Province of the EASTERN CAPE EDUCATION

EC CURRICULUM: FET MATHEMATICS, MATHEMATICAL LITERACY AND TECHNICAL MATHEMATICS

NATIONAL SENIOR CERTIFICATE

GRADE 12

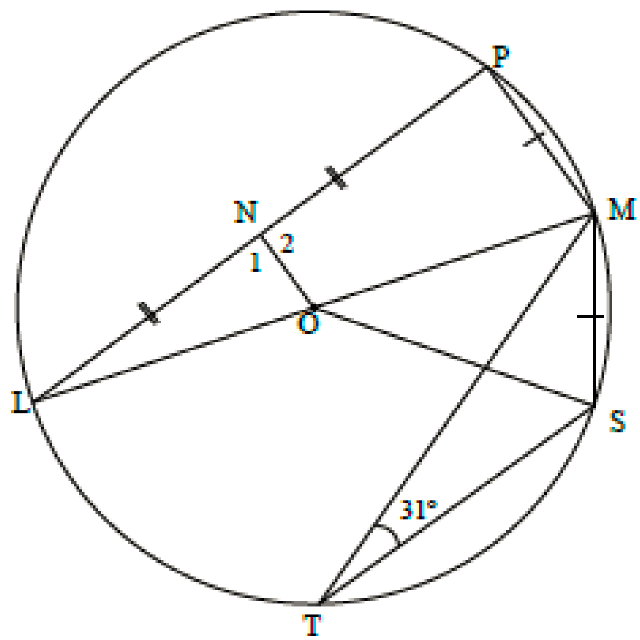
MATHEMATICS TOPIC TEST 4 OF 2020: EUCLIDEAN GEOMETRY MARKING GUIDELINES

MARKS: 50

This Marking Guidelines consists of 8 pages.

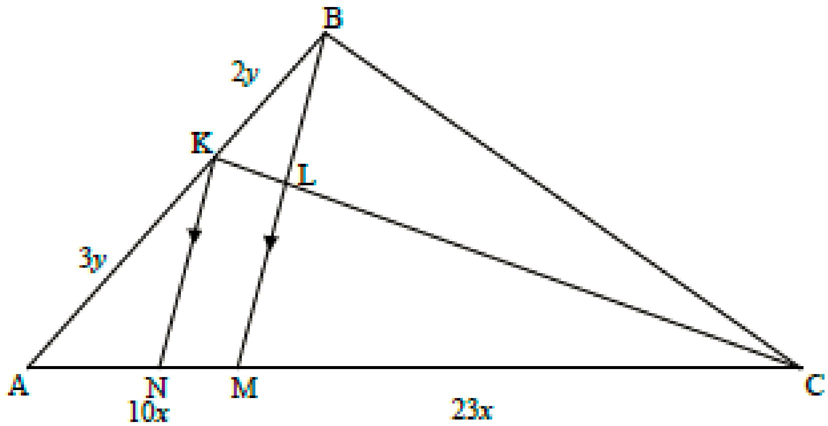
QUESTION 1

1.1



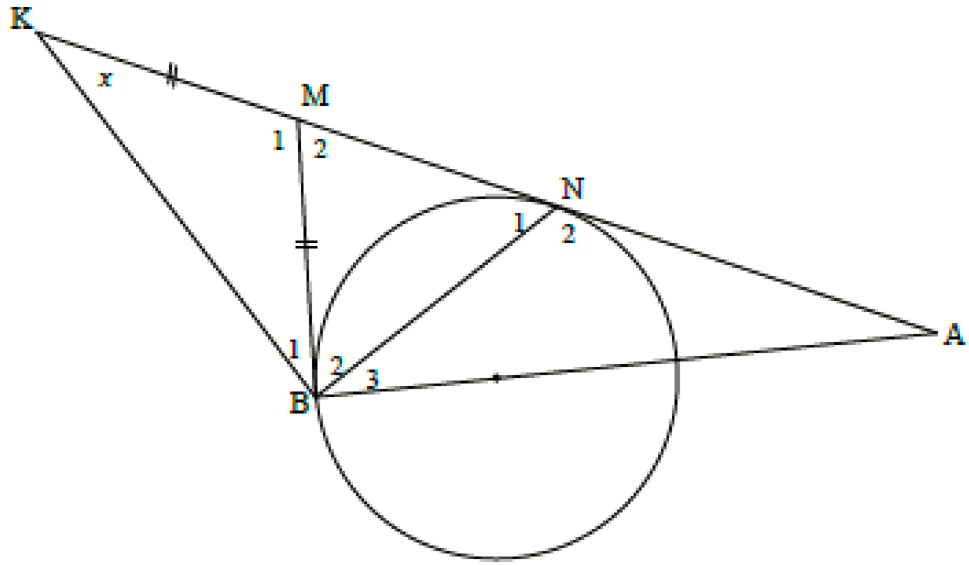
1.1.1	(a)	$M\hat{O}S = 62°$ [∠ at centre = 2× ∠ at circumf/*middelpts∠ =2omtreks∠*]	✓ S ✓ R (2)
1.1.1	(b)	$\hat{L} = 31°$ [equal chords; equal ∠s /= *koorde; = ∠e*]	✓ S ✓ R (2)
1.1.2		LN = NP and LO = OM $\therefore ON = \frac{1}{2}PM$ [midpoint theorem/*middelpuntstelling*] $\therefore ON = \frac{1}{2}MS$ [PM = MS] **OR** $\hat{N}_1 = 90°$ [line from centre to midpt chord/*lyn v midpt na midpt kd*] $\hat{P} = 90°$ [∠ in semi-circle/*∠ in halfsirkel*] $\hat{L}$ is common/*gemeen* $\therefore \Delta NLO \parallel\!\mid \Delta PLM$ (∠∠∠) $\frac{NL}{PL} = \frac{NO}{PM} = \frac{1}{2}$ $\therefore ON = \frac{1}{2}PM$ $\therefore ON = \frac{1}{2}MS$ [PM = MS]	✓ LO = OM ✓ S ✓ R ✓ S (4) ✓ S R ✓ S/R ✓ S ✓ S (4)

1.2



1.2.1	$\frac{AN}{AM}=\frac{AK}{AB}$ [line || one side of Δ OR prop theorem; KN ||BM/ *lyn || sy van Δ OR eweredigheidst; KN||BM*] $\frac{AN}{AM}=\frac{3y}{5y}=\frac{3}{5}$	✓R ✓S (2)
1.2.2	$\frac{AM}{MC}=\frac{10x}{23x}$ [given] $AM = 5y = 10x \quad \therefore \quad y = 2x$ $\frac{LC}{KL}=\frac{MC}{NM}$ [line || one side of Δ OR prop theorem; KN ||LM/ *lyn || sy van Δ OR eweredigheidst; KN||BM*] $=\frac{23x}{2y}=\frac{23x}{4x}=\frac{23}{4}$ **OR** $\frac{AM}{MC}=\frac{10x}{23x}$ [given] $\frac{AN}{MN}=\frac{3y}{2y}=\frac{6x}{4x}$ $\frac{LC}{KL}=\frac{MC}{NM}$ [line || one side of Δ OR prop theorem; KN ||LM/ *lyn || sy van Δ OR eweredigheidst; KN||BM*] $=\frac{23x}{2y}=\frac{23x}{4x}=\frac{23}{4}$	✓ S ✓ R ✓ S (3) ✓ S ✓ R ✓ S (3)
		[13]

QUESTION 2

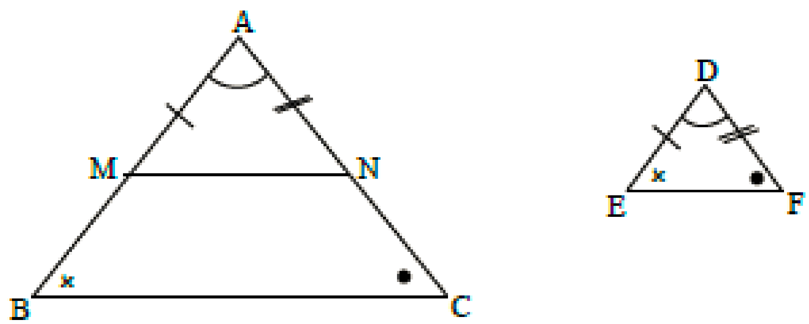


2.1	$\hat{B}_1 = x$ [$\angle$'s opp = sides/$\angle$*e teenoor* = *sye*] $\hat{M}_2 = 2x$ [ext $\angle$ of Δ] OR $\hat{M}_1 = 180° - 2x$ [$\angle$s of Δ] BM = MN [2 tans from a common point/*raaklyne vanuit dieselfde punt*] $\hat{N}_1 = \frac{180° - 2x}{2} = 90° - x$ [$\angle$'s opp = sides/$\angle$*e teenoor* = *sye*] **OR** NM = BM [2 tans from a common point/*raaklyne vanuit dieselfde punt*] $\hat{B}_2 = \hat{N}_1$ [$\angle$'s opp = sides/$\angle$*e teenoor* = *sye*] $\hat{B}_1 = x$ [$\angle$'s opp = sides/$\angle$*e teenoor* = *sye*] In Δ KBN: $x + x + \hat{B}_2 + \hat{N}_1 = 180°$ [sum of $\angle$'s of Δ] $2x + 2\hat{N}_1 = 180°$ $x + \hat{N}_1 = 90°$ $\hat{N}_1 = 90° - x$	✓S ✓S ✓R ✓S ✓R ✓answer (6) ✓S ✓R ✓S ✓R ✓S ✓answer (6)
2.2	$M\hat{B}A = \hat{B}_2 + \hat{B}_3 = 90°$ [tangent⊥diameter/*raaklyn⊥middellyn*] $\hat{B}_3 = 90° - \hat{B}_2$ $= 90° - (90° - x) = x$ $\hat{B}_3 = \hat{K} = x$ $\therefore$ AB is a tangent/*raaklyn* converse tan-chord theorem/ *omgekeerde raakl koordst*]]	✓S ✓ R ✓ S ✓ S ✓ R (5)

	OR $\hat{B}_2 = \hat{N}_1$ $\hat{B}_1 + \hat{B}_2 = x + (90° - x) = 90°$ $\therefore$ KN is diameter/*middellyn* [converse $\angle$ in semi-circle/ *omgekeerde $\angle$ in halfsirkel*] $M\hat{B}A = \hat{B}_2 + \hat{B}_3 = 90°$ [tangent $\perp$ diameter] $\therefore$ AB is a tangent/*raaklyn* converse tan-chord theorem/ *omgekeerde raakl koordst*]]	✓S ✓ R ✓ S ✓ R ✓ R (5)
		[11]

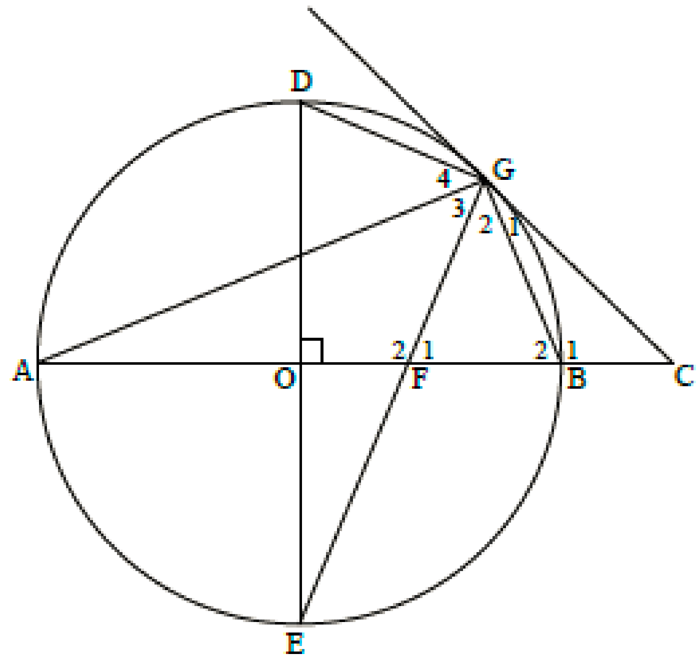
QUESTION 3

3.1



3.1	Constr: Let M and N lie on AB and AC respectively such that AM = DE and AN = DF. Draw MN. *Konst: Merk M en N op AB en AC onderskeidelik af sodanig dat AM = DE en AN = DF. Verbind MN.* Proof: In Δ AMN and Δ DEF AM = DE [Constr] AN = DF [Constr] $\hat{A} = \hat{D}$ [Given] ∴ Δ AMN ≡ Δ DEF (SAS) $\therefore A\hat{M}N = \hat{E} = \hat{B}$ MN ‖ BC [corresp ∠'s are equal/*ooreenkomstige ∠e =*] $\frac{AB}{AM} = \frac{AC}{AN}$ [line ‖ one side of Δ OR prop theorem; MN ‖BC] $\therefore \frac{AB}{DE} = \frac{AC}{DF}$ [AM = DE and AN = DF]	✓Constr / *Konstr* ✓ Δ AMN ≡ Δ DEF ✓SAS ✓MN ‖ BC and R ✓ $\frac{AB}{AM} = \frac{AC}{AN}$ ✓R (6)

3.2



3.2.1	(a)	$D\hat{O}B = 90°$ $D\hat{G}F = \hat{G}_3 + \hat{G}_4 = 90°$ [∠ in semi-circle/∠ *in halfsirkel*] $D\hat{O}B + D\hat{G}F = 180°$ ∴ DGFO is a cyclic quad. [converse: opp ∠s of cyclic quad/ *omgekeerde teenoorst ∠e v koordevh*] OR ∠s of quad = 180°/*∠e van koordevh = 180°*] **OR** $E\hat{O}B = 90°$ $D\hat{G}F = \hat{G}_3 + \hat{G}_4 = 90°$ [∠ in semi-circle/∠ *in halfsirkel*] $E\hat{O}B = D\hat{G}F$ ∴ DGFO is a cyclic quad. [converse: ext ∠ = opp int ∠/ *omgekeerde buite∠ = teenoorst ∠*] OR ext∠ of quad = opp int ∠/*buite∠ v vh = teenoorst ∠*]	✓S ✓R ✓R (3) ✓S ✓R ✓R (3)
3.2.1	(b)	$\hat{F}_1 = \hat{D}$ [ext ∠of cyclic quad/buite∠ v koordevh] $\hat{G}_1 + \hat{G}_2 = \hat{D}$ [tan-chord theorem/raakl koordst] $\therefore \hat{F}_1 = \hat{G}_1 + \hat{G}_2$ ∴ GC = CF [sides opp equal ∠s/sye teenoor = ∠e]	✓S ✓R ✓S ✓R ✓R (5)

3.2.2	(a)	AB = DE = 14 [diameters/*middellyne*] ∴ OB = 7 units ∴ BC = OC – OB = 11 – 7 = 4 units Answer only: full marks	✓ S ✓ S ✓ S (3)
3.2.2	(b)	In ΔCGB and ΔCAG $\hat{G}_1 = \hat{A} = x$ [tan-chord theorem/*raakl koordst*] $\hat{C} = \hat{C}$ [common] ΔCGB ||| ΔCAG [∠, ∠, ∠] $\frac{CG}{CA} = \frac{CB}{CG}$ $\frac{CG}{18} = \frac{4}{CG}$ $CG^2 = 72$ $CG = \sqrt{72}$ or $6\sqrt{2}$ *or* 8,49 units	✓ S/R ✓ S ✓ S ✓ CA = 18 ✓answer (5)
3.2.2	(c)	$OF = OC - FC$ $= 11 - \sqrt{72}$ $\tan E = \frac{OF}{OE}$ $= \frac{11-\sqrt{72}}{7} = 0{,}36$ $\hat{E} = 19{,}76°$ **OR** $OF = OC - FC$ $= 11 - \sqrt{72}$ $FE^2 = OE^2 + OF^2$ $= 7^2 + (11-\sqrt{72})^2$ $FE = 7{,}437.. = 7{,}44$ $\cos E = \frac{OE}{FE}$ *OR* $\sin E = \frac{OF}{FE}$ $= \frac{7}{7{,}44} = 0{,}94$ $= \frac{11-\sqrt{72}}{7{,}44} = 0{,}338$ $\hat{E} = 19{,}76°$ $\hat{E} = 19{,}76°$	✓ OF ✓ trig ratio ✓ substitution ✓ answer (4) ✓ OF ✓ trig ratio ✓ substitution ✓ answer (4)
			[26]

TOTAL: 50