Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 11

NOVEMBER 2020

TECHNICAL MATHEMATICS P2 (EXEMPLAR)

MARKS: **150**

TIME: **3 hours**

ITMATE2

This question paper consists of 12 pages.

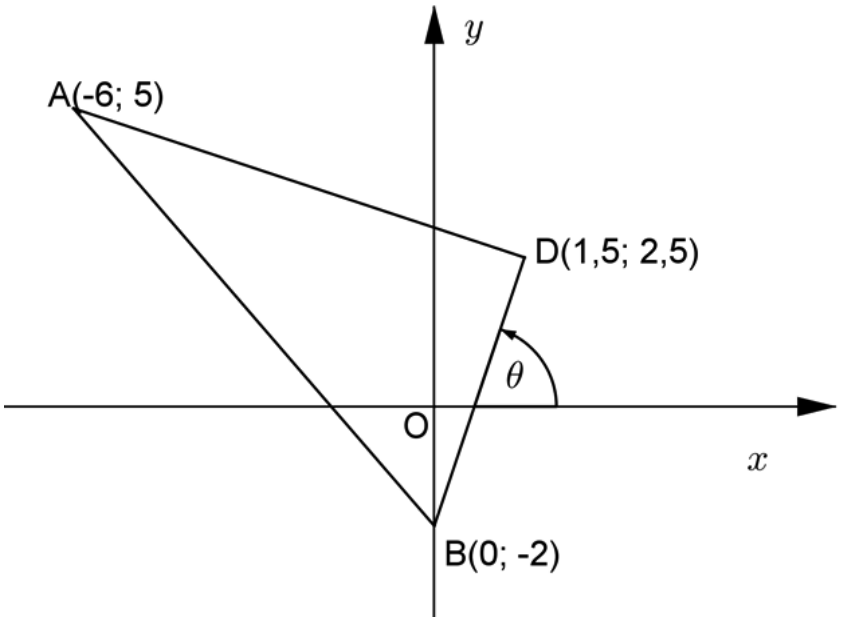
INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of EIGHT questions.
2. Answer ALL the questions in the SPECIAL ANSWER BOOK provided.
3. Clearly show ALL calculations, diagrams, graphs, et cetera which 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 your answers to TWO decimal places, unless stated otherwise.
7. Diagrams are NOT necessarily drawn to scale.
8. Write neatly and legibly.

QUESTION 1

In the diagram below, A(-6; 5), B(0,-2) and D(1,5; 2,5) are the vertices of ΔADB.
The equation of BD is given by $-3x+y=-2$.



Determine:

1.1 The length of AB (3)

1.2 The gradient of AD (3)

1.3 The equation of the line that goes through A parallel to BD in the form $y = \ldots$ (4)

1.4 Show that AD ⊥ BD (2)

1.5 The coordinates of the midpoint of AB (3)

1.6 The size of θ (rounded off to THREE decimal digits) (2)

1.7 If BC || AD, what type of quadrilateral is formed by ACBD? Provide a reason. (2)

1.8 The length of CD (1)

1.9 The coordinates of C (4)

1.10 The area of ACBD (4)

[28]

QUESTION 2

2.1 If $\hat{A} = 310°$ and $\hat{B} = 130,5°$, determine the following values, correct to ONE decimal digit:

2.1.1 $\tan 3B + \frac{1}{3}\cos\frac{A}{3}$ (2)

2.1.2 $-\sec\left(\frac{A}{4} - 2B\right)$ (2)

2.2 If $\cot\theta = -\frac{12}{5}$ and $\sin\theta > 0$, determine the value of $20\text{cosec}\theta - 12\sec\theta$, WITHOUT the use of a calculator. (5)

2.3 Simplify the following expression:

$$\frac{\sin(360° - x)\sec(180° + x)}{\tan(180° - x)\text{cosec}(360° + x)}$$ (8)

2.4 Prove that:

$$\frac{1}{1+\cot^2 x} + \frac{1}{1+\tan^2 x} = 1$$ (5)

2.5 Solve for x for $x \in [0°;360°]$, correct to ONE decimal digit:

$$-\frac{2}{3}\sin x + 0,524 = 0$$ (4)

[26]

QUESTION 3

Given: $f(x)=\cos(x-45°)$ and $g(x)=-2\sin 2x$

3.1 Draw neat sketch graphs of the functions, *f* and *g*, on the same system of axes, for $x\in[0°;360°]$ using the grid provided in the SPECIAL ANSWER BOOK.

Clearly show ALL critical points. (6)

3.2 Write down the range of *g*. (2)

3.3 Write down the period of *g*. (1)

3.4 Use your graphs to answer the following:

For which values(s) of *x* is:

3.4.1 $f(x)-g(x)=1$ (1)

3.4.2 $g(x)-f(x)=-3$ (1)

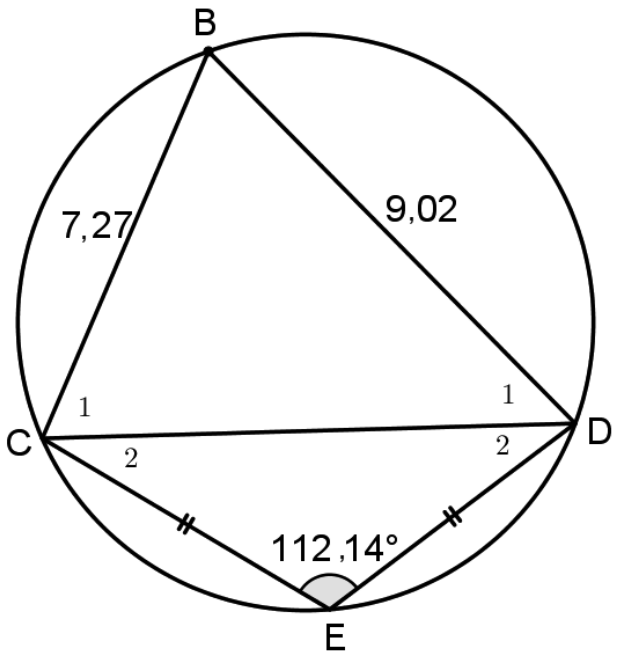
3.4.3 $f(x)\leq 0$ (2)

3.4.4 $f(x)g(x)\geq 0$ for $x\in[0°;180°]$ (2)

[15]

QUESTION 4

In the diagram below, BCED is a cyclic quadrilateral with $\hat{E} = 112,14°$, BC = 7,27 units, BD = 9,02 units and CE = ED.



Calculate to TWO decimal places:

4.1 The area of ΔBCD (4)

4.2 The length of CD (4)

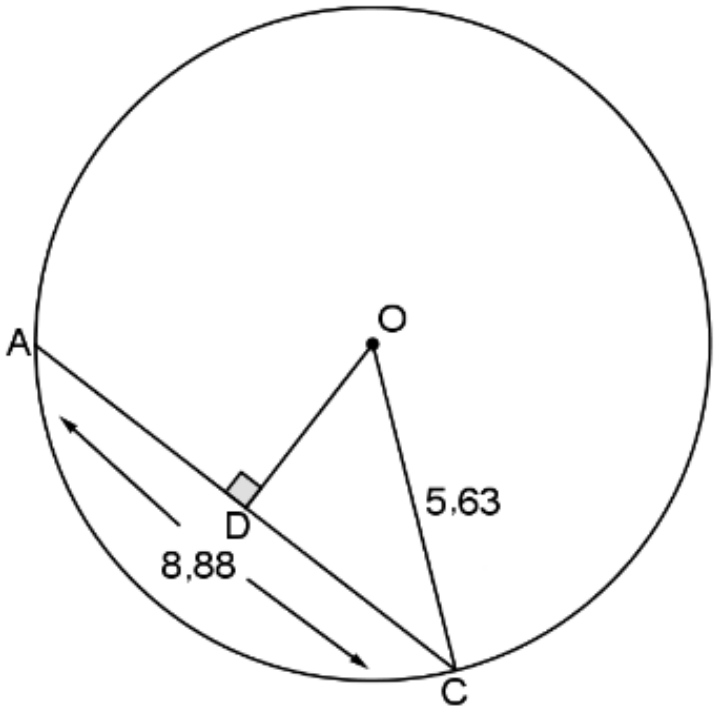
4.3 The length of CE (4)
[12]

QUESTION 5

5.1 Complete the following statement:

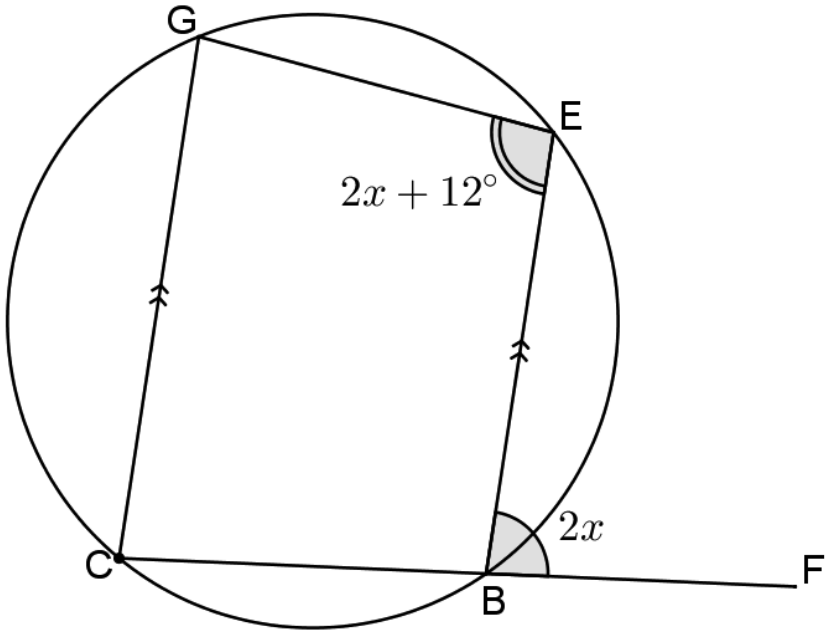
The ... of a chord passes through the centre of a circle. (1)

5.2 In the diagram below, O is the centre of the circle with OC = 5,63 units, AC = 8,88 units and OD ⊥ AC.



Determine the length of OD, with reasons. (5)

5.3 In the diagram below, BCGE is a cyclic quadrilateral with CG ∥ BE, $E\hat{B}F = 2x$ and $\hat{E} = 2x + 12°$.



Determine the size of $\hat{E}$, with reasons. (7)

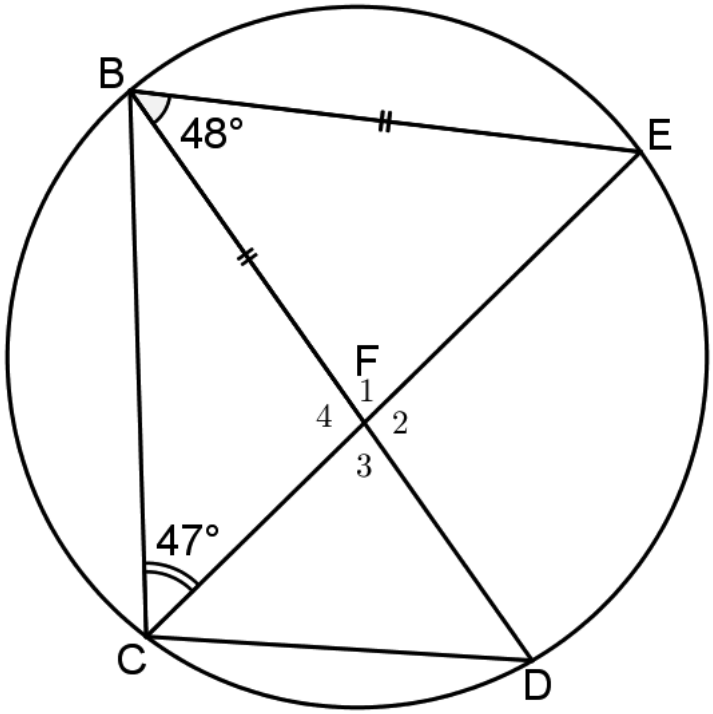
[13]

QUESTION 6

6.1 Complete the following statement:

Angles subtended by a chord of the circle, on the same side of the chord, ... (1)

6.2 In the diagram below $E\hat{B}F = 48°$, $F\hat{C}B = 47°$ and BF = BE.

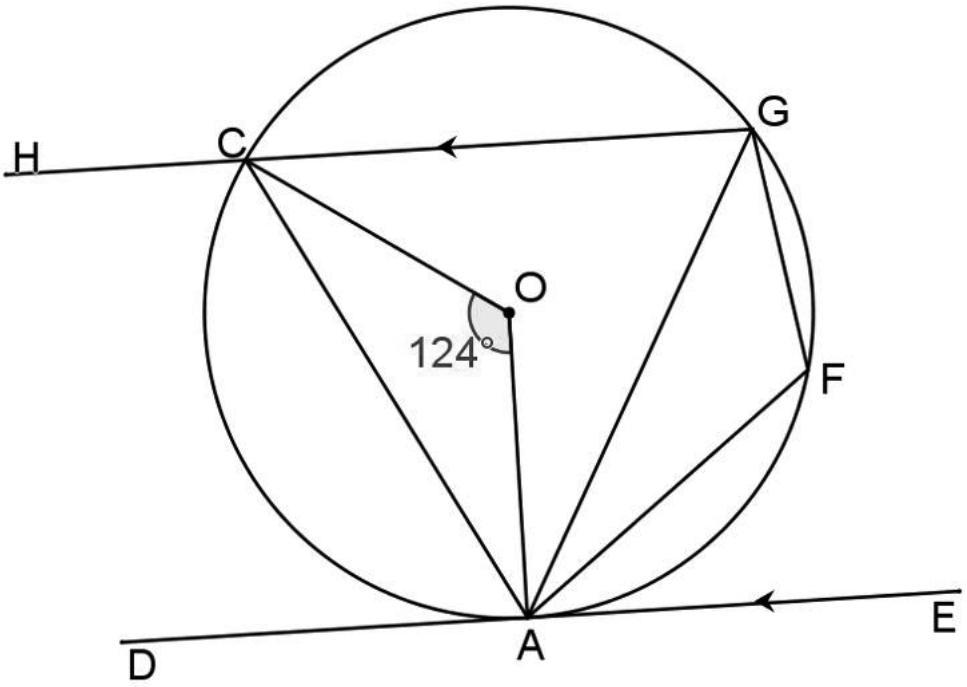


6.2.1 Determine, with reasons, the size of $F\hat{D}C$. (4)

6.2.2 Hence, prove with reasons, that CF = CD. (2)

6.2.3 Determine, stating reasons, whether CE is a diameter of the circle. (2)

6.3 In the diagram below, DAE is a tangent to the circle with centre O. CAFG is a cyclic quadrilateral with CG ∥ DAE, GC is extended to H and $C\hat{O}A = 124°$.



Determine, with reasons, the size of the following:

6.3.1 $C\hat{G}A$ (2)

6.3.2 $D\hat{A}C$ (2)

6.3.3 $A\hat{C}O$ (2)

6.3.4 $\hat{F}$ (3)

6.3.5 $G\hat{A}O$ (4)

[22]

QUESTION 7

Area $= 2lh + 2bh + 2bl$	Volume $= lbh$
Area $= 2\pi r^2 + 2\pi rh$	Volume $= \pi r^2 h$
Area $= \pi r^2 + \pi rl$	Volume $= \frac{1}{3}\pi r^2 h$
$= \pi r^2 + \pi r\sqrt{h^2 + r^2}$	
Area $= 4\pi r^2$	Volume $= \frac{4}{3}\pi r^3$
	Volume $= \frac{1}{3}Bh$

7.1 If the surface area of a cylinder is 56π m^2 and the circular base has a diameter of 8 meters, determine the height of the cylinder. (4)

7.2 A tin can is 11 cm tall and has a diameter of 7,5 cm.

How many square millimetres of paper, to the nearest whole number, will it take to make a label for the can? (Hint: wrapping excludes the top and bottom) (4)

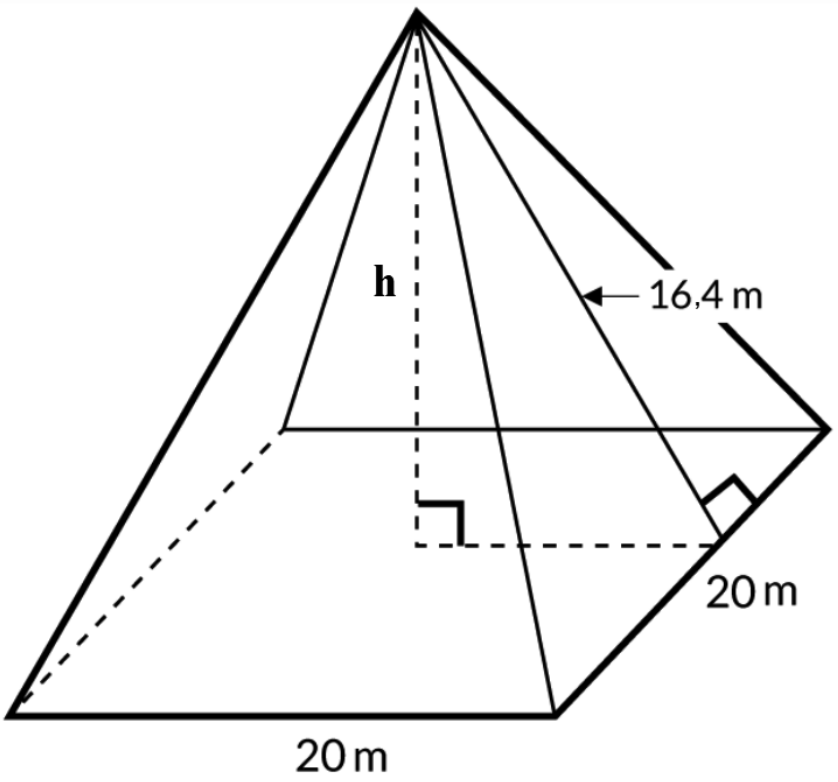
7.3 The radius of a cone is 5 cm. The height is 8 cm.

7.3.1 Determine the volume of the cone. (3)

7.3.2 Suppose the radius of the cone is doubled and the height remains the same. What is the volume of the new cone? (1)

7.3.3 What is the ratio of the volume of the new cone to the volume of the original cone? (2)

7.4 The figure below is a diagram of a pyramid with a square base, with sides 20 m and the slant height of 16,4 m.



7.4.1 Determine the height, h, of the pyramid, to the nearest metre. (3)

7.4.2 Hence, determine the volume of the pyramid. (3)

7.5 A cube with sides 60 mm, made from lead, is melted. Out of this melted lead a sphere is casted.

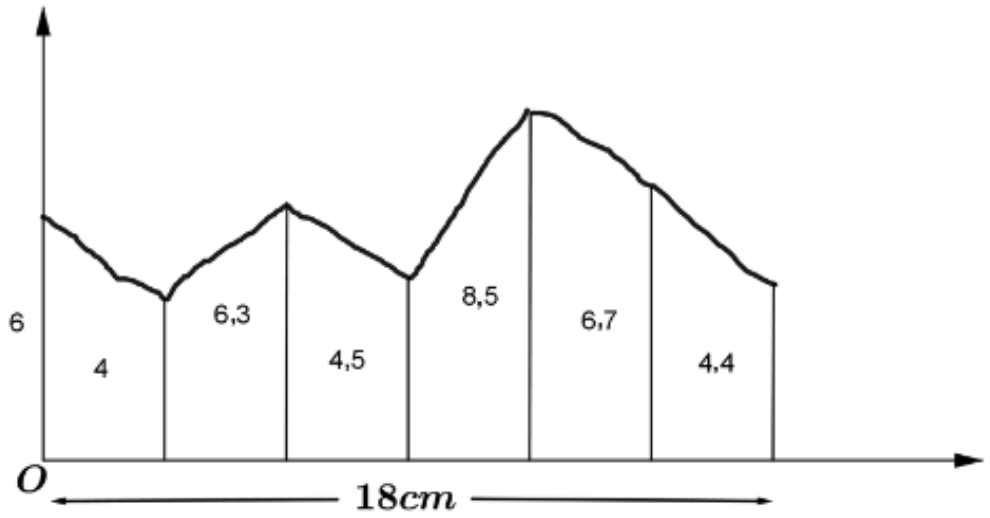
Calculate:

7.5.1 The volume of the sphere (2)

7.5.2 The radius of the sphere (5)
[27]

QUESTION 8

The diagram below describes an irregular figure. All measurements are in cm.



Determine the area of the irregular figure by using the mid-ordinate rule. Give your answer in mm^2. (7)

[7]

TOTAL: 150

Province of the
EASTERN CAPE
EDUCATION

LEARNER'S NAME/ ***NAAM VAN LEERDER:***	

GRADE/*GRAAD* 11	

NATIONAL SENIOR CERTIFICATE/ *NASIONALE SENIOR SERTIFIKAAT*

GRADE/*GRAAD* 11

NOVEMBER 2020

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

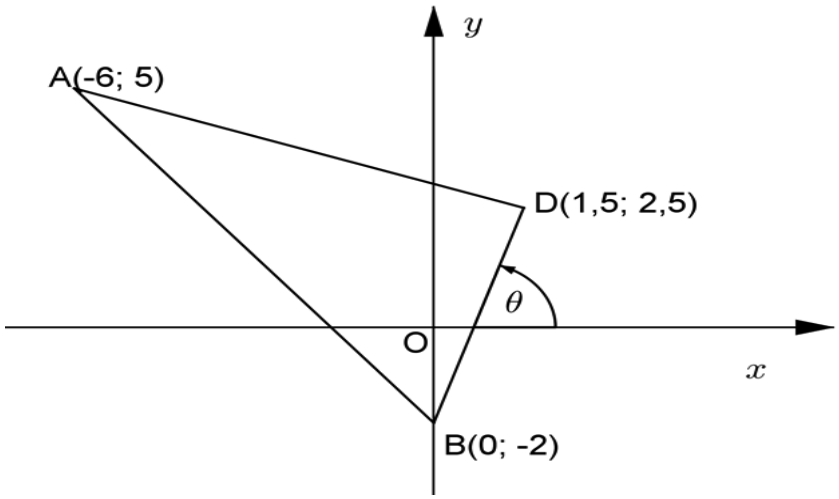
QUESTION/*VRAAG*	MARKS/*PUNTE*			HOD/*HVD* (Level 1 mod./*Vlak 1 mod.*)			DISTRICT/*DISTRIK* (Level 2 mod./*Vlak 2 mod.*)			PROVINCIAL/*PROVINSIAAL* (Level 3 mod./*Vlak 3 mod.*)		
1												
2												
3												
4												
5												
6												
7												
8												
TOTAL/*TOTAAL*												

ITMATHE4

This special answer book consists of 23 pages./
Hierdie spesiale antwoordeboek bestaan uit 23 bladsye.

FOLLOW THESE INSTRUCTIONS CAREFULLY	VOLG HIERDIE INSTRUKSIES NOUKEURIG
1. Answer ALL questions in the spaces provided.	1. Beantwoord ALLE vrae in die ruimtes wat voorsien is.
2. No pages may be torn from this answer book.	2. Geen bladsye mag uit hierdie antwoordeboek geskeur word nie.
3. Answers must be written in black/blue ink as distinctly as possible. Do not write in the margins.	3. Skryf die antwoorde so duidelik moontlik met swart/blou ink. Moenie in die kantlyn skryf nie.
4. Indicate the questions you have answered by drawing a circle around the relevant numbers on the front cover of the answer book where marks are to be recorded.	4. Dui die vrae wat jy beantwoord het aan op die voorblad van die antwoordeboek waar die punte aangebring is, deur 'n kringetjie te trek om die nommers van die vrae wat jy beantwoord het.
5. Draw a line through any work/rough work that must not be marked.	5. Trek 'n netjiese lyn deur enige werk/rofwerk wat nie nagesien moet word nie.
6. In the event that you use the additional space provided:	6. Ingeval jy die bykomende ruimte wat voorsien word, gebruik:
6.1 Write down the number of the question	6.1 Skryf die nommer van die vraag neer.
6.2 Leave a line and rule off after your answer.	6.2 Laat 'n lyn oop en trek 'n lyn na jou antwoord.

QUESTION/*VRAAG* 1



	Solution/*Oplossing*	**Marks** ***Punte***
1.1		(3)
1.2		(3)
1.3		(4)

	Solution/*Oplossing*	**Marks** ***Punte***
1.4		(2)
1.5		(3)
1.6		(2)
1.7		(2)
1.8		(1)

	Solution/*Oplossing*	**Marks** ***Punte***
1.9		(4)
1.10		(4)
		[28]

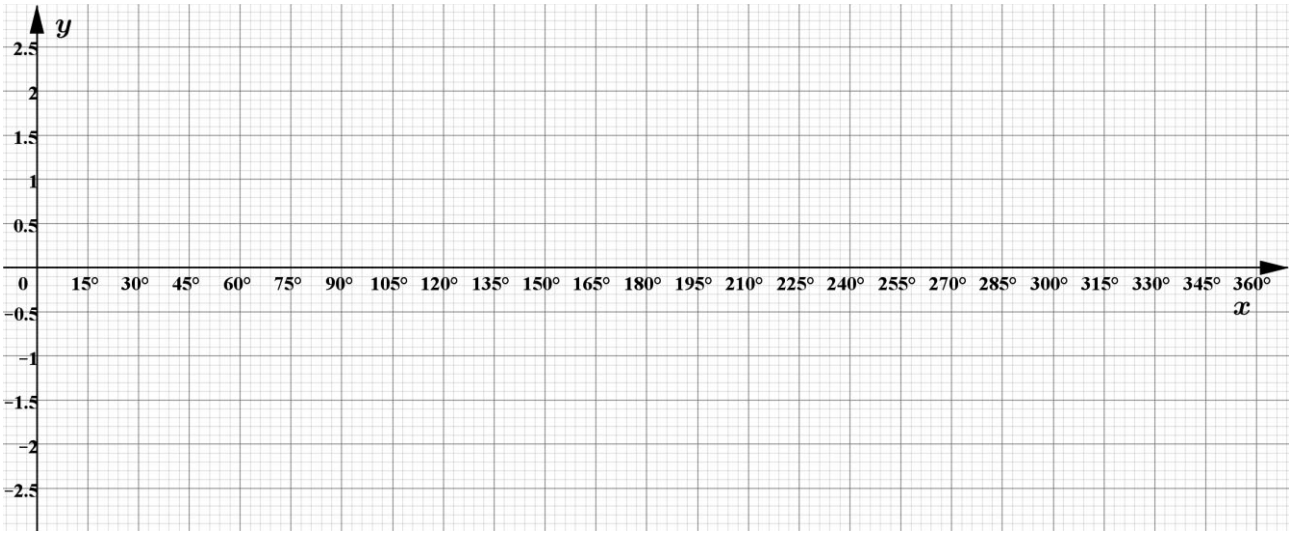
QUESTION/*VRAAG* 2

	Solution/*Oplossing*	**Marks** ***Punte***
2.1.1	$\tan 3B + \frac{1}{3}\cos\frac{A}{3}$	(2)
2.1.2	$-\sec\left(\frac{A}{4} - 2B\right)$	(2)
2.2		(5)

2.3	$\dfrac{\sin(360°-x)\sec(180°+x)}{\tan(180°-x)\operatorname{cosec}(360°+x)}$	(8)
2.4		(5)
2.5	$-\dfrac{2}{3}\sin x+0,524=0$	(4)
		[26]

QUESTION/*VRAAG* 3

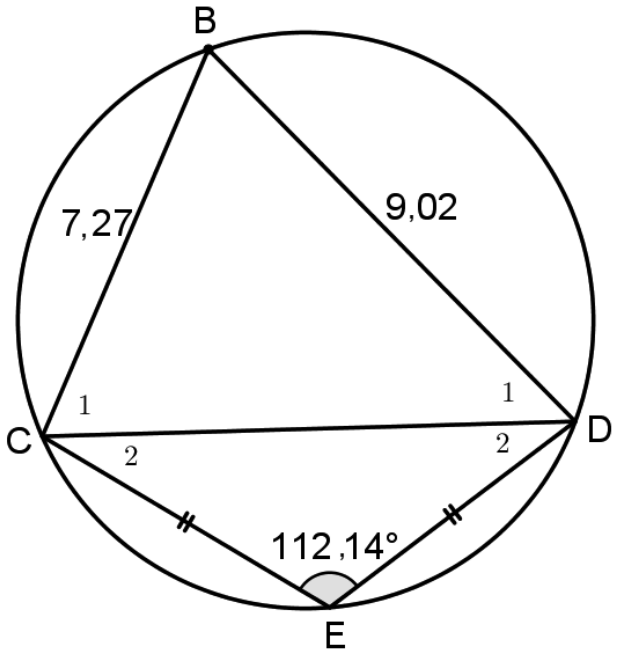
3.1



(6)

	Solution/*Oplossing*	**Marks** ***Punte***
3.2		(2)
3.3		(1)
3.4.1		(1)
3.4.2		(1)
3.4.3		(2)
3.4.4		(2)
		[15]

QUESTION/*VRAAG* 4

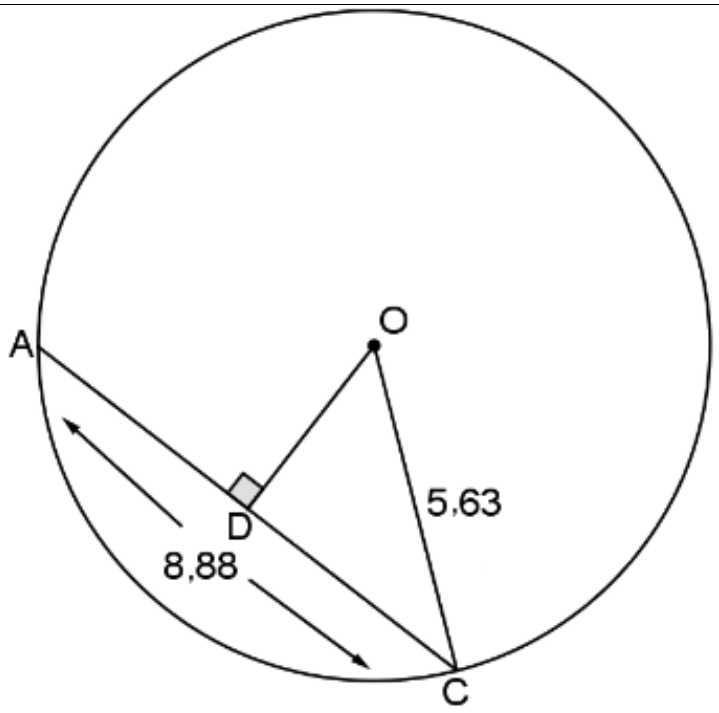


	Solution/*Oplossing*	**Marks** ***Punte***
4.1		(4)
4.2		(4)

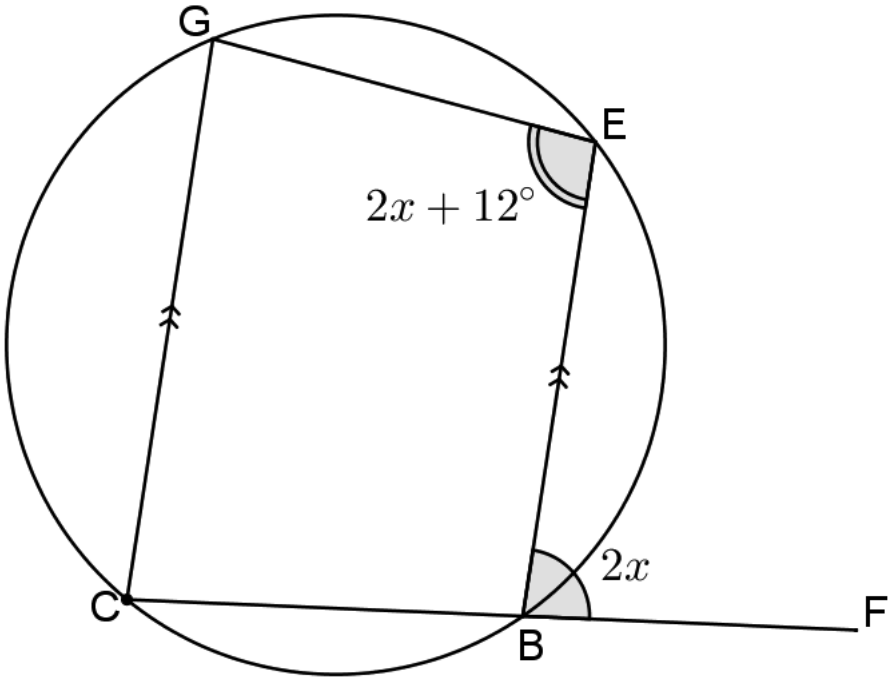
	Solution/*Oplossing*	**Marks** ***Punte***
4.3		
		(4)
		[12]

QUESTION/*VRAAG* 5

	Solution/*Oplossing*	**Marks** ***Punte***
5.1		(1)



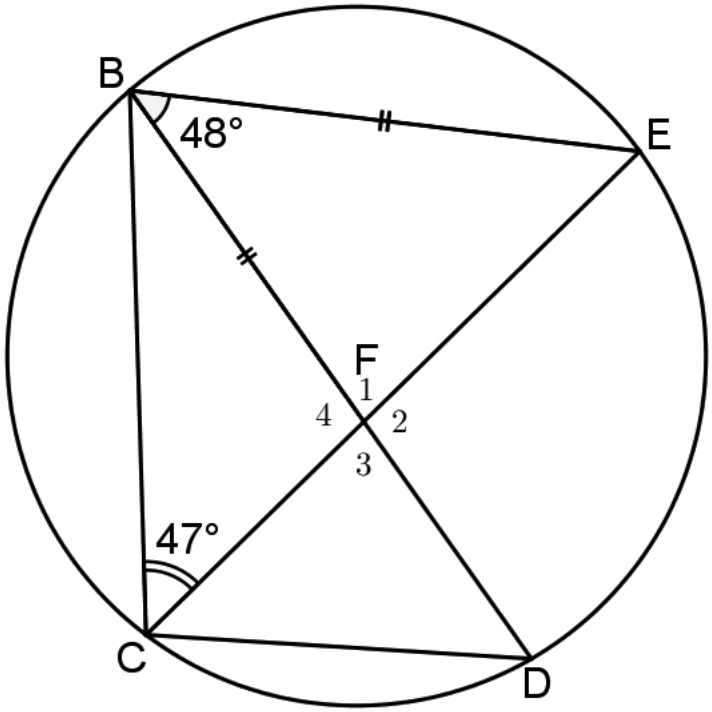
	Solution/*Oplossing*	**Marks** ***Punte***
5.2		(5)



	Solution/*Oplossing*	**Marks** ***Punte***
5.3		
		(7)
		[13]

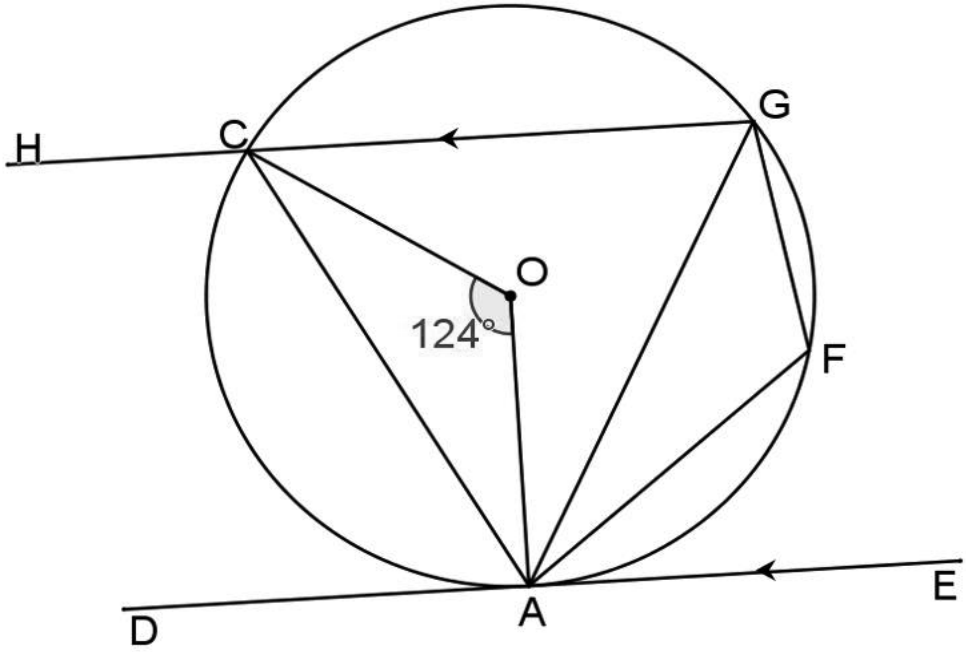
QUESTION/*VRAAG* 6

	Solution/*Oplossing*	**Marks** ***Punte***
6.1		(1)



	Solution/*Oplossing*	**Marks** ***Punte***
6.2.1		(4)
6.2.2		(2)

	Solution/*Oplossing*	**Marks** ***Punte***
6.2.3		(2)



	Solution/*Oplossing*	**Marks** ***Punte***
6.3.1		(2)
6.3.2		(2)
6.3.3		(2)

6.3.4		
		(3)
6.3.5		
		(4)
		[22]

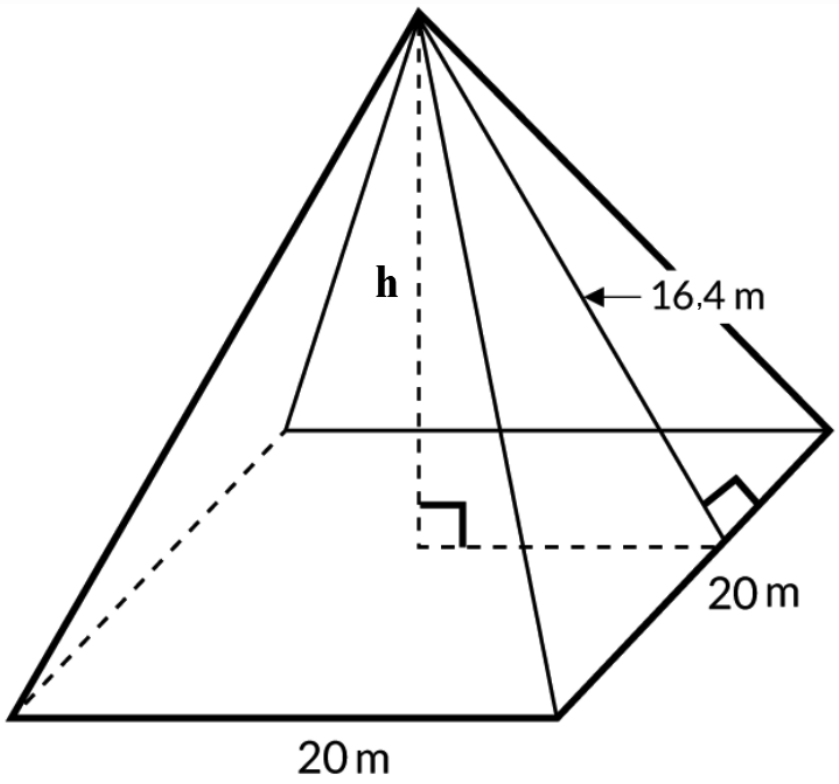
QUESTION/*VRAAG* 7

Area $= 2lh + 2bh + 2bl$	Volume $= lbh$
Area $= 2\pi r^2 + 2\pi rh$	Volume $= \pi r^2 h$
Area $= \pi r^2 + \pi rl$	Volume $= \frac{1}{3}\pi r^2 h$
$= \pi r^2 + \pi r\sqrt{h^2 + r^2}$	
Area $= 4\pi r^2$	Volume $= \frac{4}{3}\pi r^3$
	Volume $= \frac{1}{3}Bh$

	Solution/*Oplossing*	**Marks *Punte***
7.1		(4)
7.2		(4)

7.3.1		(3)
7.3.2		(1)
7.3.3		(2)

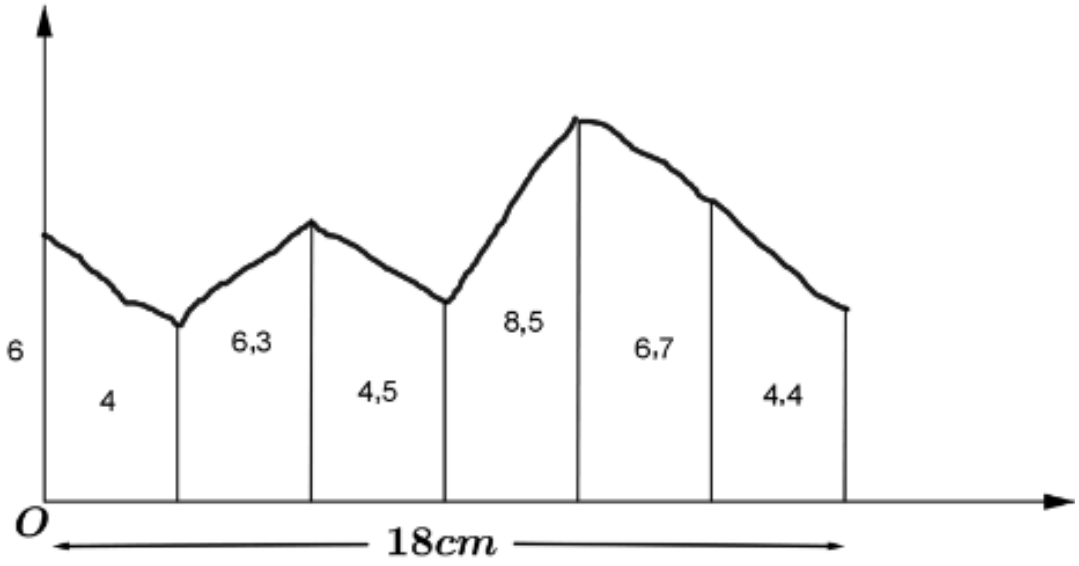
7.4



	Solution/*Oplossing*	**Marks** ***Punte***
7.4.1		(3)
7.4.2		(3)

7.5.1		(2)
7.5.2		(5)
		[27]

QUESTION/*VRAAG* 8



	Solution/*Oplossing*	**Marks** ***Punte***
		(7)
		[7]

	Additional Space/*Addisionele Ruimte*	**Marks** ***Punte***

	Additional Space/*Addisionele Ruimte*	**Marks** ***Punte***

	Additional Space/*Addisionele Ruimte*	**Marks** ***Punte***
	TOTAL/*TOTAAL:*	**150**

Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE/*NASIONALE SENIOR SERTIFIKAAT*

GRADE/*GRAAD* 11

NOVEMBER 2020

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

MARKS/*PUNTE*: 150

This marking guideline consists of 17 pages./
Hierdie nasienriglyn bestaan uit 17 bladsye.

NOTE:

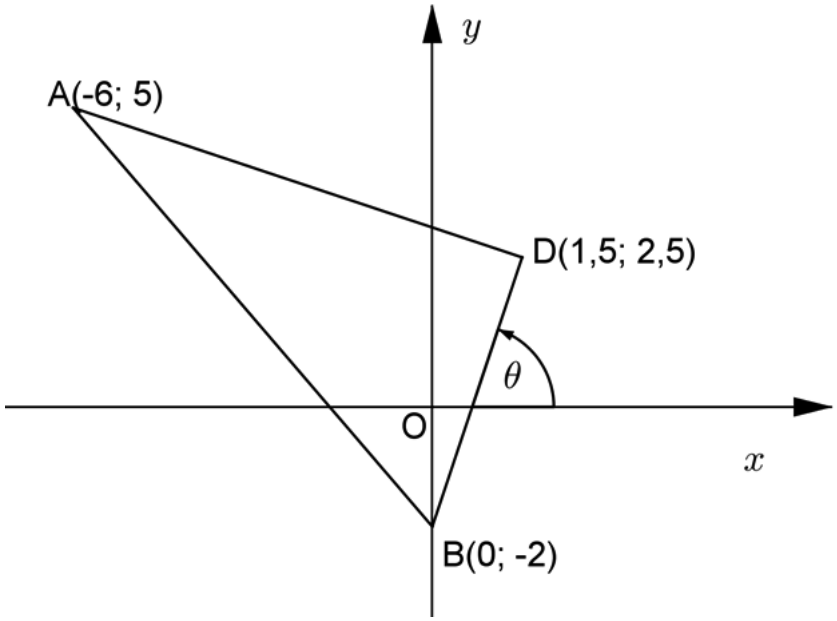
- Continuous accuracy (CA) applies only where indicated in this marking guideline.
- Assuming values/answers in order to solve a problem is unacceptable.

LET WEL:

- *Volgehoue akkuraatheid (CA) is slegs van toepassing soos aangedui in hierdie nasienriglyn.*
- *Aanvaarding van waardes/antwoorde om 'n probleem op te los, is onaanvaarbaar.*

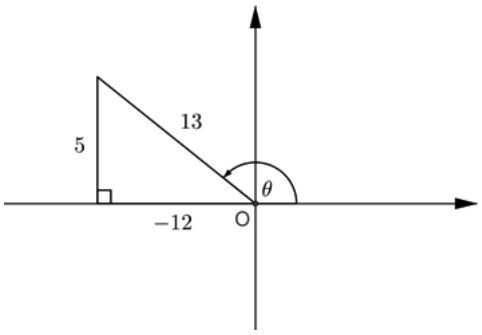
MARKING CODES / *NASIENKODES*	
M	**Method / *Metode***
A	**Accuracy / *Akkuraatheid***
AO	**Answer only / *Slegs antwoord***
CA	**Consistent accuracy / *Deurlopende akkuraatheid***
F	**Formula / *Formule***
I	**Identity / *Identiteit***
R	**Rounding / *Afronding***
S	**Simplification / *Vereenvoudiging***
ST	**Statement / *Bewering***
RE	**Reason / *Rede***
ST RE	**Statement and correct reason / *Bewering en korrekte rede***
SF	**Substitution correctly in correct formula / *Korrekte vervanging in die korrekte formule***
NPU	**No penalty for omitting units / *Geen penalisering vir eenhede uitgelaat***

QUESTION/*VRAAG* 1



1.1	$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $= \sqrt{(-6-0)^2 + (5+2)^2} = \sqrt{(0+6)^2 + (-2-5)^2}$ $= \sqrt{85}$ or 9,22	✓**F** ✓**SF** **A** ✓**CA**	(3)
1.2	$m_{AD} = \frac{y_2 - y_1}{x_2 - x_1}$ $= \frac{5-2,5}{-6-1,5} = \frac{2,5-5}{1,5+6}$ $= -\frac{1}{3}$	✓**F** ✓**SF** **A** ✓ gradient / *gradiënt* **CA**	(3)
1.3	BD: $y = 3x - 2$ $\therefore \quad m_{AC} = m_{BD} = 3$ (parallel lines / *ewewydige lyne*) AC: $y - y_1 = m(x - x_1)$ $\therefore \quad y - 5 = 3(x + 6)$ $\therefore \quad y - 5 = 3x + 18$ $\therefore \quad y = 3x + 23$	✓**M** BD standard form / *standaardvorm* ✓**M** gradient / *gradiënt* ✓**M** substitute point A / *vervang punt A* ✓**CA** equation / *vergelyking*	(4)
1.4	$m_{BD} = 3$ (from/*vanaf* 1.3) $m_{AD} \times m_{BD} = -\frac{1}{3} \times 3$ $= -1$ $\therefore AD \perp BD$ (product of gradients = -1 / *produk van gradiënte* = -1)	✓**M** ✓**R**	(2)

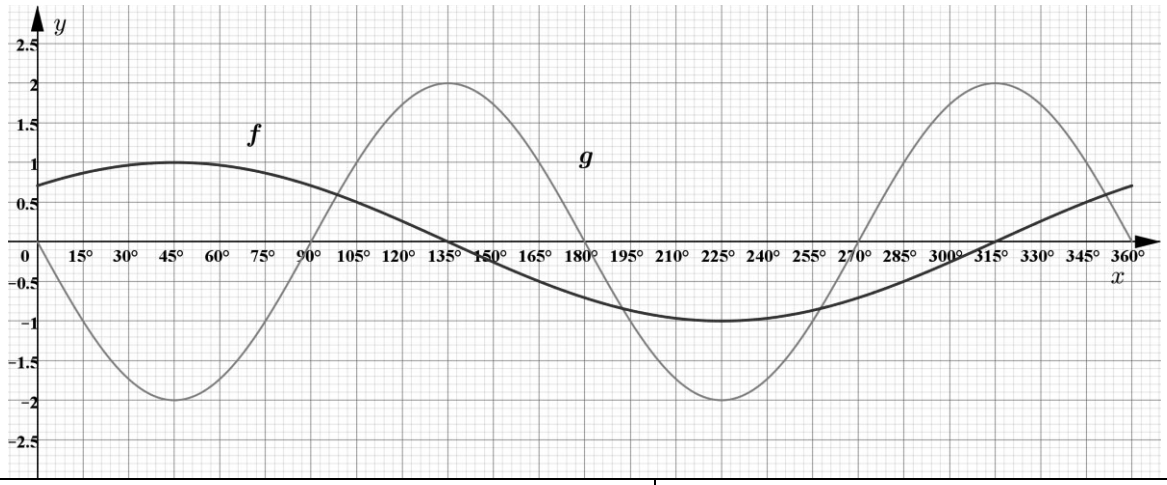
1.5	$M_{AB} = \left(\frac{x_1 + x_2}{2}; \frac{y_1 + y_2}{2}\right)$ $= \left(\frac{-6+0}{2}; \frac{5-2}{2}\right)$ $= \left(-3; \frac{3}{2}\right)$	✓**F** ✓**SF A** ✓ **CA**	(3)
1.6	$\tan\theta = m_{BD}$ $= 3$ $\theta = \tan^{-1}(3)$ $= 71{,}565°$	✓**M** ✓**CA** value of θ in degree / *waarde van* θ *in grade*	(2)
1.7	ACBD is a rectangle (all angles = 90°) *ABCD is 'n reghoek (alle hoeke = 90°)*	✓**A** rectangle / *reghoek* ✓**R** angles/*hoeke* = 90°	(2)
1.8	$CD = \sqrt{85}$ or/*of* 9,22 (diagonals of rectangle = / *hoeklyne van reghoek =*)	✓**CA** from / vanaf 1.1	(1)
1.9	$\frac{x_C + x_D}{2} = x_{\text{midpt AB}}$ and $\frac{y_C + y_D}{2} = y_{\text{midpt AB}}$ $\frac{x_C + 1{,}5}{2} = -3$ and $\frac{y_C + 2{,}5}{2} = 1{,}5$ $x_C + 1{,}5 = -6$ and $y_C + 2{,}5 = 3$ $\therefore x_C = -7{,}5$ and $y_C = 0{,}5$	✓**M** ✓**S CA** ✓**CA** x_C ✓**CA** y_C	(4)
1.10	AD $= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $= \sqrt{(-6-1{,}5)^2 + (5-2{,}5)^2}$ $= 2{,}5\sqrt{10}$ BD $= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $= \sqrt{(0-1{,}5)^2 + (-2-2{,}5)^2}$ $= 1{,}5\sqrt{10}$ Area = AD × BD *Oppervlakte* $= 2{,}5\sqrt{10} \times 1{,}5\sqrt{10}$ $= 37{,}5$ sq units / *vk eenhede*	✓**CA** length/*lengte* AD ✓**CA** length/*lengte* BD ✓**M** ✓**CA** area	(4)
			[28]

QUESTION/*VRAAG* 2			
2.1.1	$\tan 3B + \frac{1}{3}\cos\frac{A}{3}$ $= \tan 3(130,5°) + \frac{1}{3}\cos\frac{310°}{3}$ $= 0,6128 + (-0,07687...)$ $\approx 0,5$	✓**SF A** ✓**CA** **AO: Full marks / *volpunte***	(2)
2.1.2	$-\sec\left(\frac{A}{4} - 2B\right)$ $= -\sec\left(\frac{310°}{4} - 2\times 130,5°\right)$ $= -\frac{1}{\cos(-183,5°)}$ ≈ 1	✓**M** $\frac{1}{\cos()}$ ✓**CA** **AO: Full marks / *volpunte***	(2)
2.2	 $r = \sqrt{(-12)^2 + 5^2}$ $= \sqrt{144 + 25}$ $= \sqrt{169}$ $= 13$ $20\text{cosec}\theta - 12\sec\theta$ $= 20\times\frac{13}{5} - 12\times\frac{13}{-12}$ $= 52 + 13$ $= 65$	✓**A** correct quadrant / *korrekte kwadrant* ✓**CA** Hypotenuse / *skuinssy* ✓**CA** $\text{cosec}\theta = \frac{13}{5}$ ✓**CA** $\sec\theta = \frac{13}{-12}$ ✓**CA**	(5)

2.3	$\dfrac{\sin(360°-x)\sec(180°+x)}{\tan(180°-x)\operatorname{cosec}(360°+x)}$ $=\dfrac{(-\sin x)(-\sec x)}{(-\tan x)(\operatorname{cosec} x)}$ $=\dfrac{(\sin x)(\sin x)}{(\tan x)(-\cos x)}$ $=\dfrac{(\sin x)(-\tan x)}{\tan x}$ $=-\sin x$	✓**A** $-\sin x$ ✓**A** $-\sec x$ ✓**A** $-\tan x$ ✓**A** $\operatorname{cosec} x$ ✓**A** $\sec x=\dfrac{1}{\cos x}$ ✓**A** $\operatorname{cosec} x=\dfrac{1}{\sin x}$ ✓**A** $\tan x=\dfrac{\sin x}{\cos x}$ ✓**CA**	(8)
2.4	LHS/LK $=\dfrac{1}{1+\cot^2 x}+\dfrac{1}{1+\tan^2 x}$ $=\dfrac{1}{\operatorname{cosec}^2 x}+\dfrac{1}{\sec^2 x}$ $=\sin^2 x+\cos^2 x$ $=1$ = RHS / RK	✓**A** $\operatorname{cosec}^2 x=1+\cot^2 x$ ✓**A** $\sec^2 x=1+\tan^2 x$ ✓**A** $\sin x=\dfrac{1}{\operatorname{cosec} x}$ ✓**A** $\cos x=\dfrac{1}{\sec x}$ ✓**A** $\sin^2 x+\cos^2 x=1$	(5)
2.5	$-\dfrac{2}{3}\sin x+0,524=0$ $-\dfrac{2}{3}\sin x=-0,524$ $\sin x=0,786$ Reference / Verwysings $\angle=51,8°$ $x=51,8°$ or/of $180°-51,8°$ $x=51,8°$ or/of $128,2°$	✓**S** ✓**CA** Ref / *Verw* $\angle$ ✓**CA** $x=51,8°$ ✓**CA** $x=128,2°$	(4)
			[26]

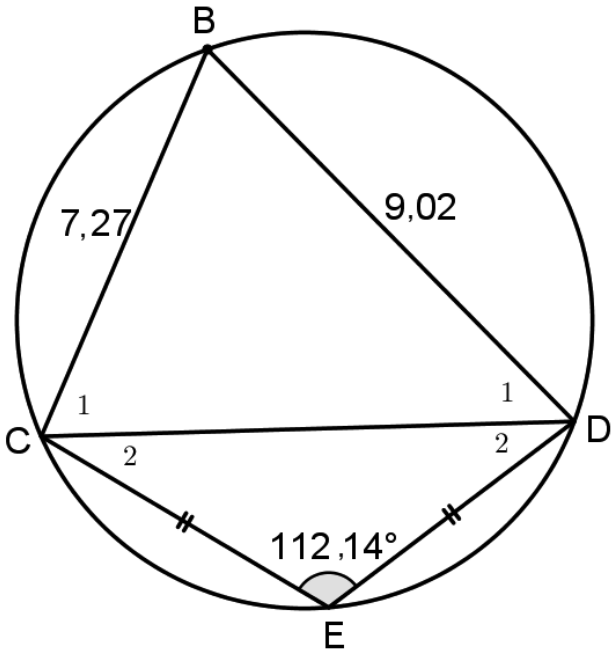
QUESTION/*VRAAG* 3

3.1



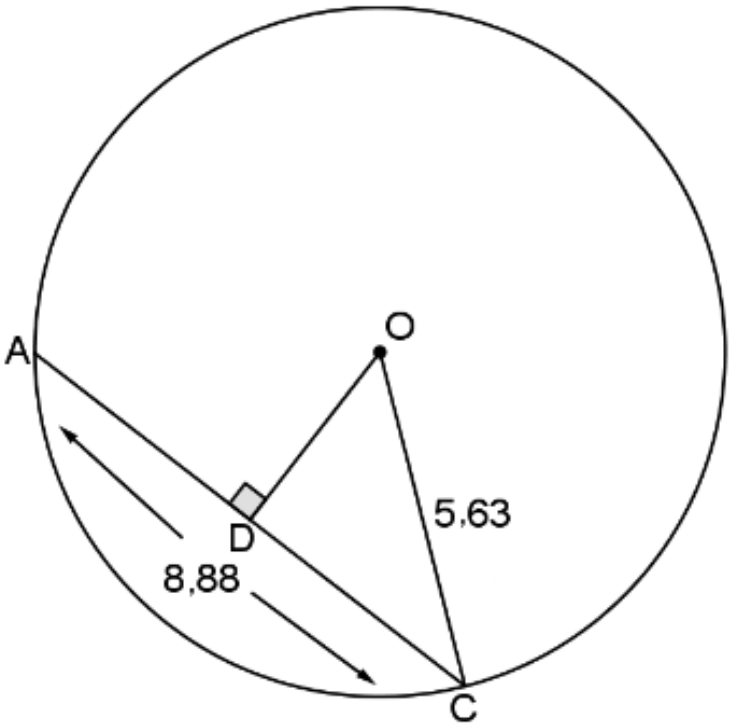
	***f*:** ✓**A** endpoints / *eindpunte* ✓**A** *x*-intercepts at / *x-afsnitte by* 135° & 315° ✓**A** TP / DP (45°; 1) & (225°; -1)	**g:** ✓**A** endpoints / *eindpunte* ✓**A** *x*-intercepts at / *x-afsnitte by* 0°, 90°, 180°, 270° & 360° ✓**A** TP / DP (45°; -2), (135°; 2), (225°; -2) & (315°; 2)	(6)
3.2	$y \in [-2;2]$	✓**A** notation / *notasie* ✓**A** end values / *eindwaardes*	(2)
3.3	Period = 180°	✓**A**	(1)
3.4.1	$x = 225°$	✓**A**	(1)
3.4.2	$x = 45°$	✓**A**	(1)
3.4.3	$135° \leq x \leq 315°$	✓**A** notation / *notasie* ✓**A** end values / *eindwaardes*	(2)
3.4.4	$90° \leq x \leq 135°$	✓**A** notation / *notasie* ✓**A** end values / *eindwaardes*	(2)
			[15]

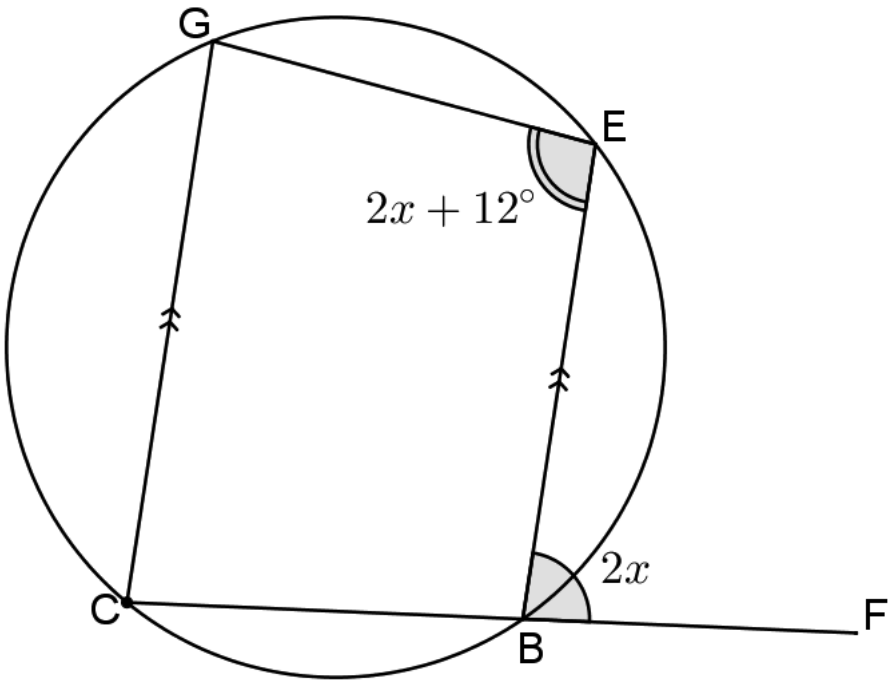
QUESTION/*VRAAG* 4



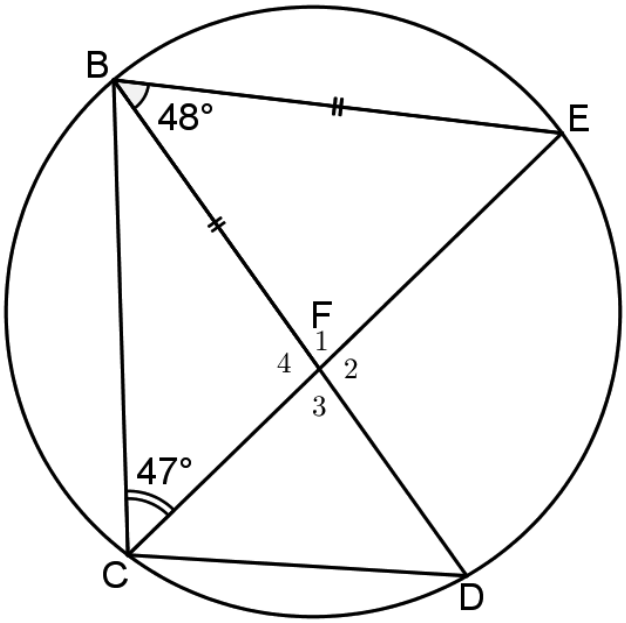
4.1	$\hat{B} = 67,86°$ $\left(\begin{matrix}\text{opp } \angle\text{s of cyclic quad} \\ \textit{teenoorst } \angle\textit{e v kdvk}\end{matrix}\right)$ Area of/*van* $\Delta BCD = \frac{1}{2} BC \times BD \sin B$ $= \frac{1}{2} \times 7,27 \times 9,02 \sin 67,86°$ $= 30,37$ sq units / *vk eenhede*	✓**ST** ✓**F** ✓**SF CA** ✓**CA**	(4)
4.2	$CD^2 = BC^2 + BD^2 - 2BC \times BD \cos B$ $= 7,27^2 + 9,02^2 - 2 \times 7,27 \times 9,02 \cos 67,86°$ $= 84,786...$ $CD \approx 9,21$ units / *eenhede*	✓**F** ✓**SF CA** ✓**ST** ✓**CA**	(4)

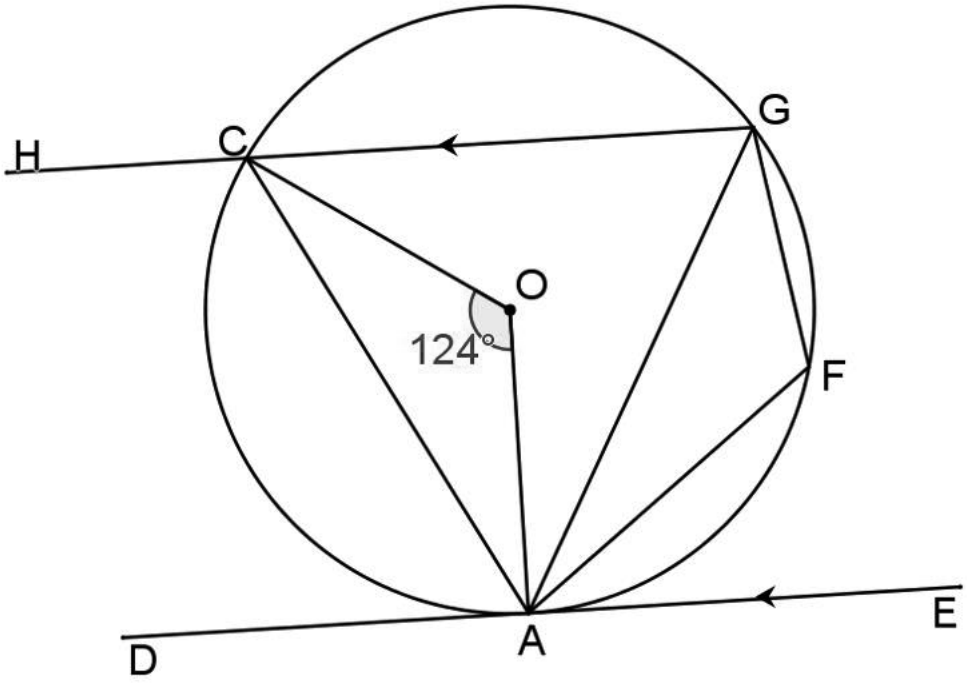
4.3	$\hat{C}_2 = \hat{D}_2 \quad \begin{pmatrix} \angle s \text{ opp} = \text{sides} \\ \angle e \text{ teenoor } = sye \end{pmatrix}$ $= \frac{180° - 112,14°}{2} \quad \begin{pmatrix} \text{Int } \angle \text{s of } \Delta \\ \text{Binne } \angle e \text{ van } \Delta \end{pmatrix}$ $= 33,93°$ $\frac{CE}{\sin D_2} = \frac{CD}{\sin E}$ $\frac{CE}{\sin 33,93°} = \frac{9,21}{\sin 112,14°}$ $CE = \frac{9,21 \sin 33,93°}{\sin 112,14°}$ $= 5,55 \text{ units / } eenhede$	✓**ST** ✓**F** ✓**SF CA** ✓**CA**	(4)
			[12]

QUESTION/*VRAAG* 5			
5.1	Perpendicular bisector / *middelloodlyn*	✓**A**	(1)
			
5.2	$DC = 4,44$ $\begin{pmatrix}\text{line from centre } \perp \text{ to chord}\\ \textit{loodlyn uit midpt e na koord}\end{pmatrix}$ $OD^2 = OC^2 - DC^2$ (Pyth) $=5,63^2 - 4,44^2$ $=11,9833$ $OD \approx 3,46$ units / *eenhede*	✓**ST** ✓**RE** ✓**ST** ✓**SF CA** ✓**CA**	(5)



5.3	$\hat{C} = 2x$ $\begin{pmatrix}\text{corrsp } \angle\text{s; GC P BE}\\ \text{ooreenk } \angle\text{e;GC P BE}\end{pmatrix}$ $2x + 12° + 2x = 180°$ $\begin{pmatrix}\text{opp } \angle\text{s of cyclic quad}\\ \textit{teenoor } \angle\textit{e van kdvk}\end{pmatrix}$ $4x = 168°$ $x = 42°$ $\hat{E} = 2(42°) + 12°$ $= 96°$ **OR/OF** $\hat{G} = 2x$ $\begin{pmatrix}\text{Ext } \angle \text{ of cyclic quad}\\ \textit{Buite } \angle \textit{ van kdvh}\end{pmatrix}$ $2x + 12° + 2x = 180°$ $\begin{pmatrix}\text{co-int } \angle\text{; CG P BE)}\\ \text{Ko-binne } \angle\text{e;CG P BE}\end{pmatrix}$ $4x = 168°$ $x = 42°$ $\hat{E} = 2(42°) + 12°$ $= 96°$	✓**ST RE** ✓**ST** ✓**RE** ✓**ST** ✓**CA** ✓**ST** ✓**CA** size / *grootte* $\hat{E}$ **OR/ OF** ✓**ST** ✓**RE** ✓**ST RE** ✓**ST** ✓**CA** ✓**ST** ✓**CA** size / *grootte* $\hat{E}$	(7)
			[13]

QUESTION/*VRAAG* 6			
6.1	Are equal / *is gelyk aan mekaar*	✓**A**	(1)
6.2			
6.2.1	$\hat{F}_1 = \hat{E}$ $\begin{pmatrix}\angle s \text{ opp = sides}\\ \angle e \text{ teenoor } = \text{ sye}\end{pmatrix}$ $= \frac{180° - 48°}{2}$ $\begin{pmatrix}\text{Int } \angle\text{s of } \Delta\\ \text{Binne } \angle e \text{ van } \Delta\end{pmatrix}$ $= 66°$ $\hat{D} = \hat{E}$ $\begin{pmatrix}\angle s \text{ in same seg}\\ \angle e \text{ in dies segm}\end{pmatrix}$ $= 66°$	✓**ST RE** ✓**ST** ✓**ST** ✓ **RE**	(4)
6.2.2	$\hat{F}_3 = \hat{F}_1$ $\begin{pmatrix}\text{vert opp } \angle\text{s}\\ \text{regoorst } \angle e\end{pmatrix}$ $= 66°$ $CD = CF$ $\begin{pmatrix}\text{side opp} = \angle\text{s}\\ \text{sye teenoor } = \angle e\end{pmatrix}$	✓**ST RE** ✓ **RE**	(2)

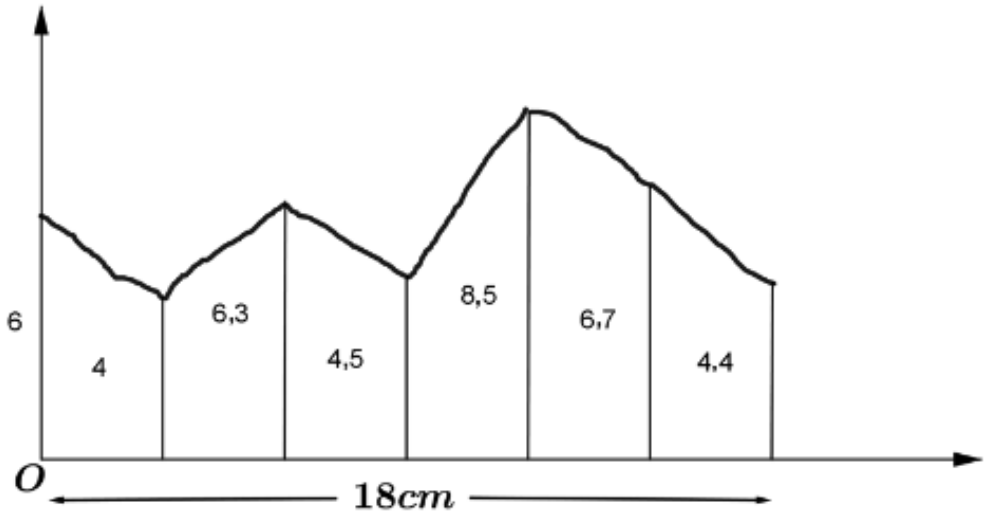
6.2.3	$C\hat{B}F = 19°$ $\begin{pmatrix}\text{Ext } \angle \text{ of } \Delta \\ \textit{Buite } \angle \textit{ van } \Delta\end{pmatrix}$ $C\hat{B}E = 19° + 48° = 67°$ $\therefore$ CE is not a diameter $\begin{pmatrix}\text{does not subtends } \angle \text{ of } 90° \\ \textit{onderspan nie } \angle \textit{ van } 90°\end{pmatrix}$ **OR/*OF*** $C\hat{B}E = 67°$ $\begin{pmatrix}\text{Int } \angle s \text{ of } \Delta \\ \textit{Binne } \angle e \textit{ van } \Delta\end{pmatrix}$ $\therefore$ CE is not a diameter $\begin{pmatrix}\text{does not subtends } \angle \text{ of } 90° \\ \textit{onderspan nie } \angle \textit{ van } 90°\end{pmatrix}$	✓**ST RE** ✓ **RE** **OR/*OF*** ✓**ST RE** ✓ **RE**	(2)
6.3			
6.3.1	$C\hat{G}A = 62°$ $\begin{pmatrix}\angle \text{ at centre} = 2 \times \angle \text{ at circ} \\ \textit{midpts } \angle \ = \ 2 \ \times \ \textit{omtreks} \angle\end{pmatrix}$	✓**ST** ✓ **RE**	(2)
6.3.2	$D\hat{A}C = 62°$ $\begin{pmatrix}\text{tan-chord} \\ \textit{raaklyn} - \textit{koord}\end{pmatrix}$	✓**ST** ✓ **RE**	(2)
6.3.3	$A\hat{C}O = 28°$ $\begin{pmatrix}\angle s \text{ opp} = \text{sides:radii} \\ \angle e \textit{ teenoor } = \textit{ sye} : \textit{ radii}\end{pmatrix}$	✓**ST** ✓ **RE**	(2)

6.3.4	$G\hat{C}A = 62°$ $\begin{pmatrix}\text{alt } \angle s; CG \text{ P } DAE \\ verw\ \angle e; CG \text{ P } DAE\end{pmatrix}$ $\hat{F} = 118°$ $\begin{pmatrix}\text{opp } \angle s \text{ of cyclic quad} \\ teenoor\ \angle e\ van\ kdvk\end{pmatrix}$	✓**ST RE** ✓**ST** ✓ **RE**	(3)
6.3.5	$G\hat{A}E = 62°$ $\begin{pmatrix}\text{tan-chord} \\ raaklyn - koord\end{pmatrix}$ $G\hat{A}O = 28°$ $(\text{Rad} \perp \text{tan})$ **OR/*OF*** $G\hat{A}E = C\hat{G}A = 62°$ $\begin{pmatrix}\text{alt } \angle s; \text{ CG P DAE} \\ verw\ \angle e;\ CG \text{ P } DAE\end{pmatrix}$ $G\hat{A}O = 28°$ $(\text{Rad} \perp \text{tan})$	✓**ST** ✓ **RE** ✓**ST** ✓ **RE** **OR/ *OF*** ✓**ST** ✓ **RE** ✓**ST** ✓ **RE**	(4)
			[22]

QUESTION/*VRAAG* 7			
7.1	Surface Area of cylinder $= 2\pi r^2 + 2\pi rh$ $56\pi = 2\pi\left(\frac{8}{2}\right)^2 + 2\pi\left(\frac{8}{2}\right)h$ $56\pi = 32\pi + 8\pi h$ $24\pi = 8\pi h$ $h = 3$ m	✓**F A** ✓**SF A** ✓**S** ✓**CA**	(4)
7.2	Label $= 2\pi rh$ $= 2\pi\left(\frac{7,5}{2}\right)(11)$ $= 82,5\pi$ cm^2 $= 259,18$ cm$^2 \times \frac{100 \text{ mm}^2}{1\text{cm}^2}$ $= 25\,918$ mm^2	✓**M** ✓**SF A** ✓**S CA** ✓**CA** conversion / *herleiding*	(4)
7.3.1	$V_{\text{cone}} = \frac{1}{3}\pi r^2 h$ $V_{\text{kegel}} = \frac{1}{3}\pi(5)^2(8)$ $= \frac{200}{3}\pi$ cm^3 or/of $209,44$ cm^3	✓**F A** ✓**SF A** ✓**CA**	(3)
7.3.2	$V_{\text{cone}} = \frac{1}{3}\pi r^2 h$ $V_{\text{kegel}} = \frac{1}{3}\pi(10)^2(8)$ $= \frac{800}{3}\pi$ cm^3 or/of $837,76$ cm^3	✓**A**	(1)
7.3.3	$V_{\text{new cone}} : V_{\text{orginal cone}} = \frac{800}{3}\pi : \frac{200}{3}\pi$ $V_{\text{nuwe kegel}} : V_{\text{oorspronklike kegel}} = 4:1$	✓**M** ✓**CA**	(2)
7.4.1	$h^2 = 16,4^2 - \left(\frac{20}{2}\right)^2$ (Pythagroras) $= 168,96$ $h = 12,998...$ ≈ 13 m	✓**M** ✓**CA** ✓**CA**	(3)

7.4.2	$V = \frac{1}{3}Bh$ $= \frac{1}{3}(20 \times 20)(13)$ $= 1733,33 \text{ m}^3$	✓**F** ✓**SF A** ✓**CA**	(3)
7.5.1	Volume of/*van* sphere/*sfeer* = Volume of/*van* cube/*kubus* $= 60^3 = 216\,000 \text{ mm}^3$	✓**M** ✓**A**	(2)
7.5.2	$V_{\text{sphere/}sfeer} = \frac{4}{3}\pi r^3 = 216000$ $\pi r^3 = 162000$ $r^3 = 51566,20156$ $r = \sqrt[3]{51566,20156}$ $= 37,22 \text{ mm}$	✓**F A** ✓**M** equating / *gelykstelling* ✓**ST CA** ✓**ST CA** ✓**CA** answer / *antwoord*	(5)
			[27]

QUESTION/*VRAAG* 8



$$A_T = a\left(\frac{o_1 + o_n}{2} + o_2 + o_3 + o_4 + \ldots + o_{n-1}\right)$$
$$= 3\left(\frac{6 + 4,4}{2} + 4 + 6,3 + 4,5 + 8,5 + 6,7\right)$$
$$= 3 \text{ cm}(35,2 \text{ cm})$$
$$= 30 \text{ mm} \times 352 \text{ mm}$$
$$= 10\ 560 \text{ mm}^2$$

✓**F A**

✓**A** value of *a* / *waarde van a*

✓**SF CA**

✓**ST**
✓**CA** conversion / *herleiding*

✓**CA** answer / *antwoord*
✓**A** units / *eenhede*

OR/*OF*

$$A_T = a(m_1 + m_2 + m_3 + \ldots + m_{n-1})$$
$$A_T = a\left(\frac{6+4}{2} + \frac{4+6,3}{2} + \frac{6,3+4,5}{2} + \frac{4,5+8,5}{2} + \frac{8,5+6,7}{2} + \frac{6,7+4,4}{2}\right)$$
$$= 3(5 + 5,15 + 5,4 + 6,5 + 7,6 + 5,55)$$
$$= 3 \text{ cm}(35,2 \text{ cm})$$
$$= 30 \text{ mm} \times 352 \text{ mm}$$
$$= 10\ 560 \text{ mm}^2$$

OR/*OF*

✓**F A**

✓**A** value of *a* / *waarde van a*

✓**SF CA**

✓**ST**
✓**CA** conversion / *herleiding*

✓**CA** answer / *antwoord*
✓**A** units / *eenhede* (7)

[7]

TOTAL/*TOTAAL*: 150