\circ + m = 90^\circ$ $m = 20^\circ$ $\angle OBD = \angle ODB$ $\angle OBD + \angle ODB + 140^\circ = 180^\circ$ $2\angle ODB = 40^\circ$ $\angle ODB = 20^\circ$ $x + \angle ODB = 90^\circ$ $x + 20^\circ = 90^\circ$ $x = 70^\circ$	$\angle$ at center = $2 \times \angle$ at circum Alt $\angle$ s $CD \parallel AT$ Rad perp to tangent $\angle$ s opp equal radii Sum of $\angle$ s in triangle Rad perp to tangent

Question 8 a)

STATEMENT	REASON
$PA = PT$	Tangents drawn from same point
$a = T_3$	$\angle$ s opp equal sides
$a + T_3 + 50^\circ = 180^\circ$ $2a = 130$ $a = 65^\circ$	Sum of $\angle$ s in a triangle
$A_2 + a = 90^\circ$ $A_2 + 65^\circ = 90^\circ$ $A_2 = 25^\circ$ $A_2 = T_3$ $A_2 + T_3 + b = 180^\circ$ $25^\circ + 25^\circ + b = 180^\circ$ $b = 130^\circ$	Rad perp tang $\angle$ s opp equal sides Sum of $\angle$ s in a triangle
$c = 65^\circ$	$\angle$ at center = $2 \times \angle$ at circum

Question 9

a)

STATEMENT	REASON
$y = 70^\circ$	Tan chord
$x = 60^\circ$	Tan chord

b)

STATEMENT	REASON
$y = 40^\circ$	Tan chord theorem
$x = 100^\circ$	Tan chord theorem

c)

STATEMENT	REASON
$CT = PT$	Tangents drawn from same point
$r = 67^\circ$	$\angle$ s opp equal sides
$67^\circ + 67^\circ + s = 180^\circ$	Sum of $\angle$ s in a triangle
$s = 46^\circ$	Tan-chord theorem
$p = 67^\circ$	
$p = P_1 = 67^\circ$	$\angle$ s opp equal radii/equal sides
$67^\circ + 67^\circ + z = 180^\circ$	Sum of $\angle$ s in a triangle
$z = 46^\circ$	
$q = 23^\circ$	$\angle$ at center = $2 \times \angle$ at circum

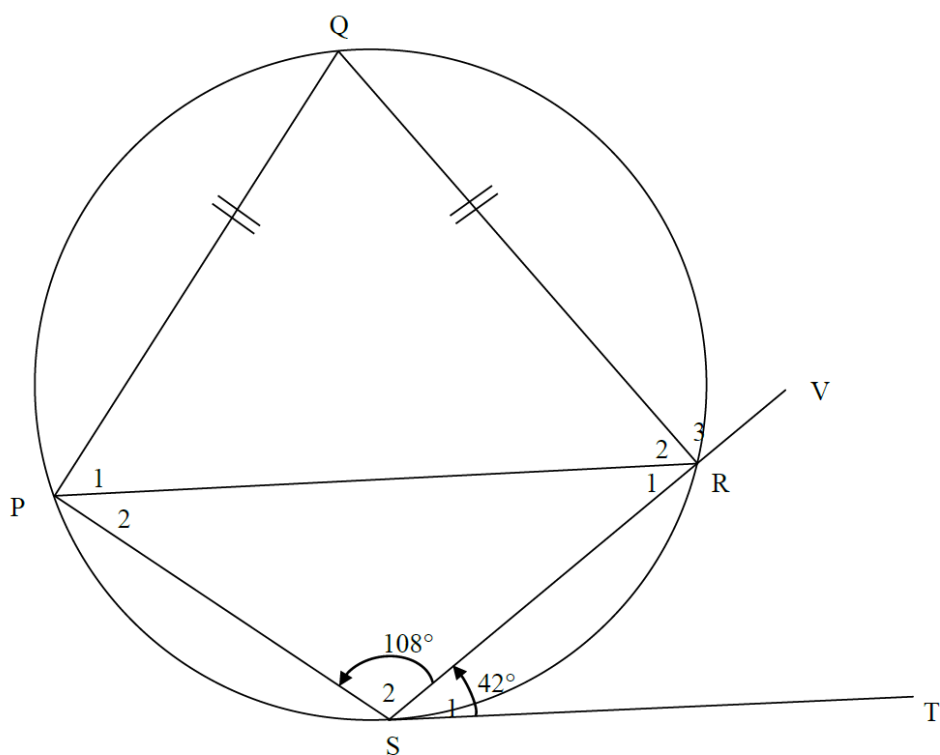
$$x = 23^\circ$$

Tan-chord theorem

2022 KwaZulu Natal Preliminary Paper 2 Q 8

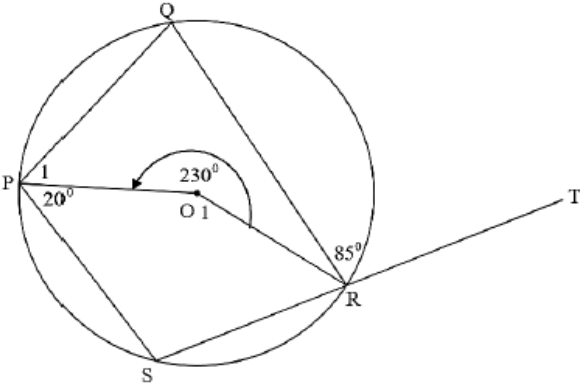
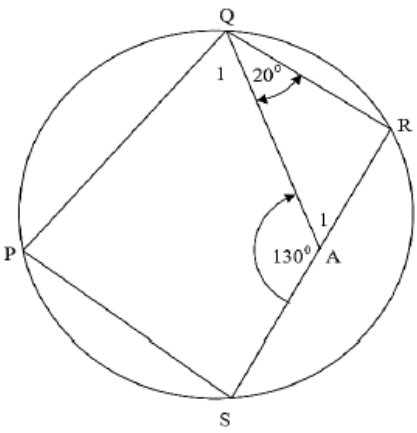
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2017 March Paper 2 Q 8



8.1	$\hat{Q} = 72^\circ$ [opp $\angle$ s of cyclic quad/teenoorst $\angle$ e koordevh]	✓ S ✓ R (2)
8.2	$\hat{R}_2 = \hat{P}_1$ [$\angle$ s opp equal sides/ $\angle$ e teenoor gelyke sye] $\hat{R}_2 = \frac{180^\circ - 72^\circ}{2}$ [sum of $\angle$ s in Δ /som v $\angle$ e in Δ] $= 54^\circ$	✓ S/R ✓ answer (2)
8.3	$\hat{P}_2 = 42^\circ$ [tan chord theorem/raakl-koordst]	✓ S ✓ R (2)
8.4	$\hat{R}_3 = \hat{P}_1 + \hat{P}_2$ [ext $\angle$ of cyclic quad/buite $\angle$ van koordevh] $= 54^\circ + 42^\circ$ $= 96^\circ$ OR/OF $\hat{R}_1 = 180^\circ - 108^\circ - 42^\circ = 30^\circ$ [sum of/som van $\angle$ s/e in Δ] $\hat{R}_3 = 180^\circ - \hat{R}_1 - \hat{R}_2$ [$\angle$ s on str line/ $\angle$ e op reguitlyn] $= 180^\circ - 30^\circ - 54^\circ$ [sum of/som van $\angle$ s/e in Δ] $= 96^\circ$	✓ R ✓ S ✓ $\hat{R}_1 = 30^\circ$ ✓ S (2) [8]

2024 Eastern Cape November Paper 2 Q 9.2

9.2				
9.2.1	$\hat{S} = 115^\circ$ [$\angle$ at the centre = $2 \times \angle$ at the circumference] [Middelpunts $\angle = 2 \times$ Omtreks $\angle$]	✓ S	✓ R	(2)
9.2.2	$\hat{Q} = 65^\circ$ [opposite $\angle$ s of cyclic quad] [teenoorst. $\angle$ e van 'n koordevierhoek]	✓ S	✓ R	(2)
9.2.3	$\hat{P}_1 + 20^\circ = 85^\circ$ [ext. $\angle$ of cyclic quad] [buite. $\angle$ van 'n koordevierhoek] $\hat{P}_1 = 65^\circ$	✓ S	✓ R	(2)
9.3				
9.3.1	$\hat{A}_1 = 50^\circ$ [$\angle$ s in a str. line] / [$\angle$ op 'n reguitlyn] $\hat{R} = 110^\circ$ [$\angle$ s in a Δ] / [$\angle$ in 'n driehoek] $\hat{P} = 70^\circ$ [opp $\angle$ s of a cyclic quad] [teenoorst. $\angle$ e van 'n koordevierhoek] OR/OF $\hat{R} = 130^\circ - 20^\circ = 110^\circ$ [ext $\angle$ of a Δ] / [buite $\angle$ van Δ] $\hat{P} = 70^\circ$ [opp. $\angle$ s of a cyclic quad] / [teenoorst. $\angle$ e van 'n kv]	✓ S		
		✓ S		
		✓ S	✓ R	
			OR/OF	
		✓ S	✓ R	
		✓ S	✓ R	(4)
				[15]

2008 November Paper 3 Q 7

7.1.1 equal to twice the angle subtended by the same chord at the circle.

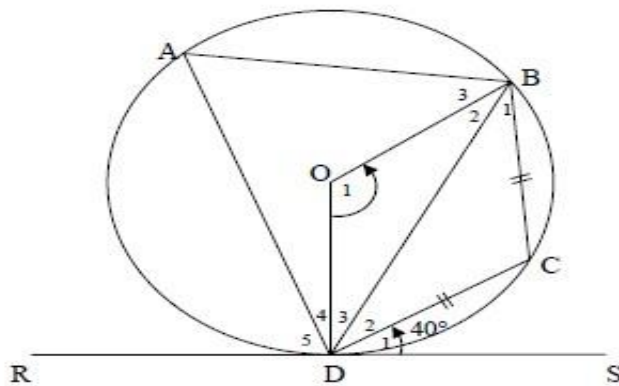
✓ answer (1)

7.1.2 equal to the angle subtended by the same chord in the alternate segment.

✓ answer (1)

7.1.3 supplementary.

✓ answer (1)



7.2.1 $\hat{D}_1 = \hat{B}_1 = 40^\circ$... (angle between tangent and chord)
 $\therefore \hat{D}_2 = \hat{B}_1 = 40^\circ$... (CD = CB)

✓ statement & reason
 ✓ statement (2)

7.2.2 $\therefore \hat{C} = 180^\circ - (40^\circ + 40^\circ)$
 $= 100^\circ$... (angle sum of triangle)

✓ statement $\hat{C} = 100^\circ$ (1)

7.2.3 $\hat{A} = 180^\circ - 100^\circ$
 $= 80^\circ$... (Opposite angles of a cyclic quad are supp.)

✓ statement $\hat{A} = 80^\circ$ (1)

7.2.4 $\hat{O}_1 = 2\hat{A} = 160^\circ$... (angle at the centre is twice...)

✓ statement $\hat{O}_1 = 160^\circ$
 ✓ reason (2)

ALTERNATIVE

From 7.2.1 $\hat{D}_2 = \hat{B}_1 = 40^\circ$

Now $\hat{D}_3 = 90^\circ - (40^\circ + 40^\circ) = 10^\circ$... (tan $\perp$ radius)

$\therefore \hat{O}_1 = 180^\circ - (10^\circ + 10^\circ) = 160^\circ$... (sum of angles in triangles)

✓ $\hat{D}_3 = 10^\circ$

✓ $\hat{O}_1 = 160^\circ$

(2)
 [9]

2021 Gauteng November Paper 2 Q 10

10.1			
10.1.1	$\angle O_1 = 2\theta$ ($\angle$ at the centre = 2x the $\angle$ at the circumference)	✓ statement ✓ reason	(2)
10.1.2	$\angle W = \theta$ ($\angle$ s in the same seg)	✓ statement ✓ reason	(2)
10.1.3	$\angle Z = 90^\circ$ ($\angle$ in a semi-circle) $\angle Y_2 = 90 - \theta$ (sum of $\angle$ s in a Δ)	✓ statement & reason ✓ statement & reason	(2)
10.2	$WY^2 = WZ^2 + YZ^2$ (Pythagoras theorem) $YZ = WU = UZ$ (given) $\therefore OW = OY = r$ (given) $\Rightarrow YZ = \sqrt{\frac{4r^2}{5}} = \frac{4r}{\sqrt{5}}$	✓ statement & reason ✓ statement & reason ✓ statement & reason $YZ = \sqrt{\frac{4r^2}{5}}$ OR $YZ = \frac{4r}{\sqrt{5}}$ ✓	(4)
10.3	$OW = OV = r = OU + OV$ (radii) $r^2 = 3^2 + 4^2$ (Pythagoras theorem) $r = 5$ cm $\therefore UV = 5 - 2 = 3$ cm	✓ statement ✓ reason $r^2 = 3^2 + 4^2$ ✓ $r = 5$ cm ✓ ✓ answer	(2)
			[12]

2015 Western Cape Preliminary Paper 2 Q 8

QUESTION/ VRAAG 8

8.1	Line from centre to midpt of chord OR Line from centre bisects chord	✓ reason	(1)
8.2	$\hat{B} = 43^\circ$ [$\angle$ s in same segment]	✓ S ✓ R	(2)
8.3	$\hat{BAD} = 90^\circ$ [$\angle$ in semi-circle] $= \hat{E}_1$	✓ S ✓ R	(2)
8.4	BD = 28 units $\therefore \cos 43^\circ = \frac{AB}{28}$ $\therefore AB = 28 \cos 43^\circ = 20,48$ units	✓ correct ratio ✓ answer	(2)
			[7]

2020 Gauteng Preliminary Paper 2 Q 8

8.1.1	$\hat{A}DC = 67^\circ$ OR / OF $\hat{B}_2 + \hat{B}_3 = 113^\circ$ $\hat{A}DC = 67^\circ$	ext. $\angle$ of cyclic quad / buite $\angle$ van kvh $\angle^s$ straight line / $\angle^e$ op reguit lyn opp $\angle^s$ of cyclic quad / oorst $\angle^e$ van kvh	$\checkmark$ S $\checkmark$ R OR / OF $\checkmark$ S $\checkmark$ R (2)
8.1.2	$\hat{C} = 180^\circ - 67^\circ$ $= 113^\circ$	co-int $\angle^s$ $BC \parallel AD$ / ko-binne $\angle^e$ $BC \parallel AD$	$\checkmark$ S/R (1)
8.1.3	$\hat{A} = 67^\circ$	opp $\angle^s$ of cyclic quad / alt $\angle^s$ $BC \parallel AD$ / alt $\angle^s$ $EC \parallel AD$ oorst $\angle^e$ van kvh / verwisselende $\angle^e$ $BC \parallel AD$ / verwis $\angle^e$ $EC \parallel AD$	$\checkmark$ S/R (1)
8.1.4	$\hat{B}_2 = 67^\circ$ $\hat{D}_2 = 180^\circ - 67^\circ - 67^\circ$ $= 46^\circ$	$\angle^s$ opposite = sides / $\angle^e$ teenoor = sye sum of $\angle^s$ in Δ / som vd $\angle^e$ v Δ	$\checkmark$ S $\checkmark$ R $\checkmark$ S (3)
8.1.5	$\hat{B}DG = 113^\circ$ OR / OF $\hat{D}_1 = 67^\circ$ $\hat{B}DG = 113^\circ$	tan chord theorem / raaklyn koordstelling tan chord theorem / raaklyn koordstelling	$\checkmark$ S $\checkmark$ R OR / OF $\checkmark$ R $\checkmark$ S (2)

8.2	$\hat{B}_3 = \hat{D}_2 = 46^\circ$ $AB = CD$ OR/OF $\hat{ADC} = \hat{A}$ $AB = CD$	alt $\angle^s BC \parallel AD$ / <i>verwisselende $\angle^e$ $BC \parallel AD$</i> $\angle^s$ subtend = chords / $\angle^e$ <i>onderspan = koorde</i> both = 67° sides opp equal angles in trapezium ABCD / <i>sye teenoor gelyke hoeke in trapesium ABCD</i>	✓S ✓R OR/OF ✓S ✓R (2)
			[11]

2010 March Paper 3 Q 8

8.1	Equal to 360°	✓ answer (1)
8.2.1	$\text{reflex } \hat{O} = 360^\circ - 100^\circ = 260^\circ$ ($\angle$'s round a point) $2\hat{LMN} = \text{reflex } \hat{O}$ ($\angle$ circ centre = 2 $\angle$ circumference) $\therefore \hat{LMN} = \frac{260^\circ}{2} = 130^\circ$	✓ $\text{reflex } \hat{O} = 260^\circ$ ✓ reason ✓ $\hat{LMN} = 130^\circ$ (3)
8.2.2	$\hat{N}_1 = \frac{180^\circ - 130^\circ}{2} = 25^\circ$ (base angles LM = MN) $\therefore \hat{K} = 25^\circ$ (angles in same segment)	✓ = 25° ✓ answer ✓ reason (3) [7]

2010 March Paper 3 Q 9

9.1	Is equal to the angle subtended by the chord in the alternate segment	✓ answer (1)
9.2.1	$\hat{A}_2 = x$ (tangent chord theorem) $\hat{A}_5 = x$ (vertically opp. angles) $\hat{P}_2 = x$ (tangent chord theorem)	✓ answer ✓ reason ✓ answer ✓ answer ✓ reason (5)
9.2.2	$PT = TA$ (tangents drawn from same point) $\hat{P}_1 = \hat{A}_3$ (angles opp equal sides) ; $PT = TA$ $\hat{A}_3 = \hat{A}_6$ (vertical opp angles) $\hat{A}_6 = \hat{R}_2$ (tangent chord theorem) $\therefore \hat{P}_1 = \hat{R}_2$ $\therefore$ APTR is a cyclic quadrilateral (converse : ext angle of cycl. quad.)	✓ statement ✓ statement ✓ statement ✓ equal angles ✓ reason (5) [11]

2009 March Paper 3 Q 7

7.1

$\hat{P}_1 = \hat{Q}_1 = x$	(given)	✓ $\hat{P}_1 = \hat{Q}_1 = x$	
and $\hat{P}_1 = \hat{R} = x$	(tan - chord theorem)	✓ $\hat{P}_1 = \hat{R} = x$	
Now $\hat{Q}_1 = \hat{R} = x$		✓ reason	
$\therefore TQ \parallel SR$	(corresponding angles are equal)	✓ reason	(4)

7.2

$\hat{P}_1 = \hat{S}_1 = x$	(TS = SP, tangents from a common point)	✓ $\hat{P}_1 = \hat{S}_1 = x$	
$\therefore \hat{Q}_1 = \hat{S}_1$	(both = x)	✓ reason	
But these are angles subtended by the same line segment TP		✓ conclusion	
$\therefore QPTS$ is a cyclic quadrilateral		✓ reason	(4)

7.3

$\hat{P}_1 = \hat{Q}_1 = x$	(given)		
$\hat{P}_1 = \hat{Q}_2 = x$	(QPTS is a cyclic quad - angles subtended by same chord.)	✓ $\hat{P}_1 = \hat{Q}_2 = x$	
$\therefore \hat{Q}_1 = \hat{Q}_2$		✓ reason	
$\therefore TQ$ bisects $\hat{S}\hat{Q}\hat{P}$.		✓ conclusion	(3)

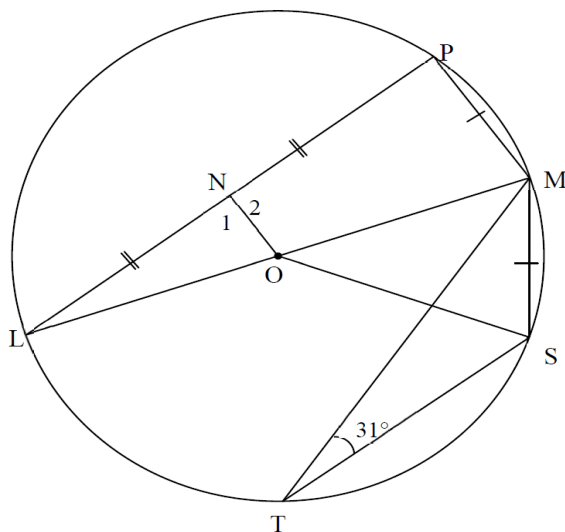
2018 KwaZulu Natal Preliminary Paper 2 Q 9.2

9.2.1	$\hat{K}_1 = x = \hat{K}_2 \dots$ KM bisects $\hat{L}\hat{K}\hat{N}$ $\hat{O}_1 = 2x$ angles opp = sides $\therefore \hat{L} = x$ $\angle$ at centre = 2 $\angle$ at circumference $\therefore \hat{K}_1 = \hat{L} = x$ $\therefore \text{TK} = \text{TL}$ (sides opposite equal angles)	(All Accuracy Marks) $\checkmark$ S $\checkmark$ R $\checkmark$ S $\checkmark$ R $\checkmark$ R	(5)
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9.2.2	$\hat{T}_1 = 2x \dots$ ext $\angle$ of Δ QKL $\hat{T}_1 = \hat{O}_1 = 2x$ $\therefore$ KOTP is a cyclic quadrilateral ...converse of $\angle$'s on the same segment equal.	$\checkmark$ S $\checkmark$ R $\checkmark$ R (All Accuracy Marks)	(3)
9.2.3	$\hat{P}_1 = \hat{L}\hat{K}\hat{N} \dots$ Angles in the same segment $= 2x$ $\therefore \hat{P}_1 = \hat{T} = 2x$ $\therefore \text{PN} \parallel \text{MK} \dots$ alt $\angle$'s proved equal	$\checkmark$ S $\checkmark$ R $\checkmark$ R (All Accuracy Marks)	(3)
			[16]

2022 Limpopo Preliminary Paper 2 Q 8.1

8.1

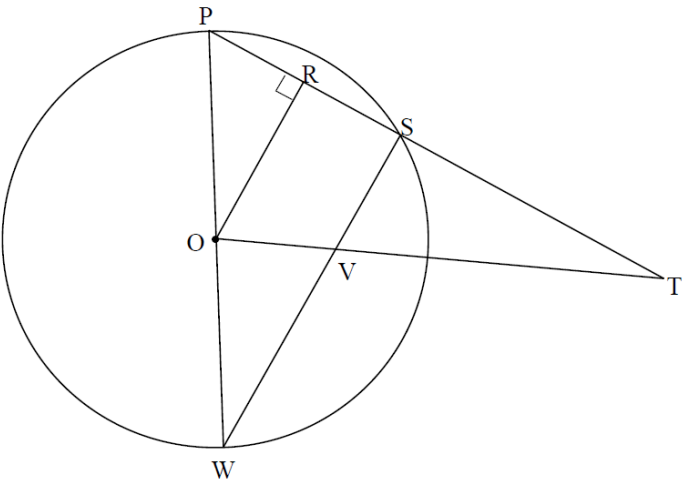


8.1.1(a)	$\hat{MOS} = 62^\circ$ [$\angle$ at centre = $2 \times \angle$ at circumf/middelpnts $\angle = 2 \text{omtreks } \angle$]	✓ S ✓ R (2)
8.1.1(b)	$\hat{L} = 31^\circ$ [equal chords; equal $\angle$ s / = <i>koorde</i> ; = $\angle e$]	✓ S ✓ R (2)
8.1.2	$LN = NP$ and $LO = OM$ $\therefore ON = \frac{1}{2} PM$ [midpoint theorem/middelpuntstelling] $\therefore ON = \frac{1}{2} MS$ [$PM = MS$] OR $\hat{N} = 90^\circ$ [$\angle$ from centre to midpt chord / <i>lyn v midpt na midpt kd</i>] $\hat{P} = 90^\circ$ [$\angle$ in semi-circle / $\angle$ in <i>halfsirkel</i>] $\hat{L}$ is common/<i>gemeen</i> $\therefore \triangle NLO \cong \triangle PLM$ ($\angle \angle \angle$) $\frac{NL}{PL} = \frac{NO}{PM} = \frac{1}{2}$ $\therefore ON = \frac{1}{2} PM$	✓ $LO = OM$ ✓ S ✓ R ✓ S (4) ✓ S R ✓ S/R ✓ S (4)

$\therefore ON = \frac{1}{2} MS$ [$PM = MS$]	✓ S
b	

2024 November Paper 2 Q 10.2

10.2



10.2.1	PR = RS PO = OW $\therefore OR = \frac{1}{2} WS$ $\therefore OR : WS = 1 : 2$ OR/OF $\hat{PSW} = 90^\circ$ $\hat{PRO} = 90^\circ$ $\therefore \hat{PRO} = \hat{PSW}$ $\therefore RO \parallel SW$	[line from centre $\perp$ to chord/ <i>lyn vanuit midpt. sirkel $\perp$ op koord</i>] [radii / <i>radiusse</i>] [midpt theorem/<i>midpt. stelling</i>] OR/OF [$\angle$ in semi circle/<i>$\angle$ in halwe sirkel</i>] [given] [corresp $\angle$s = / <i>ooreenk. $\angle$e =</i>] OR/OF [co-int. $\angle$s suppl / <i>ko-binne $\angle$e suppl</i>]	✓ S ✓ R ✓ S ✓ S ✓ R (5) ✓ S ✓ S
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2025 Western Cape Preliminary Paper 2 Q 9.3

9.3			
9.3.1	$CDO = 90^\circ$ (line from centre to midpt of chord / <i>lyn van middelpunt van $\odot$ tot middelpunt van koord</i>)	✓ S ✓ R	(2)
9.3.2	$B_1 = 59^\circ$ (tan-chord theorem / <i>raaklyn koord</i>)	✓ S ✓ R	(2)
9.3.3	$B\hat{A}G = 90^\circ$ ($\angle$ in semi $\odot$ / $\angle$ in semi $\odot$) $G_2 = 180^\circ - 90^\circ - 59^\circ = 31^\circ$ ($\angle$ sum in Δ / <i>som van $\angle$e van Δ</i>) OR $G_2 = 31^\circ$ (radius $\perp$ tangent)	✓ S ✓ R ✓ S ✓ R ✓✓ S ✓✓ R	(4)
9.3.4	$G_3 = 59^\circ$ (alt. $\angle$; $AB \parallel EG$ / <i>verwisselende $\angle$e; $AB \parallel EG$</i>)	✓ S ✓ R	(2)
9.3.5	$C_1 = 31^\circ$ ($\angle$ in the same segment / <i>$\angle$ in dieselfde segment</i>)	✓ S ✓ R	(2)
9.4	$C_2 = 180^\circ - 31^\circ - 59^\circ = 90^\circ$ (opp. $\angle$ of cyclic quad. / <i>teenoorstaande $\angle$e van kdvh</i>) $C\hat{D}O + C_2 = 180^\circ$ $AC \parallel OD$ (co-int $\angle$ s supp / <i>ko – binne hoeke supplementêr</i>)	✓ S / R ✓ S ✓ R	(3)
			[21]

2015 Mpumalanga Preliminary Paper 2 Q 9

9.1	sum of the opposite interior angles	✓ S (1)
9.2.1	$\hat{C}_1 = \hat{A} = x$ tan-cord $\hat{A} = \hat{C}_3 = x$ isosceles Δ	✓ S ✓ R ✓ S ✓ R (4)
9.2.2	$\hat{C}_2 + \hat{C}_3 = 90^\circ$ $\angle$ in semi circle $\hat{O}_3 = 90^\circ$ $SO \perp AB$ $\hat{T}_2 = \hat{A} + \hat{O}_3$ exterior $\angle$ of Δ $\therefore \hat{T}_2 = 90^\circ + x$ $\therefore \hat{PCT} = 90^\circ + x$	✓ S ✓ R ✓ S/R ✓ S ✓ S (5)
9.2.3 (a)	$\hat{C}_4 = 90^\circ - x$ adj. $\angle$'s on straight line $\hat{T}_3 = 90^\circ - x$ adj. $\angle$'s on straight line $\hat{S} = 2x$ sum of int. $\angle$'s of Δ	✓ S ✓ R ✓ S ✓ S (4)
9.2.3 (b)	$\hat{COB} = 2x$ $\angle$ at centre = $2 \times \angle$ at circumference	✓ S ✓ R (2)
9.2.3 (c)	$\hat{P} = 180^\circ - 90^\circ - 2x$ sum of int. $\angle$'s of Δ $\hat{P} = 90^\circ - 2x$	✓ S ✓ R (2)
		[18]

2019 Eastern Cape Exemplar Paper 2 Q 8.2

8.2.1 (a)	$\hat{C}_1 = 70^\circ$ (equal $\angle$'s opp equal sides / <i>gelyke $\angle$e teenoor gelyke sye</i>)	✓ S ✓ R	(2)
8.2.1 (b)	$\hat{A}_2 = 35^\circ$ (exterior $\angle$ of Δ / <i>buitehoek van driehoek</i>)	✓ S ✓ R	(2)
8.2.1 (c)	$\hat{B}_2 = 35^\circ$ ($\angle$'s in same segment / <i>$\angle$e in dieselde segment</i>)	✓ S ✓ R	(2)
8.2.2	R.T.P./<i>Te Bewys</i> : $\hat{B}_1 = \hat{B}_2$ Proof/<i>Bewys</i> : $\hat{B}_2 = 35^\circ$ (proved above / <i>bo bewys</i>) $\hat{A}BC = \hat{C}_1 = 70^\circ$ (equal $\angle$'s opp equal sides / <i>gelyke $\angle$e teenoor gelyke sye</i>) $\therefore \hat{B}_1 = 70^\circ - 35^\circ$ $\therefore \hat{B}_1 = \hat{B}_2$ $\therefore$ BE bisects $\hat{A}BC$ / BE <i>halveer $\hat{A}BC$</i>	✓ S ✓ R ✓ $\hat{B}_1 = \hat{B}_2$	(3)

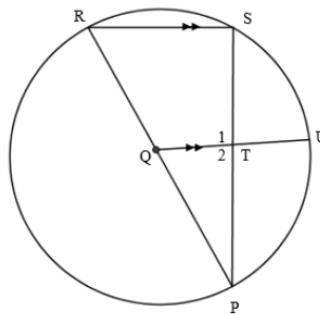
2014 June Higher Grade Paper 2 Q 7

$XT = TY = \frac{3r}{4}$ ✓S (line centre of circle $\perp$ to chord) ✓R $OX = r$ By Pythagoras; $OT^2 = OX^2 - XT^2$ $= r^2 - \left(\frac{3r}{4}\right)^2$ ✓M $= \frac{7r^2}{16}$ ✓AC $\therefore OT = \frac{\sqrt{7}r}{4}$ ✓AC ✓M $\therefore CT = r + \frac{\sqrt{7}r}{4} = \frac{4+\sqrt{7}}{4}r$	1S length in terms of r 1R reason 1M subst Pythag 1AC value 1AC taking square root 1M total length
(6)	

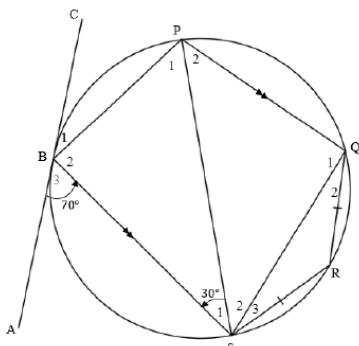
2017 Eastern Cape Preliminary Paper 2 Q 8

QUESTION/VRAAG 8

8.1



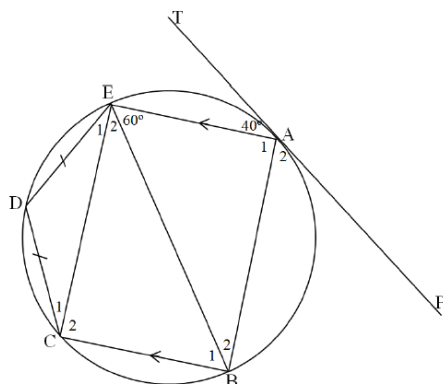
8.1.1	$\hat{S} = 90^\circ$ [$\angle$ in semi-circle / $\angle$ in semi-sirkel]	✓ S ✓ R	(2)
8.1.2	$\hat{T}_2 = \hat{S} = 90^\circ$ [corresp. $\angle$ s / ooreenk. $\angle$ e, $RS \parallel QU$] $\therefore$ T is the midpt of SP [line from centre $\perp$ to chord] <i>T is die midpt van SP [lyn vanaf middelpunt $\perp$ op koord]</i> $QP = 10$ and/en $TP = 8$ $QT^2 = (10)^2 - (8)^2$ [Pyth. Theorem/Stelling] $\therefore QT = 6$ $QU = QP = 10$ [radii] $\therefore TU = 4$	✓ S/R ✓ S/R ✓ subst. into Pyth. verv. in Pyth. ✓ QT ✓ S/R ✓ TU	(6)

8.2						
8.2.1	$\hat{B}_1 = 30^\circ$ [tan chord theorem] / [raaklyn koord stelling]	✓	S	✓	R	(2)
8.2.2	$\hat{P}_2 = 30^\circ$ [alt $\angle$ s, $BS \parallel PQ$] / [verw. $\angle$ e, $BS \parallel PQ$]	✓	S	✓	R	(2)
8.2.3	$\hat{R} = 150^\circ$ [opp. $\angle$ s of a cyclic quad] / [oorst. $\angle$ e van 'n koordevierhoek]	✓	S	✓	R	(2)
8.2.4	$\hat{Q}_2 = \hat{S}_3$ [$\angle$ s opp = sides] / [$\angle$ teenoor = sye] $\hat{Q}_2 = \frac{180^\circ - 150^\circ}{2}$ [sum of $\angle$ s in a Δ] / [som van $\angle$ e in 'n Δ] $= 15^\circ$	✓	S/R	✓	S	(3)
[17]						

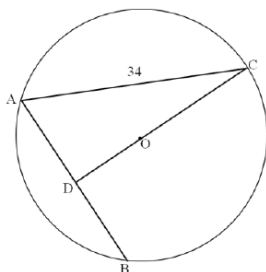
2015 Western Cape June Paper 2 Q 8.2

8.2.1	$\hat{C}_1 = 90^\circ$ ($\angle$ in semi circle/ $\angle$ in halfsirkel)	✓	S	✓	R	(2)
8.2.2	$\hat{B}_1 = 60^\circ$ (alt./ verw. $\angle$ e; $AB \parallel CD$)	✓	S	✓	R	(2)
8.2.3	$\hat{E} = 120^\circ$ (opp. $\angle$ s of cycl. quad/ teenoorst. $\angle$ e van kvh)	✓	S	✓	R	(2)
8.2.4	$\hat{D}_1 = 30^\circ$ ($\angle$ s in Δ or isosc. Δ / $\angle$ e in Δ of gelykb. Δ)	✓	S	✓	R	(2)

QUESTION / VRAAG 8



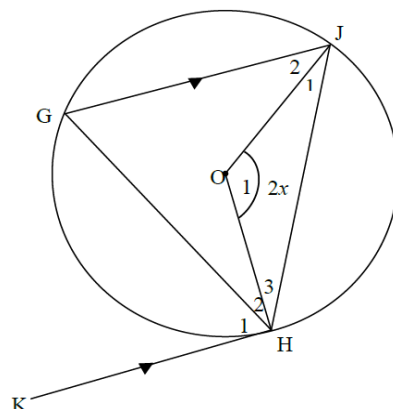
8.1	EABC EBCD	✓ EABC ✓ EBCD (2)
8.2.1	$\hat{B}_2 = 40^\circ$ [tanchord theorem / $\angle$ tussen raaklyn en koord]	✓S✓R (2)
8.2.2	$\hat{B}_1 = 60^\circ$ [alt $\angle^s$; $AE \parallel BC$] / verw. binne $\angle^e$; $AE \parallel BC$	✓S ✓R (2)
8.2.3	$\hat{D} = 120^\circ$ [opp $\angle^s$ of a cyclic quad / teenoorst. $\angle^e$ van kvlh]	✓S✓R (2)
8.2.4	$\hat{E}_1 = \hat{C}_1$ [$\angle^s$ oppequal sides / $\angle^e$ teenoor gelyke sye] $\hat{E}_1 = 30^\circ$ [sum of $\angle^s$ of a Δ / som $\angle^e$ van Δ / $\angle^e$ van Δ]	✓S ✓S ✓R (3)



8.3	AD = 20 $\hat{ADC} = 90^\circ$ [line from centre to midpoint of chord / midpt. O; midpt. koord OF lyn van midpt O na midpt van koord] $\sin \hat{C} = \frac{20}{34}$ $\sin \hat{C} = 0,588$ $\hat{C} = 36,03^\circ$ Accept 36°	✓AD = 20 ✓ R ✓ $\sin \hat{C} = \frac{20}{34}$ ✓ $\hat{C} = 36^\circ$ (4)
		[15]

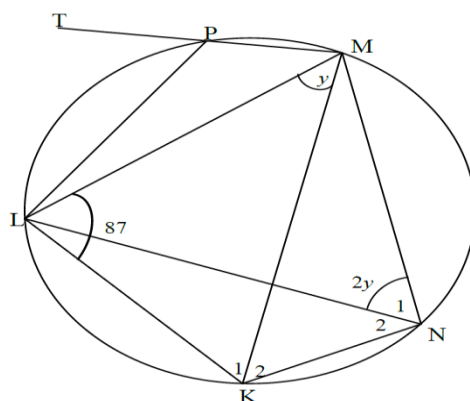
2018 Senior Certificate Paper 2 Q 8

8.1



8.1.1	$\hat{G} = x$ [$\angle$ centre = $2 \times$ circumference / <i>midpts</i> $\angle = 2 \times$ <i>omtreks</i> $\angle$] $\hat{H}_1 = x$ [alt $\angle$ s / <i>verwiss</i> $\angle$ e; $KH \parallel GJ$] $GJH = x$ [tan chord theorem / <i>raaklyn koordstelling</i>]	$\checkmark$ S $\checkmark$ R $\checkmark$ S $\checkmark$ S $\checkmark$ R	(5)
8.1.2	$\hat{J}_1 + \hat{H}_3 = 180^\circ - 2x$ [sum of $\angle$ s in Δ / <i>som van</i> $\angle$ e in Δ] $\therefore \hat{J}_1 = \hat{H}_3 = 90^\circ - x$ [$\angle$ s opp equal sides / $\angle$ e <i>teenoor gelyke sye</i>] $\therefore x + \hat{H}_2 = 90^\circ$ OR [tan $\perp$ radius / <i>raaklyn $\perp$ radius</i>] $\hat{H}_2 = 90^\circ - x$ $\therefore \hat{H}_2 = \hat{H}_3$	$\checkmark$ S $\checkmark$ S $\checkmark$ R	(3)

8.2



8.2.1	$\hat{N}_2 = y$ [$\angle$ s in the same seg / $\angle$ e in <i>dieselfde segment</i>]	$\checkmark$ S $\checkmark$ R	(2)
8.2.2(a)	$2y + y + 87^\circ = 180^\circ$ [opp $\angle$ s of cyclic quad / <i>teenoorst</i> $\angle$ e v <i>kvh</i>] $3y = 93^\circ$ $y = 31^\circ$	$\checkmark$ S $\checkmark$ R $\checkmark$ S	(3)
8.2.2(b)	$\hat{TPL} = 62^\circ$ [ext. $\angle$ of cyclic quad / <i>buite</i> $\angle$ v <i>kvh</i>]	$\checkmark$ S $\checkmark$ R	(2)
			[15]

2016 Overberg District Preliminary Paper 2 Q 8

8.1	Supplementary / <i>Supplementêr</i> (saam 180°)	✓ answer/ antwoord	(1)
8.2.1	$\widehat{EFO} = 90^\circ$ [tan radius]/[<i>raaklyn radius</i>] $\widehat{EGO} = 90^\circ$ [tan radius]/[<i>raaklyn radius</i>] $\widehat{EFO} + \widehat{EGO} = 180^\circ$ $\therefore$ FOG E is cyclic quad [opp angles supplementary] <i>is 'n koordevierhoek [teenoorst. hoeke supplementêr.]</i>	✓ S ✓ R ✓ S ✓ R ✓ R	(5)
8.2.2	$\widehat{G}_1 = \widehat{H} = x$ [tan chord]/[<i>raaklyn koord</i>] $\widehat{K}_1 = \widehat{H} = x$ [corresp angles/ooreenkmst hoeke; EK FH] $\therefore \widehat{G}_1 = \widehat{K}_1$ EG is a tangent / is 'n raaklyn [angle between line and chord] / [<i>hoek tussen lyn en koord</i>]	✓ S ✓ R ✓ S ✓ R ✓ R	(5)
8.2.3	$\widehat{O}_1 = 2\widehat{H}$ [angle at centre]/[<i>middelpuntshoek</i>] $= 2x$ $\therefore \widehat{FEG} = 180^\circ - 2x$ [opp angles of cyclic quad] / [<i>teenoorst. hoeke van koordevierhoek</i>]	✓ S ✓ R ✓ R	(3)

2019 Free State Preliminary Paper 2 Q 8

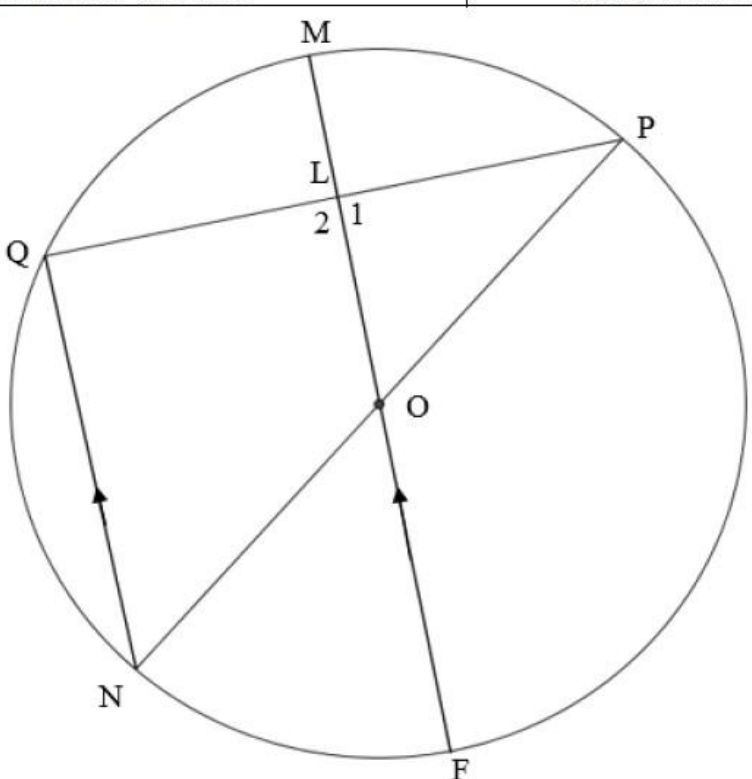
8.1.1	$\hat{H}_3 = 35^\circ$ [tan chord theorem/ <i>tan koordteorie</i>] $\hat{E}_4 = \hat{H}_3 = 35^\circ$ [$\angle$ opp = sides/ <i>∠e teenoor = sye</i>]	✓S ✓R ✓S/R (3)
8.1.2	$\hat{E}\hat{K}H = 180^\circ - 2(35^\circ)$ [sum of $\angle$'s in Δ / <i>som van ∠e in Δ</i>] $= 110^\circ$	✓S ✓ answer/ <i>antwoord</i> (2)
8.1.3	$\hat{G} = 180^\circ - 110^\circ$ [opp $\angle$ of cyclic quad/ <i>∠e teenoor van kdvh</i>] $= 70^\circ$	✓S ✓R (2)
8.1.4	$\hat{O}_1 = 220^\circ$ [$\angle$ at centre = $2 \times \angle$ at circumference/midpts $\angle^e = 2$ <i>omtreks</i> $\angle^e$]	✓S ✓R (2)
8.2	$(x-4)^2 + 12^2 = x^2$ [Pythagoras] $x^2 - 8x + 16 + 144 = x^2$ $-8x = -160$ $x = 20$	✓S/R ✓expansion/ <i>uitbreiding</i> ✓simplification/ <i>vereenvoudiging</i> ✓answer/ <i>antwoord</i> (4)
		[13]

2019 Free State Preliminary Paper 2 Q 9

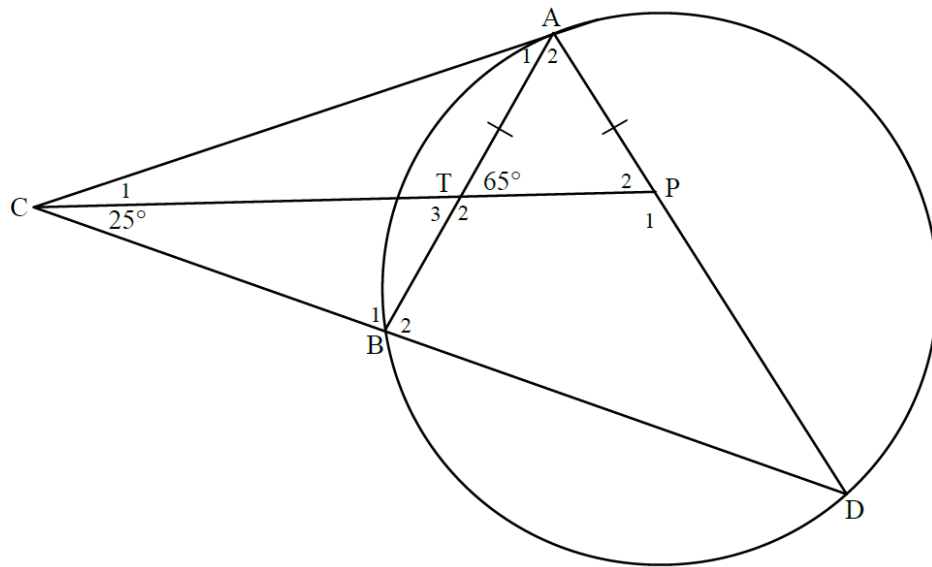
QUESTION/VRAAG 9

9.1.1	$\hat{C} = x$ [$\angle$ at centre = $2 \times \angle$ at circumference/midpts $\angle = 2 \times \text{omtreks } \angle$] $\hat{B} = x$ [$\angle$ s in same segment/ $\angle$ e in dieselfdesegment] $\hat{D}_1 = x$ [corresp $\angle$ s /ooreenkomstige $\angle$ e; $AC \parallel DF$] $\hat{BAF} = x$ [exterior $\angle$ of cyclic quad/buite $\angle$ kdvh]	$\checkmark$ S/R $\checkmark$ S/R $\checkmark$ S $\checkmark$ R $\checkmark$ S $\checkmark$ R (6)
9.1.2	$\hat{D}_1 = \hat{F}_2 = x$ $\therefore DE = FE$ [$\angle^s$ opp = sides/ $\angle$ e teenoor = sye] $\hat{E} = 180^\circ - 2x$ [sum of $\angle^s$ in Δ /som van $\angle^e$ in Δ]	$\checkmark \hat{D}_1 = \hat{F}_2$ $\checkmark \hat{E} = 180^\circ - 2x$ (2)
9.1.3	$\hat{E} = 180^\circ - 2x$ [sum of $\angle^s$ in Δ /som van $\angle^e$ in Δ] $\hat{AOD} = 2x$ $\therefore AODE$ is a cyclic quadrilateral/is 'n kdvh [converse of a cyclic quad/omgek van kdvh]	$\checkmark$ S $\checkmark$ R (2)
9.2	$\frac{AF}{FE} = \frac{CD}{DE}$ [prop theorem/eweredigh] $\frac{12}{8} = \frac{AF}{10}$ $AF = 15$	$\checkmark$ S $\checkmark$ R $\checkmark$ answer/antwoord (3)
[13]		

2016 Eastern Cape Preliminary Paper 2 Q 8

8.1	Bisects the chord / <i>Halveer die koord</i>	✓ answer / <i>antwoord</i>	(1)
8.2			
8.2.1	$\hat{Q} = 90^\circ$ [$\angle$ in semi circle.] / [$\angle$ in halwe sirkel] $\hat{L}_1 = \hat{Q} = 90^\circ$ [corresp. $\angle^s$, $QN \parallel LO$] <i>[ooreenk. $\angle^e$, $QN \parallel LO$]</i> $QL = LP$ [line from centre perp. to chord] <i>[lynstuk vanaf middelpnt is loodreg op koord]</i>	✓ S ✓ R ✓ S/R ✓ R	(4)
8.2.2	$MF = 8ML$	✓	(1)
8.2.3	$OP^2 = OL^2 + LP^2$ $(4ML)^2 = (3ML)^2 + 7^2$ $16ML^2 = 9ML^2 + 49$ $7ML^2 = 49$ $\therefore ML = \sqrt{7}$	✓ using Pyth correctly <i>korrekte gebruik van Pythagoras</i> ✓ simplification / <i>vereenvoudiging</i> ✓ ML	(3)

2015 Senior Certificate Paper 2 Q 8



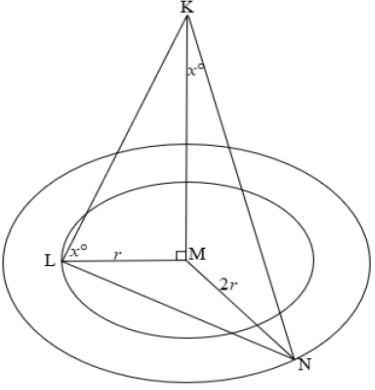
8.1.1	$\hat{P}_2 = 65^\circ$	($\angle$ s opp equal sides/ $\angle$ e teenoor gelyke sye)	$\checkmark$ S $\checkmark$ R (2)
8.1.2	$\hat{D} = 40^\circ$	(ext $\angle$ of $\triangle CDP$ /buite $\angle$ v $\triangle CDP$) OR/OF ($\angle$ s on a str line; sum of $\angle$ s in $\triangle$ / $\angle$ e op regt lyn; som v $\angle$ e in $\triangle$)	$\checkmark$ S $\checkmark$ R (2)
8.1.3	$\hat{A}_1 = 40^\circ$	(ext $\angle$ of $\triangle CAT$ /buite $\angle$ v $\triangle CAT$) OR/OF ($\angle$ s on a str line; sum of $\angle$ s in $\triangle$ / $\angle$ e op regt lyn; som v $\angle$ e in $\triangle$)	$\checkmark$ S $\checkmark$ R (2)
8.2	$\hat{A}_1 = \hat{D} = 40^\circ$ $\therefore$ CA is a tangent to the circle ($\angle$ between line and chord)/ CA is 'n raaklyn aan die sirkel ($\angle$ tussen lyn en koord)		$\checkmark$ S $\checkmark$ R (2) [8]

2016 Overberg District Preliminary Paper 2 Q 9

9.1.1	$\widehat{BAD} = 90^\circ \dots \angle \text{ in semi circle/ } \angle \text{ in halwe sirkel}$	✓ S ✓ R	(2)
9.1.2	$\widehat{AOD} = 76^\circ \dots \angle \text{ at centre} = 2 \times \angle \text{ at circumf./}$ $\text{midpts}\angle = 2 \times \text{omtreks}\angle$	✓ S ✓ R	(2)
9.1.3	$\widehat{CDE} = 63^\circ \dots \text{ext } \angle \text{ of cyclic quad/ buite } \angle \text{ van}$ koordevierhoek	✓ S ✓ R	(2)
9.1.4	$\widehat{DCE} = 25^\circ \dots \text{tan-chord thm/ raakl- koordstelling}$	✓ S ✓ R	(2)
9.1.5	$\widehat{ACD} = 38^\circ \dots \angle \text{ at centre} = 2 \times \angle \text{ at circumf. OR}$ $\angle \text{ s in same / Segment / midpts}\angle = 2 \times \text{omtreks}\angle$ $\text{OF } \angle \text{ e in dies. segm}$	✓ S ✓ R	(2)

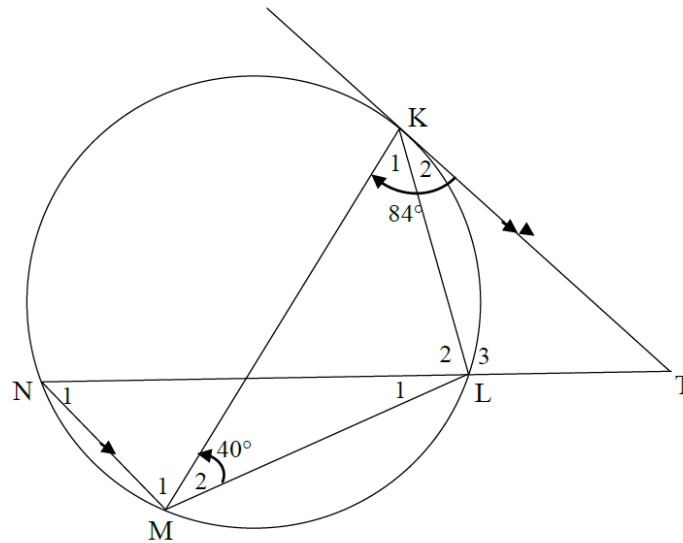
2020 Gauteng Preliminary Paper 2 Q 7

QUESTION / VRAAG 7

		
7.1	In $\triangle KLM$ $\frac{KM}{LM} = \tan x$ $\frac{KM}{r} = \tan x$ $KM = r \tan x$ In $\triangle KMN$ $\frac{MN}{KM} = \tan x$ $\frac{2r}{KM} = \tan x$ $\frac{2r}{r \tan x} = \tan x$ $2 = \tan^2 x$ $\sqrt{2} = \tan x$ $x = 54,74^\circ$	✓ correct trig ratio / <i>korrekte trig verhouding</i> ✓ $KM = r \tan x$ (simplification / <i>vereenvoudiging</i>) ✓ $\frac{2r}{KM} = \tan x$ ✓ $\frac{2r}{r \tan x}$ ✓ $\sqrt{2} = \tan x$ ✓ $x = 54,74^\circ$ (6)
7.2	$LN^2 = LM^2 + MN^2 - 2 LM \cdot MN \cos M$ $LN^2 = (5)^2 + (10)^2 - 2(5) \cdot (10) \cos 110^\circ$ $LN^2 = 159,20$ $LN = \sqrt{159,20}$ $LN = 12,62m$	✓ correct substitution in cos-rule / <i>korrekte vervanging in cos-reël</i> ✓ 12,62m (2)
		[8]

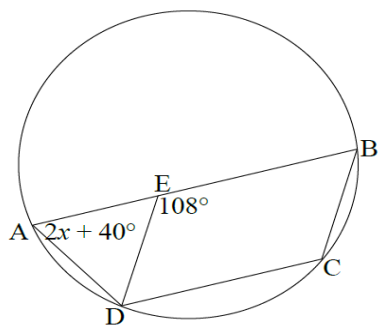
2016 March Paper 2 Q 8

8.1



8.1.1	$\hat{K}_2 = \hat{M}_2 = 40^\circ$ [tan chord theorem/ <i>raakl-kdstf</i>]	✓S ✓R (2)
8.1.2	$\hat{N}_1 = \hat{K}_1$ [$\angle$ s in the same seg/ $\angle e$ in <i>dies segm</i>] $\hat{K}_1 = 84^\circ - 40^\circ = 44^\circ$ $\therefore \hat{N}_1 = 44^\circ$	✓S ✓R ✓S (3)
8.1.3	$\hat{T} = \hat{N}_1 = 44^\circ$ [alt/ <i>verw</i> $\angle$ s/ <i>e</i> ; KT NM]	✓S ✓R (2)
8.1.4	$\hat{L}_2 = \hat{K}_2 + \hat{T}$ [ext $\angle$ of Δ / <i>buite</i> $\angle$ v Δ] $= 40^\circ + 44^\circ$ $= 84^\circ$	✓R ✓S (2)
8.1.5	In ΔKLM : $44^\circ + 84^\circ + 40^\circ + \hat{L}_1 = 180^\circ$ [$\angle$ s sum in Δ / $\angle e$ <i>som in</i> Δ] $\therefore \hat{L}_1 = 12^\circ$	✓S (1)

8.2



8.2	$\hat{C} = 108^\circ$ $2x + 40^\circ + 108^\circ = 180^\circ$ $2x = 32^\circ$ $x = 16^\circ$ OR/OF $\hat{C} = 180^\circ - (2x + 40^\circ)$ $180^\circ - (2x + 40^\circ) = 108^\circ$ $2x = 32^\circ$ $x = 16^\circ$	$\checkmark$ S $\checkmark$ R $\checkmark$ S $\checkmark$ R $\checkmark$ answ/antw (5) $\checkmark$ S $\checkmark$ R $\checkmark$ S $\checkmark$ R $\checkmark$ answ/antw (5) [15]
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