



education

Department:
Education
North West Provincial Government
REPUBLIC OF SOUTH AFRICA

PROVINCIAL ASSESSMENT/ PROVINSIALE ASSESSERING

GRADE 12/GRAAD 12

TECHNICAL MATHEMATICS P2/ *TEGNIJSE WISKUNDE V2* JUNE/JUNIE 2025 MARKING GUIDES/ *NASIENRIGLYNE*

MARKS/ PUNTE: 150

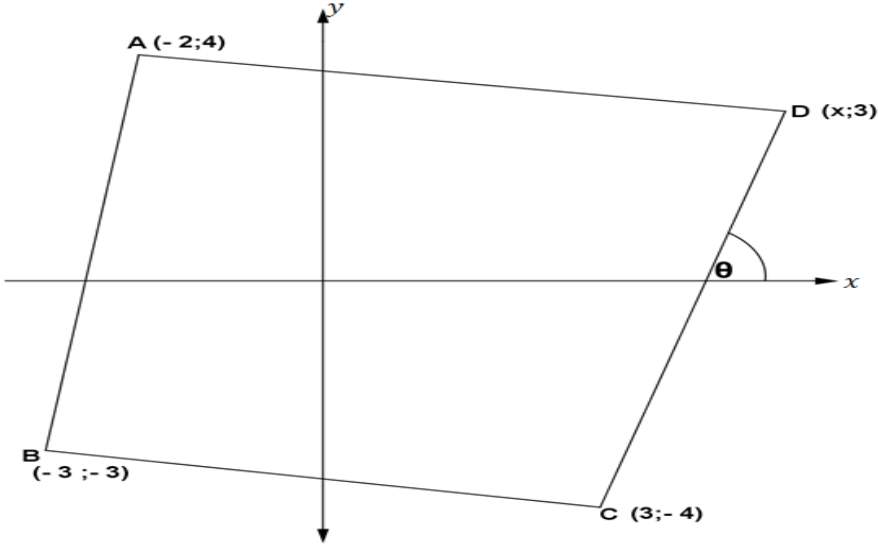
A	Accuracy/Akkuraatheid
AO	Answer only/Antwoord alleenlik
CA	Consistent Accuracy/Volgehoue Akkuraatheid
I	Identity/Identiteit
M	Method/Metode
NPR	No Penalty for Rounding/Geen penalisering vir Afronding
NPU	No Penalty for Units omitted/Geen penalisering vir eenhede weggelaat
R	Rounding/Afronding
RE	Reason/Rede
S	Simplification / Vereenvoudiging
F	Formula/Formule
SF	Substitution in correct Formula/Vervanging in korrekte formule
ST/RE	Statement with reason/Bewering met rede

This marking guideline consists of 16 pages./Hierdie nasienriglyne bestaan uit 16 bladsye.

GENERAL GUIDELINES FOR MARKING/ALGEMENE RIGLYNE OM TE MERK

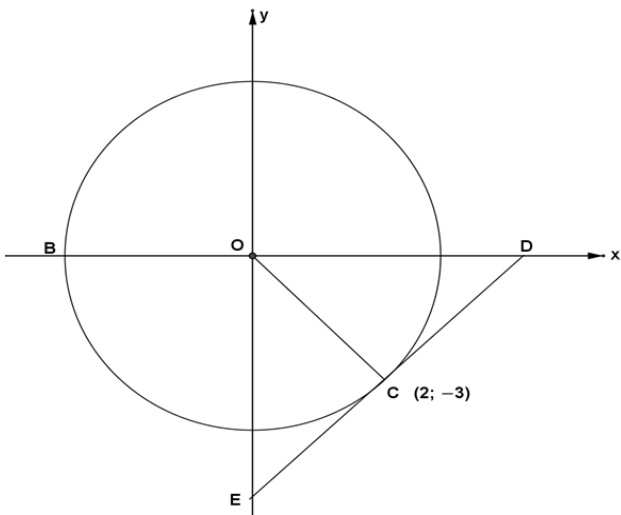
- If a learner makes **more than one attempt** at answering a question and **does not cancel** any of them out, only the **first attempt will be marked** irrespective of which of the attempt(s) may be the correct answer./As 'n leerder **meer as een poging** aanwend om 'n vraag te beantwoord en **nie een van hulle word uitgeskakel** nie, sal slegs die **eerste poging gemerk word** ongeag watter van die poging(s) die regte antwoord kan wees.
- Consistent accurate marking regarding calculations will be followed in the following cases / Volgehoue akkurate nasiening met betrekking tot berekeninge sal in die volgende gevalle gevolg word:
 - Sub question to sub question: When a certain variable is incorrectly calculated in one sub question and needs to be substituted into another sub question full marks can be awarded for the subsequent sub questions provided the methods used are correct and the calculations are correct./
Subvraag na subvraag: Wanneer 'n sekere veranderlike verkeerd in een subvraag bereken word en in 'n ander subvraag vervang moet word, kan volpunte toegeken word vir die daaropvolgende subvrae, mits die metodes wat gebruik is, en die berekeninge korrek is.
 - Assuming values/answers to solve a problem is unacceptable./
Aanvaarding van waardes/antwoorde om 'n probleem op te los, is onaanvaarbaar.
- If a learner did a question in pencil, and did not write it over in pen, the pencil must be marked. Draw a line through and make note of it./
As 'n leerder 'n vraag in potlood gedoen het en dit nie in pen oorgeskryf het nie, moet die potlood gemerk word. Trek 'n lyn deur en maak 'n nota daarvan.

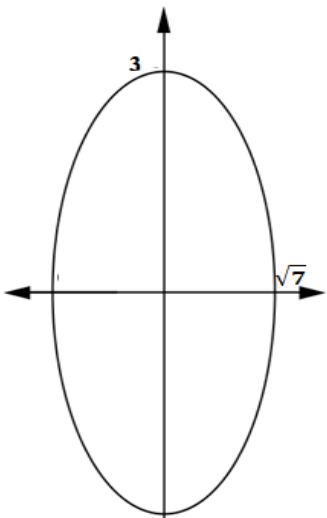
QUESTION 1 / VRAAG 1

1.1			
1.1	$m_{BC} = \frac{y_C - y_B}{x_C - x_B}$ $= \frac{-4 - (-3)}{3 - (-3)}$ $= -\frac{1}{6}$	✓ SF ✓ answer/antwoord Only CA with correct formula/ CA slegs met korrekte formule	A CA (2)
1.2	$y - y_C = m(x - x_C)$ can also use B(-3;-3) $y - (-4) = -\frac{1}{6}(x - 3)$ $-4 = -\frac{1}{6}(3) + c$ $y = -\frac{1}{6}x + \frac{1}{2} - 4$ $y = -\frac{1}{6}x - \frac{7}{2} \text{ or/of } -3,5$ OR/OF use B(-3;-3) $y = -\frac{1}{6}x + c$ $c = -\frac{7}{2}$ $\therefore y = -\frac{1}{6}x - \frac{7}{2}$	✓ SF ✓ answer/antwoord	A CA (2)
1.3	$-\frac{1}{7} = \frac{4-3}{-2-x}$ OR/OF $x - (-2) = 7$ $x + 2 = 7$ $x = 5$	✓ SF ✓ answer/antwoord AO: full marks/volpunte	A A (2)

1.4	$m_{BC} \neq m_{AD}$ $\therefore BC \nparallel AD$	✓ reason/rede ✓ answer/antwoord	A A (2)
1.5	$M_{AB} = \left(\frac{x_1 + x_2}{2}; \frac{y_1 + y_2}{2} \right)$ $= \left(\frac{-2 + (-3)}{2}; \frac{4 + (-3)}{2} \right)$ $= \left(-\frac{5}{2}; \frac{1}{2} \right)$ or/of $(-2,5; 0,5)$	✓ SF ✓ answer/antwoord	A CA (2)
1.6	$y - (-4) = 6(x - (-1))$ $y + 4 = 6x + 6$ $y = 6x + 2$	✓ correct gradient/ korrekte gradiënt $m = 6$ ✓ substitute/vervanging $(-1; -4)$ ✓ answer/antwoord	A A CA (3)
1.7	$\tan \theta = m$ $\tan \theta = \frac{7}{2}$ $\theta = 74,05^\circ$ accept/aanvaar 74°	✓ $\tan \theta = m$ ✓ gradient of/gradiënt van DC CA from/vanaf 1.3 ✓ answer/antwoord	A CA A (3) [16]

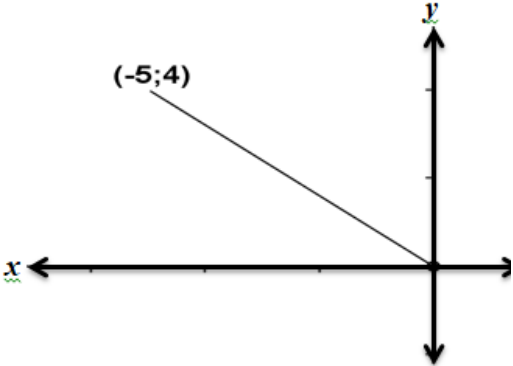
QUESTION 2 / VRAAG 2

			
2.1.1	$x^2 + y^2 = r^2$ $(2)^2 + (-3)^2 = r^2$ $13 = r^2$ $\therefore x^2 + y^2 = 13$	✓ SF ✓ answer/antwoord AO: full marks/volpunte	A CA (2)
2.1.2	$(-\sqrt{13}; 0)$ or/of $(-3.61; 0)$	✓ x-value/waarde ✓ y-value/waarde	A A (2)
2.1.3	$m_{OC} = -\frac{3}{2}$	✓ correct gradient/ korrekte gradiënt	A (1)
2.1.4	$y - y_c = m(x - x_c)$ OR/OF $y = mx + c$ $-3 = \frac{2}{3}(2) + c$ $y - (-3) = \frac{2}{3}(x - 2)$ $c = -\frac{13}{3}$ $y = \frac{2}{3}x - \frac{4}{3} - 3$ $\therefore y = \frac{2}{3}x - \frac{13}{3}$ $y = \frac{2}{3}x - \frac{13}{3}$ or/of $-4,33$ or/of $-4\frac{1}{3}$	CA the gradient from/die gradiënt vanaf 2.1.3 ✓ correct gradient/korrekte gradiënt ✓ substitute/vervanging $(2; -3)$ ✓ answer /antwoord	A A CA (3)
2.1.5	$y = \frac{2}{3}x - \frac{13}{3}$ $0 = \frac{2}{3}x - \frac{13}{3}$ $\frac{13}{3} \times \frac{3}{2} = x$ $\frac{13}{2} = x$ $\therefore D\left(\frac{13}{2}; 0\right)$ or/of $(6,5; 0)$	CA equation from/vergelyking vanaf 2.1.4 ✓ substitute/vervanging $y = 0$ ✓ coordinates/koördinate OR/OF x-value/waarde	CA CA (2)

2.2		✓ correct x-intercept <i>korrekte x-afsnit</i> ✓ correct y-intercept <i>korrekte y-afsnit</i> ✓ shape/vorm	A A CA (3) [13]
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QUESTION 3 / VRAAG 3

3.1.1	$\cos \beta = \frac{3}{5}$ $\beta = \cos^{-1} \frac{3}{5}$ $\beta = 53,13^\circ$ $\therefore 53^\circ$	✓ $\beta = 53,13^\circ$ ✓ correct rounded answer/ <i>korrek afgeronde antwoord</i>	A A (2)
3.1.2	$\frac{\pi}{6} \times \frac{180^\circ}{\pi}$ $= 30^\circ$	✓ answer/antwoord	A (1)
3.1.3	$\sin(2 \times 53^\circ) - \sec(30^\circ)$ OR/OF $53,13^\circ$ $= \sin(106^\circ) - \frac{1}{\cos(30^\circ)}$ $= -0,19$	✓ substitution/vervanging CA from 3.1.1 and 3.1.2/ <i>CA vanaf 3.1.1 en 3.1.2</i> ✓ correct identity/korrekte identiteit ✓ answer/antwoord CA with the values of β and α from above/met die waardes van β en α vanaf bo NPR	CA A CA (3)

3.2.1		✓ diagram (correct quadrant)/ (<i>korrekte kwadrant</i>)	A
3.2.2	$r = \sqrt{(-5)^2 + (4)^2} \quad (\text{pyth})$ $r = \sqrt{41}$ $= \left(\frac{-5}{\sqrt{41}}\right)^2 + \left(\frac{4}{\sqrt{41}}\right)^2$ $= \frac{25}{41} + \frac{16}{41}$ $= 1$	✓ correct value of r / <i>korrekte waarde van r</i> ✓ substitution/vervanging ✓ answer /antwoord no decimals/geen desimale. if calculator was used NO marks/ as sakrekenaar gebruik is, GEEN punte.	A CA CA
3.3	$8 \cos x - 2 = 2$ $\cos x = \frac{1}{2}$ $x = 60^\circ$ OR/OF $x = 360^\circ - 60^\circ$ $x = 300^\circ$	✓ simplifying ratio/ <i>vereenvoudig verhouding</i> ✓ first correct value of x / <i>eerste korrekte waarde vir x</i> ✓ second correct value of x /tweede <i>korrekte waarde vir x</i>	A CA CA NPR
			(3)
			[13]

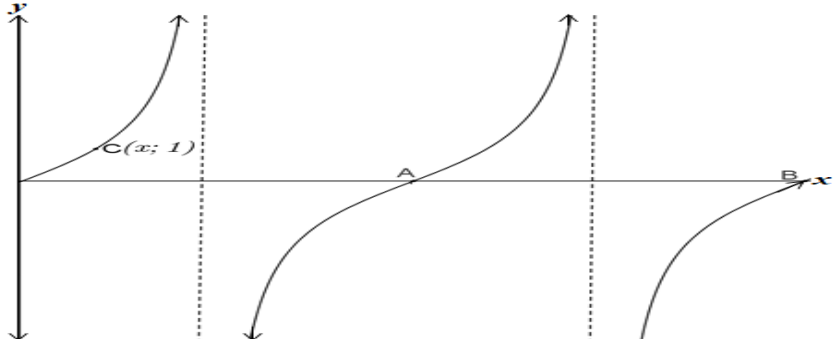
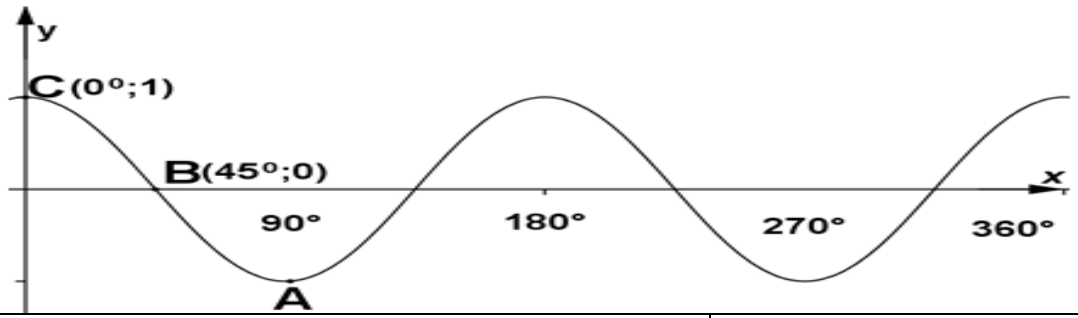
QUESTION 4 / VRAAG 4

4.1	$\frac{\cos(\pi + \theta) \cdot \tan(180^\circ + \theta) \cdot \sin^2(180 - \theta)}{-\tan(180^\circ - \theta) \cdot \sin \theta \cdot \cos(180 - \theta) \cdot \frac{1}{\sec \theta}}$ $= \frac{-\cos \theta \cdot \tan \theta \cdot \sin \theta \cdot \sin \theta}{\tan \theta \cdot \sin \theta \cdot -\cos \theta \cdot \cos \theta}$ $= \tan \theta$	✓ $-\cos \theta$ ✓ $\tan \theta$ ✓ $\sin^2 \theta$ ✓ $-(-\tan \theta)$ or/of $\tan \theta$ ✓ $-\cos \theta$ ✓ <i>identity/identiteit</i> $\frac{1}{\sec \theta} = \cos \theta$ ✓ $\tan \theta$ answer/antwoord	A A A A A A A
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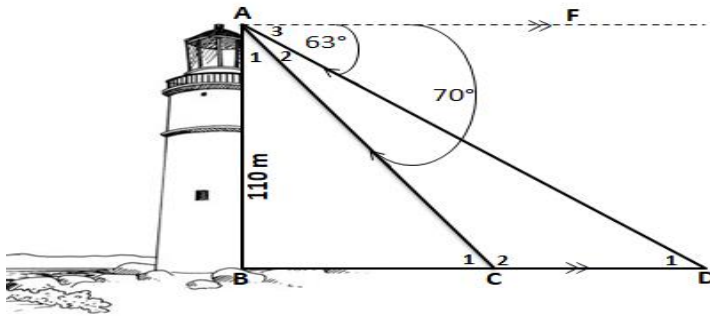
(7)

4.2	$\frac{\sin^2 \theta}{\cos^2 \theta} + \frac{\cos^2 \theta}{\cos^2 \theta} = \frac{1}{\cos^2 \theta}$ LHS/RK: $\tan^2 \theta + 1$ $= \sec^2 \theta$ $= \frac{1}{\cos^2 \theta}$	✓ $\tan^2 \theta$ ✓ 1 ✓ $\sec^2 \theta$ ✓ $\frac{1}{\cos^2 \theta}$	A A A A (4) [11]
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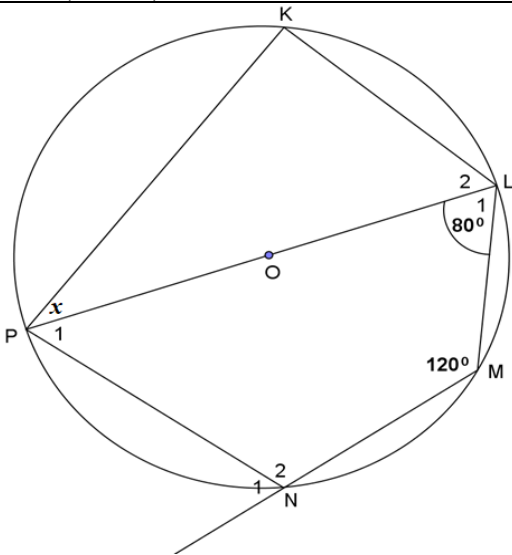
QUESTION 5/ VRAAG 5

5.1			
5.1.1	$x = 90^\circ$ or/of $x = 270^\circ$	✓ $x = 90^\circ$ ✓ $x = 270^\circ$	A (2)
5.1.2	180°	✓ correct answer/ korrekte antwoord	A (1)
5.1.3	$x = 45^\circ$	✓ correct answer/ korrekte antwoord	A (1)
5.1.4	$(180^\circ; 0)$	✓ notation/Notasie ✓ correct answer/ korrekte antwoord	A (2)
5.2			
5.2.1	$a = 1$	✓ answer/antwoord	A (1)
5.2.2	180°	✓ answer/antwoord	A (1)

5.2.3	$(90^\circ; -1)$	✓ 90° ✓ -1	A A (2)
5.3.1	$(90^\circ; 180^\circ)$	✓ correct values/ <i>korrekte waardes</i> ✓ notation/notasie	A (2)
5.3.2	$(45^\circ; 135^\circ)$	✓ correct values/ <i>korrekte waardes</i> ✓ notation/notasie	A (2)
5.4	$-1 \leq y \leq 1$ OR/OF $[-1; 1]$	✓ values/waardes ✓ notation/notasie	A (2) [16]

QUESTION 6/ VRAAG 6


6.1.1	$\hat{C}_1 = 70^\circ$ Alternate/Verwisselende $\angle$ s/e $AF \parallel BD$ OR/OF Interior/Binne $\angle$'s/e of/van Δ	✓ statement/bewering ✓ reason/rede	A A (2)
6.1.2	$\hat{A}_2 = 70^\circ - 63^\circ$ $= 7^\circ$	✓ answer/antwoord	A (1)
6.2	$\sin 70^\circ = \frac{110}{AC}$ OR/OF $\frac{AC}{\sin 90^\circ} = \frac{110}{\sin 70^\circ}$ $AC = \frac{110}{\sin 70^\circ}$ $AC = 117,06m$ $AC = 117,06m$ Learners can determine BC and use pyth to get AC./ <i>Leerders kan BC bepaal en AC bepaal d.m.v. Pyth</i> BC = 40,0367	✓ SF ✓ $AC = 117,06$	A A NPR (2)
6.3	$\frac{CD}{\sin 7^\circ} = \frac{117,06}{\sin 63^\circ}$ $CD = 16,01$ OR/OF $\frac{CD}{\sin 7^\circ} = \frac{AD}{\sin 110^\circ} = \frac{123,46}{\sin 110^\circ}$ $CD = 16,01$	✓ method/metode ✓ 63° ✓ answer/antwoord CA if $\angle$ values are wrong from 6.1. / CA as $\angle$ waardes verkeerd is vanaf 6.1.	A A CA

7.1.4	$\widehat{CDF} = 180^\circ - 70^\circ$ co interior/ko-binne $\angle$ s/e $AC \parallel FD$ $= 110^\circ$	✓ ST ✓ R	CA (2)
7.1.5	$\widehat{D}_3 = 45^\circ$ interior/binne $\angle$'s/e of Δ OR/OF $\widehat{EDG} = 65^\circ$ tangent chord/raaklyn koord $\therefore \widehat{D}_3 = 45^\circ$ $\angle$'s on a str line/ $\angle$ 'e op 'n reguit lyn	✓ ST ✓ R	A A (2)
7.1.6	any two statements:/enige twee bewerings: $\widehat{A} = \widehat{D}_2$ alternate/verwisselende $\angle$'s/e $AC \parallel FD$ $\widehat{J}_1 = \widehat{J}_2$ vertical opp $\angle$'s /regoorstaande $\angle$ 'e $\widehat{B}_1 = \widehat{F}$ alternate/verwisselende $\angle$'s/e $AC \parallel FD$ $\Delta JAB \parallel \Delta JDF$ ($\angle$; $\angle$; $\angle$)	✓ ST/R ✓ ST/R ✓ reason/rede $\angle$; $\angle$; $\angle$	A A A (3)
7.2			
7.2.1	$\widehat{N}_1 = 80^\circ$ exterior $\angle$ of a cyclic quad/ buite $\angle$ van koordevierhoek	✓ ST ✓ R	A A (2)
7.2.2	$\widehat{P}_1 = 60^\circ$ opposite interior $\angle$'s of cyclic Quad./ teenoorstaande binne $\angle$ 'e van koordevierhoek	✓ ST ✓ R	A A (2)
7.2.3	$\widehat{K} = 90^\circ$ $\angle$ in a half circle/semi-circle/ $\angle$ in halwe sirkel/semi-sirkel	✓ ST ✓ R	A A (2)
7.2.4	$\widehat{L}_2 = 60^\circ$ alternate/verwisselende $\angle$'s/e $KL \parallel PN$ $x = 30^\circ$ int $\angle$'s of Δ / binne $\angle$ 'e van Δ OR/OF $x = 30^\circ$ Co interior/Ko-binne $\angle$'s/e $KL \parallel PN$	✓ ST/R ✓ ST/R	A A (2) [24]

QUESTION 9/ VRAAG 9

9.1			
9.1	half the length/die helfte van die lengte (1)		
9.2.1	$a = 10$ midpoint theorem/middelpuntstelling	✓ ST ✓ R	A A (2)
9.2.2	$b = 6$	✓ ST	A (1)
9.2.3	$x = 45^\circ$ corresp./ooreenkomstige $\angle$'s/e $PR \parallel ST$	✓ ST ✓ R	A A (2)
9.2.4	$2c$	✓ ST	A (1)
			[7]

QUESTION 10/ VRAAG 10

10.1.1	$\omega = 2\pi n$ $= 2\pi \frac{20}{60}$ $= \frac{2\pi}{3}$ or/of 2,09rad	✓ formula/formule ✓ substitution of/vervanging van 20 ✓ $\div 60$ ✓ answer/antwoord NPR & NPU	A A A CA (4)
10.1.2	$v = \omega r$ $= \frac{2\pi}{3} \times 0,6$ $= \frac{2\pi}{5}$ or/of 1,26 OR/OF $v = \pi D n$ $= \pi \times 1,2 \times \frac{20}{60}$ $= \frac{2\pi}{5}$ or/of 1,26	✓ formula/formule ✓ SF ✓ $r = 0,6$ OR/OF $\div 60$ for 2 nd option/ vir 2 ^{de} opsie ✓ answer/antwoord NPR & NPU	A CA A CA (4)
10.1.3	$s = r\theta$ $= 0,6 \left(\frac{60\pi}{180} \right)$ $= \frac{1}{5}\pi$ or/of 0,628 Area/Oppervlakte = $\frac{rs}{2}$ $= \frac{0,6 \times 0,628}{2}$ $= 0,19$ OR/OF $Area/Oppervlakte = \frac{r^2\theta}{2}$ $= \frac{0,6 \times 60^\circ \times \frac{\pi}{180}}{2}$ $= \frac{3\pi}{5}$ or/of 0,19	✓ F ✓ SF ✓ conversion of/herlei van 60° ✓ answer/antwoord NPR & NPU	A A A CA (4)

10.2	$4h^2 - 4dh + x^2 = 0$ $4h^2 - 4(30)h + 18^2 = 0$ $4h^2 - 120h + 324 = 0$ $\div 4$ $h^2 - 30h + 81 = 0$ $h = \frac{-(-30) \pm \sqrt{(-30)^2 - 4(1)(81)}}{2}$ $h = 3$ $h \neq 27$ OR/OF $OC = \sqrt{(15)^2 - (9)^2}$ $= 12$ $DC = 15 - 12 = 3$	✓ F ✓ SF ✓ method/metode ✓ answer h=3/antwoord h=3	A A A CA (4)
			[16]

QUESTION 11/ VRAAG 11

11.1.1	$x = 15$ $A_T = a(m_1 + m_2 + m_3 + \dots m_4)$ $= 4(15 + 15,5 + 14,5 + \mathbf{14,5} + 14 + 12,5)$ $= 4(86)$ $= 344 \text{ m}^2$ OR/OF $A_T = a \left(\frac{o_1 + o_n}{2} + o_2 + o_3 + o_4 + \dots o_{n-1} \right)$ $= 4 \left(\frac{14+12}{2} + 16 + 15 + 14 + 15 + 13 \right)$ $= 344 \text{ m}^2$	✓ $x = 15$ OR/OF 14,5 ✓ F ✓ value of a / waarde van a ✓ SF ✓ answer/antwoord	A A A CA CA
		NPU	(5)
11.2.1	$V = (lxbxh) + (lxbxh)$ $V = (40 \times 16 \times 26) + (40 \times 20 \times 8)$ $V = 23040 \text{ cm}^2$	✓ adding volumes/ optel van volumes ✓ first volume/ eerste volume ✓ second volume/ tweede volume ✓ total volume/ totale volume	A A A A
			(4)
11.2.2	$A = (16 \times 40) + 2(26 \times 16) + 2(26 \times 40)$ $= 3552 \text{ cm}^2$ $A = (20 \times 40) + 2(8 \times 20) + 2(8 \times 40)$ $= 1760 \text{ cm}^2$	✓ SF ✓ answer/ antwoord ✓ answer/ antwoord CA only for correct formula/CA slegs vir korrekte formule	A CA A CA
		NPR	(3)
11.2.3	$Total Area/Totale Oppervlakte = 3552 + 1760$ $= 5312 \text{ cm}^2$	✓ total area/ totale oppervlakte	CA (1)
			[13]

TOTAL/TOTAAL:150

TECH MATHS GR 12 JUNE 2025 PAPER 2				
VRAAG/ QUESTION	KNOWLEDGE LEVEL 1	ROUTINE LEVEL 2	COMPLEX LEVEL 3	PROBLEM SOLVING LEVEL 4
Q 1: ANALYTICAL GEOMETRY				
1.1	2			
1.2	2			
1.3		2		
1.4	2			
1.5	2			
1.6		3		
1.7		3		
Q 2: HALF CIRCLE , TANGENT & ELLIPSE				
2.1.1	2			
2.1.2		2		
2.1.3	1			
2.1.4		3		
2.1.5	2			
2.2		3		
Q 3: TRIG RATIO'S				
3.1.1	2			
3.1.2	1			
3.1.3		3		
3.2.1		1		
3.2.2		3		
3.3		3		

Q 4: TRIG IDENTITIES & REDUCTION FORMULA				
4.1			7	
4.2				4
Q 5: TRIG GRAPHS				
5.1.1	2			
5.1.2	1			
5.1.3	1			
5.1.4	2			
5.2.1	1			
5.2.2	1			
5.2.3	2			
5.3.1			2	
5.3.2				2
5.4	2			
Q 6: TRIG RULES				
6.1.1	2			
6.1.2	1			
6.2		2		
6.3		3		
6.4		2		
Q 7: GEOMETRY				
7.1.1	6			
7.1.2		1		
7.1.3	2			
7.1.4	2			
7.1.5	2			

7.1.6		3		
7.2.1	2			
7.2.2	2			
7.2.3	2			
7.2.4	2			
Q 8: GEOMETRY				
8.1	1			
8.2.1	2			
8.2.2	2			
8.2.3	2			
8.2.4		2		
8.2.5		3		
Q 9: MIDPOINT T. & CONCRUENCY & SIMILARITY				
9.1	1			
9.2.1	2			
9.2.2	1			
9.2.3	2			
9.2.4			1	
Q 10: ANGULAR MOVEMENT, VELOCITY, SECTORS , RADIANS & SEGMENT HEIGHT				
10.1.1			4	
10.1.2			4	
10.1.3		4		
10.2				4

Q 11: IRREGULAR SHAPE, VOLUME & SURFACE AREA				
11.1			3	2
11.2.1		4		
11.2.2				3
11.2.3		1		
TOTAL	64	49	21	16
PERCENTAGE	42,67%	32,67%	14%	10,67%
TOTAL OF PAPER	150			