Western Cape Government
Education
FOR YOU

_____ EDUCATION

MATHEMATICS PAPER 2

GRADE 12 MARKING GUIDELINE

COMMON MID-YEAR EXAMINATION

MAY/JUNE 2026

MARKS: 150

TIME: 3 hours

NOTE:

- **If a candidate answers a question TWICE, only mark the FIRST attempt.**
- **If a candidate has crossed out an attempt of a question and not redone the question, mark the crossed-out version.**
- **Consistent accuracy applies in ALL aspects of the Marking Guidelines. Stop marking at the second calculation error.**
- **Assuming answers/values in order to solve a problem is NOT acceptable.**

LET WEL:

- *As 'n kandidaat 'n vraag TWEE KEER beantwoord, sien slegs die EERSTE poging na.*
- *As 'n kandidaat 'n antwoord van 'n vraag doodtrek en nie oordoen nie, sien die doodgetrekte poging na.*
- *Volgehoue akkuraatheid word in ALLE aspekte van die Nasienriglyne toegepas. Hou op nasien by die tweede berekeningsfout.*
- *Aanvaar van antwoorde/waardes om 'n probleem op te los, word NIE toegelaat nie.*

GEOMETRY • MEETKUNDE	
S	A mark for a correct statement (A statement mark is independent of a reason)
	'n Punt vir 'n korrekte bewering ('n Punt vir 'n bewering is onafhanklik van die rede)
R	A mark for the correct reason (A reason mark may only be awarded if the statement is correct)
	'n Punt vir 'n korrekte rede ('n Punt word slegs vir die rede toegeken as die bewering korrek is)
S/R	Award a mark if statement AND reason are both correct
	Ken 'n punt toe as die bewering EN rede beide korrek is

QUESTION 1		
1.1	$\Sigma x = 5105$ $= \frac{5105}{15}$ $= 340{,}33$ (AO full marks)	✓ 15 ✓ answer (2)
1.2	Standard deviation = 171,72	✓ answer (1)
1.3	Upper limit: $\overline{x} + \sigma = 512{,}05$ Lower limit: $\overline{x} - \sigma = 168{,}61$ $\therefore 10$	✓ upper and lower limits ✓ answer (2)
1.4	Values above 500: 520, 600, 750 Sum of affected values = 1 870 Let increase be p%. New total = $5\,105 + \left(\frac{p}{100}\right)(1\,870)$ New mean = 360 $360 \times 15 = 5\,400$ $5\,400 = 5\,105 + \left(\frac{p}{100}\right)(1\,870)$ $295 = \left(\frac{p}{100}\right)(1\,870)$ $p = 15{,}78\%$ **OR**	✓$5\,105 + \left(\frac{p}{100}\right)(1\,870)$ ✓ 5400 ✓ equation ✓ answer

	$360 \times 15 = 5400$ Sum of values under R500 $= 3235$ Sum of values over R500 $= 1870$ $3235 + \left(1870 \times \frac{100 + p}{100}\right) = 5400$ $1870 \times \frac{100 + p}{100} = 2165$ $1870 + 18{,}7p = 2165$ $18{,}7p = 295$ $p = 15{,}78\%$	✓ 5400 ✓ 3235 and 1870 ✓ equation ✓ answer (4)
		[9]

QUESTION 2

2.1 $10 \leq x < 15$

✓ answer

(1)

2.2

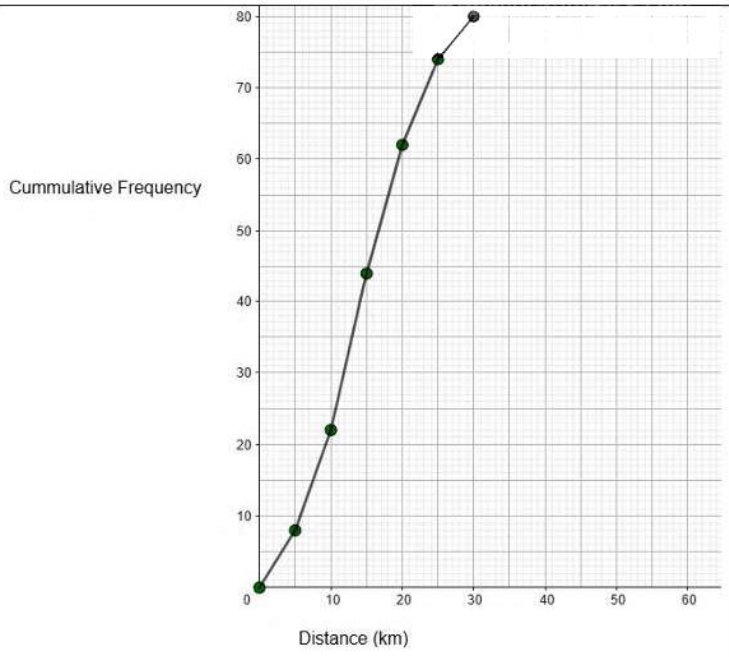
Distance (km)	Number of employees	Cumulative Frequency
$0 \leq x < 5$	8	8
$5 \leq x < 10$	14	22
$10 \leq x < 15$	22	44
$15 \leq x < 20$	18	62
$20 \leq x < 25$	12	74
$25 \leq x < 30$	6	80

✓ first three values

✓ second three values

(2)

2.3



✓ correct plotting of first 3 points
✓ correct plotting of points last 3 points

✓ grounding
✓ smooth curve

(4)

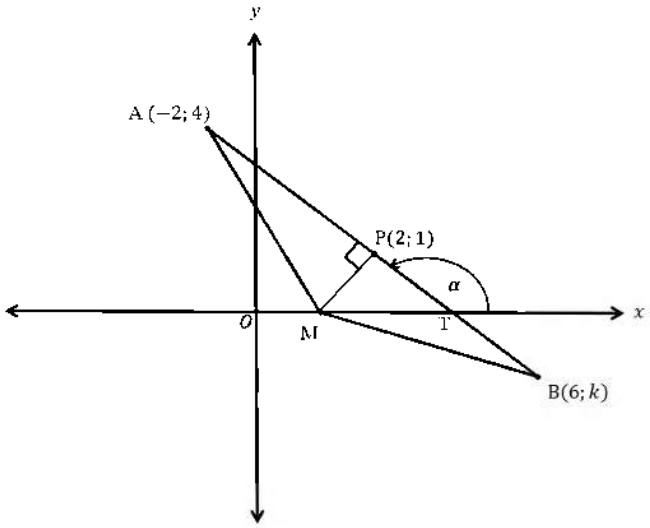
2.4. Upper quartile $= 19km$ (accept $18 - 20km$)

✓ answer

(1)

2.5	Class interval shift: | Distance (km)	Number of employees
---	---
$0 \leq x < 5$	8
$5 \leq x < 10$	14
$10 \leq x < 15$	30
$15 \leq x < 20$	18
$20 \leq x < 25$	4
$25 \leq x < 30$	6 | Original estimated mean $= \frac{8(2,5) + 14(7,5) + 30(12,5) + 18(17,5) + 4(22,5) + 6(27,5)}{80}$ $= 13,38$	✓ class interval shift ✓ equation ✓ answer (3)
		[11]

QUESTION 3



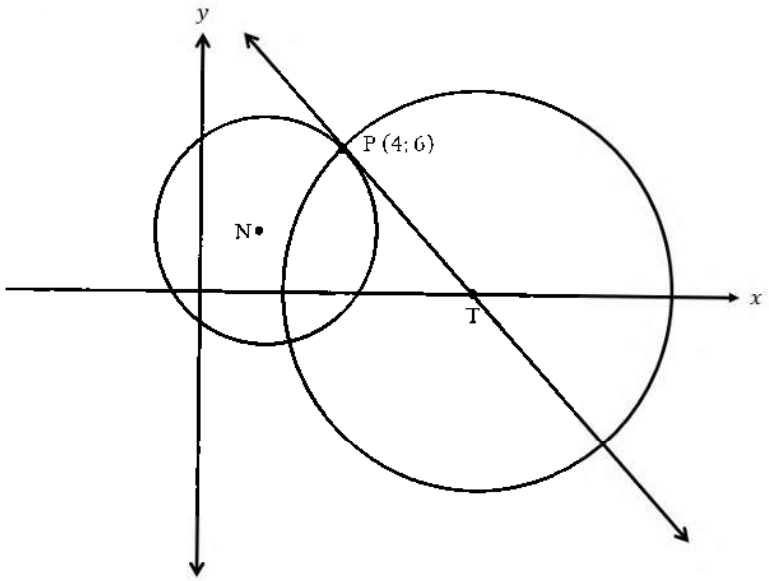
3.1	$m_{AB} = \frac{4-1}{-2-2}$ $= -\frac{3}{4}$	✓ sub ✓ answer (2)
3.2	$1 = \frac{k+4}{2}$ $k = -2$	✓ sub ✓ answer (2)
3.3	$AB = \sqrt{(-2-6)^2 + \left(4-(-2)\right)^2}$ $= 10$ **OR** $AP = \sqrt{(-2-2)^2 + \left(4-(-1)\right)^2}$ $= 5$ $AB = AP \times 2$ $= 10$	✓ sub ✓ answer ✓ sub ✓ answer (2)

$(m_1 \times m_2 = -1)$

3.4	$m_{MP} = \frac{4}{3}$ $y = \frac{4}{3}x + c$ $(2;1)$: $1 = \frac{4}{3}(2) + c$ $c = -\frac{5}{3}$ $y = \frac{4}{3}x - \frac{5}{3}$	✓ $m_{MP} = \frac{4}{3}$ ✓ sub of coordinate ✓ $c = -\frac{5}{3}$ (3)
3.5	$0 = \frac{4}{3}x - \frac{5}{3}$ $x = \frac{5}{4}$ $\quad$ $M\left(\frac{5}{4};0\right)$	✓ $0 = \frac{4}{3}x - \frac{5}{3}$ ✓ $x = \frac{5}{4}$ (2)
3.6	$S(2{,}75;2)$	✓ x- value ✓ y- value (2)
3.7	$\tan\alpha = -\frac{3}{4}$ $\alpha = 143{,}13°$	✓ sub ✓ answer (2)
3.8	$m_{AM} = \frac{4-0}{-2-\frac{5}{4}}$ $= -\frac{16}{13}$ $\tan A\hat{M}T = -\frac{16}{13}$ $A\hat{M}T = 129{,}09°$ $\therefore M\hat{A}B = 143{,}13° - 129{,}09°$ $= 14{,}04°$	✓ m_{AM} ✓ $\tan A\hat{M}T = m_{AM}$ ✓ $A\hat{M}T$ ✓ $M\hat{A}B$ (4)

3.9	Distance from M to AB MN= $\sqrt{\left(2-\frac{5}{4}\right)^2+(0-1)^2}$ $=\frac{5}{4}$ Area $\Delta MAB=\frac{1}{2}(10)(\frac{5}{4})$ $=6{,}25\ \text{units}^2$	✓ MN $=\frac{5}{4}$ ✓ sub ✓ answer (3)
		[22]

QUESTION 4

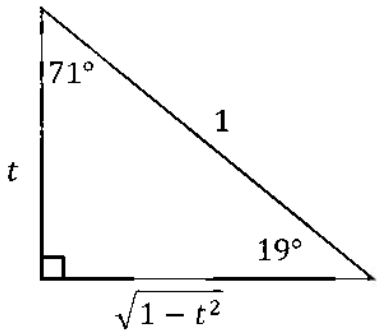


4.1	$N(1\,;2)$	✓ x- value ✓ y- value (2)
4.2	$r = 5$	✓ answer (1)
4.3	$(0-1)^2 + (y-2)^2 = 25$ $1 + y^2 - 4y + 4 = 25$ $y^2 - 4y - 20 = 0$ $y = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(-20)}}{2(1)}$ $y = 6{,}90 \quad \text{or} \quad y = -2{,}90$	✓ sub $x = 0$ ✓ standard form ✓ answer ✓ answer (4)

4.4	$m_{NP} = \frac{2-6}{1-4}$	✓ sub
	$= \frac{4}{3}$	✓ $m_{NP} = \frac{4}{3}$
	$\therefore m_{PT} = -\frac{3}{4}$ tan ⊥ radius	✓m_{PT}
	$T(x;0)$	
	$m_{PT} = \frac{0-6}{x-4}$	
	$-\frac{3}{4} = \frac{0-6}{x-4}$	✓ sub
	$-3x + 12 = -24$	
	$x = 12$ $T(12;0)$	✓ x-value of T
	$PT = \sqrt{(4-12)^2 + (6-0)^2}$	
	$= 10$	✓ distance of PT
	$\therefore (x-12)^2 + y^2 = 100$	✓ answer
	OR	
	$m_{NP} = \frac{2-6}{1-4}$	✓ sub
	$= \frac{4}{3}$	✓ $m_{NP} = \frac{4}{3}$
	$\therefore m_{PT} = -\frac{3}{4}$ tan ⊥ radius	✓m_{PT}
	$T(x;0)$	
	$m_{PT} = \frac{0-6}{x-4}$	
	$-\frac{3}{4} = \frac{0-6}{x-4}$	✓ sub

	$-3x + 12 = -24$	
	$x = 12$ T(12; 0)	✓ x-value of T
	$\therefore (x-12)^2 + y^2 = r^2$	
	Sub (4; 6): $(4-12)^2 + (6)^2 = r^2$	
	$100 = r^2$	✓ r^2
	$\therefore (x-12)^2 + y^2 = 100$	✓ answer
	OR	
	$m_{NP} = \frac{2-6}{1-4}$	✓ sub
	$= \frac{4}{3}$	✓ $m_{NP} = \frac{4}{3}$
	$\therefore m_{PT} = -\frac{3}{4}$ tan ⊥ radius	✓m_{PT}
	PT: $y = -\frac{3}{4}x + c$	
	(4; 6): $6 = -\frac{3}{4}(4) + c$	✓ sub
	$c = 9$	
	$y = -\frac{3}{4}x + 9$	
	$0 = -\frac{3}{4}x + 9$	
	$x = 12$ T(12; 0)	✓ x-value of T
	$\therefore (x-12)^2 + y^2 = r^2$	
	Sub (4; 6): $(4-12)^2 + (6)^2 = r^2$	
	$100 = r^2$	✓ r^2
	$\therefore (x-12)^2 + y^2 = 100$	✓ answer

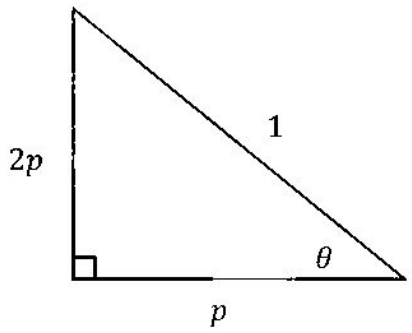
	OR $\widehat{NPT} = 90°$ (tan ⊥ radius) $T(x; 0)$ $PT^2 + NP^2 = NT^2$ (Pyth) $(4-x)^2 + (6-0)^2 + (1-4)^2 + (2-6)^2$ $= (x-1)^2 + (0-2)^2$ $16 - 8x + x^2 + 36 + 9 + 16 = x^2 - 2x + 1 + 4$ $-6x = -72$ $x = 12$ $T(12; 0)$ $\therefore (x-12)^2 + y^2 = r^2$ Sub $(4; 6)$: $(4-12)^2 + (6)^2 = r^2$ $100 = r^2$ $\therefore (x-12)^2 + y^2 = 100$	✓ sub distance PT^2 ✓ sub distance NP^2 ✓ sub distance NT^2 ✓ x-value of T ✓ sub ✓ r^2 ✓ answer (7)
4.5	$r + R = 5 + 10$ $= 15$ $NT = \sqrt{(12-1)^2 + (0-2)^2}$ $= 5\sqrt{5}$ / 11,18 Distance reduced $= 15 - 11{,}18$ $= 3{,}82$ New radius = 1,18	✓ $r + R$ ✓ NT ✓ distance reduced ✓ new radius (4)
		[18]

QUESTION 5		
5.1.1	$\sin 19° = t$  $\cos 19° = \sqrt{1-t^2}$	✓ $\sqrt{1-t^2}$ (3rd side) ✓ answer (2)
5.1.2	$\sin 38°$ $= \sin 2(19°)$ $= 2\sin 19° \cos 19°$ $= 2t\sqrt{1-t^2}$	✓ double angle ✓answer (2)

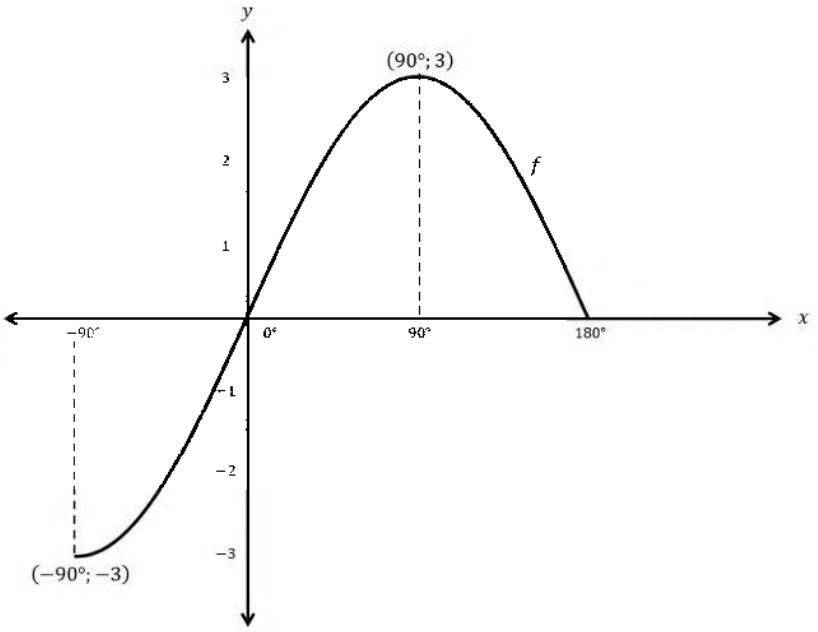
5.1.3	$\sin 101°$ $= \sin(30° + 71°)$ $= \sin 30° \cos 71° + \cos 30° \sin 71°$ $= \frac{1}{2}.t + \frac{\sqrt{3}}{2}.\sqrt{1-t^2}$ $= \frac{t}{2} + \frac{\sqrt{3}.\sqrt{1-t^2}}{2}$ $= \frac{t+\sqrt{3}.\sqrt{1-t^2}}{2}$ **OR** $\sin 101°$ $= \sin 79°$ $= \sin(60° + 19°)$ $= \sin 60° \cos 19° + \cos 60° \sin 19°$ $= \left(\frac{\sqrt{3}}{2}\right)\left(\sqrt{1-t^2}\right) + \left(\frac{1}{2}\right)(t)$ $= \frac{\sqrt{3}.\sqrt{1-t^2}}{2} + \frac{t}{2}$ $= \frac{\sqrt{3}.\sqrt{1-t^2}+t}{2}$	✓compound angle ✓expansion ✓$\frac{1}{2}.t$ ✓$\frac{\sqrt{3}}{2}.\sqrt{1-t^2}$ ✓compound angle ✓expansion ✓$\left(\frac{\sqrt{3}}{2}\right)\left(\sqrt{1-t^2}\right)$ ✓$\left(\frac{1}{2}\right)(t)$ (4)

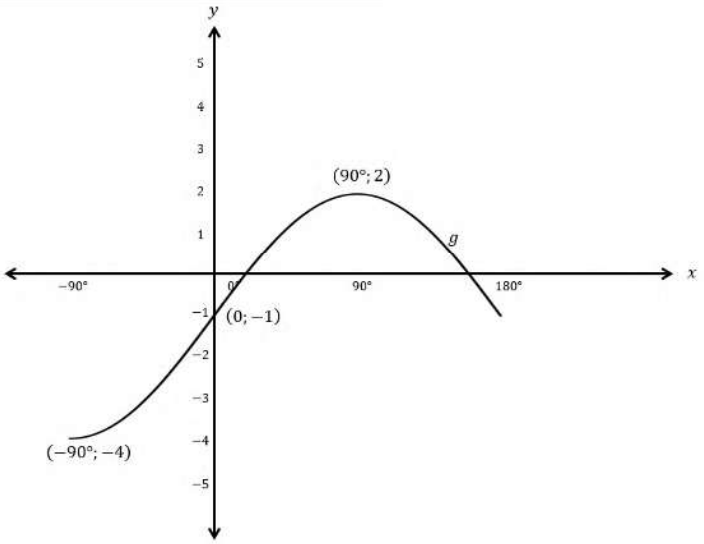
5.2	$\frac{\tan(180° - x)\cos(90° - 2x)}{\tan 225°.\sin(x - 360°)}$ $= \frac{-\tan x\,.\sin 2x}{\tan 45°\sin x}$ $= \frac{-\frac{\sin x}{\cos x}.2\sin x\cos x}{1.\sin x}$ $= -2\sin x$	✓ $-\tan x$ ✓ $\sin 2x$ ✓ $\tan 45°$ ✓ $\sin x$ ✓ $-\frac{\sin x}{\cos x}$ ✓ $2\sin x\cos x$ ✓ 1 ✓Answers (8)
5.3	$\frac{\tan^2 x + 1}{4} = 1$ $\tan^2 x = 3$ $\tan x = \pm\sqrt{3}$ RA= 60° $x = 60° + 180.k$ or $x = 120° + 180.k$ **OR** $\frac{\tan^2 x + 1}{4} = 1$ $\tan^2 x = 3$	✓ $\tan^2 x = 3$ ✓ $\tan x = \pm\sqrt{3}$ ✓ RA $= 60°$ ✓ $60° + 180.k$ and $120° + 180.k$ ✓ $k\epsilon Z$ ✓ $\tan^2 x = 3$ ✓ $\tan x = \pm\sqrt{3}$

	$\tan x = \pm\sqrt{3}$ RA$= 60°$ $x = 60° + 360.k$ or $x = 120° + 360.k$ $x = 240° + 360.k$ or $x = 300° + 360.k$ $k\epsilon$Z	✓ RA $= 60°$ ✓ all 4 answers ✓ $k\epsilon$Z (5)
5.4	$\frac{\sin 2A + \sin A}{\cos 2A + \cos A + 1} = \tan A$ $LHS = \frac{\sin 2A + \sin A}{\cos 2A + \cos A + 1}$ $= \frac{2\sin A\cos A + \sin A}{2\cos^2 A - 1 + \cos A + 1}$ $= \frac{\sin A(2\cos A + 1)}{2\cos^2 A + \cos A}$ $= \frac{\sin A(2\cos A + 1)}{\cos A(2\cos A + 1)}$ $= \tan A$	✓2 sin A cos A ✓2 cos^2 $A - 1$ ✓ Common factor ✓ Simplify denominator ✓ Common factor (5)

5.5	Given: $\sin\theta = 2p$ and $\cos\theta = p$,  	
	$1 = (2p)^2 + (p)^2$ (Pyth)	✓1
	$1 = 4p^2 + p^2$	✓Use of Pythagoras
	$1 = 5p^2$	
	$\frac{1}{5} = p^2$	✓ Value of p^2
	$p = \pm\sqrt{\frac{1}{5}} \times \frac{\sqrt{5}}{\sqrt{5}}$	✓rationalisation
	$p = \pm\frac{\sqrt{5}}{5}$	(4)
		[30]

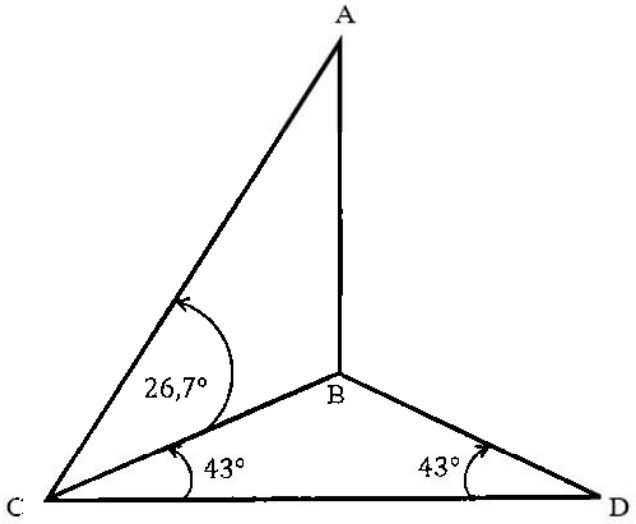
QUESTION 6



6.1	3	✓answer (1)
6.2	$0° < x < 180°$ / $x \in (0°; 180°)$	✓ cv ✓ inequality (2)
6.3		✓(90 ; 2) and y-intercept ✓shape of sine curve (2)
6.4	180°	✓answer (1)

6.5	$g(x) \geq 1$ $3\sin x - 1 \geq 1$ $3\sin x \geq 2$ $\sin x \geq \frac{2}{3}$ Reference Angle: $x = 41{,}81°$ $180° - 41.81° = 138.19°$ $\therefore 41{,}81° \leq x \leq 138{,}19° \quad / x \in [41{,}81°; 138{,}19°]$	✓ inequality ✓ 41,81° and 138,19° ✓answer (3)
6.6	$h(x) = -3\sin x + 1$ $= -3\sin(x + 90°) + 1$ $= -3\cos x + 1$	✓$-3\sin x + 1$ ✓ $-3\sin(x + 90°) + 1$ ✓$-3\cos x + 1$ (3)
		[12]

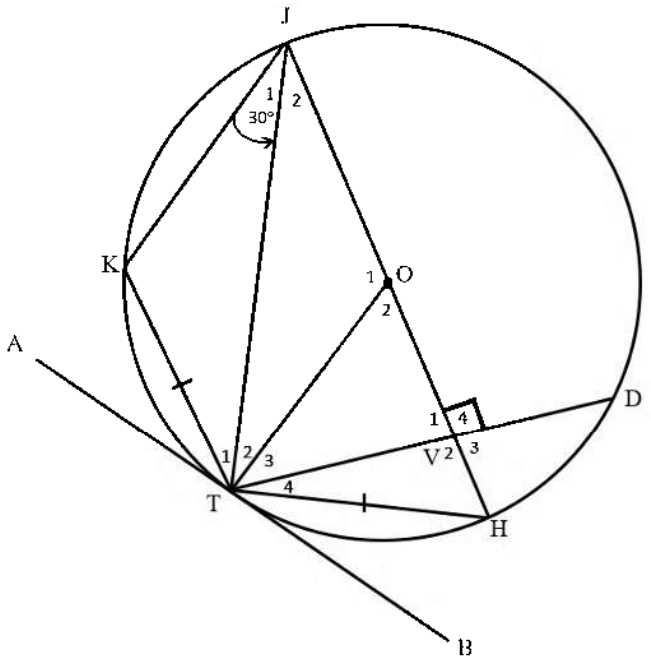
QUESTION 7



7.1	In ΔABD: $\tan 26{,}7° = \frac{AB}{BC}$ $BC = \frac{AB}{\tan 26{,}7°}$	✓$\tan 26{,}7° = \frac{AB}{BC}$ ✓BC (2)
7.2	In ΔBCD: $C\hat{B}D = 94°$ $\frac{CD}{\sin 94°} = \frac{BC}{\sin 43°}$ $BC = \frac{CD.\sin 43°}{\sin 94°}$ $\frac{AB}{\tan 26{,}7°} = \frac{CD.\sin 43°}{\sin 94°}$ $AB = \frac{CD.sin\,43°\,tan\,26{,}7°}{sin\,94°}$	✓94° ✓Subs into sin-formula ✓BC ✓Equating

	OR In ΔABD: $\tan 26{,}7° = \frac{AB}{BC}$ $AB = BC.\tan 26{,}7°$ In ΔBCD: $C\hat{B}D = 94°$ $\frac{CD}{\sin 94°} = \frac{BC}{\sin 43°}$ $BC = \frac{CD.\sin 43°}{\sin 94°}$ $\therefore AB = \frac{CD.\sin 43°}{\sin 94°}.\tan 26{,}7°$ $AB = \frac{CD.\sin 43°\tan 26{,}7°}{\sin 94°}$	✓94° ✓Subs into sin-formula ✓BC ✓sub (4)
7.3	$AB = \frac{120.\sin 43°\tan 26{,}7°}{\sin 94°}$ $AB = 41{,}3$ m	✓Subs 120 ✓Answer (2)
		[8]

QUESTION 8

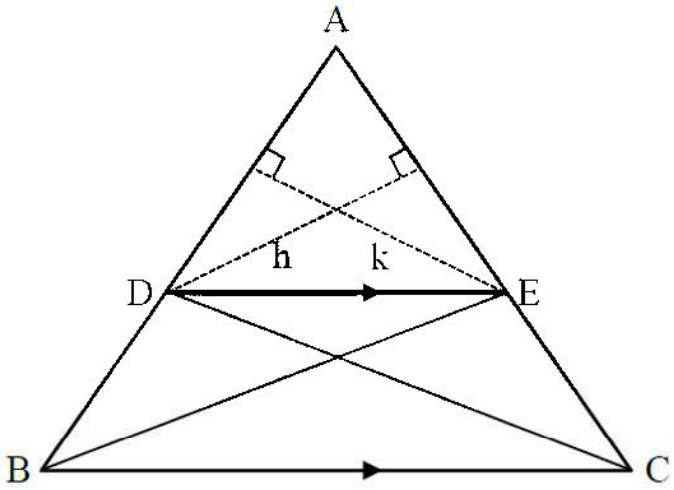


8.1	equal chords ; equal $\angle s$ /*gelyke koorde, gelyke* $\angle^e$	✓ R (1)
8.2.1	$\widehat{O}_2 = 60°$ ($\angle$ at centre $= 2 \times \angle$ at circumference) (*Midpts*$\angle = 2 \times$ *Omtreks*$\angle$)	✓ S✓ R (2)
8.2.2	$J\widehat{T}H = 90°$ ($\angle s$ in semi-circle) / ($\angle$ *in halwe sirkel*) $\widehat{H} = 60°$ (sum of $\angle s$ in Δ) / *(som van* $\angle^e$ *in* Δ) $\widehat{R} = 120°$ (opp $\angle s$ of cyclic quad) / *(teenoorst.* $\angle^e$ *van kvh)*	✓ S ✓ R ✓ S/R ✓ S ✓ R (5)
8.2.3	$\widehat{T}_2 = 30°$ ($\angle$'s opp = sides) / ($\angle^e$ *teenoor gelyke sye)*	✓ S/R (1)

8.3	$TV = 5\sqrt{3}$ (line from centre ⊥ to chord) *(lyn vanuit midpt ⊥ op koord)*	✓ S/R
	$OV = 5$ (Pyth ΔOVT)	✓ OV
	In ΔJTV	
	$JT^2 = \left(5\sqrt{3}\right)^2 + (15)^2$	
	$JT = 10\sqrt{3}$ / $\sqrt{300}$	✓ answer
	OR	
	$O\hat{H}T = 60°$ (sum of $\angle s$ in Δ) / *(som van $\angle^e$ in Δ)*	✓ S/R
	$\therefore OT = OH = TH = 10$ (sides opp $= \angle' s$) *(sye teenoor gelyke $\angle^e$)*	
	In ΔJTH	✓TH
	$JT^2 = (10)^2 + (20)^2$	
	$JT = 10\sqrt{3}$ / $\sqrt{300}$	✓ answer
		(3)
		[12]

QUESTION 9

9.1



Construction must be in words or indicated on sketch. No construction – 0/5 for question.

90° must be mentioned or indicated – if not 4/5

Konstruksie moet op skets aangedui wees, of in woorde. Geen konstruksie – 0/5 vir vraag.

90° moet genoem word of aangedui wees – indien nie 4/5

Construction: Join DC and BE and perpendicular heights *k* and *h*

Konstruksie: Verbind DC en BE en loodregte hoogtes *k* en *h*

✓ construction / kontruksie

$$\frac{\text{Area } \triangle ADE}{\text{Area } \triangle DEB} = \frac{\frac{1}{2} \cdot AD \cdot k}{\frac{1}{2} \cdot DB \cdot k} = \frac{AD}{DB}$$

✓ statement

$$\frac{\text{Area } \triangle ADE}{\text{Area } \triangle DEC} = \frac{\frac{1}{2} \cdot AE \cdot h}{\frac{1}{2} \cdot EC \cdot h} = \frac{AE}{EC}$$

✓ statement

$\text{Area } \triangle DEB = \text{Area } \triangle DEC$

(same base, same height / *dies. basis, dies. hoogte)*

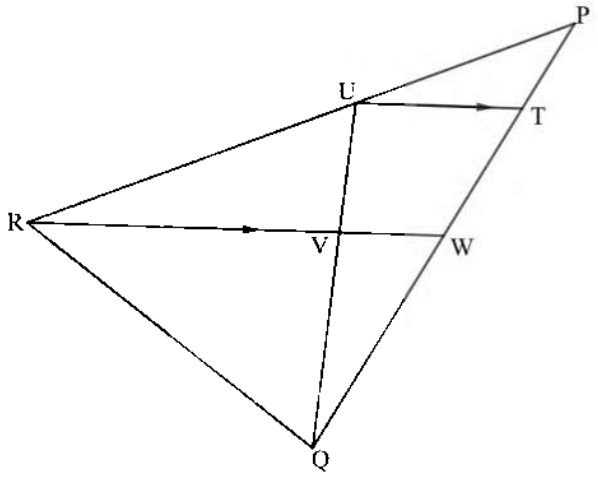
✓ statement / reason

$$\therefore \frac{\text{Area } \triangle ADE}{\text{Area } \triangle DEB} = \frac{\text{Area } \triangle ADE}{\text{Area } \triangle DEC}$$

$$\therefore \frac{AD}{DB} = \frac{AE}{EC}$$

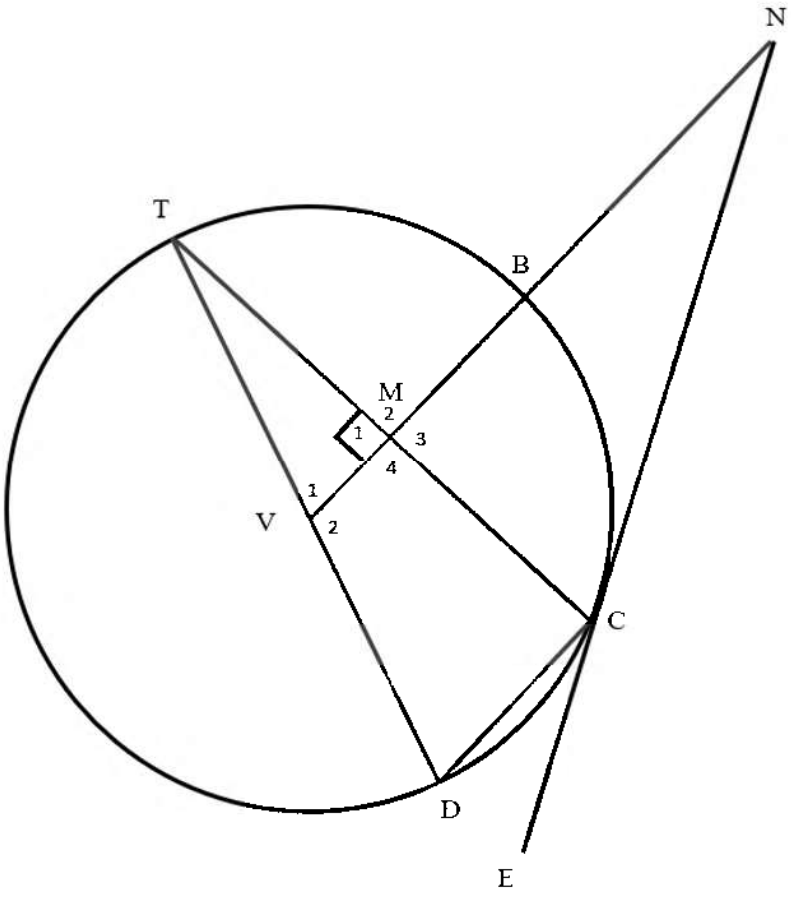
✓ statement

(5)



9.2.1	$\frac{WT}{TP} = \frac{RU}{UP} = \frac{2p}{1p}$ Line ∥ to one side of a Δ / *(lyn ∥een sy van Δ)* **OR** prop theorem; $UT \parallel RW$ *(eweredige stelling $UT \parallel RW$)*	✓S ✓R
	$\frac{VQ}{VU} = \frac{QW}{WT}$ Line ∥ to one side of a Δ/ *(lyn ∥een sy van Δ)* **OR** prop theorem; $UT \parallel RW$ *(eweredige stelling $UT \parallel RW$)*	✓ S/R
	$\therefore \frac{VQ}{VU} = \frac{5}{2}$	✓ answer (4)
9.2.2	$\frac{\text{Area } \Delta UPQ}{\text{Area } \Delta RPW} = \frac{\frac{1}{2}\text{UP. PQ. sin } \hat{P}}{\frac{1}{2}\text{RP. PW. sin } \hat{P}}$ $= \frac{1k.8p}{3k.3p}$ $= \frac{8}{9}$	✓ areas ✓ simplification / sub ✓ answer (3)
		[12]

QUESTION 10



10.1	$\widehat{M}_1 = 90°$ given $T\widehat{C}D = 90°$ (angles in semi-circle) / *(∠ in halwe sirkel)* NV ∥ CD (corr $\angle s$ =) / *(ooreenk.* $\angle^e$ =)	✓S ✓S/R ✓R (3)
10.2	$\widehat{V}_1 = T\widehat{D}C$ (corresp $\angle s$; VN ∥ DC) / *(ooreenk.* $\angle^e; VN \parallel DC$) $N\widehat{C}T = T\widehat{D}C$ (tan chord theorem) / *(rraklyn koord stelling)* $\widehat{V}_1 = N\widehat{C}T$ TNCV is a cylcic quad (converse $\angle s$ in same seg) *(omgekeerde* $\angle^e$ *in dieselfde segment)*	✓ S ✓ S/R ✓ S ✓ R (4)

10.3	In ΔTMV & ΔNMC 1. $V\hat{T}C = N$ ($\angle s$ in same seg) / *($\angle^e$ in dieselfde segment)* 2. $\hat{M}_1 = \hat{M}_3$ (vert opp $\angle s$ =) / *(regoorst. $\angle^e$)* 3. $\hat{V}_1 = T\hat{C}N$ (sum of $\angle s$ in Δ) / *(som van $\angle^e$ in Δ)* $\Delta TMV \,|||\, \Delta NMC$ ($\angle, \angle, \angle$)	✓S/R ✓S/R ✓R / 3rd angle (3)
10.4	$\frac{TM}{NM} = \frac{MV}{MC}$ $TM^2 = NM.MV$ (TM= MC) $\left(\frac{NM}{2}\right)^2 = NM.MV$ $MN^2 + MC^2 = NC^2$ (Pyth) $MN^2 = NC^2 - MC^2$ $\frac{NC^2 - MC^2}{4} = NM.MV$ $MV = \frac{NC^2}{4NM} - \frac{MC^2}{4NM}$	✓S ✓S/R ✓substitution ✓S ✓substitution ✓substitution (6)
		[16]
TOTAL 150		