Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 10

NOVEMBER 2020

MATHEMATICS P2 (EXEMPLAR)

MARKS: **100**

TIME: **2 hours**

This question paper consists of 10 pages and an answer book of 14 pages.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

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

QUESTION 1

1.1 The following mathematics test marks were recorded for a Grade 10A class of 28 students.

MARKS	FREQUENCY	MIDPOINTS	MIDPOINT × FREQUENCY
$0 < x \leq 30$	2	15	30
$30 < x \leq 40$	3	35	105
$40 < x \leq 50$	11	45	495
$50 < x \leq 60$	7	55	
$60 < x \leq 70$	3		195
$70 < x \leq 80$	2	75	150
$80 < x \leq 100$	0	90	0

1.1.1 Complete the table above by filling in the two missing numbers. (2)

1.1.2 Calculate an estimate of the mean mark. (2)

1.1.3 Represent the data on a frequency polygon. (3)

1.1.4 In which interval does the

(a) median lie? (2)

(b) 80^{th} percentile lie? (2)

1.2 The following Mathematics test marks of a Grade 10B class are recorded below:

45	49	50	51	51	53	54	57	57	59	60	64
65	66	70	71	73	74	75	76	83	89	89	

1.2.1 Write down the median mark for this class. (1)

1.2.2 Calculate the interquartile range mark for this class. (3)

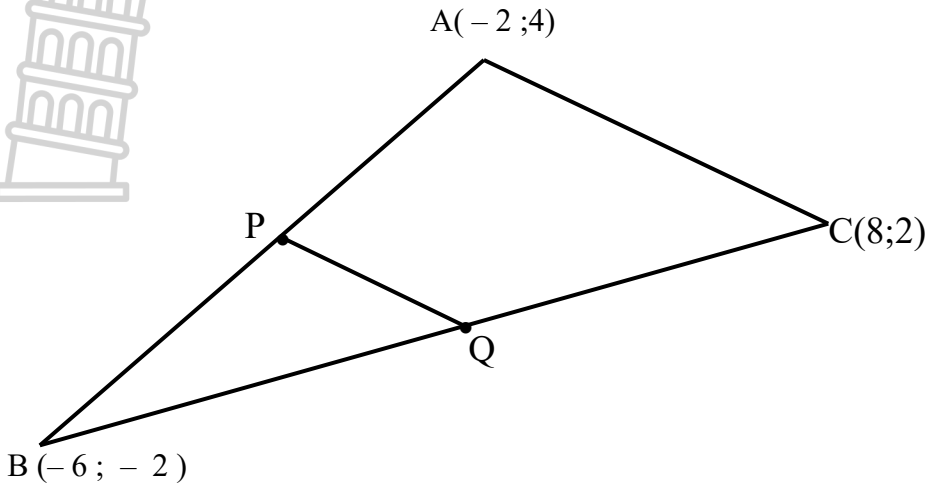
1.2.3 Represent the data on a box and whisker diagram. (3)

1.2.4 Comment on the distribution of the data with reference to the box and whisker diagram. (2)

[20]

QUESTION 2

In the diagram below, the coordinates of ΔABC are given as A(– 2 ; 4) , B(– 6 ; – 2) and C(8 ; 2). P and Q are the midpoints of AB and BC respectively.



2.1 Calculate the coordinates of P and Q. (4)

2.2 Show that:

2.2.1 PQ // AC (4)

2.2.2 $PQ = \frac{1}{2}\ AC$ (4)

2.3 Calculate, to two decimal places, the perimeter of Δ ABC. (4)
[16]

QUESTION 3

3.1 If $x = 229,5°$ and $y = 117,6°$, determine to two decimal places the values of:

3.1.1 $\sin(x + y)$ (2)

3.1.2 $\cos 2y$ (2)

3.1.3 $\text{cosec } x$ (2)

3.2 Determine the value of x to one decimal place:

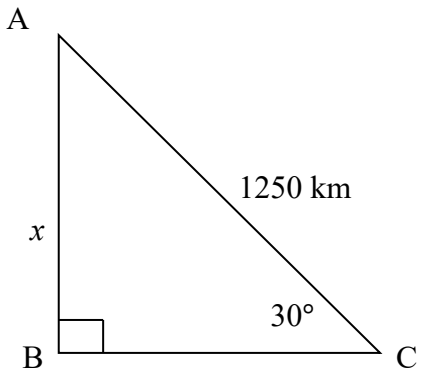
3.2.1 $\cos 2x = 0,50$ (2)

3.2.2 $7 \sec x - 11 = 0$ (3)

3.3 If $\cos x = \frac{3}{4}$ and $0° < x < 90°$, determine the value of $\tan x$. (3)

3.4 If $\tan \theta = \frac{6}{8}$ and $\sin \theta < 0$, determine the value of $\sec \theta - \text{cosec } \theta$ (5)

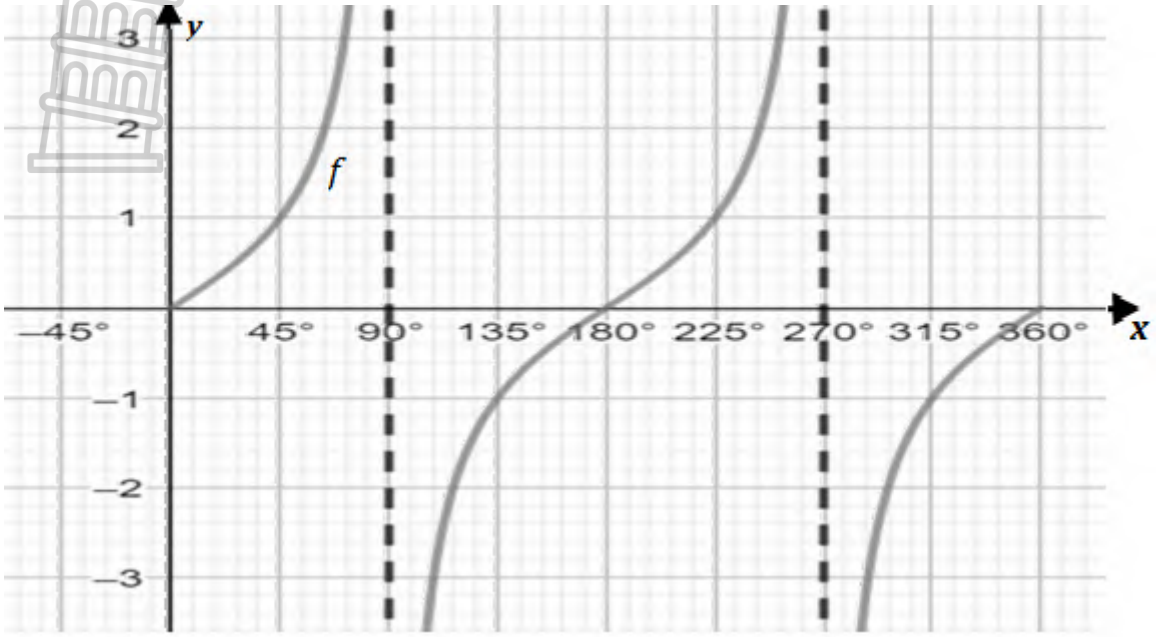
3.5 Without using a calculator, determine the value of x in the diagram below.



(2)
[21]

QUESTION 4

In the diagram below, the graph of $f(x) = \tan x$ is drawn for $x \in [0° ; 360°]$.



4.1 Sketch on the same axis the graph of $g(x) = \sin 2x$ for $x \in [0° ; 360°]$. (4)

4.2 What is the amplitude of f? (1)

4.3 Write down the period of g. (1)

4.4 For which value(s) of x is:

4.4.1 $f(x) < 0$ (2)

4.4.2 $f(x) \cdot g(x) < 0$ (2)

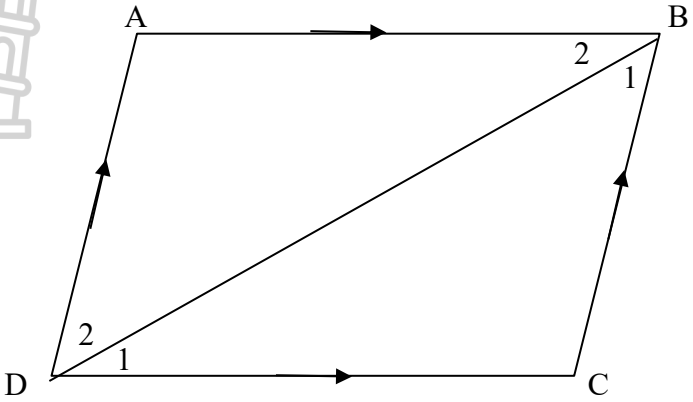
4.5 Write down the range of $k(x)$ if $k(x) = g(x) - 1$. (2)

[12]

QUESTION 5

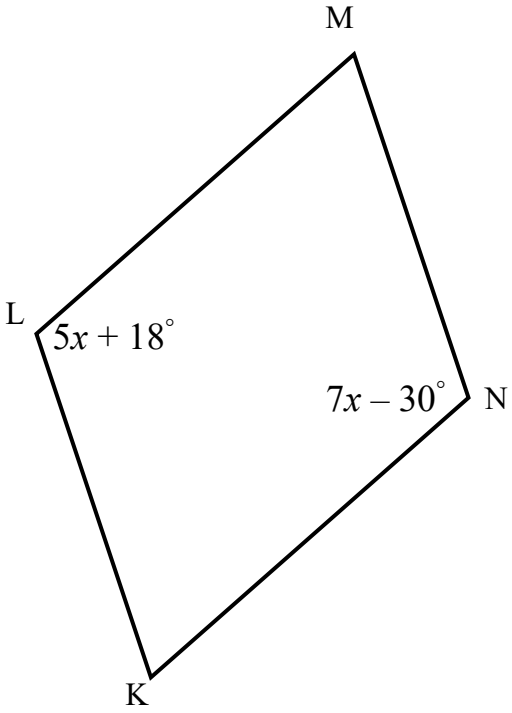
5.1 Use the diagram below to prove that the opposite sides of a parallelogram are equal, i.e. AB = CD and AD = BC.

Hint: Prove that Δ ABD ≡ Δ CDB



(4)

5.2 In the diagram below, KLMN is a parallelogram with $\hat{N} = 7x - 30°$ and $\hat{L} = 5x + 18°$.

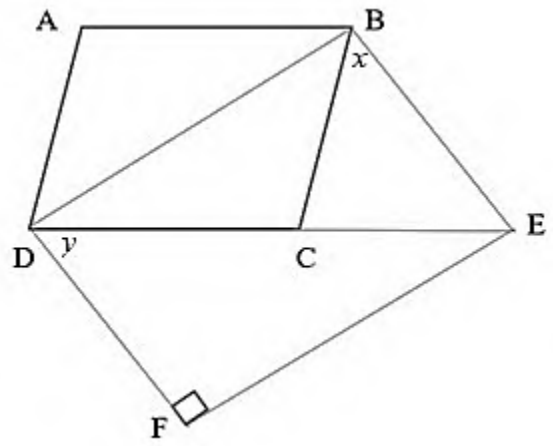


5.2.1 Calculate the value of x. (4)

5.2.2 If it is further given that $L\hat{K}N = 4y$, determine the value of y. (3)

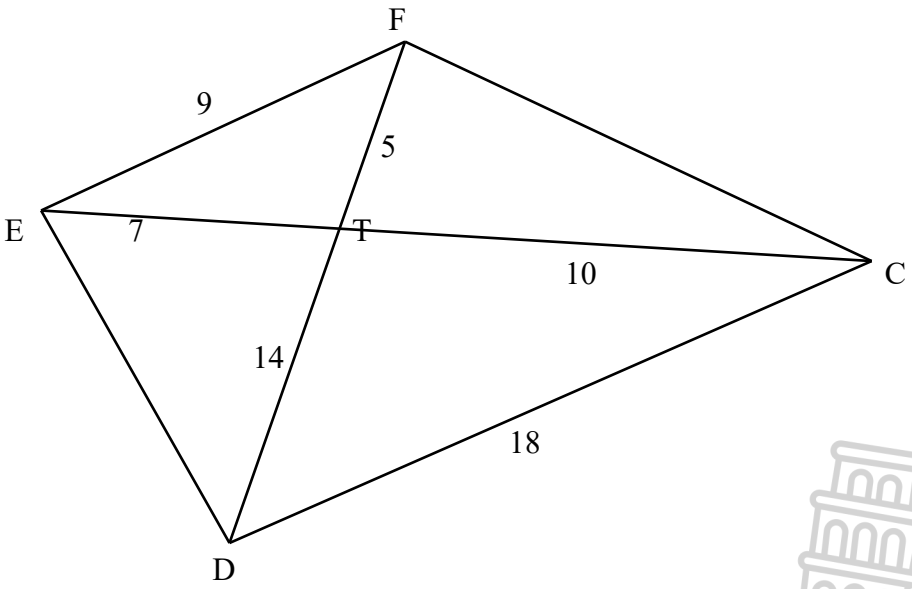
5.3 In the diagram below, ABCD is a parallelogram such that AD = BE, $\hat{A} = 124°$, ED bisects $B\hat{E}F$ and BEFD is a quadrilateral.

Calculate, with reasons, the values of x and y.



(6)

5.4 In the diagram below, FT = 5 cm, ET = 7 cm, EF = 9 cm, CT = 10 cm, DT = 14 cm and CD = 18 cm.



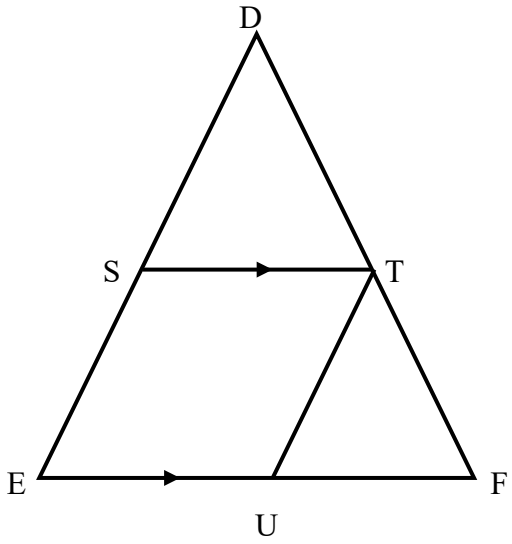
5.4.1 Prove that Δ EFT ||| Δ DCT. (3)

5.4.2 If it is further given that $D\hat{F}C = T\hat{D}C$, prove that $F\hat{E}C = T\hat{F}C$. (3)

5.5 5.5.1 Complete the following statement for Δ ABC:

If D is a point on AB and E is a point on AC such that AD = DB and DE || BC , then … (1)

5.5.2 In Δ DEF, DS = SE , EU = UF and ST || EF.

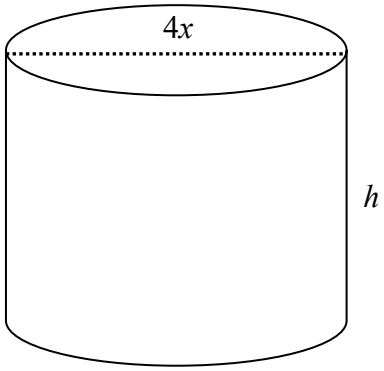


Prove that SEUT is a parallelogram. (4)
[28]

QUESTION 6

The cylinder in the diagram below has a diameter of $4x$ units and a height of h meters. The cylinder is open at the top and the total surface area of the cylinder = 32π meters.

Calculate the height of the cylinder in terms of x.



(3)
[3]

TOTAL: 100

Province of the
EASTERN CAPE
EDUCATION

LEARNER'S NAME: *LEERDERNAAM:*	

GRADE 10 *GRAAD 10*	

NATIONAL/*NASIONALE* SENIOR CERTIFICATE/*SERTIFIKAAT*

GRADE 10/*GRAAD 10*

NOVEMBER 2020

MATHEMATICS P2/*WISKUNDE V2*
SPECIAL ANSWER BOOK/*SPESIALE ANTWOORDEBOEK*
(EXEMPLAR/*EKSEMPLAAR*)

Marker/*Merker*					**Moderator's Initials / *Moderator se paraaf***														
Question *Vraag*	**Marks** *Punte*			**Initial** Parafeer	**Marks** *Punte*			**S M**	**Marks** *Punte*			**D M**	**Marks** *Punte*			**P M**	**Marks** *Punte*			**NM**
1																				
2																				
3																				
4																				
5																				
6																				
TOTAL *TOTAAL*																				

This special answer book consists of 14 pages./
Hierdie spesiale antwoordeboek bestaan uit 14 bladsye.

QUESTION 1/*VRAAG 1*

Solution / *Oplossing* | **Marks / *Punte***

1.1.1

Marks/ *Punte*	**Frequency/ *Frekwensie***	**Midpoints/ *Middelpunt***	**Midpoint × Frequency/ *Middelpt × Frekwensie***
$0 < x \leq 30$	2	15	30
$30 < x \leq 40$	3	35	105
$40 < x \leq 50$	11	45	495
$50 < x \leq 60$	7	55	
$60 < x \leq 70$	3		195
$70 < x \leq 80$	2	75	150
$80 < x \leq 100$	0	90	0

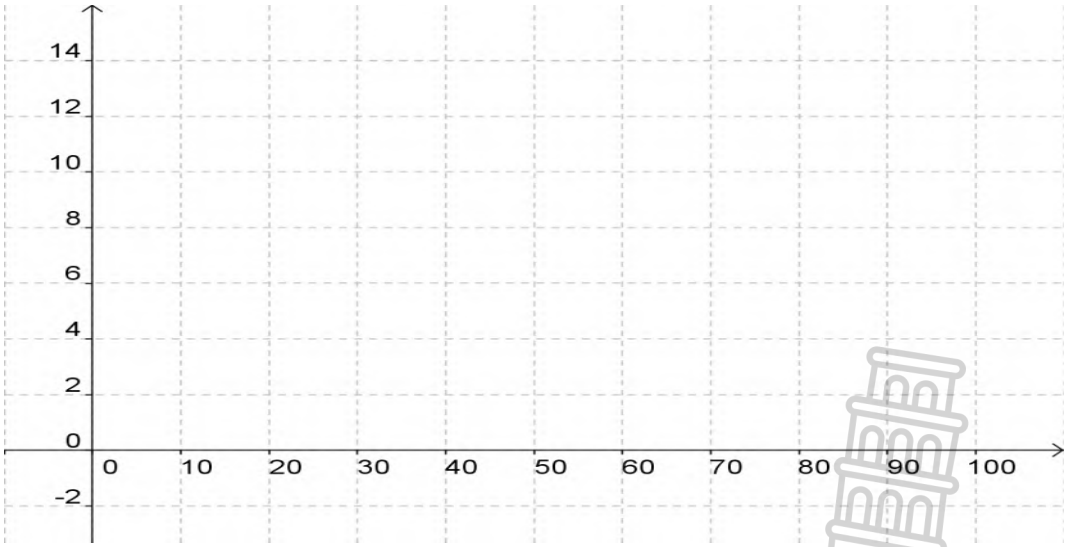
(2)

1.1.2

(2)

1.1.3

FREQUENCY POLYGON OF GRADE 10 MATHEMATICS CLASS
FREKWENSIE-POLIGOON VAN *GRAAD 10 WISKUNDEKLAS*



GRADE 10 MATHEMATICS MARKS
GRAAD 10 WISKUNDEPUNTE

(3)

1.1.4 (a)

(2)

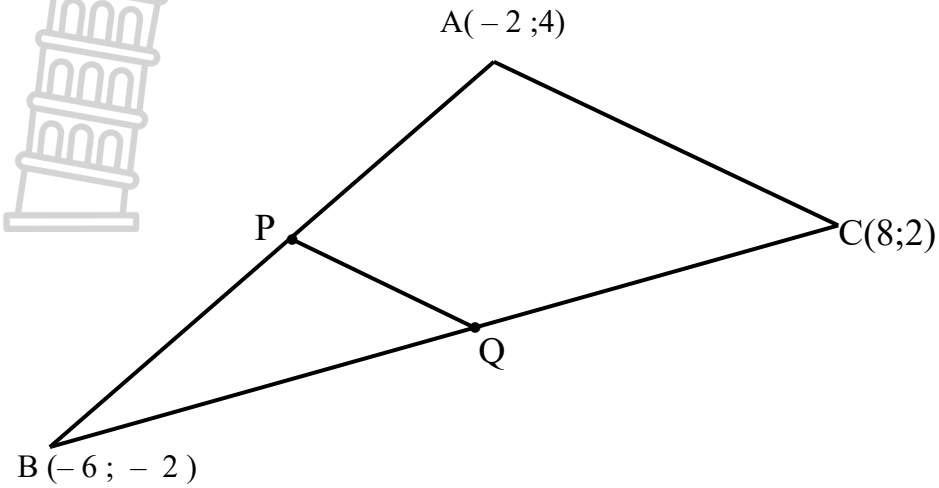
1.1.4 (b)

(2)

1.2		

45	49	50	51	51	53	54	57	57	59	60	64
65	66	70	71	73	74	75	76	83	89	89	

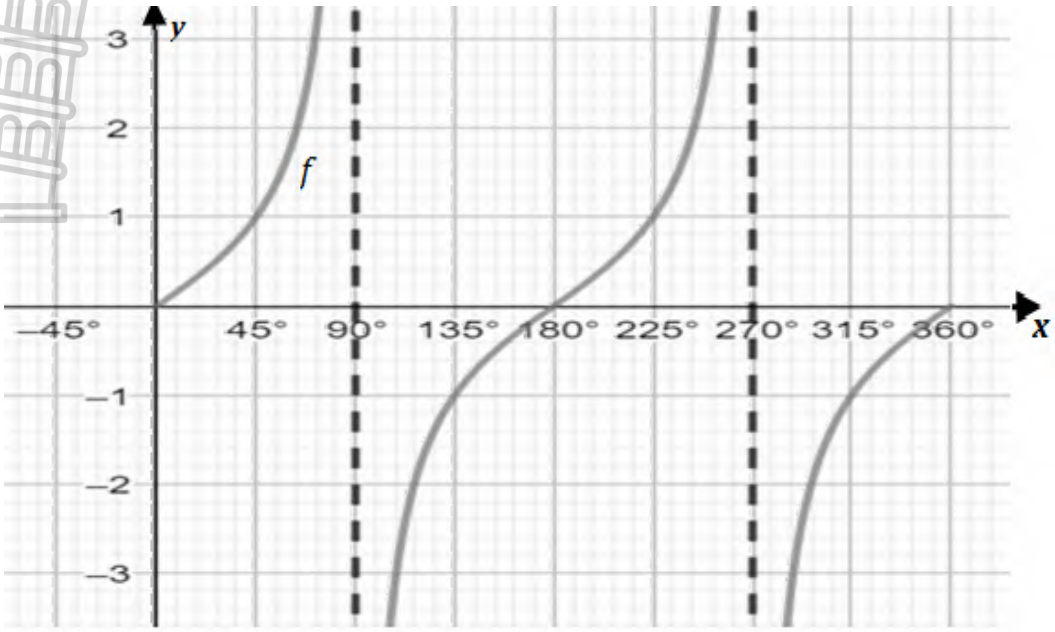
1.2.1		(1)
1.2.2		(3)
1.2.3		(3)
1.2.4		(2)
		[20]

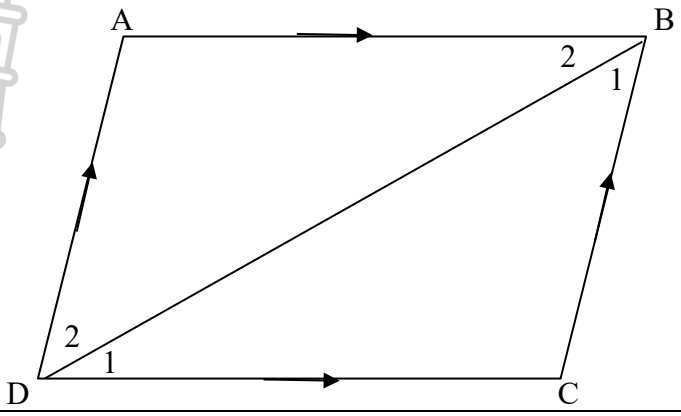
QUESTION 2/*VRAAG 2*		
	Solution / *Oplossing*	**Marks** ***Punte***
		
2.1		(4)
2.2.1		(4)

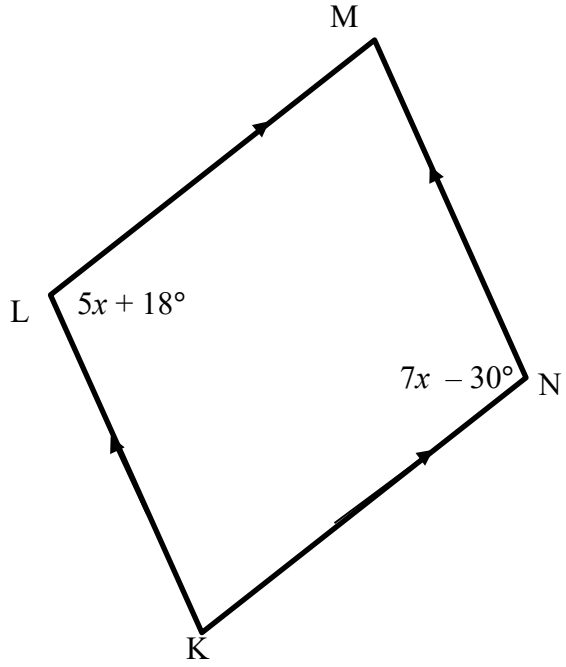
2.2.2		(4)
2.3		(4)
		[16]

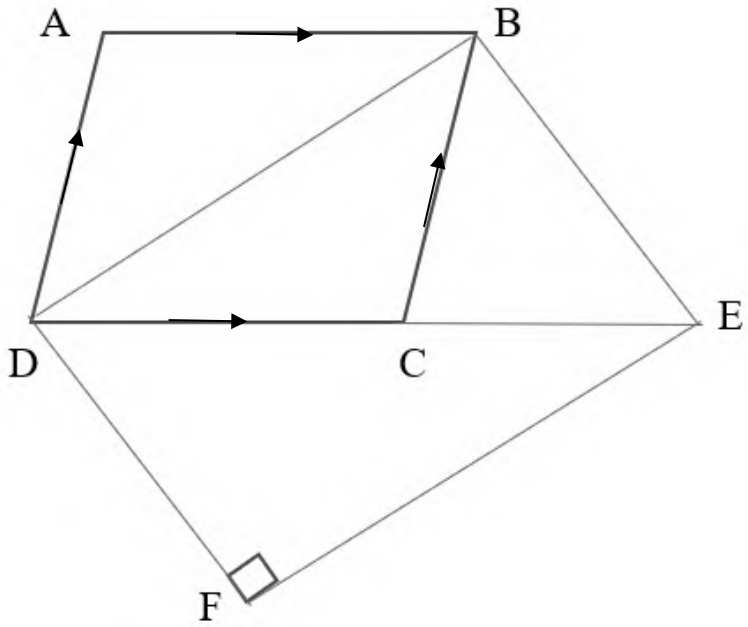
QUESTION 3 / *VRAAG 3*		
	Solution / *Oplossing*	**Marks** ***Punte***
3.1.1		(2)
3.1.2		(2)
3.1.3		(2)
3.2.1		(2)
3.2.2		(3)

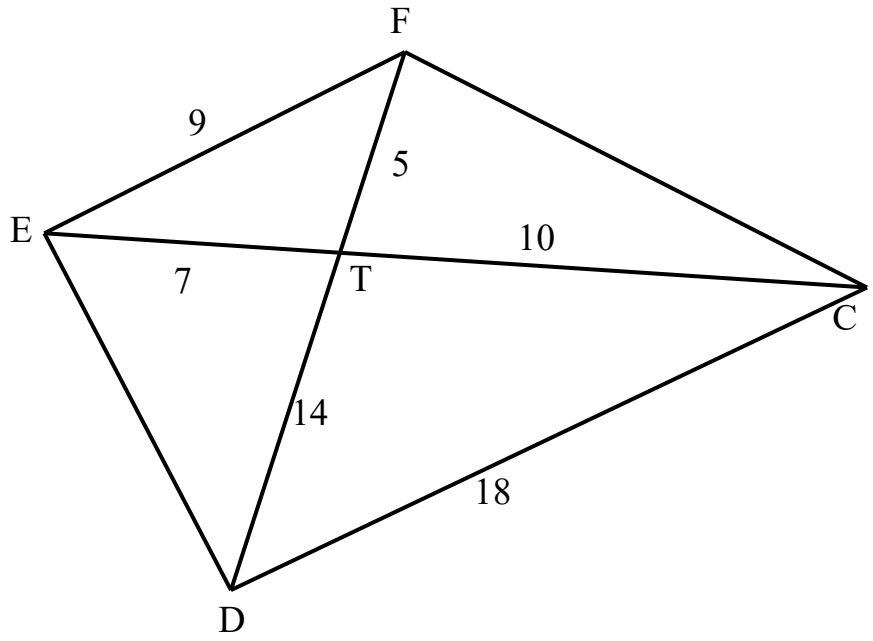
	Solution / *Oplossing*	Marks *Punte*
3.3		(3)
3.4		(5)
3.5		(2)
		[21]

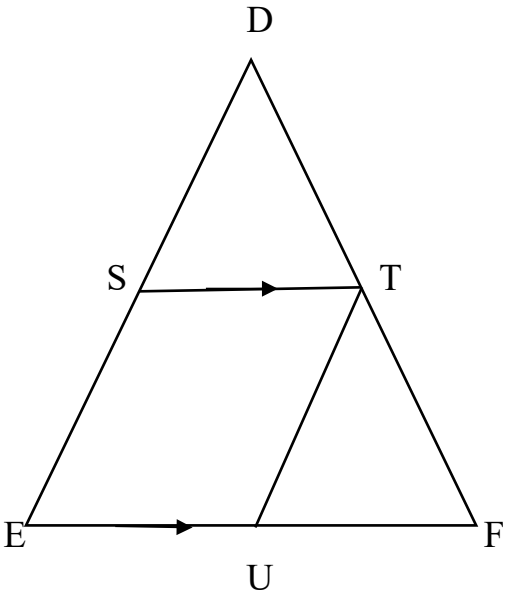
QUESTION 4 / *VRAAG 4*		
	Solution / *Oplossing*	**Marks** ***Punte***
4.1.		(4)
4.2		(1)
4.3		(1)
4.4.1		(2)
4.4.2		(2)
4.5		(2)
		[12]

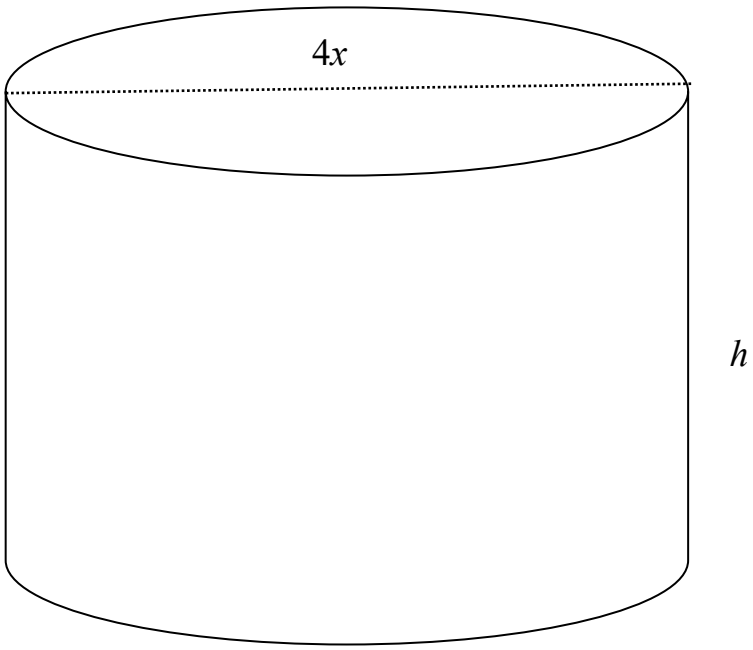
QUESTION 5/*VRAAG 5*		
	Solution / *Oplossing*	**Marks** *Punte*
5.1		
		(4)

	Solution / *Oplossing*	Marks *Punte*
5.2		
5.2.1		(4)
5.2.2		(3)

	Solution / *Oplossing*	Marks *Punte*
5.3		
		(6)

	Solution / *Oplossing*	Marks *Punte*
5.4		
5.4.1		(3)
5.4.2		(3)

	Solution / *Oplossing*	Marks *Punte*
5.5.1		(1)
5.5.2		
		(4)
		[28]

QUESTION 6 / *VRAAG 6*		
	Solution / *Oplossing*	**Marks** *Punte*
		
		(3)
		[3]
	TOTAL/*TOTAAL*:	**100**

Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE
NASIONALE SENIOR SERTIFIKAAT

GRADE/*GRAAD* 10

NOVEMBER 2020

MATHEMATICS P2/*WISKUNDE V2*
MARKING GUIDELINE/*NASIENRIGLYN*
(EXEMPLAR/*EKSEMPLAAR*)

MARKS/*PUNTE*: 100

This marking guideline consists of 11 pages./
Hierdie nasienriglyn bestaan uit 11 bladsye.

QUESTION 1/*VRAAG 1*

1.1

Marks/ ***Punte***	**Frequency/** ***Frekwensie***	**Midpoints/** ***Middelpt***	**Midpoint × Frequency/** ***Middelpt × Frekwensie***
$0 < x \leq 30$	2	15	30
$30 < x \leq 40$	3	35	105
$40 < x \leq 50$	11	45	495
$50 < x \leq 60$	7	55	**385**
$60 < x \leq 70$	3	**65**	195
$70 < x \leq 80$	2	75	150
$80 < x \leq 100$	0	90	0
	28		1360

✓ 385
✓ 65

(2)

1.1.2

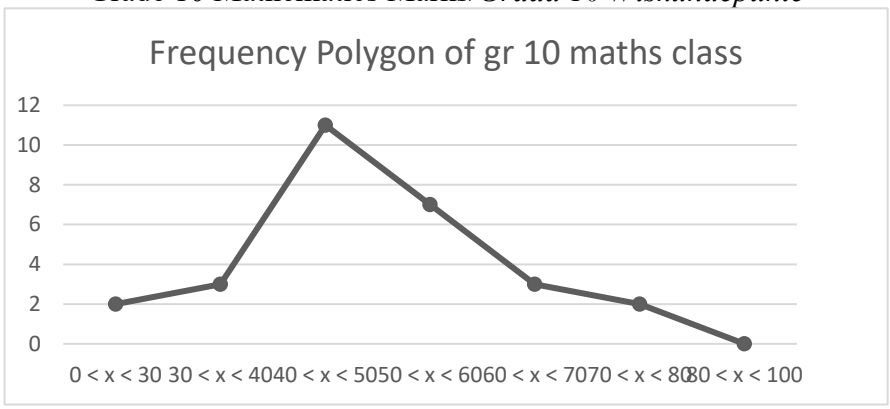
Estimate of the mean/*Benaderde gemiddelde* $= \frac{1360}{28}$
$= 48{,}6$

✓ 1360
✓ 48,6

(2)

1.1.3

Grade 10 Mathematics Marks/*Graad 10 Wiskundepunte*



✓✓ mdpts / *middelpunte*

Line joining midpoints / *Lyn verbind middelpunte*

(3)

1.1.4 (a)

$40 < x \leq 50$

✓ Endpoint / *Eindpunt*
✓ Notation / *Notasie*

(2)

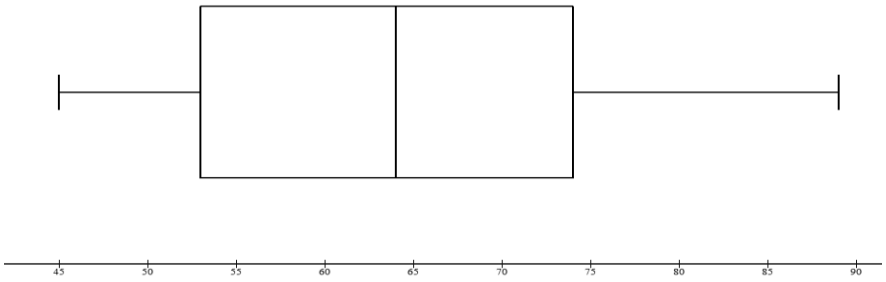
1.1.4 (b)

2,4

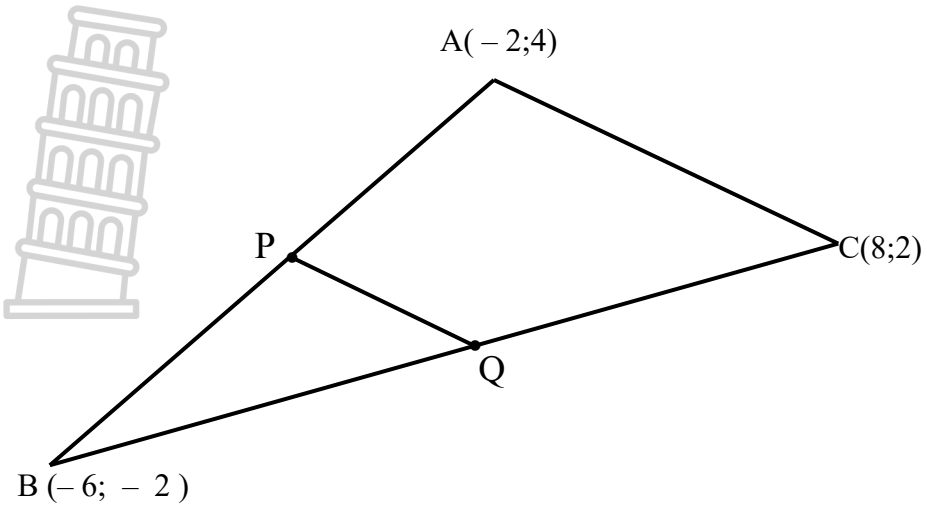
$50 < x \leq 60$

✓ 22,4
✓ Interval / *Interval*

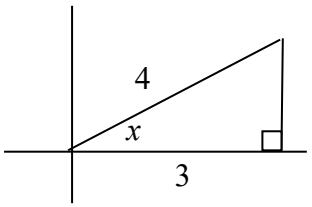
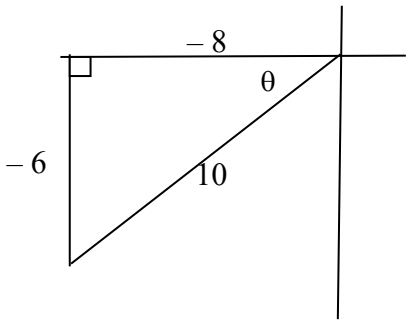
(2)

1.2	<table><tr><td>45</td><td>49</td><td>50</td><td>51</td><td>51</td><td>53</td><td>54</td><td>57</td><td>57</td><td>59</td><td>60</td><td>64</td></tr><tr><td>65</td><td>66</td><td>70</td><td>71</td><td>73</td><td>74</td><td>75</td><td>76</td><td>83</td><td>89</td><td>89</td><td></td></tr></table>		
1.2.1	Median = 64	✓answer / *antwoord*	(1)
1.2.2	IQR = Q_3 – Q_1 = 74 – 53 = 21	✓ Q_3 ✓ Q_1 ✓ answer / *antwoord*	(3)
1.2.3		✓ Min./*Min.* Max./*Maks.* ✓ Q_1 Q_3 ✓ Q_2	(3)
1.2.4	Skewed to the left / *Skeef na links*	✓✓ answer / *antwoord*	(2)
			[20]

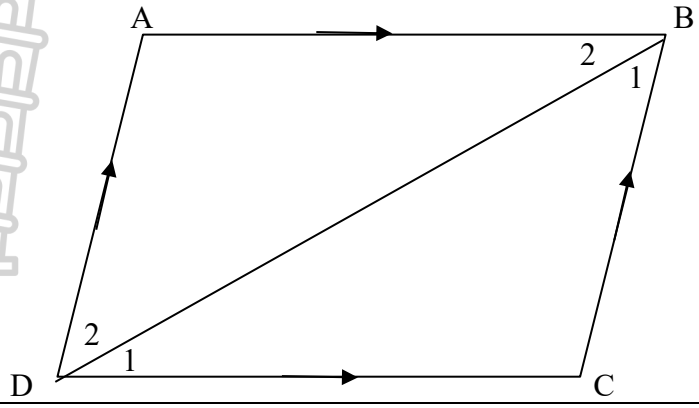
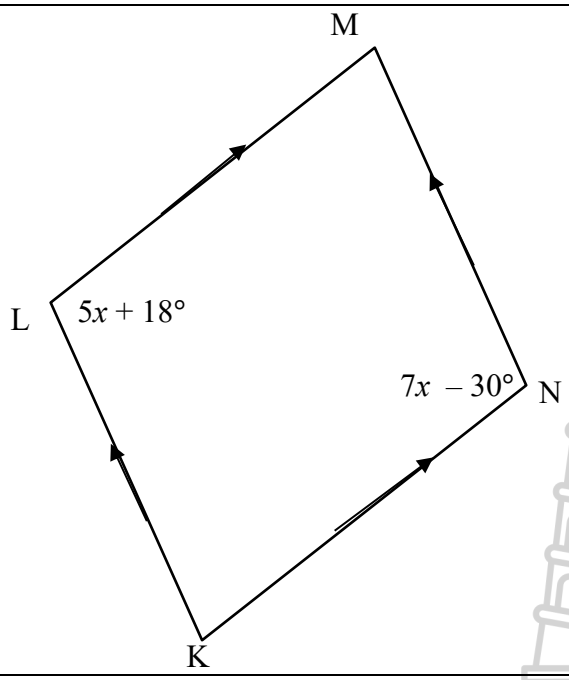
QUESTION 2/*VRAAG 2*

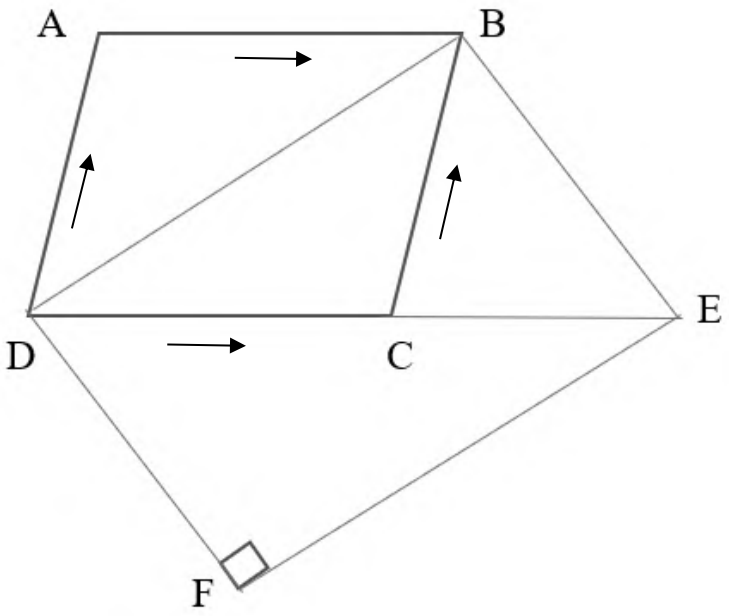


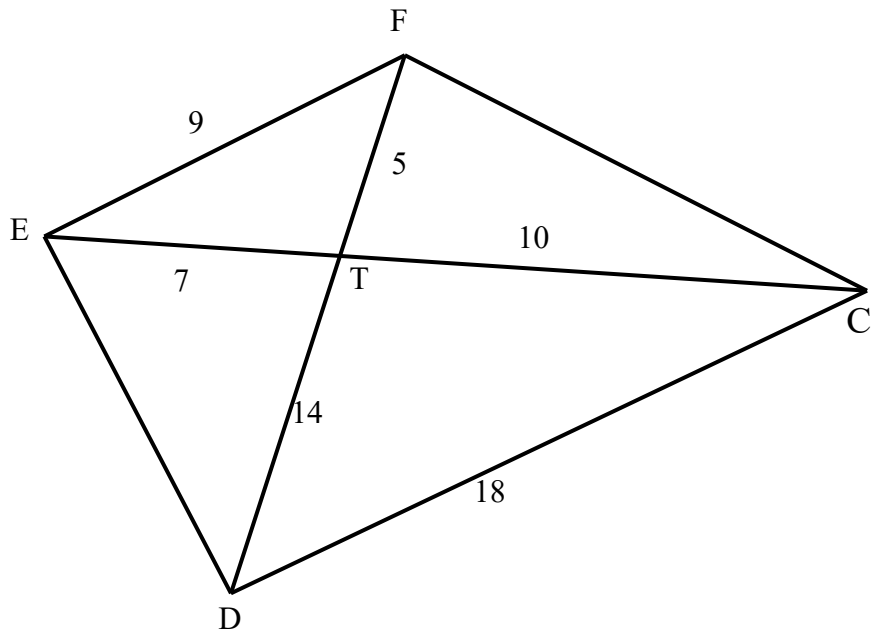
2.1	$P_{midpoint/middelpunt} = \left(\frac{-6+(-2)}{2};\frac{4+(-2)}{2}\right)$ $Q_{midpoint/middelpunt} = \left(\frac{-6+8}{2};\frac{-2+2}{2}\right)$ $P = (-4;1)$ $Q = (1;0)$	✓form / *vorm* ✓ P ✓form / *vorm* ✓Q	(4)
2.2.1	Gradient of/Gradiënt van PQ $= m_{PQ} = \frac{0-1}{1-(-4)} = -\frac{1}{5}$ Gradient of/Gradiënt van AC $= m_{AC} = \frac{2-4}{8-(-2)} = -\frac{1}{5}$	✓ form/ *vorm* ✓m_{PQ} ✓ form/ *vorm* ✓m_{AC}	(4)
2.2.2	Distance of/*Afstand van* PQ $= d_{PQ} = \sqrt{(1-(-4))^2+(0-1)^2}$ $= \sqrt{26}$ $= 5{,}1$ Distance of/*Afstand van* AC $= d_{AC} = \sqrt{(8-(-2))^2+(2-4)^2}$ $= \sqrt{104}$ $= 10{,}2$ $\therefore$ PQ $= \frac{1}{2}$AC	✓ form/ *vorm* ✓d_{PQ} ✓ form/ *vorm* ✓d_{AC}	(4)
2.3	Distance of/*Afstand van* AB $d_{AB} = \sqrt{(-2-(-6))^2+(4-(-2))^2}$ $= \sqrt{52}$ Distance of/*Afstand van* BC $d_{BC} = \sqrt{(8-(-6))^2+(2-(-2))^2}$ $= \sqrt{212}$ $\therefore$ perimeter $= \sqrt{52} + \sqrt{212} + \sqrt{104}$ $= 31{,}97$	✓ d_{AB} ✓d_{BC} ✓add / *optel* ✓answer / *antwoord*	(4)
			[16]

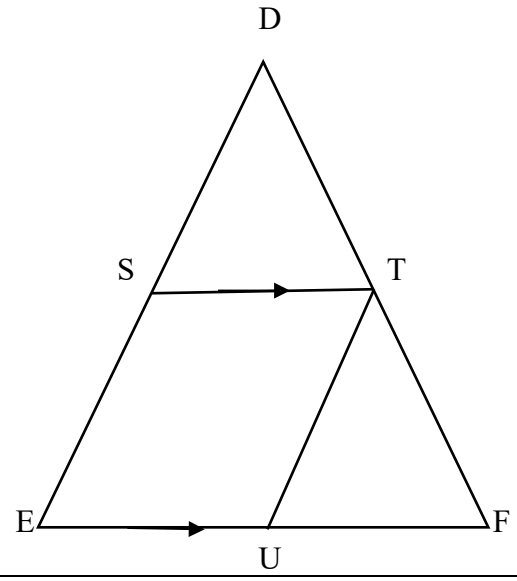
QUESTION 3 / *VRAAG 3*			
3.1.1	$\sin(x+y)$ $= \sin(229{,}5° + 117{,}6°) = -0{,}22$	✓substitution / *vervanging* ✓answer / *antwoord*	(2)
3.1.2	$\cos 2y$ $= \cos(2\times 117{,}6°) = -0{,}57$	✓substitution / *vervanging* ✓answer / *antwoord*	(2)
3.1.3	$\text{cosec } x$ $= \frac{1}{\sin 229{,}5^0} = -1{,}32$	✓✓answer/ *antwoord*	(2)
3.2.1	$\cos 2x = 0{,}5$ $2x = 60°$ $x = 30°$	✓ 60° ✓ 30°	(2)
3.2.2	$7\sec x - 11 = 0$ $\sec x = \frac{11}{7}$ $\cos x = \frac{7}{11}$ $x = 50{,}5°$	✓sec x ✓cos x ✓answer/*antwoord*	(3)
3.3	$\text{opp}^2 = 4^2 - 3^2$ $\text{opp} = \sqrt{7}$ $\therefore \tan x = \frac{\sqrt{7}}{3}$ 	✓opp/*teenoorg.* ✓diagram/ *diagram* ✓answer/*antwoord*	(3)
3.4	$\text{hyp}^2 = 6^2 + 8^2$ $\text{hyp} = 10$ $\sec\theta - \text{cosec}\,\theta$ $= \frac{10}{-8} - \frac{10}{-6}$ $= \frac{5}{12}$ 	✓hyp/*skuinssy* ✓quadr/*kwadr* ✓ – 8 and/*en* – 6 ✓substitution/ *vervanging* ✓answer/*antwoord*	(5)

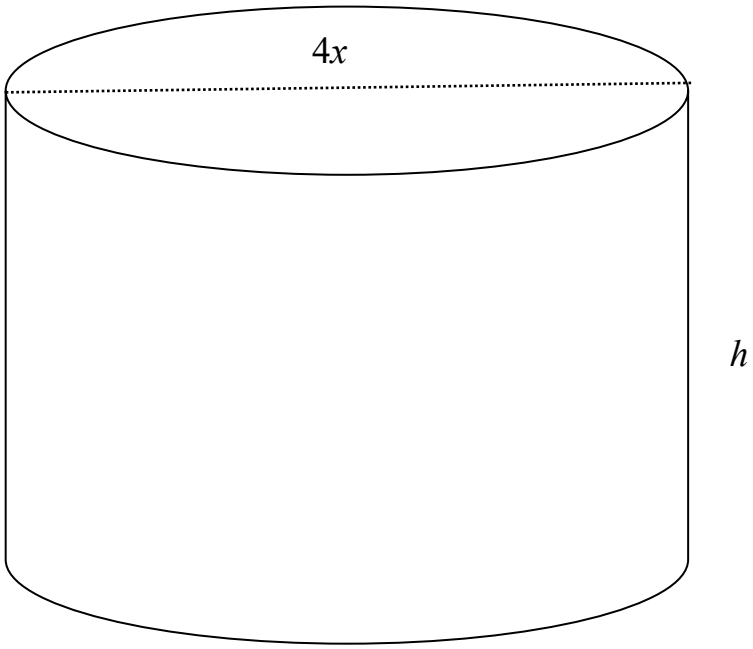
3.5	$\sin 30^0 = \frac{x}{1250}$ $x = 625$ A 1250 x 30° B C	✓correct ratio/ *korrekte verhoud.* ✓answer/*antwoord*	(2)
			[21]
QUESTION 4 / *VRAAG 4*			
4.1.	y f g x –45° 0 45° 90° 135° 180° 225° 270° 315° 360° 3 2 1 –1 –2 –3	✓ (0;0) ✓ shape/*vorm* ✓ period/*periode* ✓ amplitude	(4)
4.2	Amplitude of/*van* $f = \infty$	✓answer / *antwoord*	(1)
4.3	Period of/*Periode van* g is 180°	✓answer / *antwoord*	(1)
4.4.1	$90° < x < 180°$ and/*en* $270° < x < 360°$	✓ 1st int/*1ste int* ✓ 2nd int/2de int	(2)
4.4.2	$90° < x < 180°$	✓endpt. / *eindpt.* ✓notation / *notasie*	(2)
4.5	Range of / *Waardeversameling van* $k(x)$ if / *as* $k(x) = g(x) - 1$ $-2 \leq y \leq -1$	✓endpt. / *eindpt.* ✓notation / *notasie*	(2)
			[12]

QUESTION 5/*VRAAG 5*			
5.1			
	BD is common / *gemeen* $\hat{B}_1 = \hat{D}_2$ (alt / *verwisselende* ∠, AB // CD) $\hat{B}_2 = \hat{D}_1$ (alt / *verwisselende* ∠, BC // AD) ∴ ΔABD ≡ ΔCDB (∠, ∠, S) ∴ AB = CD and / *en* AD = BC (≡ Δ's / *e*)	✓ common / *gemeen* ✓SR ✓SR ✓∠, ∠, S	(4)
5.2			
5.2.1	$5x + 18° = 7x - 30°$ (opposite ∠'s of a parallelogram / *teenoorste ∠e van 'n parallelogram*) $-2x = -30° - 18°$ $-2x = -48°$ $x = 24°$	✓ SR ✓ $-2x$ ✓ $-48°$ ✓ Ans. /*Antw.* = 24°	(4)

5.2.2	$5(24°) + 18° + 4y = 180°$ (Co-int ∠'s / *Ko-binne ∠'e* LM || KN) $4y = 180° - 138°$ $y = 10{,}5°$	✓ SR ✓ $4y = 42°$ ✓ Answer / *Antw.* $= 10{,}5°$	(3)
5.3			
	$B\hat{C}D = 124°$ (opp angles of parallelogram are equal / *teenoorste ∠e van 'n parallelogram*) $B\hat{C}E = 56°$ (angles on str line / *∠e op 'n reguit lyn*) $B\hat{C}E = \hat{E}$ (base ∠'s of isosceles triangle / *teenoorste ∠e van 'n parallelogram*) $x = 180° - (56° + 56°)$ (angles of a triangle) $= 68°$ $D\hat{E}F = 56°$ $\therefore y = 34°$ (angles of a triangle)	✓SR ✓ S ✓ S ✓ $x = 68°$ ✓ $D\hat{E}F$ $= 56°$ ✓ $y = 34°$	(6)

5.4			
5.4.1	In Δ FTE and / *en* Δ CTD: $\frac{FT}{TC} = \frac{ET}{TD} = \frac{EF}{CD} = \frac{1}{2}$ $\therefore$ Δ EFT ||| Δ DCT (sides are in proportion / *sye is eweredig*)	✓ratio / *verhouding* ✓ratio / *verhouding* ✓ R	(3)
5.4.2	$F\hat{E}C = T\hat{D}C$ (|||) But / *Maar* $D\hat{F}C = T\hat{D}C$ (given / *gegee*) $\therefore F\hat{E}C = T\hat{D}C = T\hat{F}C$	✓ R ✓ given /*gegee* ✓ conclusion / *gevolgtrekking*	(3)
5.5.1	AE = EC and /*en* DE = $\frac{1}{2}$BC	✓ S	(1)

5.5.2			
	ST || EF (given / *gegee*) DT = TF (converse of midpoint theorem / *omgekeerde van middelpuntstelling*) ∴ TU || SE (converse of midpoint theorem / *omgekeerde van middelpuntstelling*) ∴ SEUT is a parallelogram / *'n parallelogram* (both pairs of opposite sides ||/beide pare teenoorstaande sye is ||)	✓✓SR ✓ R ✓ R	(4)
			[28]

QUESTION 6 / *VRAAG 6*			
			
	TSA of an open cylinder / *TBO van 'n oop silinder* $= \pi \times r^2 + 2 \times \pi \times r \times h$ $32\pi = \pi \times (2x)^2 + 2 \times \pi \times 2x \times h$ $h = \frac{32\pi - 4\pi x^2}{4\pi x}$ $h = \frac{8}{x} - x$	✓ formula / *formule* ✓ subst / *vervanging* ✓ Answer of h in terms of x / *Antwoord van h in terme van x*	(3)
			[3]
		TOTAL/*TOTAAL*:	**100**