basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

SENIOR CERTIFICATE EXAMINATIONS
SENIORSERTIFIKAAT-EKSAMEN

MATHEMATICS P2/*WISKUNDE V2*

2018

MARKING GUIDELINES/*NASIENRIGLYNE*

MARKS: 150
PUNTE: 150

These marking guidelines consist of 21 pages.
Hierdie nasienriglyne bestaan uit 21 bladsye.

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.

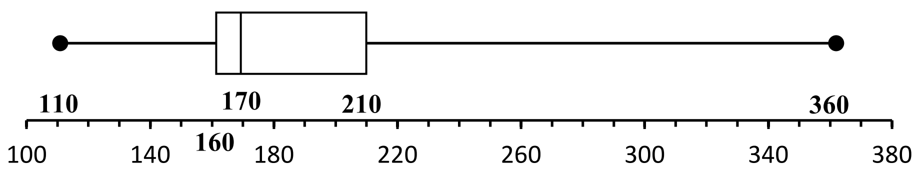
LET WEL:

- *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	
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 a 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 the statement AND reason are both correct.**
	Ken 'n punt toe as beide die bewering EN rede korrek is.

QUESTION/*VRAAG* 1

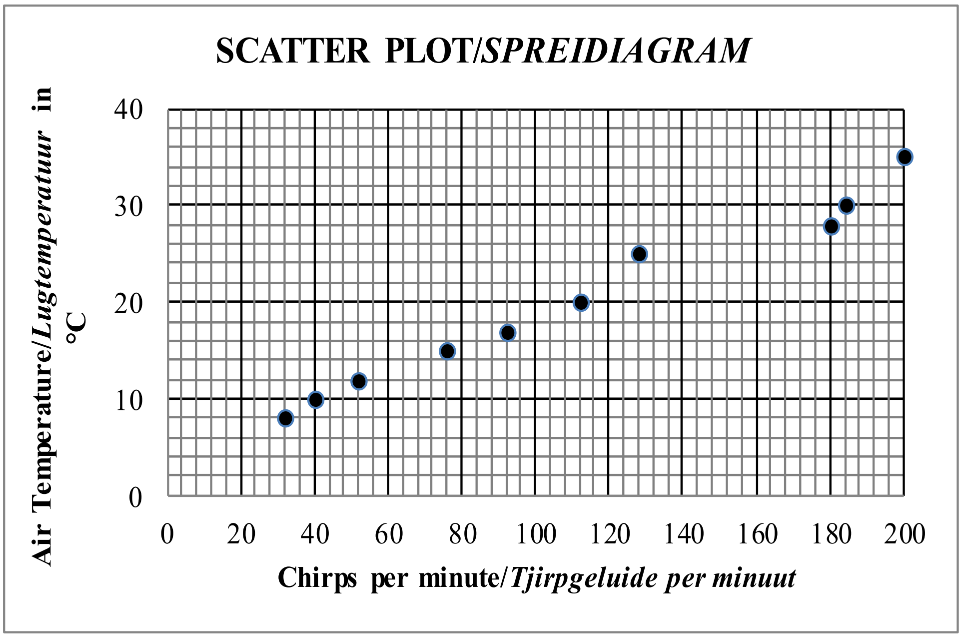
110	112	156	164	167	169
171	176	192	228	278	360

1.1.1	Mean/*Gemiddelde* $= \frac{2283}{12}$ $= 190,25$ Mean profit/*Gemiddelde wins* $=$ R190 250,00 or 190,25 thousand rands	✓ sum/*som* ✓ answer ✓ answer in thousands of rands (3)
1.1.2	Median $= \frac{169+171}{2} = 170$ thousand rands = R170 000	✓ answer (1)
1.2		✓ whiskers ✓ quartiles (2)
1.3	$\text{IQR} = Q_3 - Q_1$ = 210 – 160 thousand rands = R50 000	✓ answer (1)
1.4	Skewed to the right or positively skewed.	✓ answer (1)
1.5.1	$\sigma = 67,04118759$ thousand rands = R67 041,19	✓ answer (1)
1.5.2	$\bar{x} - \sigma = 123,21$ thousand rands For **2** months the profit was less than one standard deviation below the mean.	✓ lower limit ✓ answer (2)
		[11]

QUESTION/*VRAAG* 2

CHIRPS/*TJIRPGELUIDE* PER MINUTE/ *PER MINUUT*	AIR TEMPERATURE/ *LUGTEMPERATUUR* IN °C
32	8
40	10
52	12
76	15
92	17
112	20
128	25
180	28
184	30
200	35

2.1



3 marks:
All points correct

2 marks:
6 – 9 points correct

1 mark:
3 – 5 points correct

(3)

2.2

The points lie almost in a straight line. This suggests a very strong positive relationship between the number of chirps per minute and the temperature of the air.
Die punte lê amper in 'n reguitlyn, wat beteken dat daar 'n baie sterk positiewe verband tussen die aantal tjirpgeluide per minuut en die lugtemperatuur is.

✓ justify with straight line / *Motivering mbv reguitlyn*

(1)

OR/*OF*

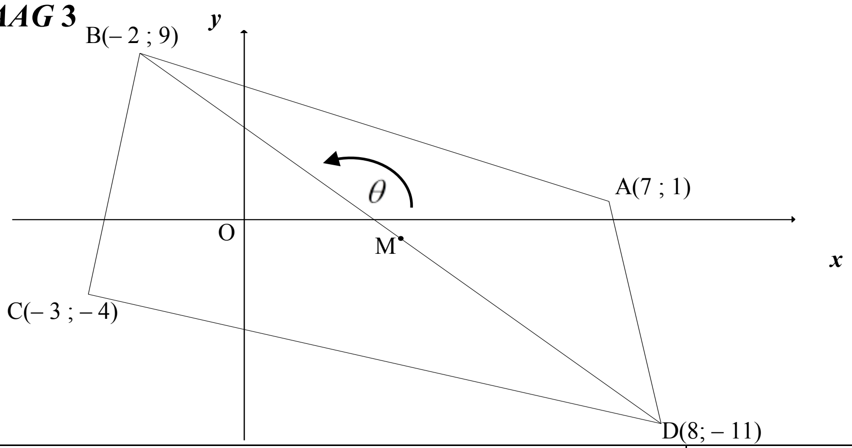
$r = 0,99$ so there is a very strong positive relationship between the number of chirps per minute and the temperature of the air.
$r = 0,99$*, dus is daar 'n baie sterk positiewe verband tussen die aantal kriekgeluide per minuut en die lugtemperatuur.*

✓ link with / *gebruik* $r = 0,99$ *om te motiveer*

(1)

2.3	$a = 3{,}97$ $b = 0{,}15$ $\hat{y} = 3{,}97 + 0{,}15x$	✓ $a = 3{,}97$ ✓ $b = 0{,}15$ ✓ equation (3)
2.4	Air temperature $\approx$ 15,67°C (calculator) **OR** $\hat{y} \approx 3{,}97 + 0{,}15(80)$ $\approx$ 15,97°C **OR** Air temperature $\approx$ 16°C (graph: Accept between 15°C and 17°C)	✓✓ answer (2) ✓ substitution ✓ answer (2) ✓✓ answer (2)
		[9]

QUESTION/*VRAAG* 3

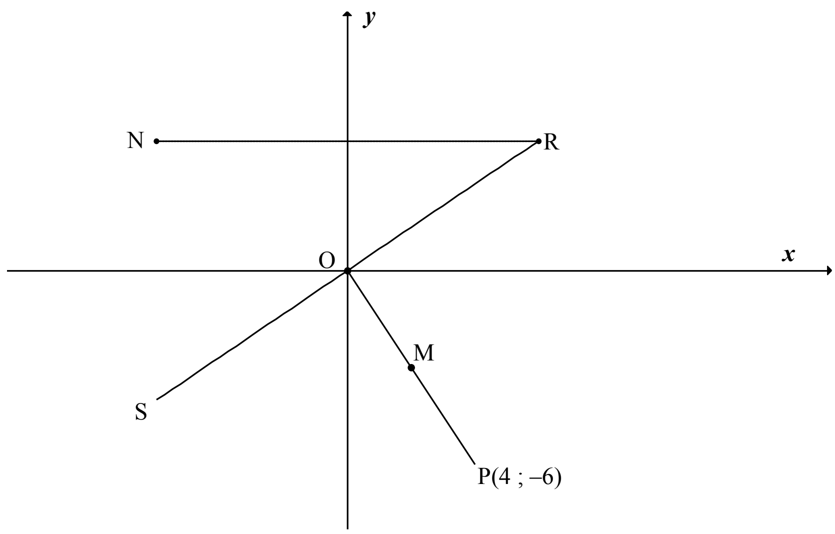


3.1	$m_{AC} = \frac{1-(-4)}{7-(-3)}$ *OR* $\frac{-4-1}{-3-7}$ $= \frac{5}{10} = \frac{1}{2}$	✓ substitution ✓answer (2)
3.2.1	$y = \frac{1}{2}x + c$ $\quad$ $y - y_1 = \frac{1}{2}(x - x_1)$ $1 = \frac{1}{2}(7) + c$ $\quad$ $y - 1 = \frac{1}{2}(x - 7)$ $c = -\frac{5}{2}$ **OR/*OF*** $y - 1 = \frac{1}{2}x - \frac{7}{2}$ $y = \frac{1}{2}x - 2\frac{1}{2}$ $\quad$ $y = \frac{1}{2}x - 2\frac{1}{2}$ **OR/*OF*** $y = \frac{1}{2}x + c$ $\quad$ $y - y_1 = \frac{1}{2}(x - x_1)$ $-4 = \frac{1}{2}(-3) + c$ $\quad$ $y - (-4) = \frac{1}{2}(x - (-3))$ $c = -\frac{5}{2}$ **OR/*OF*** $y + 4 = \frac{1}{2}x + \frac{3}{2}$ $y = \frac{1}{2}x - 2\frac{1}{2}$ $\quad$ $y = \frac{1}{2}x - 2\frac{1}{2}$	✓ substitution M and A(7 ; 1) ✓equation (2) ✓ substitution M and C(–3 ; –4) ✓equation (2)

3.2.2	$M\left(\frac{-2+8}{2}\ ;\ \frac{9+(-11)}{2}\right)$ $\therefore M(3\,;-1)$ Equation of AC: $y=\frac{1}{2}x-2\frac{1}{2}$ **OR/OF** $y=\frac{1}{2}x-2\frac{1}{2}$ $y=\frac{1}{2}(3)-2\frac{1}{2}$ $\quad -1=\frac{1}{2}x-2\frac{1}{2}$ $y=-1$ $\quad x=3$ $\therefore$ M lies on AC **OR/OF** $M\left(\frac{-2+8}{2}\ ;\ \frac{9+(-11)}{2}\right)$ $\therefore M(3\,;-1)$ $m_{CM}=\frac{-4+1}{-3-3}=\frac{1}{2}$ $\therefore\quad m_{CM}=m_{AC}$ and C a common point $\therefore$ M lies on AC	✓x coordinate ✓y coordinate ✓ substitution of x ✓ conclusion (4) ✓ x coordinate ✓ y coordinate ✓ gradient of CM ✓ reasoning & conclusion (4)
3.3	$m_{BD}=\frac{9-(-11)}{-2-8}$ OR $\frac{(-11)-9}{8-(-2)}$ $=-2$ $m_{BD}\times m_{AC}=\frac{1}{2}\times -2$ $=-1$ $\therefore BD\perp AC$	✓ correct substitution ✓ m_{BD} ✓ product of gradients = –1 (3)
3.4.1	$\tan\theta=m_{BD}=-2$ $\therefore\theta=116{,}57°$	✓ $\tan\theta=m_{BD}$ ✓ answer (2)
3.4.2	$\tan\beta=m_{BC}$ $m_{BC}=\frac{9-(-4)}{-2-(-3)}$ *OR* $\frac{-4-9}{-3-(-2)}$ $=13$ $\beta=85{,}6°$ $\therefore C\hat{B}D=116{,}57°-85{,}60°$ [ext $\angle$ of Δ] $=30{,}97°$ **OR/OF** $BD=\sqrt{500}$; $BC=\sqrt{170}$ & $CD=\sqrt{170}$ $CD^2=BD^2+BC^2-2BD.BC.\cos C\hat{B}D$ $170=500+170-2\sqrt{500}.\sqrt{170}.\cos C\hat{B}D$ $\cos C\hat{B}D=\frac{\sqrt{500}}{2\sqrt{170}}=0{,}85749...$ $C\hat{B}D=30{,}96°$	✓ $m_{BC}=13$ ✓ value of β ✓ answer (3) ✓ subst into cos rule ✓ value of $\cos C\hat{B}D$ ✓ answer (3)

3.4.3	$AC = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$ $= \sqrt{(7-(-3))^2 + (1-(-4))^2}$ *OR* $\sqrt{((-3)-7)^2 + ((-4)-1)^2}$ $= \sqrt{100+25}$ $= \sqrt{125} = 5\sqrt{5} = 11,58$	✓ correct substitution into distance formula ✓ answer (2)
3.4.4	$BM = \sqrt{((-2)-3)^2 + (9-(-1)^2}$ *OR* $\sqrt{(3-(-2))^2 + ((-1)-9)^2}$ $= \sqrt{125} = 5\sqrt{5}$ Area of $\Delta ABC = \frac{1}{2}\text{base} \times \perp \text{height}$ $= \frac{1}{2}(\sqrt{125})(\sqrt{125})$ = 62,5 square units Area of ABCD = 2 × 62,5 = 125 square units	✓ correct substitution into distance formula ✓ BM ✓ substitution into area formula ✓ 62,5 ✓ 2 × ΔABC (5)
		[23]

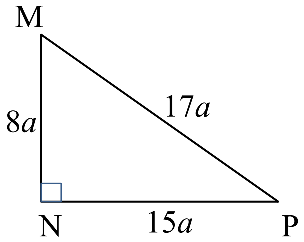
QUESTION/*VRAAG* 4



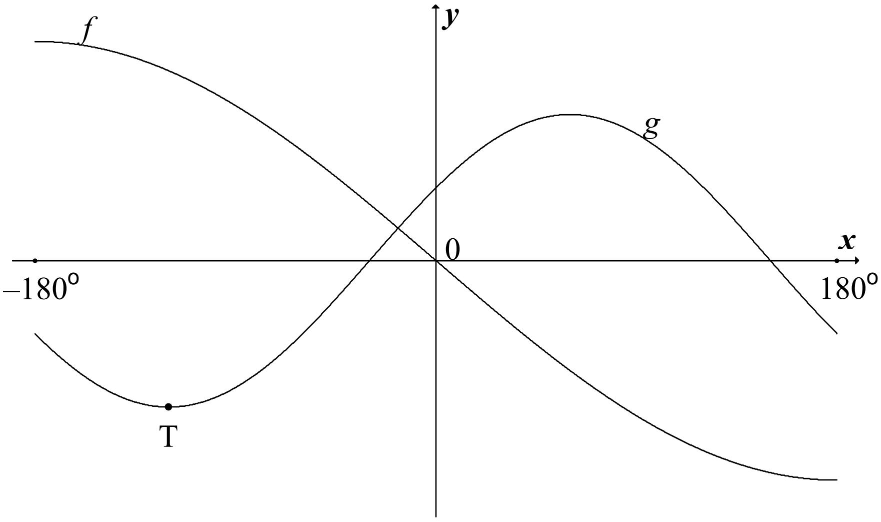
4.1	$M\left(\frac{0+4}{2}\ ;\ \frac{0+(-6)}{2}\right)$ $\therefore M(2\ ;-3)$	✓ 2 ✓ – 3 (2)
4.2.1	$x^2+y^2=4^2+(-6)^2$ $=52$ $\therefore x^2+y^2=52$	✓ substitution ✓ equation (2)
4.2.2	$(x-2)^2+(y+3)^2=\left(\frac{\sqrt{52}}{2}\right)^2=13$ $x^2-4x+4+y^2+6y+9-13=0$ $x^2+y^2-4x+6y=0$	✓ substitution of M ✓ substitution of radius = $\frac{\sqrt{52}}{2}$ ✓ answer (3)
4.2.3	$m_{OP}=\frac{-6}{4}=-\frac{3}{2}$ $m_{RS}\times m_{OP}=-1$ [radius ⊥ tangent / *raaklyn*] $\therefore\ m_{RS}=\frac{2}{3}$ $\therefore y=\frac{2}{3}x$	✓ m_{OP} ✓ m_{RS} ✓ equation (3)

4.3	$x^2 + y^2 = 52$ *and* $y = \frac{2}{3}x$ $x^2 + \left(\frac{2}{3}x\right)^2 = 52$ $x^2 + \frac{4}{9}x^2 = 52$ $1\frac{4}{9}x^2 = 52$ $x^2 = 36$ $x = 6$ $\therefore$ R(6 ; 4) and N(–6 ; 4) $\therefore$ NR = 12 units	✓ substitution ✓ simplification ✓ value of x ✓ length of NR (4)
4.4	Let T(x ; 0) be the other x intercept of the small circle Then OT is the common chord $\therefore (x-2)^2 + (0+3)^2 = 13$ $(x-2)^2 = 13 - 9 = 4$ $x - 2 = \pm 2$ $x = 2 \pm 2$ $x = 4$ *or* 0 OR $x^2 - 4x + 4 + 9 = 13$ $x^2 - 4x = 0$ $x(x-4) = 0$ $x = 0$ or $x = 4$ $\therefore$ length of common chord = OT = 4 units	✓ $y = 0$ ✓ x-values ✓ answer (3) **[17]**

QUESTION/*VRAAG* 5

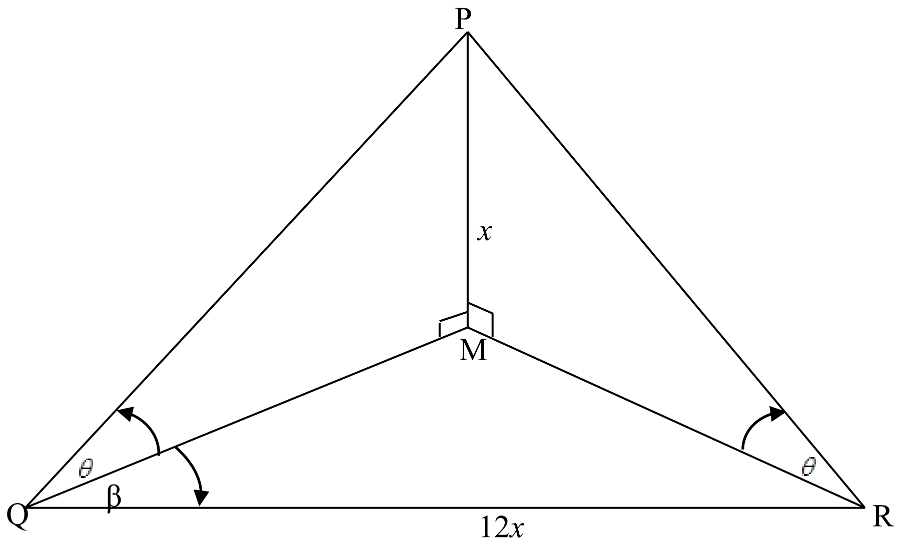
5.1.1	Given : $\sin M = \frac{15}{17}$ $MN^2 = 17^2 - 15^2$ $= 64$ $MN = 8$ OR  $\therefore \tan M = \frac{15}{8}$	✓ sketch or Pyth ✓ MN = 8 ✓answer (3)
5.1.2	$\sin M = \frac{NP}{MP}$ $\frac{NP}{51} = \frac{15a}{17a}$ $\therefore NP = 45$	✓ equating trig ratios ✓ answer (2)
5.2	$\cos(x - 360°).\sin(90° + x) + \cos^2(-x) - 1$ $= \cos x \,.\, \cos x + \cos^2 x - 1$ $= \cos^2 x + \cos^2 x - 1$ $= 2\cos^2 x - 1$ $= \cos 2x$	✓ $\cos x$ ✓ $\cos x$ ✓ $\cos^2 x$ ✓ identity (4)
5.3.1	$\sin(2x + 40°)\cos(x + 30°) - \cos(2x + 40°)\sin(x + 30°)$ $= \sin[(2x + 40°) - (x + 30°)]$ $= \sin(x + 10°)$	✓ reduction ✓ answer (2)
5.3.2	$\sin(2x + 40°)\cos(x + 30°) - \cos(2x + 40°)\sin(x + 30°) = \cos(2x - 20°)$ $\therefore \cos(2x - 20°) = \sin(x + 10°)$ $\cos(2x - 20°) = \cos[90° - (x + 10°)]$ $2x - 20° = 80° - x + k.360°$ or $2x - 20° = 360° - (80° - x) + k.360°$ $3x = 100° + k.360°$ or $2x - 20° = 280° + x + k.360°$ $x = 33{,}33° + k.120°$ or $x = 300° + k.360°$; $k \in Z$ **OR/*OF*** $\therefore \cos(2x - 20°) = \sin(x + 10°)$ $\sin[90° - (2x - 20°)] = \sin(x + 10°)$ $110° - 2x = x + 10° + k.360°$ or $110° - 2x = 180° - (x + 10°) + k.360°$ $3x = 100° - k.360°$ or $110° - 2x = 170° - x + k.360°$ $x = 33{,}33° - k.120°$ or $x = -60° - k.360°$; $k \in Z$	✓ equating ✓ co ratio ✓ $80° - x$ ✓$280° + x$ ✓ simplification/*vereenv* ✓ $x = 33{,}33° + k.120°$ ✓ $x = 300° + k.360°$; $k \in Z$ (7) ✓ equating ✓ co ratio ✓ $x + 10°$ ✓$170° - x$ ✓ simplification/*vereenv* ✓ $x = 33{,}33° - k.120°$ ✓ $x = -60° - k.360°$; $k \in Z$ (7)
		[18]

QUESTION/*VRAAG* 6



6.1	Period = 720°	✓ answer (1)
6.2	$y \in [-2\ ;\ 2]$ **OR/*OF*** $-2 \leq y \leq 2$	✓✓ answer (2) ✓✓ answer (2)
6.3	$f(-120°) - g(-120°)$ $= -3\sin\left(-\frac{120°}{2}\right) - 2\cos(-120° - 60°)$ $= \frac{4+3\sqrt{3}}{2}$ or 4,60 (4,5980...)	✓ $x = -120°$ ✓ substitution ✓ answer (3)
6.4.1	x-intercepts of g at $-90° + 60° = -30°$ and $90° + 60° = 150°$ $\therefore x \in (-30°\ ;\ 150°)$ **OR/*OF*** x-intercepts of g at $-90° + 60° = -30°$ and $90° + 60° = 150°$ $-30° < x < 150°$	✓ value ✓ value ✓ answer (3) ✓ value ✓ value ✓ answer (3)
6.4.2	$x \in [-180°\ ;\ -120°) \cup (-30°\ ; 60°) \cup (150°\ ; 180°]$ **OR/*OF*** $-180° \leq x < -120°$ or $-30° < x < 60°$ or $150° < x \leq 180°$	✓ $[-180°\ ;\ -120°)$ ✓ $(-30°\ ; 60°)$ ✓ $(150°\ ; 180°]$ ✓ notation for inclusive in the first/last interval (4) ✓ $-180° \leq x < -120°$ ✓ $-30° < x < 60°$ ✓ $150° < x \leq 180°$ 1 mark: each interval ✓ notation for inclusive in the first/last interval (4)
		[13]

QUESTION/*VRAAG* 7

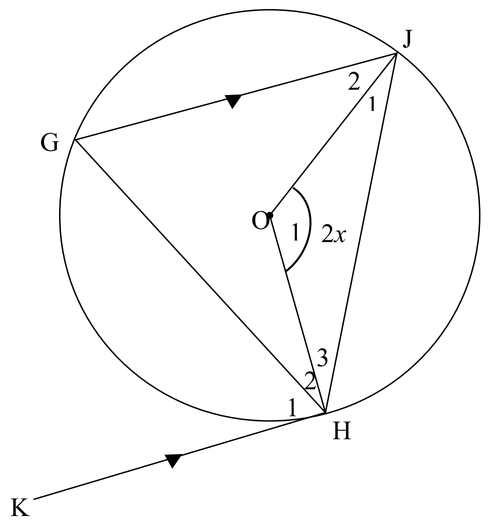


7.1	In PMQ: $\tan\theta = \frac{x}{\text{QM}}$ $\therefore \text{QM} = \frac{x}{\tan\theta}$ **OR/*OF*** $\frac{x}{\sin\theta} = \frac{\text{MQ}}{\sin P}$ $MQ = \frac{x\sin P}{\sin\theta}$ $= \frac{x\cos\theta}{\sin\theta}$ $= \frac{x}{\tan\theta}$	✓ trig ratio ✓ answer (2) ✓ sine rule ✓ answer (2)
7.2	In PMR: $\tan\theta = \frac{x}{\text{MR}}$ *OR* $\text{PMQ} \equiv \text{PMR}$ [AAS/HHS] $\therefore \text{MR} = \frac{x}{\tan\theta} = \text{QM}$ $\text{Q}\hat{\text{M}}\text{R} = 180° - 2\beta$ $\frac{\sin\beta}{\text{MR}} = \frac{\sin \text{Q}\hat{\text{M}}\text{R}}{12x}$ $\sin\beta \times \frac{\tan\theta}{x} = \frac{\sin(180° - 2\beta)}{12x}$ $\tan\theta = \frac{\sin 2\beta}{12x} \times \frac{x}{\sin\beta}$ $\tan\theta = \frac{2\sin\beta\cos\beta}{12x} \times \frac{x}{\sin\beta}$ $\tan\theta = \frac{\cos\beta}{6}$ **OR**	✓ MR = QM ✓ correct substitution into the sine rule in ΔQMR ✓ reduction ✓ double angle (4)

	In PMR : $\tan\theta = \dfrac{x}{\text{MR}}$ *OR* $\text{PMQ} \equiv \text{PMR}$ [AAS/HHS] $\text{MR}^2 = \text{QM}^2 + \text{QR}^2 - 2\text{QM.QR}\cos\beta$ $\text{MR}^2 = \left(\dfrac{x}{\tan\theta}\right)^2 + (12x)^2 - 2\left(\dfrac{x}{\tan\theta}\right)(12x)(\cos\beta)$ $\dfrac{x^2}{\tan^2\theta} = \dfrac{x^2}{\tan^2\theta} + 144x^2 - 24\left(\dfrac{x^2}{\tan\theta}\right)(\cos\beta)$ $24\left(\dfrac{x^2}{\tan\theta}\right)(\cos\beta) = 144x^2$ $\cos\beta = 6\tan\theta$ $\tan\theta = \dfrac{\cos\beta}{6}$	✓ correct substitution into the cosine rule in ΔQMR ✓ substitution ✓ MR = QM ✓ simplification (4)
7.3	$\dfrac{x}{\text{QM}} = \dfrac{\cos\beta}{6}$ [both equal $\tan\theta$] $x = \dfrac{60\cos 40}{6}$ $x = 7{,}66$ The height of the lighthouse is 8 metres	✓ equating ✓ subst. QM = 60 and $\beta = 40°$ ✓ answer (3)
		[9]

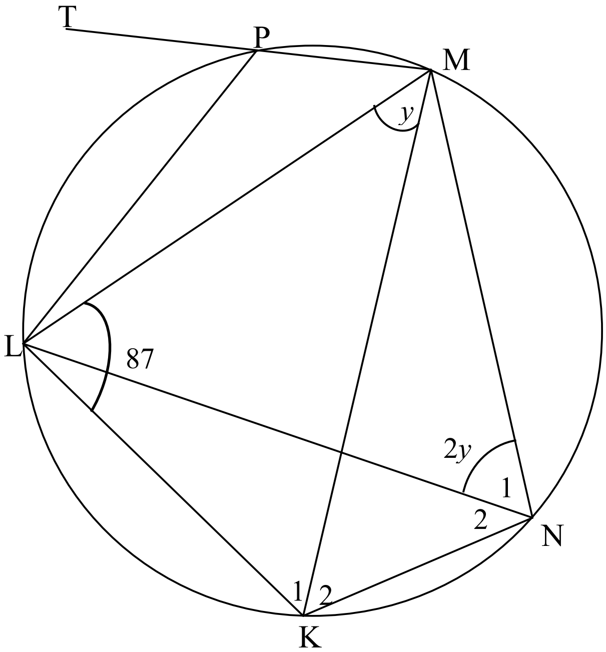
QUESTION/*VRAAG* 8

8.1



8.1.1	$\hat{G} = x$ [$\angle$ centre = 2× circumference / *midpts*$\angle$ = 2× *omtreks*$\angle$] $\hat{H}_1 = x$ [alt $\angle$s / *verwiss* $\angle$*e*; KH ∥ GJ] $G\hat{J}H = x$ [tan chord theorem / *raaklyn koordstelling*]	✓S ✓R ✓S ✓S ✓R (5)
8.1.2	$\hat{J}_1 + \hat{H}_3 = 180° - 2x$ [sum of $\angle$s in Δ / *som van* $\angle$*e in* Δ] $\therefore \hat{J}_1 = \hat{H}_3 = 90° - x$ [$\angle$s opp equal sides / $\angle$*e teenoor gelyke sye*] $\therefore x + \hat{H}_2 = 90°$ **OR** [tan ⊥ radius / *raaklyn* ⊥ *radius*] $\hat{H}_2 = 90° - x$ $\therefore \hat{H}_2 = \hat{H}_3$	 ✓S ✓S ✓R (3)

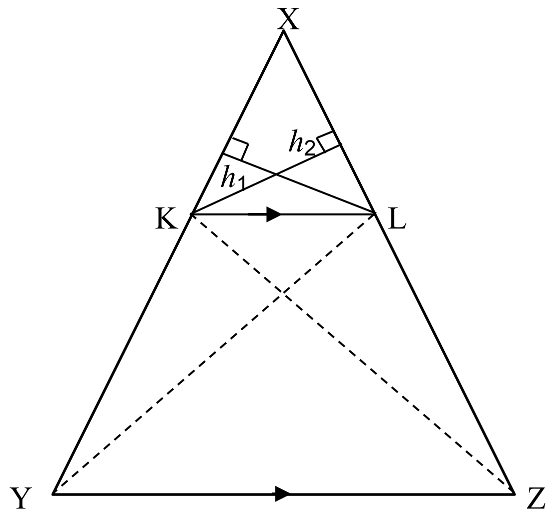
8.2



8.2.1	$\hat{N}_2 = y$ [∠s in the same seg / ∠*e in dieselfde segment*]	✓S ✓R (2)
8.2.2(a)	$2y + y + 87° = 180°$ [opp ∠s of cyclic quad / *teenoorst ∠e v kvh*] $3y = 93°$ $y = 31°$	✓S ✓R ✓S (3)
8.2.2(b)	$T\hat{P}L = 62°$ [ext. ∠ of cyclic quad / *buite ∠ v kvh*]	✓S ✓R (2)
		[15]

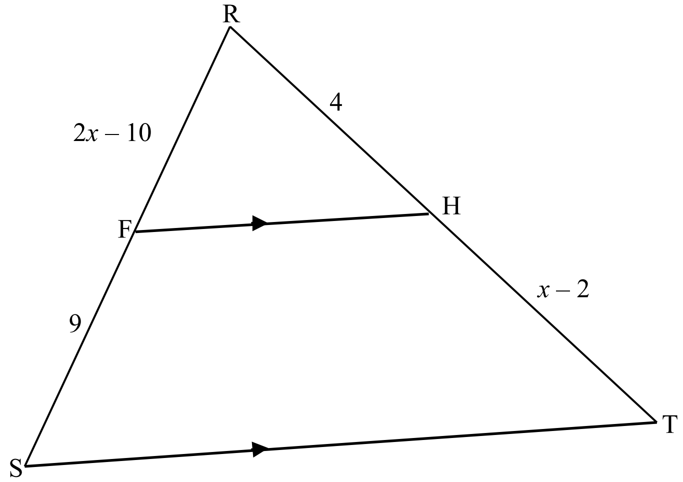
QUESTION/*VRAAG* 9

9.1



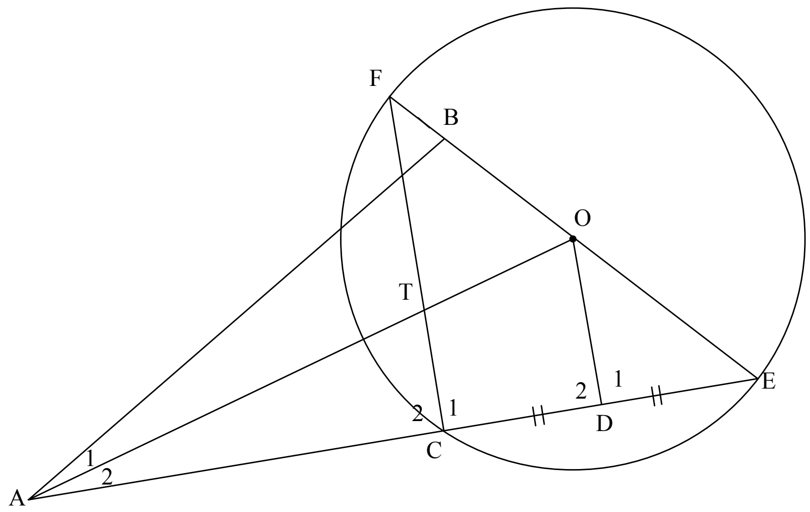
9.1	Constr: Join KZ and LY and draw h_1 from K ⊥ XL and h_2 from L ⊥ XK *Konstr: Verbind KZ en LY en trek* h_1 *vanaf* K ⊥ XL *en* h_2 *vanaf* L ⊥ XK . Proof / *Bewys*: $\frac{\text{area } \Delta XKL}{\text{area } \Delta LYK} = \frac{\frac{1}{2} XK \times h_1}{\frac{1}{2} KY \times h_1} = \frac{XK}{KY}$ $\frac{\text{area } \Delta XKL}{\text{area } \Delta KLZ} = \frac{\frac{1}{2} XL \times h_2}{\frac{1}{2} LZ \times h_2} = \frac{XL}{LZ}$ area ΔXKL = area ΔXKL [common / *gemeenskaplik*] But area ΔLYK = area ΔKLZ [same base & height ; LK ‖ YZ / *dies basis & hoogte ;* LK ‖ YZ] $\therefore \frac{\text{area } \Delta XKL}{\text{area } \Delta LYK} = \frac{\text{area } \Delta XKL}{\text{area } \Delta KLZ}$ $\therefore \frac{XK}{KY} = \frac{XL}{LZ}$	✓ constr / *konstr* ✓ $\frac{\text{area } \Delta XKL}{\text{area } \Delta LYK} = \frac{\frac{1}{2} XK \times h_1}{\frac{1}{2} KY \times h_1}$ ✓ S ✓R ✓ S (5)

9.2



9.2.1	$\frac{RF}{FS}=\frac{RH}{HT}$ [line || one side of Δ **OR** prop theorem; FH || ST] [*Lyn || een sy van Δ* ***OF*** *eweredigh. st;* FH|| ST] $\frac{2x-10}{9}=\frac{4}{x-2}$ $(2x-10)(x-2)=4\times 9$ $2x^2-14x-16=0$ $x^2-7x-8=0$ $(x-8)(x+1)=0$ $\therefore x=8\ \ (x\neq -1)$ **OR/OF** $\frac{RF}{RS}=\frac{RH}{RT}$ [line || one side of Δ **OR** prop theorem; FH || ST] [*Lyn || een sy van Δ* ***OF*** *eweredigh. st;* FH|| ST] $\frac{2x-10}{2x-1}=\frac{4}{x+2}$ $(2x-10)(x+2)=4(2x-1)$ $2x^2-14x-16=0$ $x^2-7x-8=0$ $(x-8)(x+1)=0$ $\therefore x=8\ \ (x\neq -1)$	✓S/R ✓ substitution ✓ standard form ✓ factors ✓answer with rejection (5) ✓S/R ✓ substitution ✓ standard form ✓ factors ✓answer with rejection (5)
9.2.2	$\frac{\text{area }\Delta RFH}{\text{area }\Delta RST}=\frac{\frac{1}{2}RF\times RH\sin\hat{R}}{\frac{1}{2}RS\times RT\sin\hat{R}}$ $=\frac{\frac{1}{2}\times 6\times 4\times\sin\hat{R}}{\frac{1}{2}\times 15\times 10\times\sin\hat{R}}$ $=\frac{24}{150}=\frac{4}{25}$	✓ numerator/*teller* ✓ denominator/*noemer* ✓ substitution ✓answer (4)
		[14]

QUESTION/*VRAAG* 10



10.1.1	$\hat{C}_1 = 90°$ [∠ in semi circle / *∠ in halfsirkel*] $\hat{D}_1 = 90°$ [line from centre to midpt of chord / *lyn vanaf midpt na midpt van koord*] $\therefore \hat{C}_1 = \hat{D}_1$ $\therefore$ FC ∥ OD [corresp ∠s = / *ooreenkomstige ∠e* =] **OR/OF** FO = OE [radii] CD = DE [given / *gegee*] $\therefore$ FC ∥ OD [midpoint theorem / *middelpuntstelling]*	✓ S ✓ R ✓ S ✓ R ✓ R (5) ✓ S ✓ R ✓ S ✓✓ R (5)
10.1.2	$D\hat{O}E = \hat{F}$ [corresp ∠s =; FC ∥ OD] $B\hat{A}E = \hat{F}$ [∠s in the same seg] $\therefore D\hat{O}E = B\hat{A}E$	✓ S ✓ R ✓ S ✓ R (4)
10.1.3	In ΔABE and ΔFCE: $\hat{E}$ is common $B\hat{A}E = \hat{F}$ [proved in 10.1.2] $\therefore A\hat{B}E = \hat{C}_1$ [sum of ∠s in Δ] $\therefore$ ΔABE ∣∣∣ ΔFCE [∠∠∠] $\frac{AB}{FC} = \frac{AE}{FE}$ [∣∣∣ Δs] $AB \times FE = AE \times FC$ But FE = 2 OF [$d = 2r$] And FC =2 OD [midpoint theorem] $AB \times 2OF = AE \times 2OD$ $\therefore AB \times OF = AE \times OD$	✓ S ✓ S ✓ R ✓ S ✓ S ✓ S/R ✓ S (7)

	OR/*OF* In ΔODE and ΔABE 1. $\hat{E}$ is common 2. $D\hat{O}E = E\hat{A}B$ (proved in 10.1.2) 3. $\hat{D}_1 = A\hat{B}E$ (∠ sum Δ) ΔODE ||| ΔABE (∠∠∠) $\frac{EO}{EA} = \frac{OD}{AB} = \frac{ED}{EB}$ (||| Δs) $\therefore AB.EO = OD.EA$ but OE = FO (radii) $\therefore AB \times OF = OD \times EA$	✓ S ✓ S ✓ R ✓ S ✓ S ✓ S ✓ R (7)
10.2	$\frac{AT}{TO} = \frac{AC}{CD} = \frac{3}{1}$ [line || one side of Δ **OR** prop theorem; FC || OD] But CD = DE $\frac{AE}{CE} = \frac{5}{2}$ $\therefore$ $AE = \frac{5}{2}CE$ $\frac{BE}{CE} = \frac{AE}{FE}$ [||| Δs] $\frac{BE}{CE} = \frac{\frac{5}{2}CE}{FE}$ $BE \times FE = \frac{5}{2}CE^2$ $\therefore 5CE^2 = 2BE.FE$	✓ S ✓ R ✓ S ✓ S ✓substitute $AE = \frac{5}{2}CE$ (5)
		[21]

TOTAL/TOTAAL: 150

MATHEMATICS P2: JUNE 2018
MARKING GUIDELINES NOTES

QUESTION 1

1.1.1	If left as 190, 25 then penalise 1 mark.
1.1.2	If the position is used: $\left[\frac{1}{4}(n+1)+\frac{3}{4}(n+1)\right]\div 2$ $=\frac{158+219}{2}$ $=\frac{377}{2}$ $=188,5$

QUESTION 2

2.4	Do not accept estimation from the table.

QUESTION 3

3.1	No ca if $\frac{x_2-x_1}{y_2-y_1}$	
3.3	MD^2+AM^2 $=\left[(3-8)^2+(-1+11)^2\right]+\left[(3-7)^2+(-1-1)^2\right]$ $=125+20$ $=145$ AD^2 $=(7-8)^2+(1+11)^2$ $=145$ $\text{MD}^2+\text{AM}^2=\text{AD}^2$	✓ AM^2+MD^2 ✓ AD^2 ✓ $\text{MD}^2+\text{AM}^2=\text{AD}^2$ (3)

QUESTION 4

4.3	Candidates can use the rotation of P through $90°$ to get to R(6 ; 4) If the candidate assumes that R(4 ; 6) : 1/4 marks

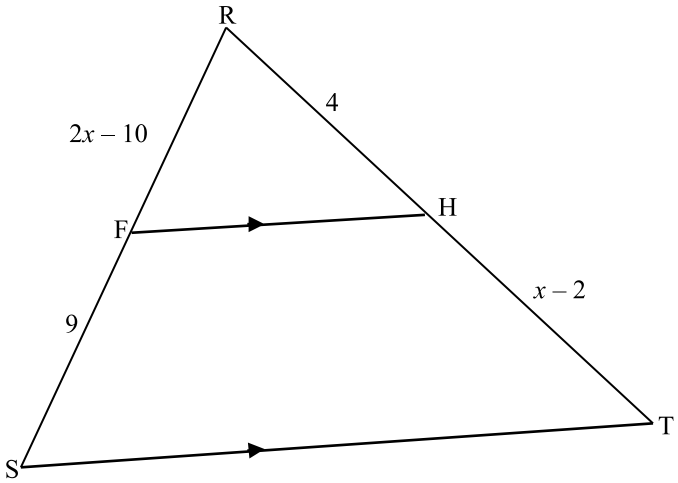
QUESTION 6

6.2	$y\in(-2\ ;\ 2)$ 1/2 marks $-2<y<2$ 1/2 marks

QUESTION 7

7.3	There is NO penalty for incorrect rounding.

QUESTION 9



9.2.2	Join FT. area ΔRFH = $\frac{4}{10} \times$ (area ΔRFT) But area ΔRFT = $\frac{6}{15} \times$ (area ΔRST) (common vertex; = heights) area ΔRFH = $\frac{4}{10} \times \frac{6}{15} \times$(area ΔRST) $\frac{\text{area}\Delta\text{RFH}}{\text{area}\Delta\text{RST}} = \frac{4}{25}$