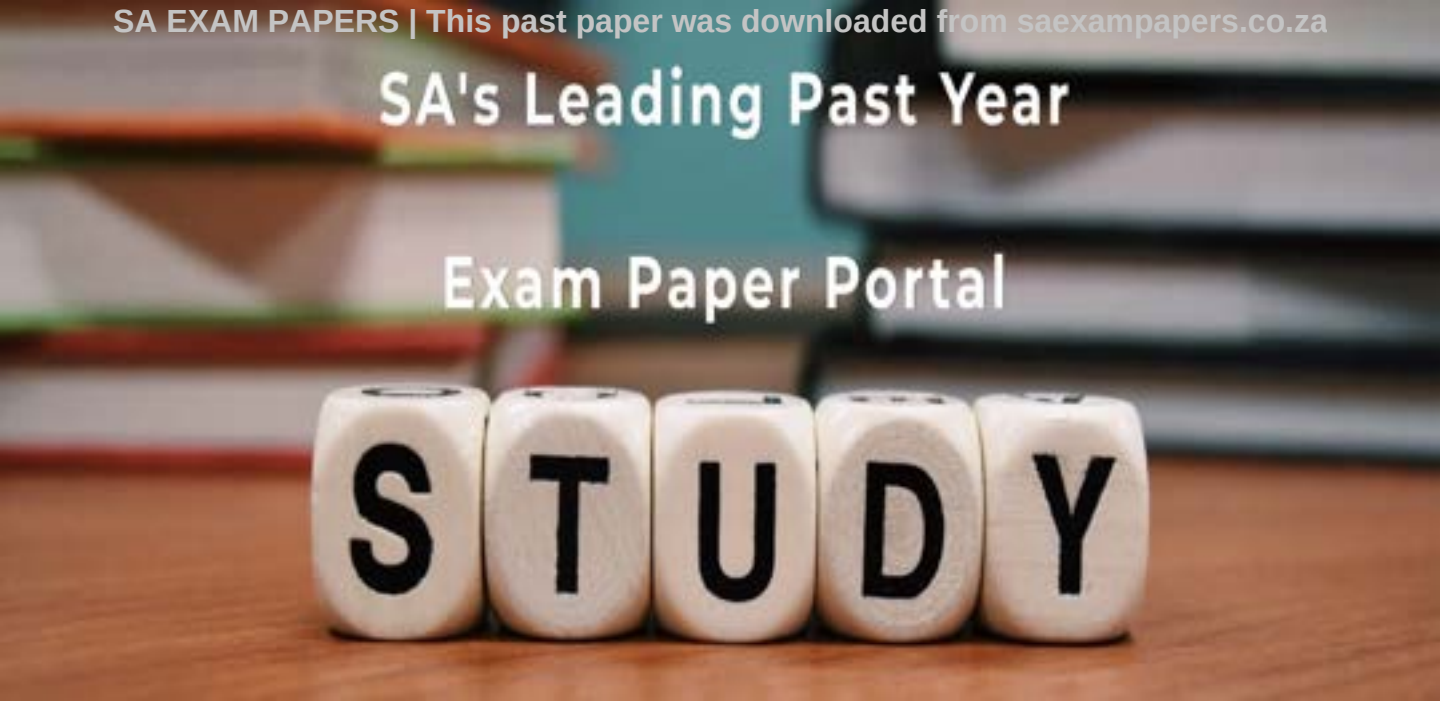


LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

VHEMBE WEST DISTRICT

GRADE 12

MATHEMATICS P2

PRE-MIDYEAR EXAMINATION 2024

MEMORANDUM

MARKS: 140

This question paper consists of 21 pages **including the cover page**

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 memorandum. Stop marking at the second calculation error.
- Assuming answers/values in order to solve a problem is NOT acceptable.

NOTA:

- *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.*
- *Om antwoorde/waardes te aanvaar 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/*VRAAG* 1

1.1 45 children

✓ answer (1)

1.2 $\bar{x} = \frac{\sum fx}{n} = \frac{(4\times 2)+(8\times 10)+(12\times 9)+(16\times 7)+(20\times 8)+(24\times 7)+(28\times 2)}{45}$

$\bar{x} = \frac{692}{45}$ OR $\bar{x} = 15{,}38$ minutes

Answer only: full marks

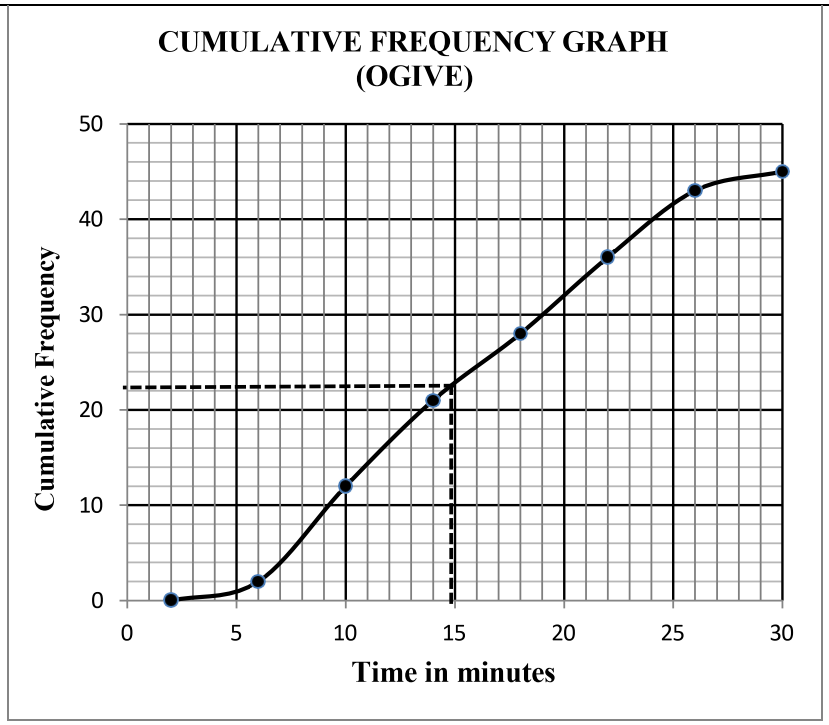
✓ 692
✓ answer (2)

1.3

Time taken (t) (in minutes)	Number of children	Cumulative frequency
$2 < t \leq 6$	2	2
$6 < t \leq 10$	10	12
$10 < t \leq 14$	9	21
$14 < t \leq 18$	7	28
$18 < t \leq 22$	8	36
$22 < t \leq 26$	7	43
$26 < t \leq 30$	2	45

✓ first 4 cum freq correct
✓ last 3 cum freq correct (2)

1.4



✓ plotting cum freq at upper limits correctly (all points)
✓ shape (smooth)
✓ grounding (2;0) (3)

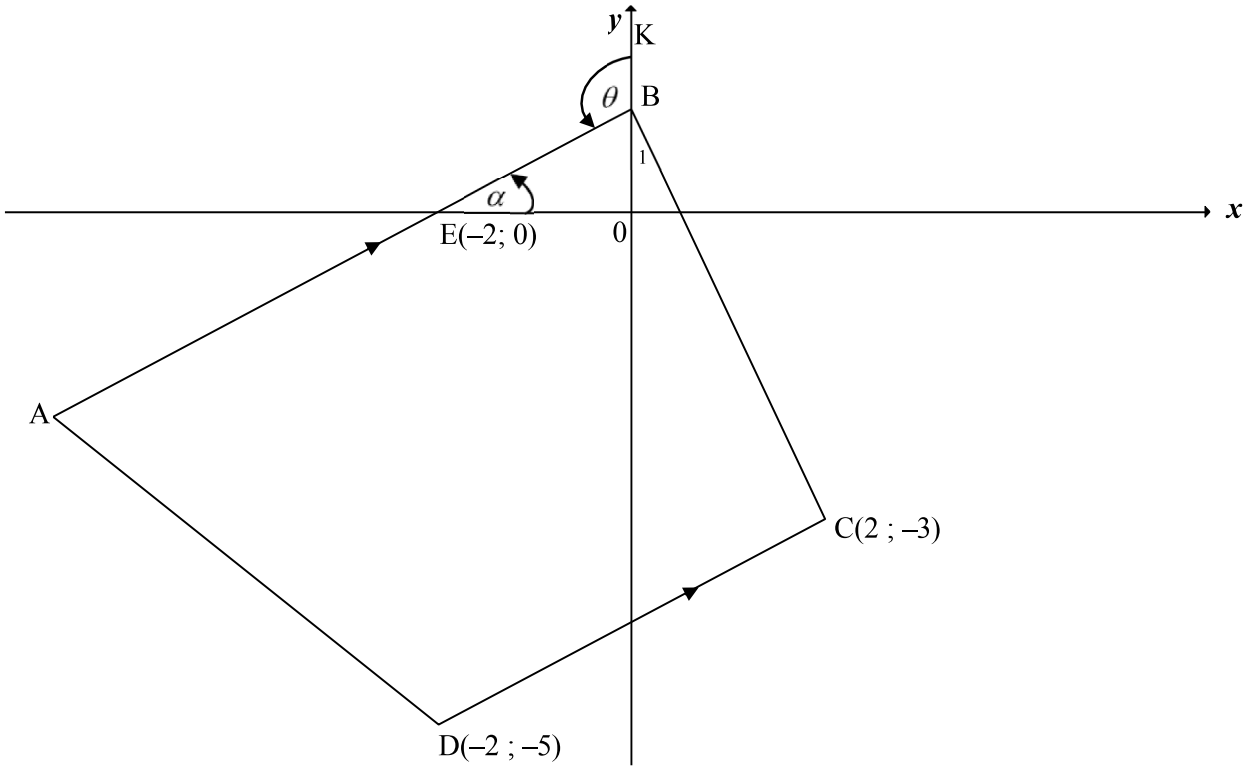
1.5 On graph at the y-value of 22,5 or 23
Median = ± 15 minutes.

Answer only: full marks

✓ graph
✓ answer (2)

[10]

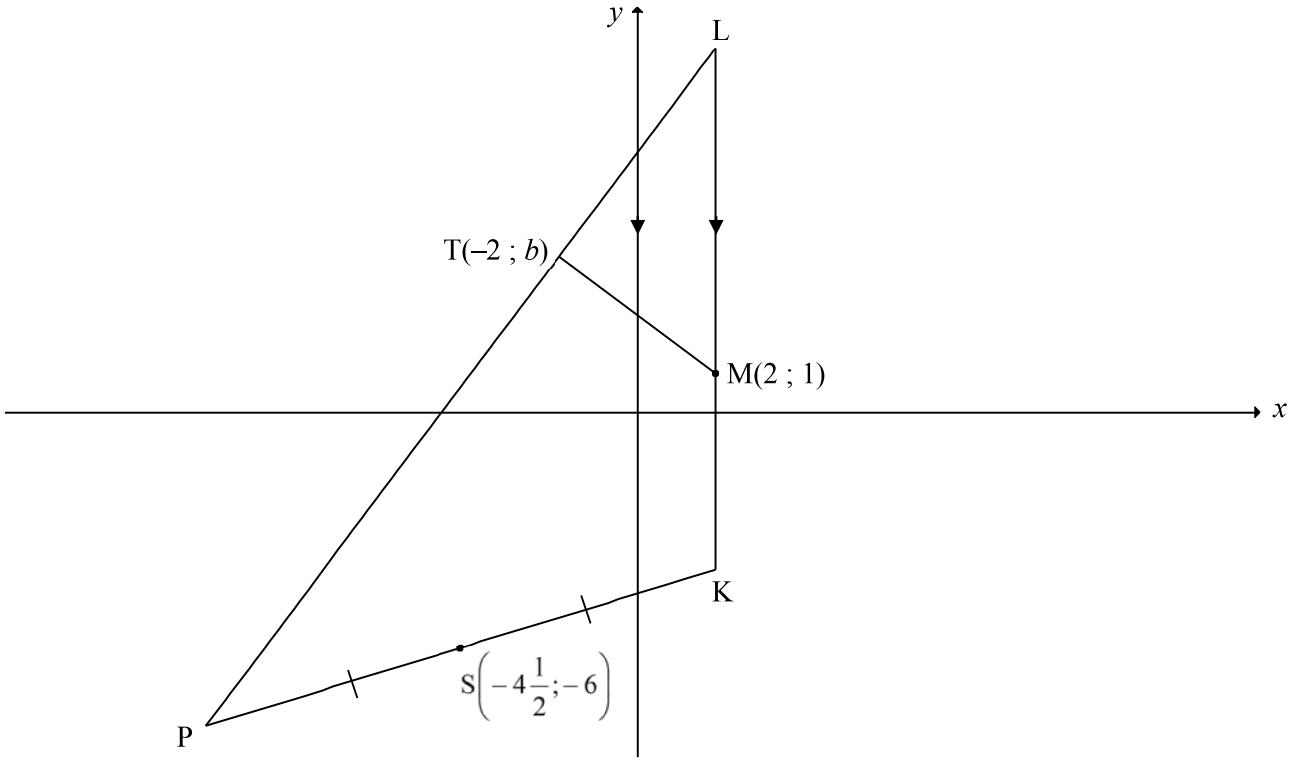
QUESTION/*VRAAG* 2



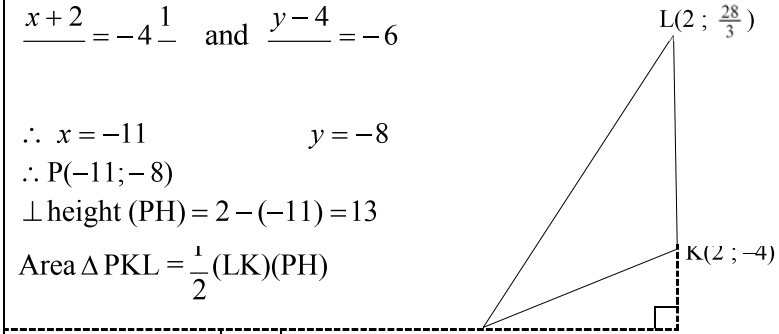
2.1.1	Midpoint of EC: $=\left(\frac{-2+2}{2}\ ;\ \frac{0+(-3)}{2}\right)=\left(0\ ;\ \frac{-3}{2}\right)$	✓x value ✓y value (2)
2.1.2	$m_{DC}=\frac{-3-(-5)}{2-(-2)}$ OR $\frac{-5-(-3)}{-2-2}$ $=\frac{2}{4}=\frac{1}{2}$ Answer only: full marks	✓ substitution ✓ answer (2)
2.1.3	$m_{AB}=\frac{1}{2}$ [AB ∥ DC] $y=\frac{1}{2}x+c$ OR $y-y_1=\frac{1}{2}(x-x_1)$ $0=\frac{1}{2}(-2)+c$ OR $y-0=\frac{1}{2}(x-(-2))$ $c=1$ $\therefore y=\frac{1}{2}x+1$	✓ $m_{AB}=\frac{1}{2}$ ✓substitution of $(-2;0)$ ✓equation (3)
2.1.4	$\tan\alpha=m_{AB}=\frac{1}{2}$ $\alpha=26{,}57°$ $\theta=90°+26{,}57°$ [ext ∠of Δ] $=116{,}57°$	✓ $\tan\alpha=\frac{1}{2}$ ✓value of α ✓value of θ (3)

2.2	B(0 ; 1) $m_{BC} = \frac{1-(-3)}{0-2}$ **OR** $m_{BC} = \frac{(-3)-1}{2-0}$ $= -2$ $= -2$ $m_{AB} \times m_{BC} = \frac{1}{2} \times -2$ $= -1$ $\therefore AB \perp BC$	✓ coordinates of B ✓ $m_{BC} = -2$ ✓ product of gradients = –1 (3)
2.3.1	$A\hat{B}C = 90°$ $\therefore$ EC is diameter [converse; $\angle$ in semi circle] $\therefore$ centre of circle $= \left(0 ; -\frac{3}{2}\right)$	✓ answer (1)
2.3.2	$(x-0)^2 + \left(y+\frac{3}{2}\right)^2 = r^2$ $(-2-0)^2 + \left(0+\frac{3}{2}\right)^2 = r^2$ **OR** $(2-0)^2 + \left(-3-\left(\frac{-3}{2}\right)\right)^2 = r^2$ **OR** $(0-0)^2 + \left(1-\left(\frac{-3}{2}\right)\right)^2 = r^2$ **OR** $r = \frac{EC}{2} = \frac{\sqrt{(-2-2)^2 + (0-(-3))^2}}{2}$ **OR** $r = 1-(-\frac{3}{2})$ $\therefore r^2 = \frac{25}{4}$ or $r = \frac{5}{2}$ $x^2 + \left(y+\frac{3}{2}\right)^2 = \frac{25}{4}$	✓ substitution of centre ✓ correct substitution of E(–1 ; 0), B(0 ; 1) or C(2 ; –3) to calculate r^2 or r ✓ value of r^2 or r ✓ equation (4)
		[18]

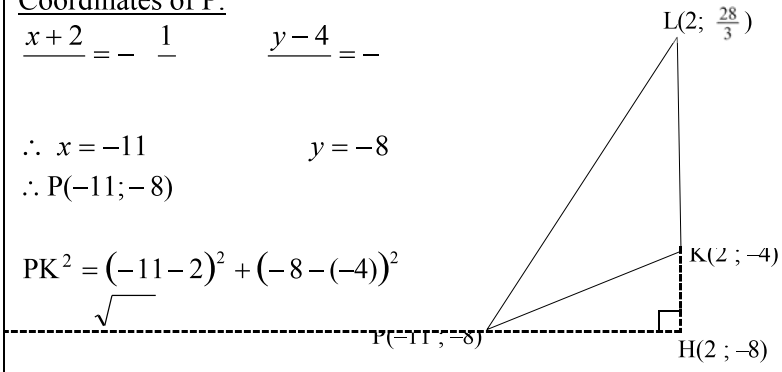
QUESTION/*VRAAG* 3



3.1	$(x-2)^2+(y-1)^2=25$ $(-2-2)^2+(b-1)^2=25$ $(b-1)^2=9$ $b-1=\pm 3$ $\therefore b=4$ or $b\neq -2$ **OF** $(x-2)^2+(y-1)^2=25$ $(-2-2)^2+(b-1)^2=25$ $16+b^2-2b+1=25$ $b^2-2b-8=0$ $\therefore b=4$ or $b\neq -2$	✓ equation of the circle ✓ substitution of point T ✓ simplification ✓ answer (4)
3.2.1	K(2 ; 1 – 5) ∴ K(2 ; –4) Answer only: full marks	✓ x value ✓ y value (2)
3.2.2	$m_{MT}=\frac{4-1}{-2-2}=-\frac{3}{4}$ $m_{PL}=\frac{4}{3}$ [radius ⊥ tangent] $y=\frac{4}{3}x+c$ $4=\frac{4}{3}(-2)+c$ $c=\frac{20}{3}$ $y=\frac{4}{3}x+\frac{20}{3}$	✓ m_{MT} ✓ $m_{PL}=\frac{4}{3}$ ✓ substitution of m_{PL} and the point T ✓ equation (4)

	OR $m_{MT} = \frac{4-1}{-2-2} = -\frac{3}{4}$ $m_{PL} = \frac{4}{3}$ [radius ⊥ tangent] $y - y_1 = \frac{4}{3}(x - x_1)$ $y - 4 = \frac{4}{3}(x + 2)$ $y = \frac{4}{3}x + \frac{20}{3}$ **OR** P(–11 ; –8) $m_{PL} = \frac{4-(-8)}{-2-(-11)}$ $= \frac{4}{3}$ $y = \frac{4}{3}x + c$ $-8 = \frac{4}{3}(-11) + c$ $c = \frac{20}{3}$ $y = \frac{4}{3}x + \frac{20}{3}$	✓ m_{MT} ✓ $m_{PL} = \frac{4}{3}$ ✓ substitution of m_{PL} and the point T ✓ equation (4) ✓ coordinates of P ✓ $m_{PL} = \frac{4}{3}$ ✓ substitution of m_{PL} and the point P or T ✓ equation (4)
3.2.3	$y = \frac{4}{3}(2) + \frac{20}{3} = \frac{28}{3}$ $\left(2 ; \frac{28}{3}\right)$ and K(2 ; –4): LK $= \frac{28}{3} - (-4) = \frac{40}{3}$ Coordinates of P: $\frac{x+2}{1} = \frac{-4}{1}$ and $\frac{y-4}{1} = -6$ $\therefore x = -11$ $y = -8$ $\therefore$ P(–11; – 8) ⊥ height (PH) $= 2 - (-11) = 13$ Area ΔPKL $= \frac{1}{2}$(LK)(PH) $= \frac{1}{2}\left(\frac{40}{3}\right)(13)$ $= \frac{260}{3}$ **OR** 86,67 square units  	✓ $y = \frac{28}{3}$ ✓ length of LK ✓ x_P ✓ y_P ✓ length of ⊥ height ✓ substitution into the area formula ✓ answer (7)

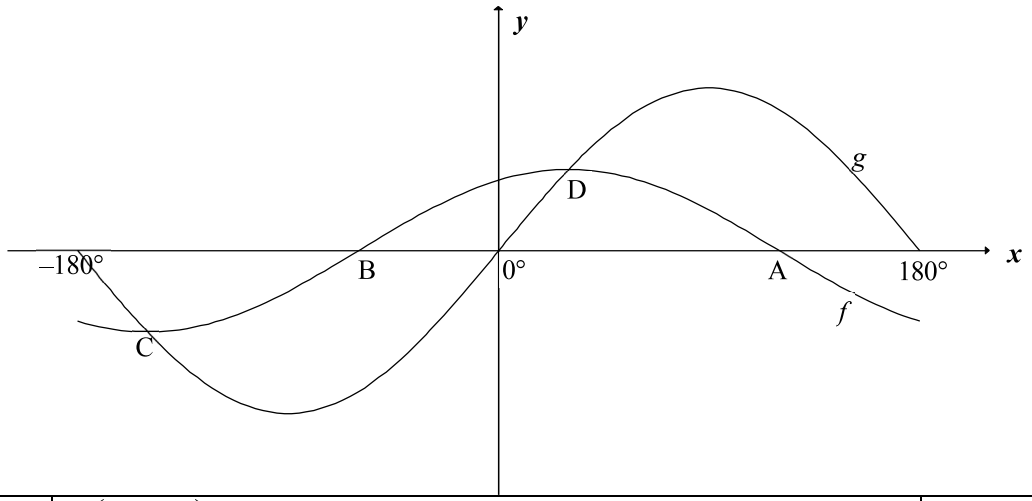
3.2.3	**OR** $y = \frac{4}{-}(2) + \frac{20}{-} = \frac{28}{-}$ $\left(2\,;\ \frac{28}{-}\right)$ and $K(2\,;-4)$: $LK = \frac{28}{-} - (-4) = \frac{40}{-}$ Coordinates of P: $\frac{x+2}{-} = -\frac{1}{-}$ $\frac{y-4}{-} = -$ $\therefore\ x = -11$ $y = -8$ $\therefore P(-11;-8)$ $PK^2 = (-11-2)^2 + (-8-(-4))^2$ $\sqrt{\ }$ PK $\overline{-11-2}$ $\overline{13}$ $\tan\theta = \frac{4}{-}$ $\therefore \theta = 17{,}1027...°$ $\therefore PK\hat{}L = 90° + 17{,}1027...° = 107{,}1°$ Area $\Delta PKL = \frac{1}{-}(PK)(LK).\sin P\hat{K}L$ $= \frac{1}{-}\left(\sqrt{185}\right)\left(\frac{40}{-}\right)$ n107,10° = 86,67 square units	✓$y = \frac{28}{-}$ ✓ length of LK ✓ x_P ✓ y_P ✓ $P\hat{K}L$ ✓ substitution into the area rule ✓ answer (7)
3.3	The centres of the two circles lie on the same vertical line $x = 2$. and the sum of the radii = 10 $n - 1 = 10$ or $1 - n = 10$ $n = 11$ $n = -9$ Answer only: full marks	✓correct method ✓ sum of radii = 10 ✓ $n = 11$ ✓ $n = -9$ (4)
		[21]



QUESTION/*VRAAG* 4

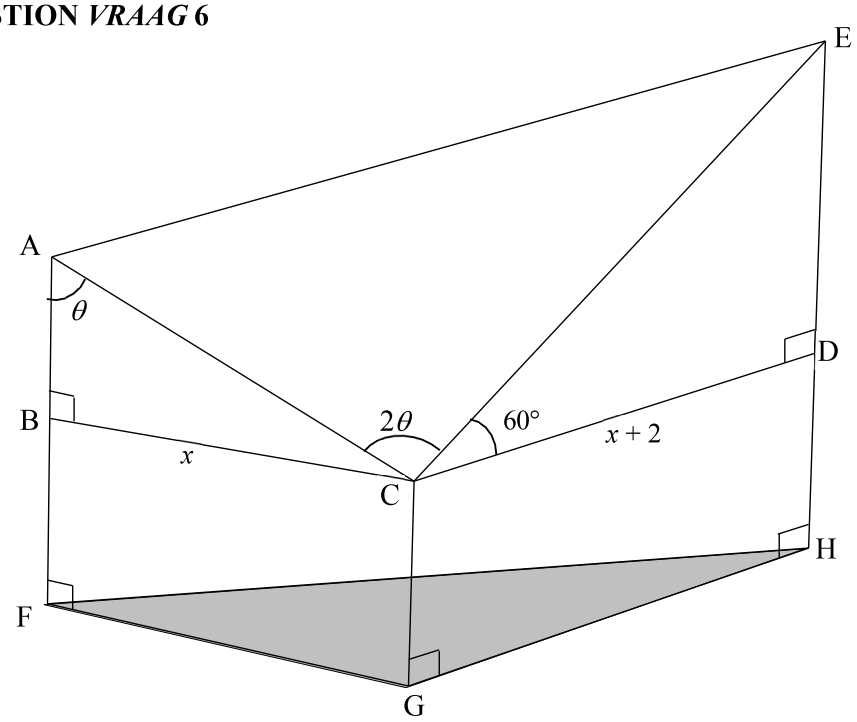
4.1.1	$\sin 191°$ $=-\sin 11°$	$-\sin 11°$ (1)
4.1.2	$\cos 22°$ $=\cos(2\times 11°)$ $=1-2\sin^2 11°$	answer (1)
4.2	$\cos(x-180°)+\sqrt{2}\sin(x+45°)$ $=-\cos x+\sqrt{2}(\sin x\cos 45°+\cos x\sin 45°)$ $=-\cos x+\sqrt{2}\left(\sin x\left(\frac{1}{\sqrt{2}}\right)+\cos x\left(\frac{1}{\sqrt{2}}\right)\right)$ $=-\cos x+\sin x+\cos x$ $=\sin x$ **OR** $\cos(x-180°)+\sqrt{2}\sin(x+45°)$ $=-\cos x+\sqrt{2}(\sin x\cos 45°+\cos x\sin 45°)$ $=-\cos x+\sqrt{2}\left(\sin x\left(\frac{\sqrt{2}}{2}\right)+\cos x\left(\frac{\sqrt{2}}{2}\right)\right)$ $=-\cos x+\sin x+\cos x$ $=\sin x$	$-\cos x$ expansion special angle ratios simplification of last 2 terms answer (5) $-\cos x$ expansion special angle ratios simplification of last 2 terms answer (5)
4.3	$\sin P+\sin Q=\sin P+\cos P$ $(\sin P+\cos P)^2=\left(\frac{7}{5}\right)^2$ $\sin^2 P+2\sin P\cos P+\cos^2 P=\frac{49}{25}$ $2\sin P\cos P=\frac{49}{25}-1$ $\sin 2P=\left(\frac{49}{25}-\frac{25}{25}\right)$ $=\frac{24}{25}$	$\sin Q=\cos P$ squaring expansion $\sin^2 P+\cos^2 P=1$ answer (5)
		[12]

5.1	$\cos(x-30°) = 2\sin x$ $\cos x\cos 30° + \sin x\sin 30° = 2\sin x$ $\frac{\sqrt{3}}{2}\cos x + \frac{1}{2}\sin x = 2\sin x$ $\frac{\sqrt{3}}{2}\cos x = \frac{3}{2}\sin x$ $\tan x = \frac{\sqrt{3}}{3}$ $x = 30° + k.180°; \quad k \in Z$ **OR** $x = 30° + k.360°$ or $x = 210° + k.360°; \quad k \in Z$	✓ expansion ✓ special ∠s ✓ simplification ✓ equation in tan ✓ $30°$ ✓ $k.180°; k \in Z$ **OR** ✓ $30°$ and $210°$ ✓ $k.360°; \quad k \in Z$ (6)



5.2.1(a)	$A(120° ; 0)$	✓ answer (1)
5.2.1(b)	$C(-150° ; -1)$	✓ x value ✓ y value (2)
5.2.2(a)	$x \in (-90° ; 30°)$ OR $-90° < x < 30°$	✓ endpoints ✓ correct interval (2)
5.2.2(b)	$x \in (-160° ; 20°)$ OR $-160° < x < 20°$	✓ endpoints ✓ correct interval (2)
5.2.3	$y = 2^{2\sin x + 3}$ Range of $y = 2\sin x$: $y \in [-2 ; 2]$ **OR** $-2 \le y \le 2$ Range of $y = 2\sin x + 3$: $y \in [1 ; 5]$ **OR** $1 \le y \le 5$ Range: $y = 2^{2\sin x + 3}$: $y \in [2 ; 32]$ **OR** $2 \le y \le 32$ Answer only: full marks	✓ 1 ✓ 5 ✓ 2 ✓ 32 ✓ correct interval (5)

/ QUESTION *VRAAG* 6

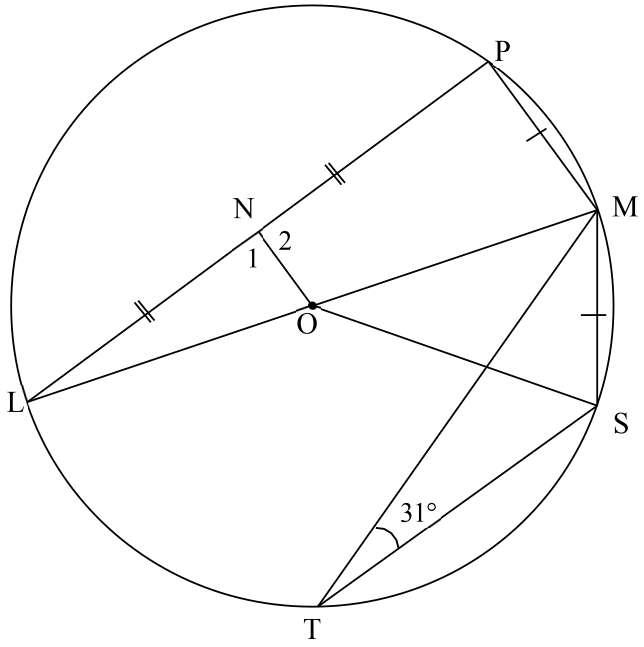


6.1.1	$\sin\theta = \frac{x}{AC}$ **OR** $\frac{\sin\theta}{x} = \frac{\sin 90°}{AC}$ $AC = \frac{x}{\sin\theta}$ $AC = \frac{x}{\sin\theta}$	✓ trig ratio ✓ simplification (2)
6.1.2	$\cos 60° = \frac{x+2}{CE}$ **OR** $\frac{\sin 30}{x+2} = \frac{\sin 90°}{CE}$ $CE = \frac{x+2}{\cos 60°}$ $CE = \frac{x+2}{\sin 30°}$ $= \frac{x+2}{\frac{1}{2}} = 2(x+2)$ $= 2(x+2)$	✓ trig ratio ✓ making CE the subject (2)
6.2	$\text{Area } \Delta ACE = \frac{1}{2}AC.EC.\sin A\hat{C}E$ $= \frac{1}{2}\left(\frac{x}{\sin\theta}\right)(2(x+2))\sin 2\theta$ $= \frac{x(x+2)\times 2\sin\theta\cos\theta}{\sin\theta}$ $= 2x(x+2)\cos\theta$	✓ use area rule correctly ✓ substitution of $\frac{x}{\sin\theta}(2(x+2))$ ✓ substitution of $\sin 2\theta$ (3)

6.3	$EC = 2(12 + 2) = 28$ $AE^2 = AC^2 + EC^2 - 2(AC)(EC)\cos A\hat{C}E$ $= \left(\frac{12}{\sin 55^\circ}\right)^2 + 28^2 - 2\left(\frac{12}{\sin 55^\circ}\right)(28)\cos 110^\circ$ $AE = 35,77m$	✓ EC ✓ use cosine rule correctly ✓ substitution ✓ answer (4)
		[11]

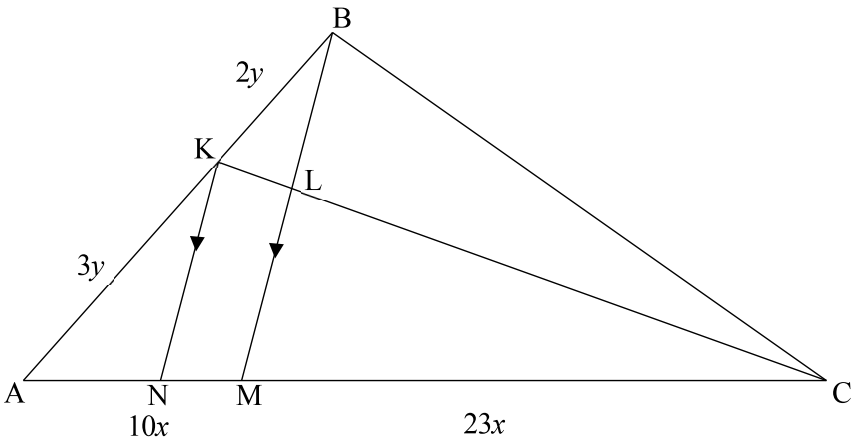
QUESTION/*VRAAG* 7

7.1



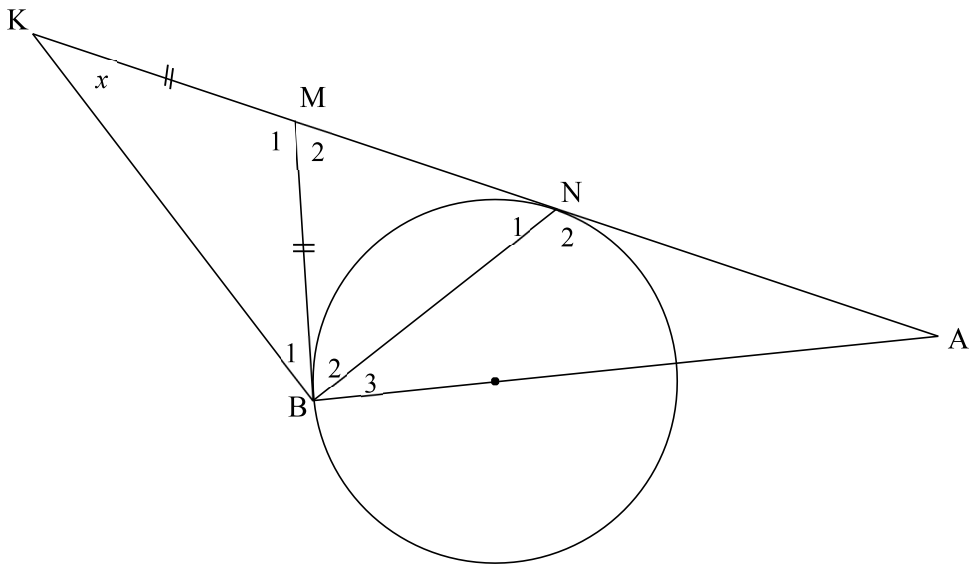
7.1.1(a)	$M\hat{O}S = 62°$ [∠ at centre = 2× ∠ at circumf/*middelpts∠=2omtreks∠*]	✓ S ✓ R (2)
7.1.1(b)	$\hat{L} = 31°$ [equal chords; equal ∠s /= *koorde; = ∠e*]	✓ S ✓ R (2)
7.1.2	LN = NP and LO = OM $\therefore ON = \frac{1}{2}PM$ [midpoint theorem/*middelpuntstelling*] $\therefore ON = \frac{1}{2}MS$ [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* $\therefore \Delta NLO \,|||\, \Delta PLM$ (∠∠∠) $\frac{NL}{PL} = \frac{NO}{PM} = \frac{1}{2}$ $\therefore ON = \frac{1}{2}PM$ $\therefore ON = \frac{1}{2}MS$ [PM = MS]	✓ LO = OM ✓ S ✓ R ✓ S (4) ✓ S R ✓ S/R ✓ S ✓ S (4)

7.2



7.2.1	$\frac{AN}{AM}=\frac{AK}{AB}$ [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)
7.2.2	$\frac{AM}{MC}=\frac{10x}{23x}$ [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/*VRAAG* 8

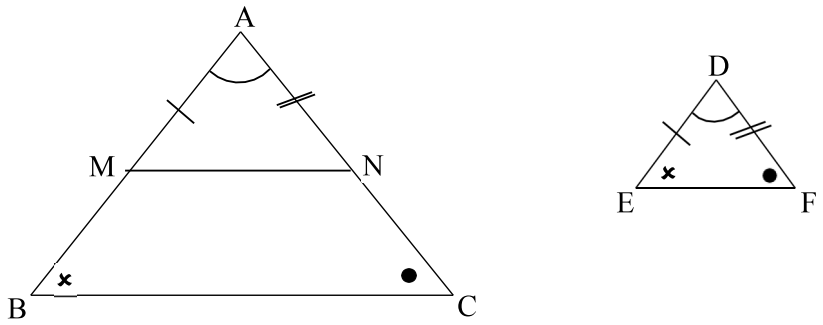


8.1	$\hat{B}_1 = x$ [$\angle$'s opp = sides/*$\angle$e teenoor = sye*] $\hat{M}_2 = 2x$ [ext $\angle$ of Δ] **OR** $\hat{M}_1 = 180° - 2x$ [$\angle$s of Δ] BM = MN [2 tans from a common point/*raaklyne vanuit dieselfde punt*] $\hat{N}_1 = \frac{180° - 2x}{2} = 90° - x$ [$\angle$'s opp = sides/*$\angle$e 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)
8.2	$M\hat{B}A = \hat{B}_2 + \hat{B}_3 = 90°$ [tangent$\perp$diameter/*raaklyn$\perp$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]

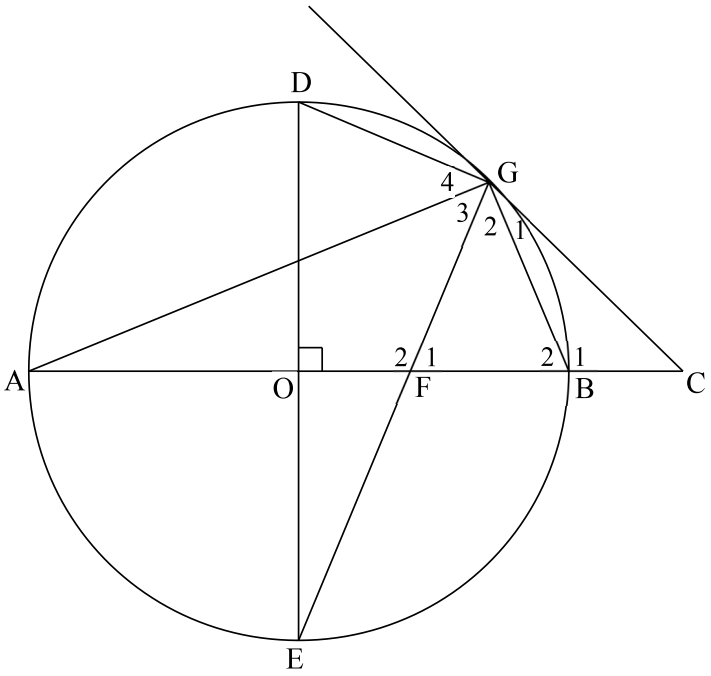
QUESTION/*VRAAG* 9

9.1



9.1	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] $\therefore\ \Delta AMN \equiv \Delta DEF$(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* ✓ $\Delta AMN \equiv \Delta DEF$ ✓ SAS ✓ MN ‖ BC and R ✓ $\frac{AB}{AM} = \frac{AC}{AN}$ ✓R (6)

9.2



9.2.1(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)
9.2.1(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)

9.2.2(a)	AB = DE = 14 [diameters/*middellyne*] ∴ OB = 7 units ∴ BC = OC – OB = 11 – 7 = 4 units Answer only: full marks	✓ S ✓ S ✓ S (3)
9.2.2(b)	In ΔCGB and ΔCAG $\hat{G}_1 = \hat{A} = x$ [tan-chord theorem/*raakl koordst*] $\hat{C} = \hat{C}$ [common] $\Delta CGB \text{ ||| } \Delta CAG$ [∠, ∠, ∠] $\frac{CG}{CA} = \frac{CB}{CG}$ $\frac{CG}{18} = \frac{4}{CG}$ $CG^2 = 72$ $CG = \sqrt{72}$ or $6\sqrt{2}$ *or* 8,49 units	✓ S/R ✓ S ✓ S ✓ CA = 18 ✓ answer (5)
9.2.2(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/*TOTAAL*:	**140**