education

Department:
Education
North West Provincial Government
REPUBLIC OF SOUTH AFRICA

PROVINCIAL ASSESSMENT/
PROVINSIALE ASSESSERING

GRADE 12/*GRAAD* 12

TECHNICAL MATHEMATICS P2/*TEGNIESE WISKUNDE V2*

JUNE/*JUNIE* 2024

MARKING GUIDELINES/*NASIENRIGLYNE*

MARKS/*PUNTE*: 150

CODE/KODE	Accuracy /*Akkuraatheid*
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 nie*
NPU	No Penalty for Units omitted /*Geen penalisering vir eenhede weggelaat nie*
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*

These marking guidelines consist of 14 pages.
Hierdie nasienriglyne bestaan uit 14 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 gekanselleer** nie, sal slegs die **eerste poging gemerk word** ongeag watter van die poging(s) die regte antwoord kan wees.*

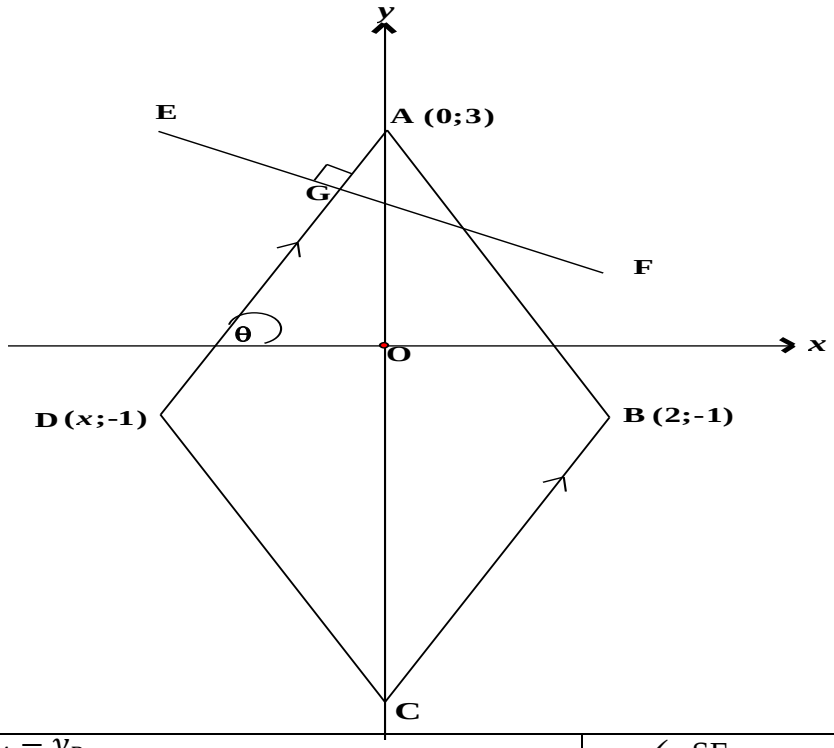
- Consistent accurate marking regarding calculations will be followed in the following cases / *Konsekwente akkurate nasien met betrekking tot berekeninge sal in die volgende gevalle gevolg word:*

    - 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, korrek is en die berekeninge korrek is.

    - Assuming values/answers to solve a problem is unacceptable. /
      Aanvaar waardes / antwoorde om 'n probleem op te los, is onaanvaarbaar.

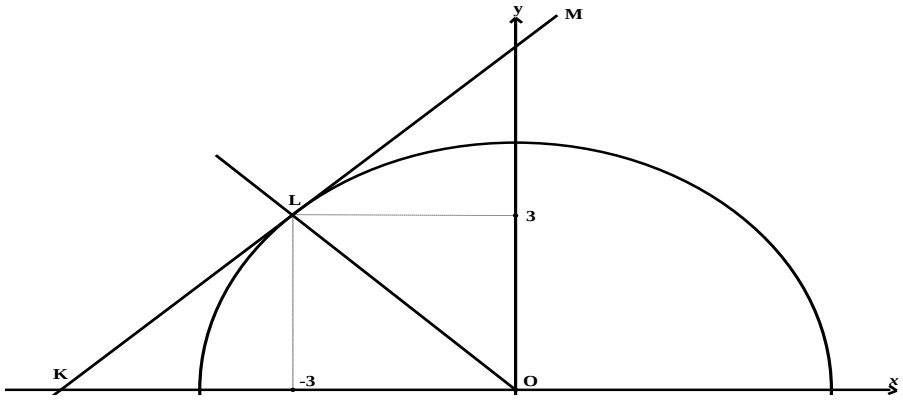
- If a learner did a question in pencil, and did not write it over in pen, the pencil must be marked. Draw a line through and make note of it. /
  As 'n leerder 'n vraag in potlood gedoen het en dit nie in pen oorgeskryf het nie, moet die potlood gemerk word. Trek 'n lyn deur en maak 'n nota daarvan.

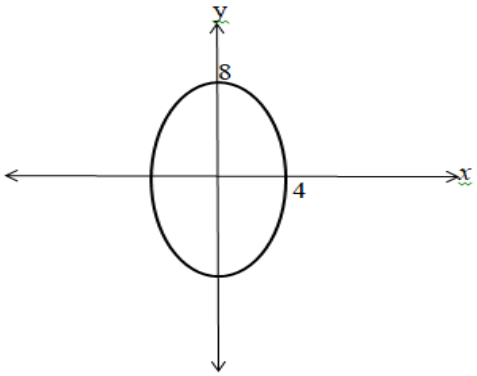
QUESTION 1 / *VRAAG 1*

1.1			
1.1.1	$m_{AB} = \frac{y_A - y_B}{x_A - x_B}$ $= \frac{3-(-1)}{0-2}$ $= -2$	✓ SF ✓ answer/*antwoord* **AO: full marks/*vol punte***	**A** **CA** **(2)**
1.1.2	$y - y_A = m(x - x_A)$ also can use B(2;-1) $y - 3 = -2(x - 0)$ $y = -2x + 3$	✓ SF ✓ answer /a*ntwoord*	**A** **CA** **(2)**
1.1.3	$M_{AB} = \left(\frac{x_1 + x_2}{2}; \frac{y_1 + y_2}{2}\right)$ $= \left(\frac{2+0}{2}; \frac{3-1}{2}\right)$ $= (1; 1)$	✓ SF ✓ answer/antwoord	**A** **CA** **(2)**
1.1.4	$x = -2$	✓ answer/antwoord	**A** **(1)**
1.1.5	$C(0; -5)$	✓ answer/*antwoord*	**A** **(1)**
1.1.6	$3 + 5 = 8$	✓ answer/*antwoord*	**A** **(1)**

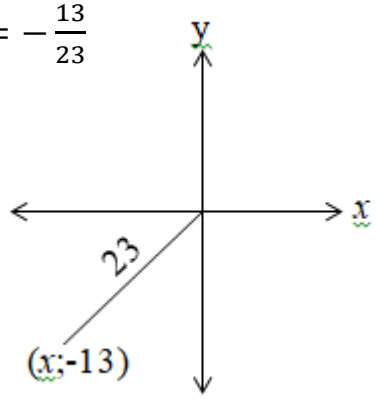
1.2	$\parallel lines \ \therefore equal\ gradients$ $y = 2x + 3$	✓ equal gradients or value of 2/ gelyke gradiente of waarde van 2 ✓ y-intercept **AO full marks/vol punte**	**A** **A** **(2)**
1.3	$m_{EF} \times m_{AD} = -1$ $y - 3 = -\frac{1}{2}(x + 1)$ $y = -\frac{1}{2}x + \frac{5}{2}$ or -2,5 or $2\frac{1}{2}$	✓ reason for gradients *rede vir gradient* ✓ correct gradient/ *korrekte gradient* ✓ subst (-1;3) ✓ answer/*antwoord*	**A** **A** **A** **CA** **(4)**
1.4	$\tan\theta = 2$ $\theta = 63{,}43°$	✓ gradient of AD ✓ answer/antwoord	**A** **A** **(2)** **[17]**

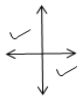
QUESTION 2/*VRAAG 2*



2.1.1	$x^2 + y^2 = r^2$ $(-3)^2 + (3)^2 = r^2$ $18 = r^2$ $y = \sqrt{18 - x^2}$	✓ SF ✓ value/*waarde* r^2 ✓ answer/a*ntwoord*	**A** **A** **CA** **(3)**
2.1.2	$m = -1$ $y = -x$	✓ answer/a*ntwoord* ✓ answer/a*ntwoord*	**A** **A** **(2)**
2.1.3	$m_{KM} = 1$ $y - 3 = 1(x + 3)$ $y = x + 6$	✓ correct gradient/ *korrekte gradient* ✓ *subst van (-3;3)* ✓ answer/antwoord	**A** **A** **CA** **(3)**
2.1.4	$(-6; 0)$	✓ *x* - coordinate -6 ✓ *y*-coordinate 0	**A** **(2)**
2.2		✓ correct x-intercept *korrekte x-afsnit* ✓ correct y-intersept *korrekte y-afsnit* ✓ shape/*vorm*	**A** **A** **CA** **(3)** **[13]**

QUESTION 3 / *VRAAG 3*

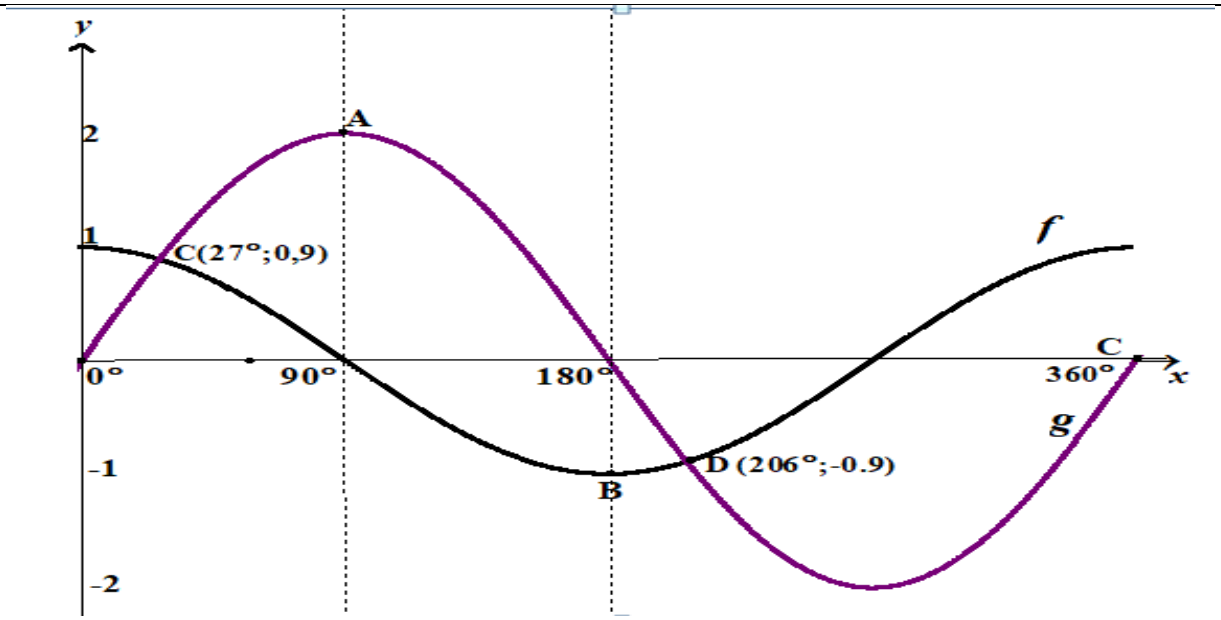
3.1.	$\sin(2(63°)+60°)$ $\quad \frac{\pi}{3}\times\frac{180°}{\pi}=60°$ $=-0{,}11$ **OR** $\sin(2\left(\frac{7\pi}{20}\right)+\frac{\pi}{3})$ $\quad 63°\times\frac{\pi}{180}=\frac{7\pi}{20}$ $=-0{,}10$	✓ conversion/ *omskakeling* ✓ SF ✓ answer/a*ntwoord*	**A** **CA** **CA** **(3)**
3.2.1	$\sin\theta+\frac{5}{23}=\frac{-8}{23}$ $\sin\theta=-\frac{13}{23}$ 	✓ simplified equation/ *vereenvoudigde vergelyking* ✓ diagram (**correct quadrant)**/ ***(korrekte kwadrant)***	A A **(2)**
3.2.2	$x=\sqrt{23^2-(-13)^2}$ pyth $x=-6\sqrt{10}$ OR -18,97 $\tan\theta=\frac{13}{6\sqrt{10}}$ **OR** $\frac{13\sqrt{10}}{60}$ **OR** $\frac{13}{18{,}97}$	✓ correct value of *x/ korrekte waarde van x* ✓ correct ratio 13 **OR** $13\sqrt{10}$ ✓ $6\sqrt{10}$ **OR** 60 **OR** 18,97	**A** **CA** **CA** **(3)**
3.2.3	$23\sin\theta+23\cos\theta$ $=23\left(\frac{-13}{23}\right)+23\left(\frac{-6\sqrt{10}}{23}\right)$ $=-13-6\sqrt{10}$ $=-31{,}97$ $=-32$	✓ substitution of *sin Θ* ✓ substitution of *cos Θ* ✓ correctly rounded answer **Rounding**	**A** **CA** **CA** **(3)**

3.3	$2\tan x = -3$ $\tan x = -\frac{3}{2}$ $x = 180° - 56.31°$ $x = 123{,}69°$ **OR** $x = 360° - 56{,}31°$ $x = 303{,}69°$ 	✓ simplifying ratio ✓ ref angle ✓ first correct value of x ✓ second correct value of x	**A** **A** **CA** **CA** **(4)**
			[15]

QUESTION 4 / *VRAAG 4*

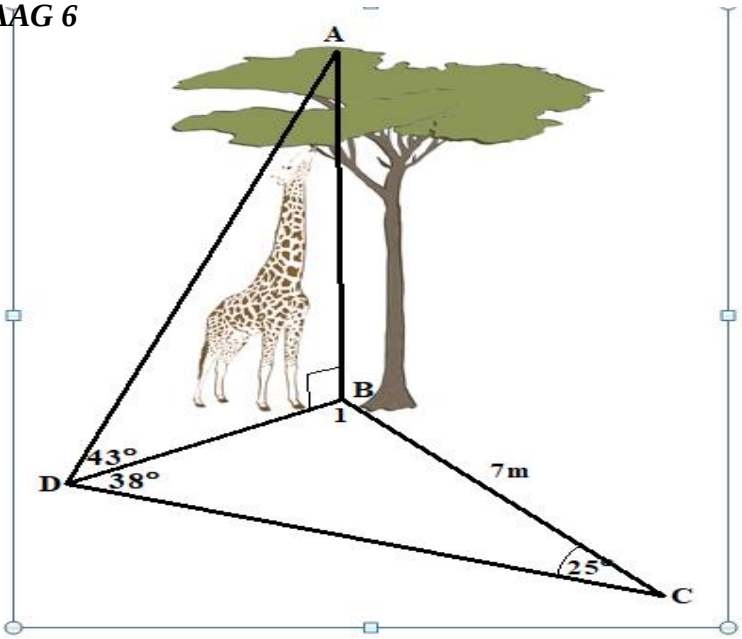
4.1	$\frac{-\sin(360° - \theta)\cos(180° + \theta)\tan 180° - \theta)}{-\cos(180° - \theta)\tan\theta\sin(\pi + \theta)}$ $= \frac{-(-)\sin\theta.-\cos\theta.-\tan\theta}{-(-)\cos\theta\,.\tan\theta\,.-\sin\theta}$ $= -1$ **OR** $= \frac{\sin\theta\,.-\cos\theta\,.-\tan\theta}{\cos\theta\,.\tan\theta\,.-\sin\theta}$ $= \frac{\sin\theta.-\cos\theta\times-\frac{\sin\theta}{\cos\theta}}{\cos\theta\times\frac{\sin\theta}{\cos\theta}\times-\sin\theta}$ $= \frac{sin^2\theta}{-sin^2\theta}$ $= -1$	✓ $-\sin\theta$ ✓ $-\cos\theta$ ✓ $-\tan\theta$ ✓ $-\cos\theta$ ✓ $-\sin\theta$ ✓ -1 OR ✓ $\sin\theta$ ✓ $-\cos\theta$ ✓ $-\tan\theta$ ✓ $-\sin\theta$ ✓ $\frac{\sin\theta}{\cos\theta}$ ✓ -1	**A** **A** **A** **A** **A** **CA** **A** **A** **A** **A** **A** **CA** **(6)**
4.2	$\frac{(1 - cos^2\theta)\cot\theta}{(1 - sin^2\theta)} = 1$ $LS = \frac{sin^2\theta \times \frac{cos^2\theta}{sin^2\theta}}{cos^2\theta}$ $= \frac{cos^2\theta}{cos^2\theta} \quad = 1 = RS$	✓ identity: $sin^2\theta$ ✓ $\frac{cos^2\theta}{sin^2\theta}$ ✓ $cos^2\theta$ ✓ simplifying to $\frac{cos^2\theta}{cos^2\theta}$	**A** **A** **A** **A** **(4)**
			[10]

QUESTION 5/ *VRAAG 5*



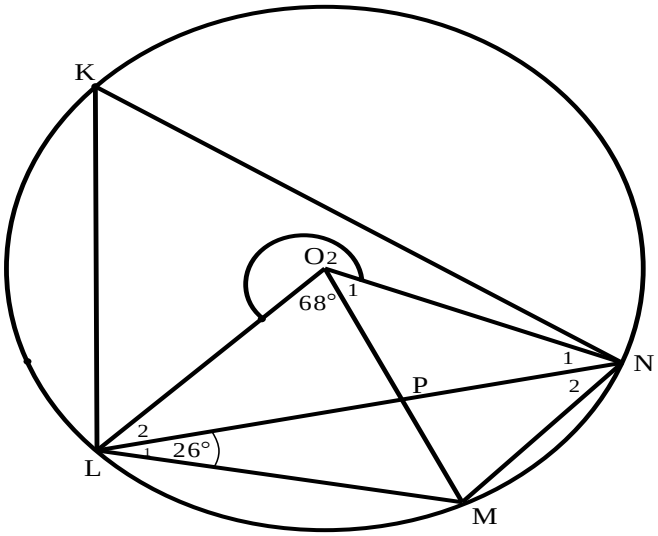
5.1.1	$a = 1$	✓ correct answer	**A (1)**
5.1.2	$a = 2$	✓ correct answer	**A (1)**
5.2.	A(90°;2) B(180°;-1)	✓ one mark for ✓ each correct coordinated pair	**A** **A (2)**
5.3	360°	✓ correct answer	**A (1)**
5.4.1	C(27°; 0,9) and D(206°;-0,9)	✓ one mark for ✓ each points correct coordinates	**A** **A (2)**
5.4.2	[27°;206°] OR $27° \leq x \leq 206°$	✓ correct end values ✓ correct notation	**A** **A (2)**
5.5	$-2 \leq y \leq 2$	✓ correct end values ✓ correct notation	**A** **A (2)**
			[11]

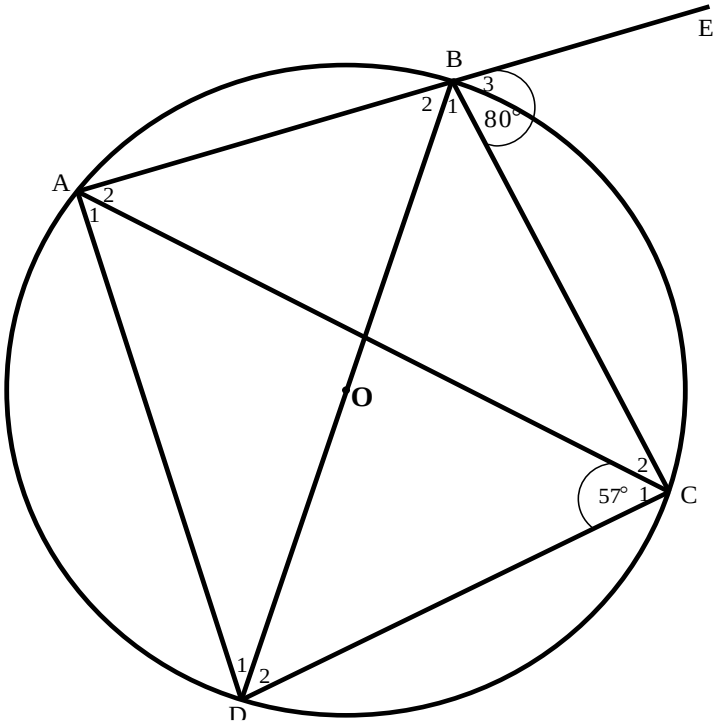
QUESTION 6/ *VRAAG 6*



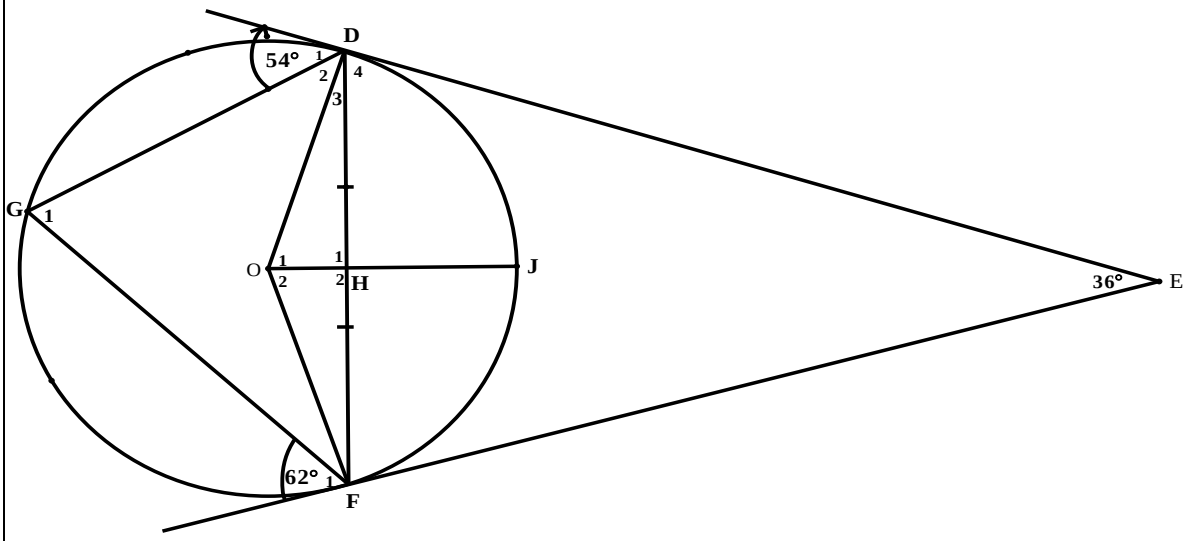
6.1	$\frac{BD}{\sin 25°} = \frac{BC}{\sin 38°}$ $BD = \frac{7 \times \sin 25°}{\sin\ 38°}$ $BD = 4.81m$	✓ subst in correct formula/ i*nvervang in korrekte formule*. ✓ simplifying/ *vereenvoudiging* ✓ correct answer/ *korrekte antwoord*	**A** **A** **CA** **(3)**
6.2	$\tan 43° = \frac{AB}{4.81}$ OR $\frac{AB}{\sin 43°} = \frac{4,81}{\sin 47°}$ $4,49 = AB$ $AB = 4,49$ $4,50 \approx AB$ $AB \approx 4,50m$	✓ subst in correct formula/ invervang in korrekte formule ✓ correct answer **4,5** / k*orrekte antwoord* ***4,5***	**A** **A** **(2)**
6.3	$4,5 \times \frac{4}{5} = 3,6\ m$	✓ method/metode answer/a*ntwoord* ✓ **AO Full marks**	**A** **A** **(2)**
6.4	$A_{\Delta BCD} = \frac{1}{2}(4,81)(7)\sin 117°$ $\hat{B}_1 = 117°$ $= 15\ m^2$ **NOTE: learners can determine DC and then use other angles and sides.**	✓ subst into correct formule/ *invervang in korrekte formule* ✓ 117° ✓ answer **NPR**	**A** **A** **CA** **(3)**
			[10]]

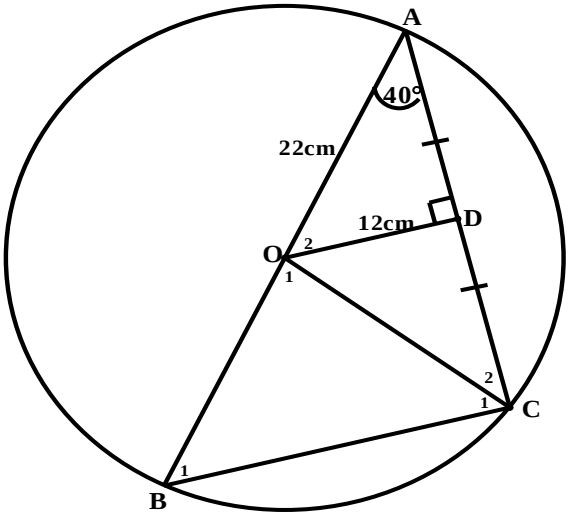
QUESTION 7/ *VRAAG 7*

7.1			
7.1.1	$\hat{O}_1 = 26° \times 2 = \mathbf{52°}$ $\angle at\ centre\ = 2 \times \angle at\ circumf.$	✓ ST ✓ R	**A** **A** **(2)**
7.1.2	$L\hat{K}N = \frac{68°+52°}{2} = \mathbf{60°}$ $\angle at\ circumf = \frac{1}{2}\ \angle at\ centre$	✓ ST ✓ R	**CA** **CA** **(2)**
7.1.3	$L\hat{M}N = 180° - 60° = \mathbf{120°}$ *opp interior ∠ of cyclic Quad*	✓ ST ✓ R	**A** **A** **(2)**
7.1.4	$\hat{N}_2 = \hat{N}_1$ *∠'s opp equal sides =* $\hat{N}_1 = \frac{180°-120°}{2}$ *Int ∠'s of Δ* $= 30°$	✓ ST/R ✓ ST/R	**A** **CA** **(2)**

7.2			
7.2.1	$\hat{B}_2 = 57°$ *∠'s in the same segment / ∠'s subtended by same Chord OR equal chords; equal angles*	✓ ST ✓ R	**A** **A** **(2)**
7.2.2	$A\hat{D}C = 80°$ *Ext ∠ of a cyclic Quad.*	✓ ST ✓ R	**A** **A** **(2)**
7.2.3	$\hat{C}_2 = 90° - 57° = 33°$ *∠ in a half circle/semi-circle*	✓ ST ✓ R	**A** **A** **(2)** **[14]**

QUESTION 8/ *VRAAG 8*

8.1	Equal / Gelyk	✓ answer/*antwoord*	**A (1)**
8.2			
8.2.1	$E\hat{F}O = 90°$ *Tangent ⊥ Radius*	✓ ST ✓ R	**A** **A** **(2)**
8.2.2	$D\hat{F}G = 54°$ *Tangent Chord*	✓ ST ✓ R	**A** **A** **(2)**
8.2.3	$\hat{D}_2 = 90° - 54°$ *Tangent Chord* $= 36°$	✓ ST ✓ R	**A** **A** **(2)**
8.2.4	$\hat{H}_1 = 90°$ *Line from Centre divides Chord in equal Parts* ∴ OJ⊥DF	✓ ST ✓ R	**A** **A** **(2)**
8.2.5	$\hat{D}_3 = \hat{F}_1 - \hat{D}_2$ *Tangent chord* $\hat{D}_3 = 62° - 36°$ $\hat{D}_3 = 26°$	✓ $62° - 36°$ ✓ R ✓ answer/*antwoord*	**CA** **A** **CA** **(3)**
8.2.6	$\hat{O}_1 = 180° - 90° - 26° = 64°$ *Int ∠'s of Δ*	✓ ST ✓ R	**CA** **A** **(2)**
8.2.7	$\hat{G} = 64°$ *∠At centre =2x∠at circumf.*	✓ ST ✓ R	**CA** **A** **(2)**
			[16]

QUESTION 9/ *VRAAG 9*			
9.1	Half/*helfte*	✓ answer/antwoord	**A** **(1)**
			
9.2.1	Yes *Midpoint theorem or corresp ∠'s equal*	✓ ST ✓ R	**A** **A** **(2)**
9.2.2	$BC = 24cm$	✓ answer/*antwoord*	**A** **(1)**
9.2.3	$AD = \sqrt{22^2 - (12)^2}$ *pyth* $= 18{,}44$	✓ ST ✓ R	**A** **A** **(2)**
9.3	$\hat{O}_1 = 80°$ *∠at the centre = 2x ∠at circumf* ***OR*** $\hat{B}_1 = \hat{O}_2 = 50°$ *corresp ∠'s OD∥BC* $\hat{O}_1 = 180° - 2(50°)$ *Int ∠'s of Δ & ∠'s opp equal* $= 80°$ *sides =*	✓ ST ✓ R **OR** ✓ ST/R ✓ ST/R	**A** **A** **A** **A** **(2)**
9.4	Yes s; ∠; s **OR** s; s; s **OR** ∠; ∠; s **OR** 90°∠; hypotenuse; s	✓ ST ✓ R	**A** **A** **(2)**
9.5	Yes sides are in proportion **OR** ∠;∠;∠	✓ ST ✓ R	**A** **A** **(2)**
			[12]

QUESTION 10/ *VRAAG 10*

10.1.1	$150° \times \frac{\pi}{180°}$ $= \frac{5\pi}{6} \quad or\ 2{,}62rad$	✓ method/*metode* ✓ answer/*antwoord*	**A** **A** **(2)**
10.1.2	$A = \frac{r^2\theta}{2}$ $A = \frac{(30)^2 \times \frac{5\pi}{6}}{2}$ $A = \frac{750\pi}{2} = 375\pi \ or\ 1178{,}10\,cm^2$	✓ F ✓ SF ✓ S **NPR & NPU**	**A** **CA** **CA** **(3)**
10.1.3	$s = r\theta$ $= 30\left(\frac{5\pi}{6}\right)$ $= 25\pi \quad or \quad 78{,}54cm$	✓ F ✓ SF ✓ answer /*antwoord* **NPR & NPU**	**A** **CA** **CA** **(3)**
10.1.4	$v = \pi DN$ $= \pi \times 0{,}6 \times \frac{90}{60}$ $= \frac{9\pi}{10} \quad or\ 2{,}83m/s$	✓ conversion of D/*omskakeling van D* ✓ SF ✓ conversion of minutes/*omskakeling* ✓ correct answer/*korrekte antwoord*	**A** **A** **A** **A** **(4)**
10.2	$4h^2 - 4dh + x^2 = 0$ $4h^2 - 4(26)h + 20^2 = 0$ $h^2 - 26h + 100 = 0$ $h = \frac{-(-26) \pm \sqrt{(-26)^2 - 4(1)(100)}}{2}$ $h = 4{,}69$ $h \neq 21{,}31$	✓ F ✓ SF ✓ method/*metode* ✓ answer 4,69/*antwoord 4,69*	**A** **A** **A** **CA** **(4)**
			[16]

QUESTION 11/ *VRAAG 11*

11.1.1	$A_T = a(m_1 + m_2 + m_3 + \cdots m_4)$ $= 8(4 + 6{,}5 + 7{,}5 + 6{,}5 + 4)$ $= 8\left(\frac{57}{2}\right)$ $= 228\ m^2$ **OR** $A_T = a\left(\frac{o_1 + o_n}{2} + o_2 + o_3 + o_4 + \cdots o_{n-1}\right)$ $= 8\left(\frac{3+2}{2} + 5 + 8 + 7 + 6\right)$ $= 228\ m^2$	✓ formula ✓ value of *a* ✓ subst in correct formula/*invervang in korrekte formule* ✓ answer/*antwoord* ***NPU***	**A** **A** **A** **CA** **(4)**
11.2.1	0,62 ; 0,77 ; 0,42	✓ correct convertion of **ALL**	**A** **(1)**
11.2.2	$A = 2\{(0{,}42 \times 0{,}62) + (0{,}77 \times 0{,}42)\} + (0{,}77 \times 0{,}62)$ $= 2(0{,}2604 + 0{,}3234) + 0{,}4774$ $= 1{,}1676 + 0{,}4774$ $= 1{,}645\ m^2$	✓ subst in correct formula/i*nvervang in korrekte formule* ✓ simplify/vereenvoudig ✓ answer CA is only for correct formula **NPR**	**A** **CA** **CA** **(3)**
11.2.3	$V = \pi(7{,}5)^2(20)$ $= \mathbf{3534{,}29cm^2}$ **/** $\mathbf{1125\pi}$ $= 3.534\ \boldsymbol{liter}$ / $\frac{9}{8}\boldsymbol{\pi}$ $\therefore \approx 3{,}5\ liter$	✓ SF ✓ 3534,29 Answer ✓ in **liters 3,53 or 3,5** /*antwoord* in liter 3,53 of 3,5	**A** **A** **A** **(3)**
11.2.4	$\frac{55}{3.5} = 15{,}71$ $\therefore 15\ tins$	✓ answer = 15 **CA the value of liter from 11.2.3**	**A** **(1)**
11.2.5	$77 \div 15 \approx 5$ $62 \div 15 \approx 4$ $42 \div 20 \approx 2$ $5 \times 4 \times 2 = 40$ tins /blikkies	✓ 77/15=5 ✓ 62/15=4 ✓ 42/20=2 ✓ answer	**A** **A** **A** **CA** **(4)**
			[16]
			TOTAL/*TOTAAL*: 150