basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

MATHEMATICS P2

NOVEMBER 2016

NATIONAL SENIOR CERTIFICATE

GRADE 10

MARKS: 100

TIME: 2 hours

This question paper consists of 10 pages and a 16-page answer book.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of 9 questions.
2. Answer ALL the questions in the SPECIAL ANSWER BOOK provided.
3. Clearly show ALL calculations, diagrams, graphs et cetera that you used to determine the answers.
4. Answers only will NOT necessarily be awarded full marks.
5. If necessary, round off answers to TWO decimal places, unless stated otherwise.
6. Diagrams are NOT necessarily drawn to scale.
7. You must use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
8. Write neatly and legibly.

QUESTION 1

The heights of 20 children were measured (in centimetres) and the results were recorded. The data collected is given in the table below.

127	128	129	130	131	133	134	134	135	136
137	138	139	140	141	142	142	143	144	145

1.1 Write down the median height measured. (1)

1.2 Determine:

1.2.1 The mean height (2)

1.2.2 The range (1)

1.2.3 The interquartile range (3)

1.3 Draw a box and whisker diagram to represent the data. (2)
[9]

QUESTION 2

The intelligence quotient score (IQ) of a Grade 10 class is summarised in the table below.

IQ INTERVAL	FREQUENCY
$90 \leq x < 100$	4
$100 \leq x < 110$	8
$110 \leq x < 120$	7
$120 \leq x < 130$	5
$130 \leq x < 140$	4
$140 \leq x < 150$	2

2.1 Write down the modal class of the data. (1)

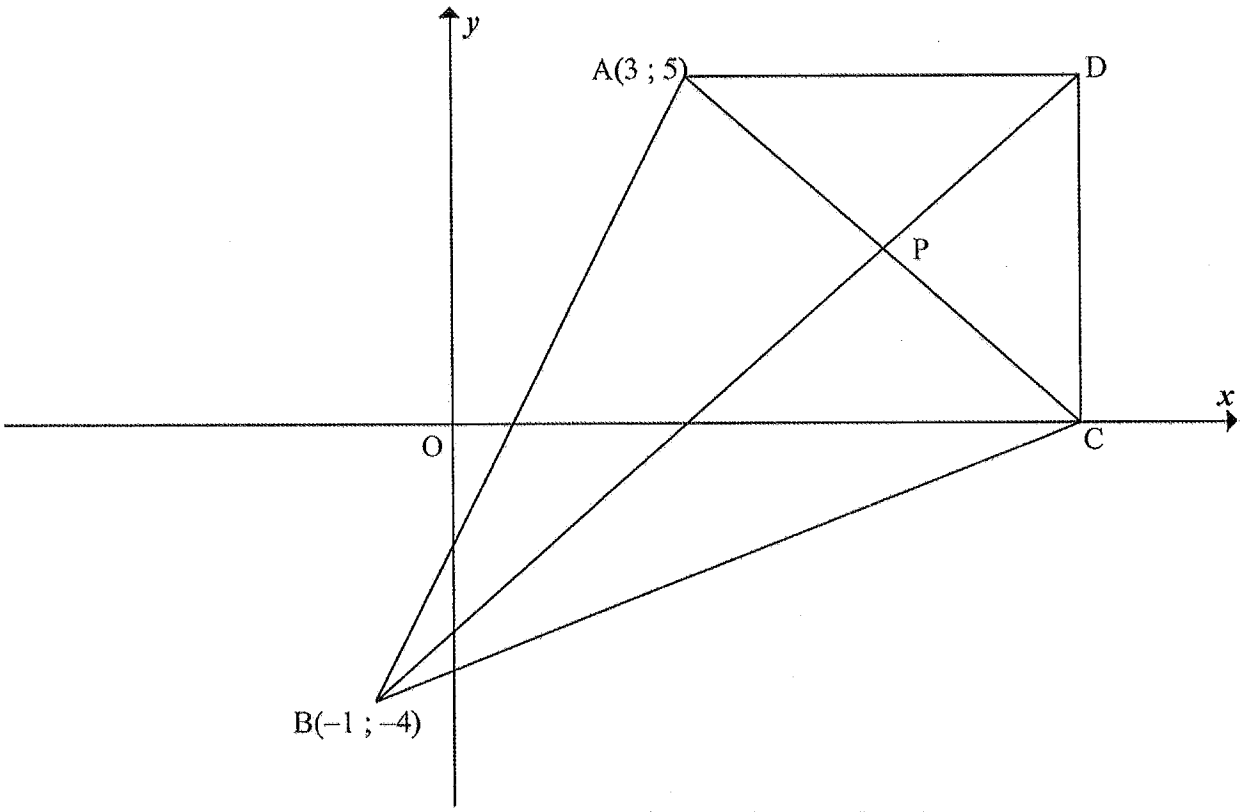
2.2 Determine the interval in which the median lies. (2)

2.3 Estimate the mean IQ score of this class of learners. (3)
[6]

QUESTION 3

3.1 Show that a triangle ABC, with vertices A(1 ; 1); B(3 ; 6) and C(6 ; 3), is an isosceles triangle. (4)

3.2 In the diagram below, ADCB is a kite with A(3 ; 5) and B(–1 ; –4). AD = DC and AB = BC. D is a point such that AD is parallel to the x-axis and AD = 5 units. CD is perpendicular to the x-axis. The diagonals intersect at P.



3.2.1 Show that the coordinates of C are (8 ; 0). (2)

3.2.2 Write down the coordinates of point P. (2)

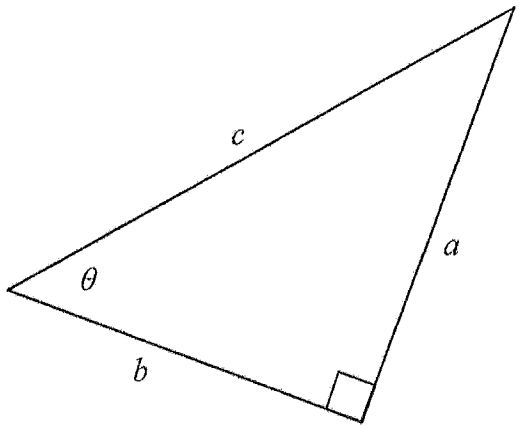
3.2.3 Calculate the gradient of line BD. (2)

3.2.4 Calculate the length of line AC. (2)

3.2.5 Calculate the area of the kite ADCB. (3)
[15]

QUESTION 4

4.1 A right-angled triangle has sides a, b and c and the angle θ, as shown below.



4.1.1 Write the following in terms of a, b and c:

(a) $\cos\theta$ (1)

(b) $\tan\theta$ (1)

(c) $\sin(90° - \theta)$ (2)

4.1.2 If it is given that $a = 5$ and $\theta = 50°$, calculate the numerical value of b. (2)

4.2 Given that $\hat{A} = 38{,}2°$ and $\hat{B} = 146{,}4°$.

Calculate the value of 2cosecA + cos3B. (3)

4.3 Simplify fully, WITHOUT the use of a calculator:

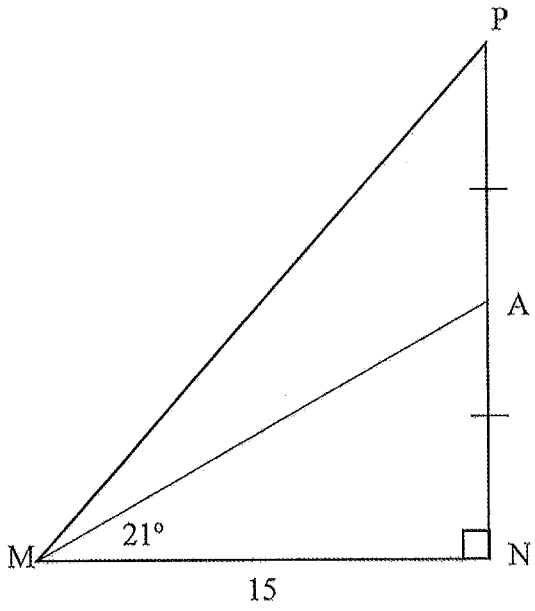
$$\frac{\sin 45°.\tan^2 60°}{\cos 45°}$$ (4)

4.4 Given that $5\cos\beta - 3 = 0$ and $0° < \beta < 90°$.

If $\alpha + \beta = 90°$ and $0° < \alpha < 90°$, calculate the value of $\cot\alpha$. (4)
[17]

QUESTION 5

5.1 In the sketch below, ΔMNP is drawn having a right angle at N and MN = 15 units. A is the midpoint of PN and $A\hat{M}N = 21°$.



Calculate:

5.1.1 AN (3)

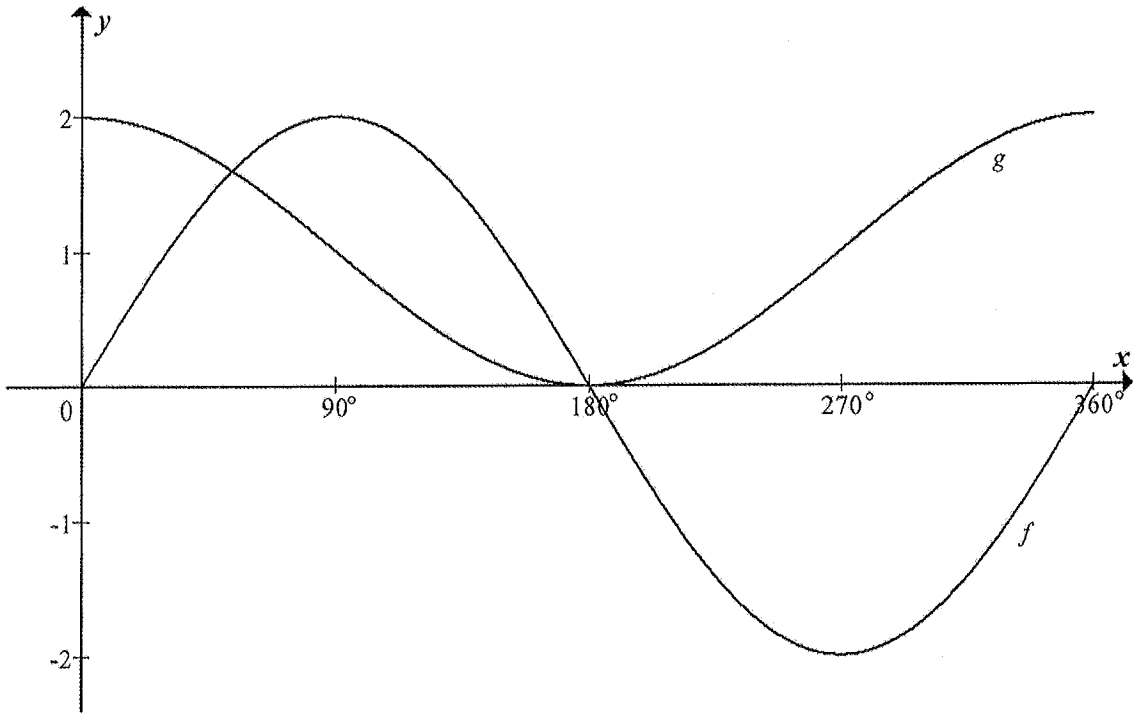
5.1.2 $P\hat{M}N$ (3)

5.1.3 MP (3)

5.2 Calculate θ if $2\sin(\theta + 15°) = 1{,}462$ and $0° \leq \theta \leq 90°$. (3)
[12]

QUESTION 6

The graphs of $f(x) = a\sin x$ and $g(x) = \cos x + 1$ for $x \in [0\,;\,360]$ are sketched below.



6.1 Write down the value of a. (1)

6.2 Write down the period of f. (1)

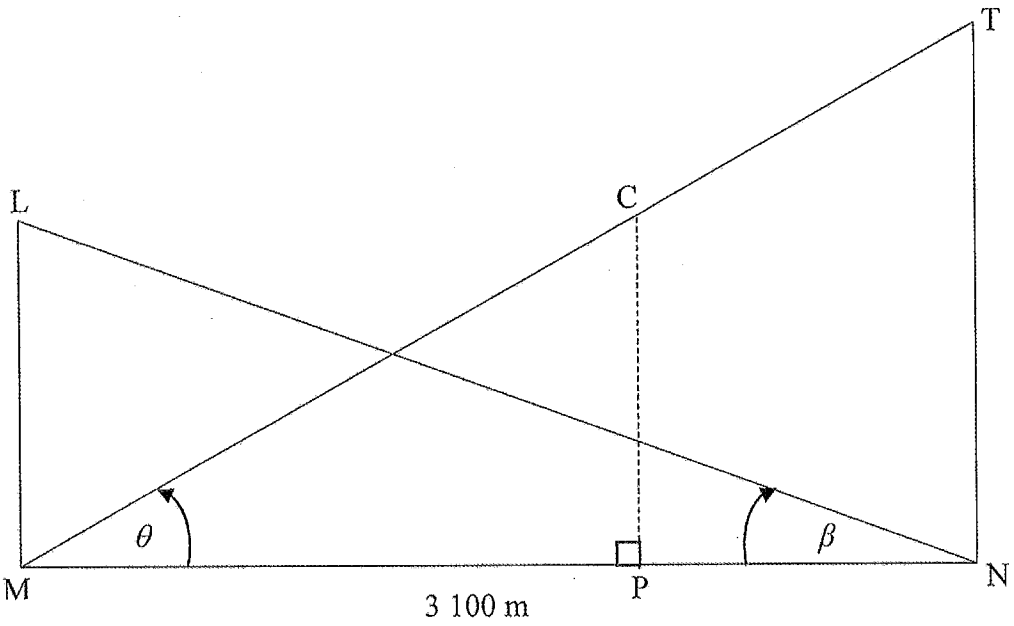
6.3 Write down the range of g. (2)

6.4 For which values of x for $x \in [0° ; 360°]$ will $f(x).g(x) > 0$? (2)

6.5 The graph g is reflected about the x-axis and then shifted 2 units upwards to obtain the graph h. Write down the equation of h. (2)
[8]

QUESTION 7

The diagram below represents a cross-section of the peaks of Table Mountain, T, and Lions Head, L, above sea level. Points M and N are directly below peaks L and T respectively, such that MPN lies on the same horizontal plain at sea level and P is directly below C.
MN = 3 100 m.
The angle of elevation of L from N is β and the angle of elevation of T from M is θ.
It is given that $\tan\theta = 0{,}35$ and $\tan\beta = 0{,}21$.



$\tan\theta = 0{,}35$
$\tan\beta = 0{,}21$

7.1 Calculate the ratio of LM : TN. (4)

7.2 A cable car, C, travelling from the top of Table Mountain, T, follows a path along TCM.

7.2.1 Calculate the angle formed ($M\hat{T}N$) between the cable and the vertical height TN. (2)

7.2.2 If the cable car, C, travels along the cable, such that TC = 400 m, calculate the height of the cable car above sea level at that instant. (5)
[11]

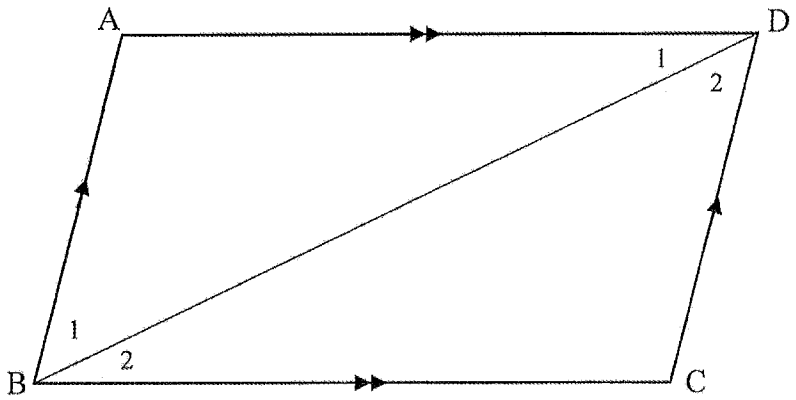
Give reasons for your statements in QUESTIONS 8 and 9.

QUESTION 8

8.1 Complete the following statement:

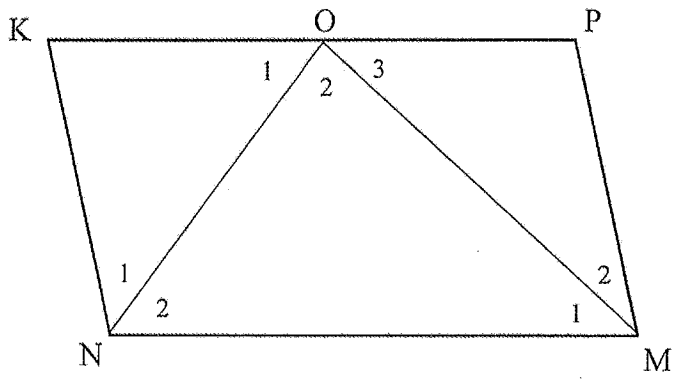
If the opposite angles of a quadrilateral are equal, then the quadrilateral … (1)

8.2 Use the sketch below to prove that the opposite sides of a parallelogram are equal.



(6)

8.3 In the sketch below, KPMN is a parallelogram. ON bisects $K\hat{N}M$ and OM bisects $N\hat{M}P$.



8.3.1 Show that $N\hat{O}M = 90°$. (3)

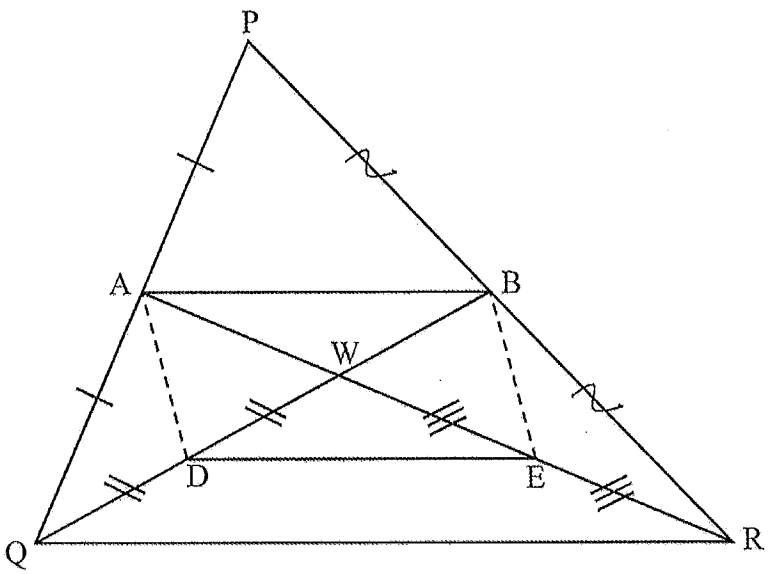
8.3.2 Prove that O is the midpoint of KP. (6)
[16]

QUESTION 9

9.1 Complete the following statement:

The line through the midpoint of two sides in a triangle is parallel to and ... the third side. (1)

9.2 In ΔPQR, A and B are the midpoints of sides PQ and PR respectively. AR and BQ intersect at W. D and E are points on WQ and WR respectively such that WD = DQ and WE = ER.



Prove that ADEB is a parallelogram. (5)
[6]

TOTAL: 100

NAME OF LEARNER: *NAAM VAN LEERDER:*	
CLASS: *KLAS:*	

NATIONAL SENIOR CERTIFICATE
NASIONALE SENIOR SERTIFIKAAT

MATHEMATICS P2/*WISKUNDE V2*

GRADE/*GRAAD* 10

NOVEMBER 2016

SPECIAL ANSWER BOOK
SPESIALE ANTWOORDEBOEK

QUESTION *VRAAG*	MARK *PUNT*			INITIAL *PARAAF*	MODERATION *MODERERING*			INITIAL *PARAAF*
1								
2								
3								
4								
5								
6								
7								
8								
9								
TOTAL *TOTAAL* (100)								

This answer book consists of 16 pages.
Hierdie antwoordeboek bestaan uit 16 bladsye.

QUESTION/*VRAAG* 1

127	128	129	130	131	133	134	134	135	136
137	138	139	140	141	142	142	143	144	145

	Solution/*Oplossing*	**Marks** ***Punte***
1.1		(1)
1.2.1		(2)
1.2.2		(1)
1.2.3		(3)
1.3		(2)
		[9]

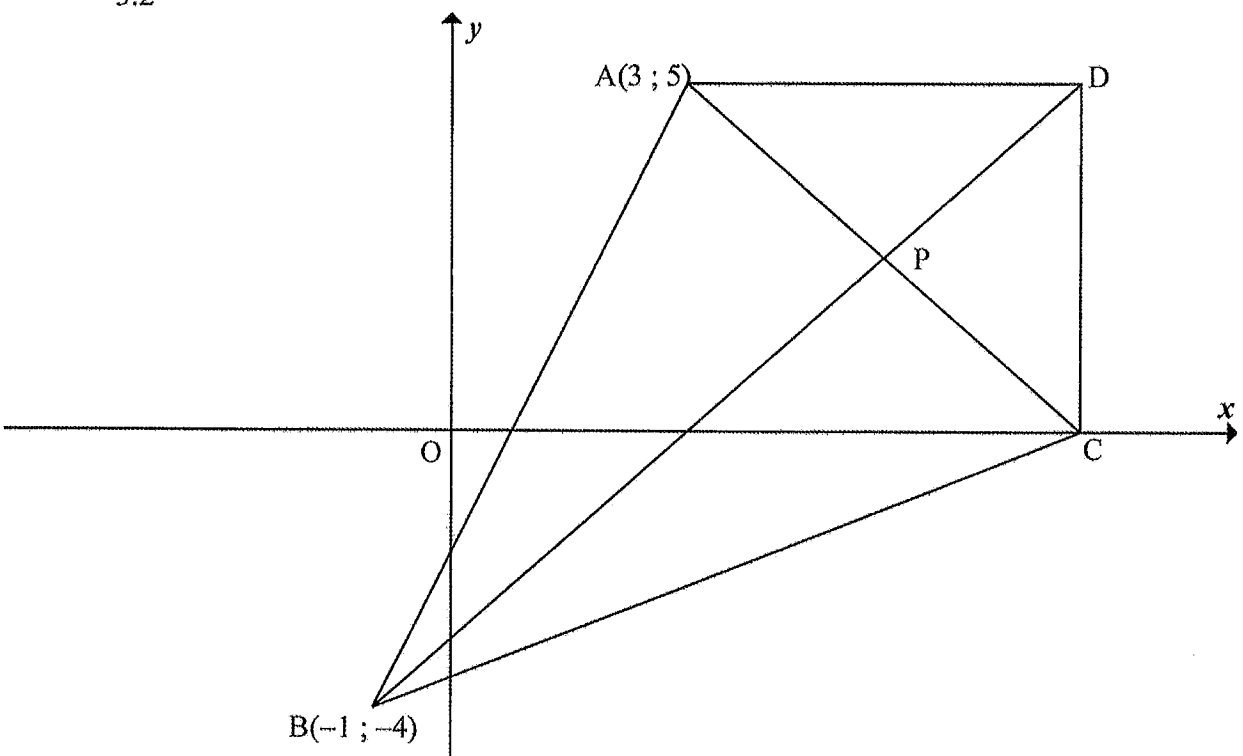
QUESTION/*VRAAG* 2

	Solution/*Oplossing*	**Marks** ***Punte***
2.1		(1)
2.2		(2)
2.3		(3)
		[6]

QUESTION/*VRAAG* 3

	Solution/*Oplossing*	**Marks** ***Punte***
3.1		(4)

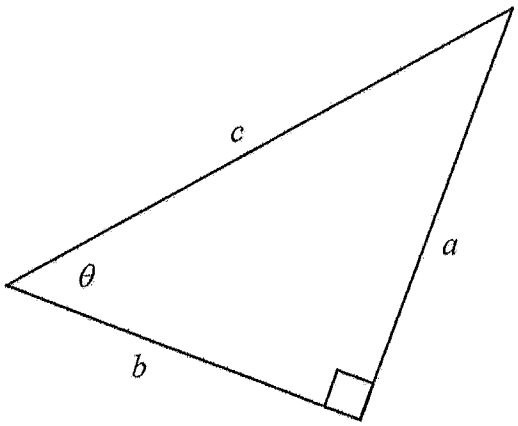
3.2



3.2.1		(2)

3.2.2		(2)
3.2.3		(2)
3.2.4		(2)
3.2.5		(3)
		[15]

QUESTION/*VRAAG* 4

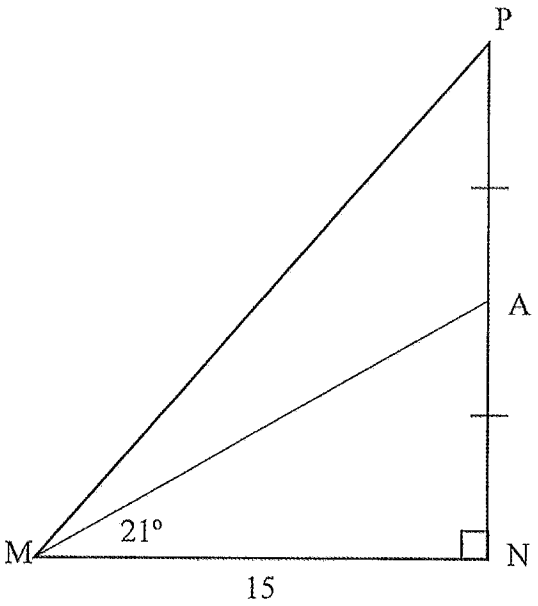


	Solution/*Oplossing*	**Marks** ***Punte***
4.1.1(a)		(1)
4.1.1(b)		(1)
4.1.1(c)		(2)
4.1.2		(2)
4.2		(3)

4.3		(4)
4.4		(4)
		[17]

QUESTION/*VRAAG* 5

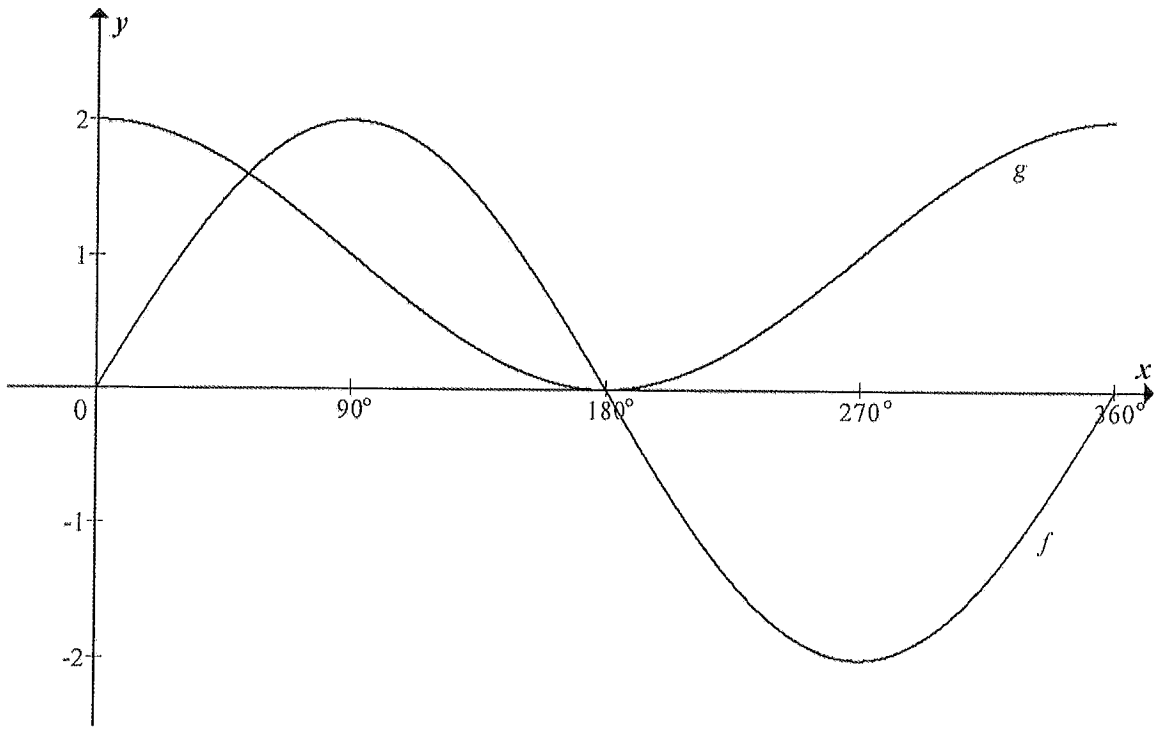
5.1



	Solution/*Oplossing*	**Marks** ***Punte***
5.1.1		(3)
5.1.2		(3)

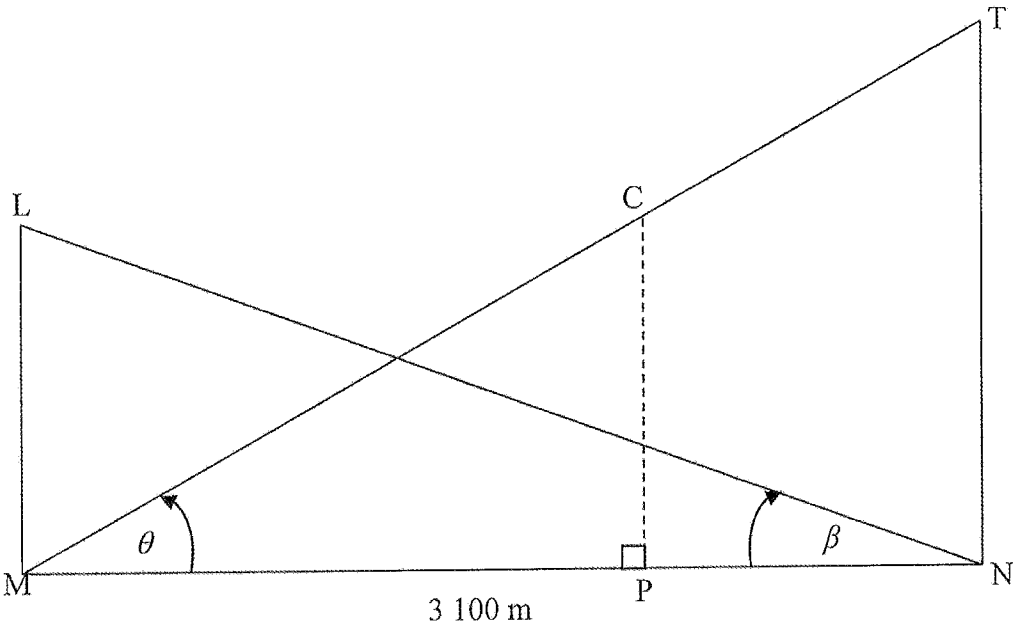
5.1.3		(3)
5.2		(3)
		[12]

QUESTION/*VRAAG* 6



	Solution/*Oplossing*	Marks *Punte*
6.1		(1)
6.2		(1)
6.3		(2)
6.4		(2)
6.5		(2)
		[8]

QUESTION/*VRAAG* 7

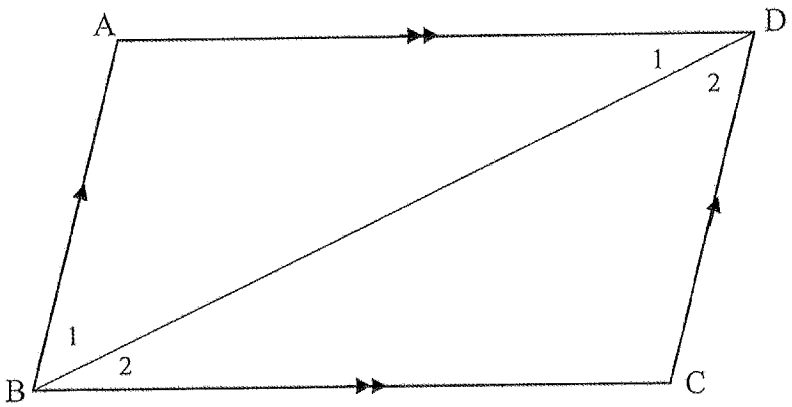


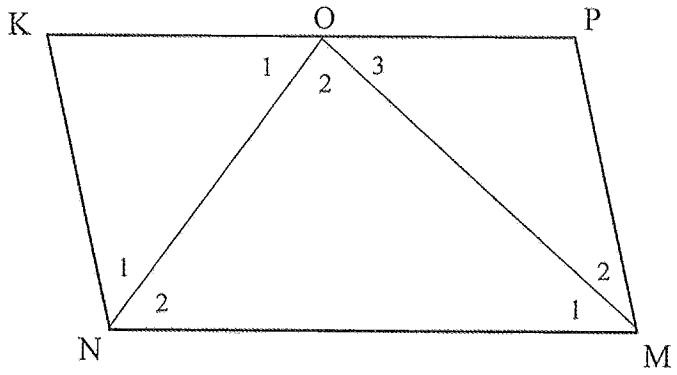
7.1		(4)
7.2.1		(2)

7.2.2		(5)
		[11]

Give reasons for your statements in QUESTIONS 8 and 9.
Gee redes vir jou bewerings in VRAAG 8 en 9.

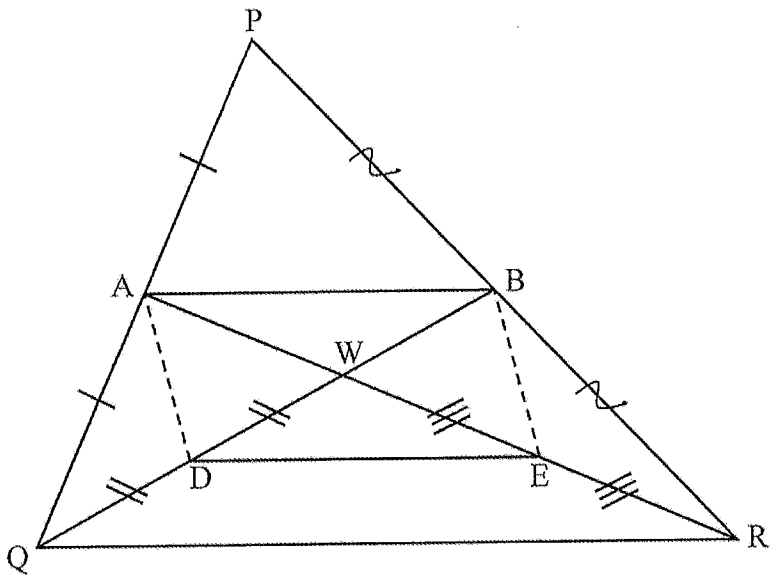
QUESTION/*VRAAG* 8

	Solution/*Oplossing*	Marks *Punte*
8.1		(1)
8.2		(6)



8.3.1		(3)
8.3.2		(6)
		[16]

QUESTION/*VRAAG* 9

	Solution/*Oplossing*	**Marks** ***Punte***
9.1		(1)
9.2		(5)
		[6]

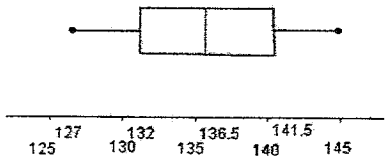
	Additional space/*Bykomende ruimte*	**Marks** ***Punte***

TOTAL/*TOTAAL*: 100

NOTE:
- If a candidate answered a question TWICE, mark only the FIRST attempt.
- If a candidate crossed out an answer and did not redo it, mark the crossed-out answer.
- Consistent accuracy applies to ALL aspects of the marking memorandum.
- Assuming values/answers in order to solve a problem is unacceptable.

LET WEL:
- *As 'n kandidaat 'n vraag TWEE keer beantwoord het, sien slegs die EERSTE poging na.*
- *As 'n kandidaat 'n antwoord deurgehaal en nie oorgedoen het nie, sien die deurgehaalde antwoord na.*
- *Volgehoue akkuraatheid is op ALLE aspekte van die memorandum van toepassing.*
- *Dit is onaanvaarbaar om waardes/antwoorde te veronderstel om 'n probleem op te los.*

QUESTION 1/*VRAAG 1*

1.1	Median/*Mediaan* $= \frac{136+137}{2}$ $= 136,5$	✓ answer/*antwoord* (1)
1.2.1	Mean/*Gemiddelde* $= \frac{2728}{20}$ $= 136,4$ cm	✓ 2728 ✓ answer/*antwoord* Answer only/ *slegs antw* 2/2 (2)
1.2.2	Range/*Variasiewydte* $= 145 - 127$ $= 18$ cm	✓ answer/*antwoord* (1)
1.2.3	Lower quartile/*Onderste kwartiel* = 132 Upper quartile/*Boonste kwartiel* $= 141\frac{1}{2}$ Interquartile range/*IKO* $= 141\frac{1}{2} - 132$ $= 9,5$ cm	✓ Lower quartile/*Onderste kwartiel* ✓ Upper quartile/*Boonste kwartiel* ✓ answer/*antwoord* Answer only full marks *Slegs antw volpunte* (3)
1.3		✓ median/min/max/ *mediaan/min/maks* ✓Q_1 and/ *en* Q_3 CA from 1.1 & 1.2.3 *VA vanaf 1.1 & 1.2.3* (2) [9]

basic education
Department:
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REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE/ *NASIONALE SENIOR SERTIFIKAAT*

GRADE/*GRAAD* 10

MATHEMATICS P2/*WISKUNDE V2*

NOVEMBER 2016

MEMORANDUM

MARKS/*PUNTE*: 100

This memorandum consists of 15 pages.
Hierdie memorandum bestaan uit 15 bladsye.

DEPARTMENT OF BASIC EDUCATION
PRIVATE BAG X895, PRETORIA, 0001
2016 -11- 08
APPROVED MARKING GUIDELINE
PUBLIC EXAMINATION

Copyright reserved/*Kopiereg voorbehou*

Please turn over/*Blaai om asseblief*

	y-koördinate But / *maar* AD = 5 units/*eenhede* ∴ D(8 ; 5) CD is perpendicular to the *x*-axis/*CD is loodreg op x-as* ∴ C and D have the same x-coordinate/*C en D het dieselfde x-koördinate* But C lies on the *x*-axis./*C lê op die x-as* ∴ C(8 ;0) **Or any other valid explanation** / ***of enige ander geldige rede***	✓explaining x-coordinate/ *x-koördinaat verduidelik* ✓explaining y-coordinate/ *y-koördinaat verduidelik* (2)

QUESTION 2/*VRAAG 2*

2.1	Modal class(*Module klas*) $100 \leq x < 110$	✓ answer/*antwoord* Do not penalise notation *Notasie word nie gepenaliseer nie* (1)
2.2	$110 \leq x < 120$	✓✓answer/*antwoord* Note: if learner identifies position of median only: 1/2 *Nota: Indien leerder slegs posisie van mediaan bepaal: 1/2* (2)
2.3	Estimate Mean IQ of students/*Geskatte gemiddelde IK* $= \frac{3480}{30}$ $= 116$	✓ 3480 ✓ 30 ✓ answer/*antwoord* CA on numerator only *VA slegs vir teller* Answer only/ *Slegs antw* 3/3 (3) **[6]**

QUESTION 3/*VRAAG 3*

3.1	$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $= \sqrt{(3-1)^2 + (6-1)^2}$ $= \sqrt{29}$ $AC = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $= \sqrt{(6-1)^2 + (3-1)^2}$ $= \sqrt{29}$ AB = AC ∴ ΔABC is isosceles/*gelykbenig*	✓corr. subst. in corr. formula/*vervang in korrekte formule* ✓ distance/*afstand* AB ✓subst. in corr. formula/*vervang in korrekte formule* ✓AB = AC or / *of* ΔABC is isosceles / *gelykbenig* Wrong formula 0/4 marks *Verkeerde formule 0/4* (4)
3.2.1	AD is parallel to the *x*-axis/*AD parallel aan x-as* ∴ A and D have the same *y*-coordinates/*A en D het dieselfde*	

QUESTION 4/*VRAAG 4*

4.1.1(a)	$\frac{b}{c}$	✓ answer/*antwoord* (1)
4.1.1(b)	$\frac{a}{b}$	✓ answer/*antwoord* (1)
4.1.1(c)	$\frac{b}{c}$	✓✓ answer/*antwoord* 0 or / *of* 2 marks /*punte* (2)
4.1.2	$\tan\theta = \frac{a}{b}$ $\tan 50° = \frac{5}{b}$ $\therefore b = \frac{5}{\tan 50°}$ $b = 4{,}20$	✓ correct subst in ratio/ *korr subst in verhouding* ✓ *b* value/*waarde* (penalise for rounding off only in this question) *(afronding word slegs in hierdie vraag gepenaliseer)* (2)
4.2	$2\text{cosec } 38{,}2° + \cos 3(146{,}4°)$ $= 2(\frac{1}{\sin 38.2°}) + \cos 3(146{,}4°)$ $= 3{,}42$	✓ $(\frac{1}{\sin 38.2°})$ or/*of* 2(1,617) or/*of* 3,234 ✓✓ answer accurate/ *antwoord akkuraat* [Answer only – full marks] *[Slegs antwoord – volpunte]* (3)
4.3	$\frac{\sin 45° . \tan^2 60°}{\cos 45°}$ $\frac{(\frac{1}{\sqrt{2}})(\frac{\sqrt{3}}{1})(\frac{\sqrt{3}}{1})}{\frac{1}{\sqrt{2}}}$ $\frac{\frac{3}{\sqrt{2}}}{\frac{1}{\sqrt{2}}}$ $\frac{3}{\sqrt{2}} \cdot \frac{\sqrt{2}}{1}$ 3	✓ $\frac{1}{\sqrt{2}} / \frac{\sqrt{2}}{2}$ ✓ $\frac{\sqrt{3}}{1}$ ✓ $\frac{1}{\sqrt{2}} / \frac{\sqrt{2}}{2}$ (denominator / *noemer*) ✓ answer/*antwoord* **Answer only/ *Slegs antw 0/4*** (4)
4.4	$\cos\beta = \frac{3}{5}$ $y^2 = 5^2 - 3^2$	✓ $\cos\beta = \frac{3}{5}$ ✓ application Pyth. Th. *toepassing van Pyth. St.*

3.2.2	P is midpoint of AC the diagonals of the kite/ *P is middelpunt van AC, die hoeklyne van die vlieër* $\therefore P \ \frac{3+8}{2} ; \frac{5+0}{2}$ $P\left(\frac{11}{2} ; \frac{5}{2}\right)$	✓ *x*-value/*waarde* ✓ *y*-value/*waarde* (2)
3.2.3.	B(–1 ; –4) D(8 ; 5) $m_{BD} = \frac{5+4}{8+1}$ $= 1$	✓ substitution/*vervang* ✓answer/*antwoord* Answer only 2/2 *Slegs antw 2/2* (2)
3.2.4	A(3 ; 5) & C(8 ; 0) $AC = \sqrt{(0-5)^2 + (8-3)^2}$ $= \sqrt{50}$ or/*of* $5\sqrt{2}$ or/*of* 7,07	✓ substitution/*vervang* ✓ answer/*antwoord* (2)
3.2.5	B(–1 ; –4) & D(8 ; 5) $BD = \sqrt{(5+4)^2 + (8+1)^2}$ $= \sqrt{162}$ Area $= \frac{1}{2}$(BD.AC) $= \frac{1}{2}(\sqrt{162} . \sqrt{50})$ $= 45$ OR / *OF* B(–1 ; –4) & D(8 ; 5) $BD = \sqrt{(5+4)^2 + (8+1)^2}$ $= \sqrt{162}$ A(3 ; 5) & P(5,5 ; 2,5) $AP = \sqrt{(3-5{,}5)^2 + (5-2{,}5)^2}$ $= \frac{5\sqrt{2}}{2}$ Area ADCB = area ΔABD + area ΔCBD $= 2$ (0,5 X BD X AP) $= 2(\frac{1}{2} \times \sqrt{162} \times \frac{5\sqrt{2}}{2})$ $= 45$	✓ length/*lengte* BD ✓ substitution in corr formula/ *vervang in korr formule* ✓ answer/*antwoord* correct area formula only 1/3 *slegs korrekte areaformule 1/3* (3) **OR/*OF*** ✓ length/*lengte* BD ✓ length/*lengte* AP ✓ answer/*antwoord* (3) **[15]**

QUESTION 5/*VRAAG 5*

5.1.1	In Δ *AMN* $\tan \hat{M} = \frac{AN}{MN}$ $\tan 21° = \frac{AN}{15}$ $AN = 15.\tan 21°$ $AN = 5,76$ units/*eenhede*	✓ $\tan \hat{M} = \frac{AN}{MN}$ ✓ substitute/*vervang* ✓answer/*antwoord* (3)
5.1.2	$PN = 2(5,76)$ $= 11,52$ $\tan \hat{M} = \frac{PN}{MN}$ $= \frac{11,52}{15}$ $\hat{M} = 37,52°$ $\therefore P\hat{M}N = 37,52°$	✓ PN =11,52 ✓$\tan \hat{M} = \frac{11,52}{15}$ ✓ answer/*antwoord* (3)
5.1.3	$\sin 37,52 = \frac{11,52}{MP}$ $MP = \frac{11,52}{\sin 37,52}$ $MP = 18,92$ (accept 18,91 also / *aanvaar ook 18,91*) **OR/*OF*** $MP^2 = 15^2 + 11,52^2$ *Pyth* $MP = 18,91$ **ANY OTHER VALID METHOD/** ***ENIGE ANDER GELDIGE METODE***	✓ $\sin 37,52° = \frac{11,52}{MP}$ ✓ MP subject/*onderwerp* ✓answer/*antwoord* (3) ✓ using Pyth *gebruik* ✓ subst ✓answer/*antw* (3)
5.2	$2\sin(\theta + 15°) = 1,462$ $\sin(\theta + 15°) = 0,731$ $\therefore \theta + 15° = 46,97°$ $\theta = 46,97° - 15°$ $\theta = 31,97°$	✓0,731 ✓46,97° ✓answer/*antwoord* Answer only /*slegs antw* 3/3 (3) [12]

	$y = 4$ $\therefore \cot\alpha = \frac{4}{3}$ **OR/*OF*** $\cos\beta = \frac{3}{5}$ $\beta = 53,13°$ $\alpha = 36,87°$ $\cot \alpha = \frac{1}{\tan 36,87°} = 1,33$	Or reason/ *of rede Pyth* ✓ $y = 4$ ✓answer/*antwoord* (4) ✓ $\cos\beta = \frac{3}{5}$ ✓ value of / *waarde van* β ✓ value of/*waarde van* α ✓ answer / *antw* (4) [17]

QUESTION 6/*VRAAG 6*

6.1	$a = 2$	✓answer/*antwoord* (1)
6.2	Period/*periode* $f = 360°$	✓answer/*antwoord* (1)
6.3	$y \in [0\,;2]$ or / *of* $0 \leq y \leq 2$	✓0 and 2 ✓notation / *notasie* (2)
6.4	$0° < x < 180°$	✓critical values/ *kritiese waardes* ✓correct inequalities / *korrekte ongelykhede* (2)
6.5	$y = -\cos x - 1 + 2$ $= -\cos x + 1$	✓ $-\cos x - 1$ ✓ $+ 2$ OR /*OF* ✓✓ answer/*antwoord* Answer only *Slegs antw* 2/2 (2) **[8]**

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APPROVED MARKING GUIDELINE
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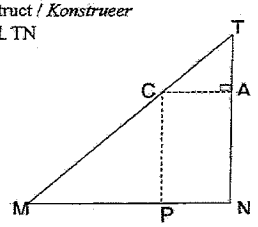
	OR / *OF* Construct / *Konstrueer* CA ⊥ TN  In Δ TAC : $\frac{TA}{400} = \cos 70{,}0995\ldots$ $\therefore TA = 400\cos 70{,}0995\ldots = 132{,}14\ldots.$ Then CP = 1085 − 132,14... = 952,86 m	✓ construction of CA *Konstrueer CA* ✓ $\frac{TA}{400} = \cos 70{,}0995\ldots$ ✓ 132,14 ✓ subtracting / *aftrek* ✓ answer / *antw* (4) **[11]**

QUESTION 7/*VRAAG 7*

7.1	$\frac{LM}{3100} = tan\beta = 0{,}21$ $\therefore LM = 3100 \times 0{,}21 = 651\ m$ $\frac{TN}{3100} = tan\theta = 0{,}35$ $\therefore TN = 3100 \times 0{,}35 = 1085\ m$ $\frac{LM}{TN} = \frac{651}{1085} = \frac{3}{5}$ **OR / *OF*** $\tan\beta = \frac{LM}{MN} = 0{,}21 \quad \tan\theta = \frac{TN}{MN} = 0{,}35$ $\frac{LM}{MN} \div \frac{TN}{MN} = \frac{0{,}21}{0{,}35}$ $\frac{LM}{TN} = \frac{0{,}21}{0{,}35}$ $= \frac{3}{5}$ ∴ LM : TN 3 : 5	✓ $\frac{LM}{3100} = tan\beta = 0{,}21$ ✓ 651m ✓ 1085m ✓ answer/ *antwoord* ✓ $\tan\beta = \frac{LM}{MN}$ ✓ $\tan\theta = \frac{TN}{MN}$ ✓ $\frac{LM}{MN} \div \frac{TN}{MN} = \frac{0{,}21}{0{,}35}$ ✓ answer/*antw* LM : TN (4)
7.2.1	$tan\theta = 0{,}35$ $\theta = 19{,}29°$ $\therefore \hat{MTN} = 70{,}71°$	✓ $\theta = 19{,}29°$ ✓ answer/ *antwoord* (2)
7.2.2	$\cos 19{,}29° = \frac{3100}{TM}$ TM = 3284,39 CM = 2884,39 $\therefore \sin 19{,}29° = \frac{CP}{2884{,}39}$ ∴ CP = 2884,39(sin 19,29°) CP = 952,86 m	✓ $\cos 19{,}29° = \frac{3100}{TM}$ ✓ TM = 3284,39 ✓ CM = 2884,39 ✓ $\sin 19{,}29° = \frac{CP}{2884{,}39}$ ✓ answer/ *antwoord* (5)

QUESTION 8/ *VRAAG 8*

8.1	is a parallelogram/*is 'n parallelogram*	✓answer/*antwoord* (1)
8.2	In Δ ABD and/*en* Δ CDB $\hat{D}_1 = \hat{B}_2$ [alt. angles/ *verw. hoek* ,AD ∥ BC] $\hat{B}_1 = \hat{D}_2$ [alt. angles/ *verw. hoek* ,AB ∥ DC] BD = BD [common side/ *dieselfde sy*] ∴ Δ ABD ≡ Δ CDB [A,A,S] ∴ AB = DC, AD = BC	✓S ✓R ✓S/R ✓S/R ✓S/R ✓S Penalise once for leaving out ∥ lines in reason *Penaliseer slegs een keer vir ∥ lyne in rede* (6)
8.3.1	Let/*Laat* $\hat{N}_1 = \hat{N}_2 = x$ [ON bisects/*halveer KNM*] Let/*Laat* $\hat{M}_1 = \hat{M}_2 = y$ [OM bisects/*halveer NMP*] ∴ $2x + 2y = 180°$ [co-int./*ko-bin. hoek* KN ∥ PM] ∴ $x + y = 90°$ $\hat{O}_2 + x + y = 180°$ [int. angles of/*binnehoeke van* Δ] ∴ $\hat{O}_2 + 90° = 180°$ ∴ $\hat{O}_2 = 90°$	✓S/R ✓S/R ✓substitution/*vervang* $(x + y = 90°)$ (3)
8.3.2	$\hat{N}_2 = \hat{O}_1$ [alt. angle/*verw. hoek* KP ∥ NM] $\hat{O}_1 = \hat{N}_1$ ∴ *KO = KN* [opp. Angles =/*oorst hoeke* =] $\hat{O}_3 = \hat{M}_1$ [alt angle/*verw.* KP ∥ MN] $\hat{O}_3 = \hat{M}_2$ ∴ *OP = PM* [sides opp. = angles] *[sye oor. = hoeke]* But/*Maar* KN = PM [opp. sides =/*oor sye* =] ∴ KO = OP ∴ O is the midpoint/*middelpunt*	✓ S/R ✓ S ✓ S/R ✓ S/R ✓ S/R ✓ S (6) **[16]**

QUESTION 9/*VRAAG 9*

9.1	half the length of /*die helfde van die lengte van*	✓ half /*helfte* (1)
9.2	AB ∥ QR [line joining midpoint or midpoint theorem] [*lyn deur middelpunte of middelpuntstelling*] $AB = \frac{1}{2}$ QR [line joining midpoint] [*lyn deur middelpunte*] DE ∥ QR [line joining midpoint/*lyn deur middelpunte*] $DE = \frac{1}{2}$ QR ∴ AB ∥ DE and/*en* AB = DE ∴ ADEB is a parm. [one pair of opp. sides = and ∥] *[een paar teenoorstande sye = en ∥]*	✓R ✓S/R ✓S ✓S (both/*albei*) ✓ R (5) **[6]**

TOTAL/*TOTAAL*: 100