Province of the
EASTERN CAPE
EDUCATION

NASIONALE SENIORSERTIFIKAAT

GRAAD 11

NOVEMBER 2020

TEGNIESE WISKUNDE V2 (EKSEMPLAAR)

PUNTE: **150**

TYD: **3 uur**

ITMATA2

Hierdie vraestel bestaan uit 12 bladsye.

INSTRUKSIES EN INLIGTING

Lees die volgende instruksies aandagtig deur voor die beantwoording van die vrae.

1. Hierdie vraestel bestaan uit AGT vrae.

2. Beantwoord AL die vrae in die SPESIALE ANTWOORDEBOEK wat verskaf word.

3. Toon duidelik ALLE berekeninge, diagramme, grafieke, ensovoorts wat jy gebruik het om die antwoorde te bepaal.

4. Volpunte sal NIE noodwendig aan slegs antwoorde toegeken word NIE.

5. Jy mag ’n goedgekeurde wetenskaplike sakrekenaar (nieprogrammeerbaar en niegrafies) gebruik, tensy anders vermeld.

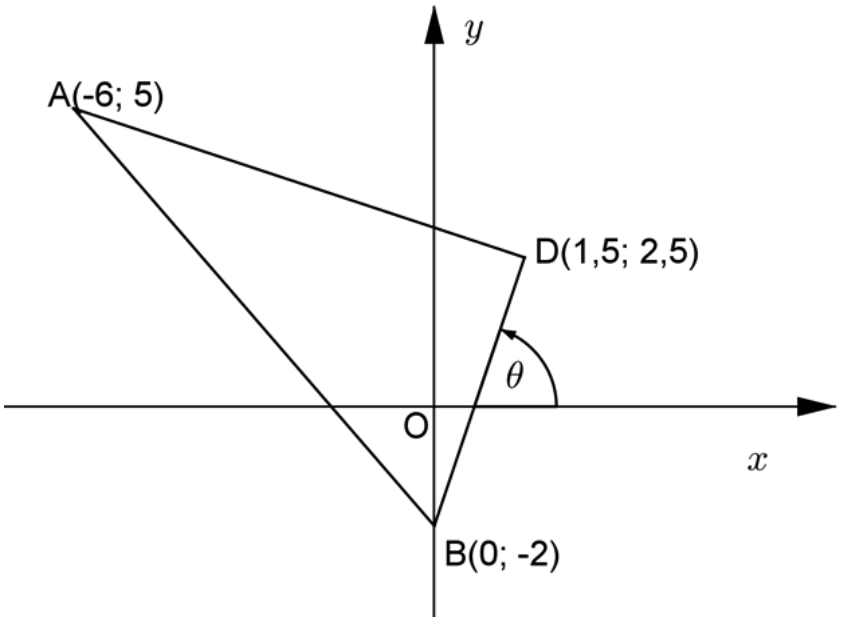
6. Indien nodig, rond jou antwoorde tot TWEE desimale plekke af, tensy anders vermeld.

7. Diagramme is nie noodwendig volgens skaal geteken nie.

8. Skryf netjies en leesbaar.

VRAAG 1

In die diagram hieronder is A(-6; 5), B(0,-2) en D(1,5; 2,5) die hoekpunte van ΔADB.
Die vergelyking van BD word deur $-3x+y=-2$ gegee.



Bepaal:

1.1 Die lengte van AB (3)

1.2 Die gradiënt van AD (3)

1.3 Die vergelyking van die lyn wat deur A gaan en ewewydig is aan BD, in die formaat $y = \ldots$ (4)

1.4 Toon aan dat AD ⊥ BD (2)

1.5 Die koördinate van die middelpunt van AB (3)

1.6 Die grootte van θ (afgerond tot DRIE desimale syfers) (2)

1.7 As BC || AD, watter tipe vierhoek word deur ACBD gevorm? Voorsien 'n rede. (2)

1.8 Die lengte van CD (1)

1.9 Die koördinate van C (4)

1.10 Die oppervlakte van ACBD (4)
[28]

VRAAG 2

2.1 As $\hat{A} = 310°$ en $\hat{B} = 130,5°$, bepaal die volgende waardes, korrek tot EEN desimale syfer:

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 As $\cot\theta = -\frac{12}{5}$ en $\sin\theta > 0$, bepaal die waarde van $20\text{cosec}\theta - 12\sec\theta$, SONDER die gebruik van 'n sakrekenaar. (5)

2.3 Vereenvoudig die volgende uitdrukking:

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

2.4 Bewys dat:

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

2.5 Los op vir x as $x \in [0°;360°]$, korrek tot EEN desimale syfer:

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

[26]

VRAAG 3

Gegee: $f(x)=\cos(x-45°)$ en $g(x)=-2\sin 2x$

3.1 Teken netjiese sketsgrafieke van *f* en *g* op dieselfde assestelsel vir $x\in[0°;360°]$ op die rooster wat in die SPESIALE ANTWOORDEBOEK voorsien is.

Toon duidelik ALLE kritiese punte. (6)

3.2 Skryf die waardeversameling van *g* neer. (2)

3.3 Skryf die periode van *g* neer. (1)

3.4 Gebruik jou grafiek om die volgende te beantwoord:

Vir wattter waarde(s) van *x* is:

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

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

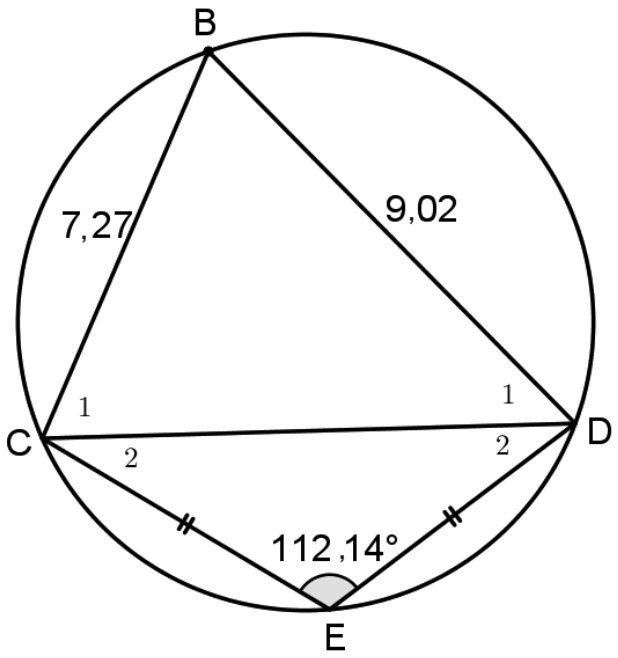
3.4.3 $f(x)\le 0$ (2)

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

[15]

VRAAG 4

In die diagram hieronder is BCED 'n koordevierhoek met $\hat{E} = 112{,}14°$, BC = 7,27 eenhede, BD = 9,02 eenhede en CE = ED.



Bereken tot TWEE desimale plekke:

4.1 Die oppervlakte van ΔBCD (4)

4.2 Die lengte van CD (4)

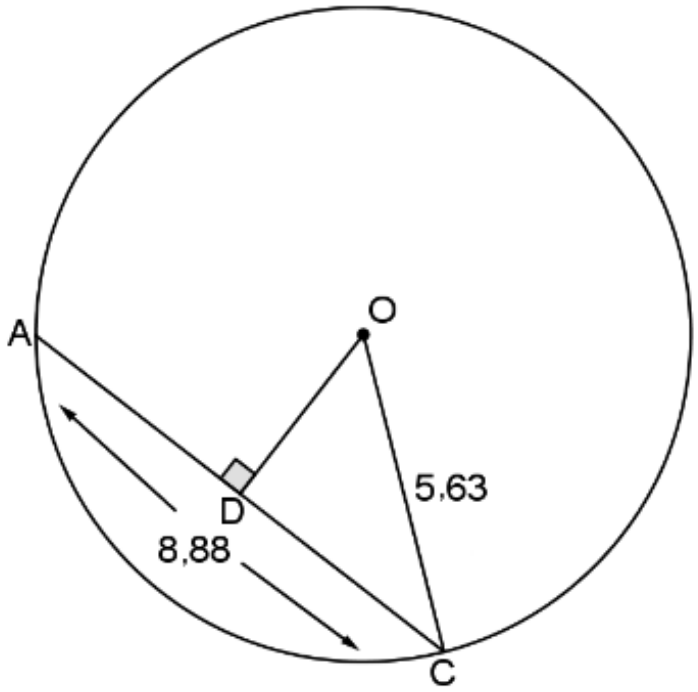
4.3 Die lengte van CE (4)
[12]

VRAAG 5

5.1 Voltooi die volgende stelling:

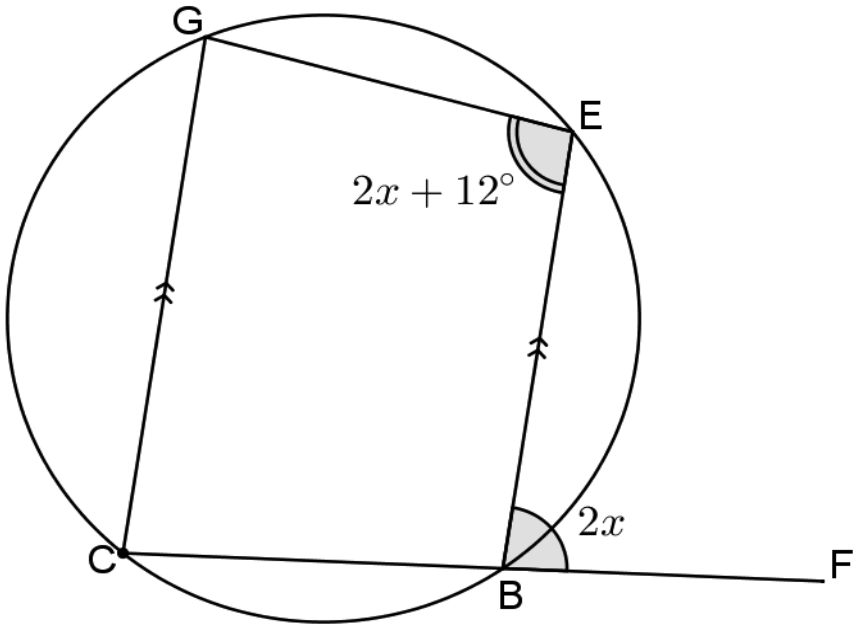
Die ... van 'n koord gaan deur die middelpunt van die sirkel. (1)

5.2 In die diagram hieronder is O die middelpunt van die sirkel met OC = 5,63 eenhede, AC = 8,88 eenhede en OD ⊥ AC.



Bepaal die lengte van OD, met redes. (5)

5.3 In die diagram hieronder, is BCGE 'n koordevierhoek met CG ∥ BE, $E\hat{B}F = 2x$ en $\hat{E} = 2x + 12°$.



Bepaal die grootte van $\hat{E}$, met redes. (7)

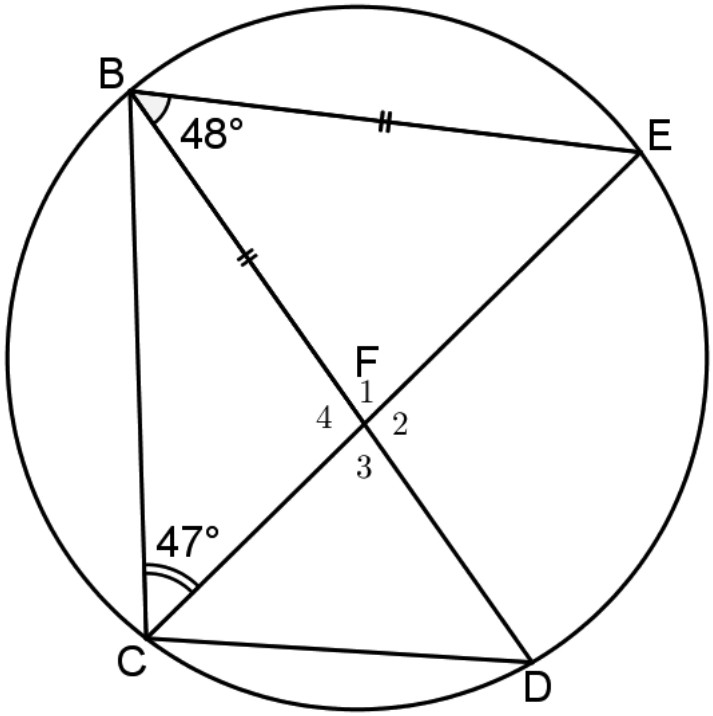
[13]

VRAAG 6

6.1 Voltooi die volgende stelling:

Hoeke in dieselfde sirkelsegment ... (1)

6.2 In die diagram hieronder $E\hat{B}F = 48°$, $F\hat{C}B = 47°$ en BF = BE.

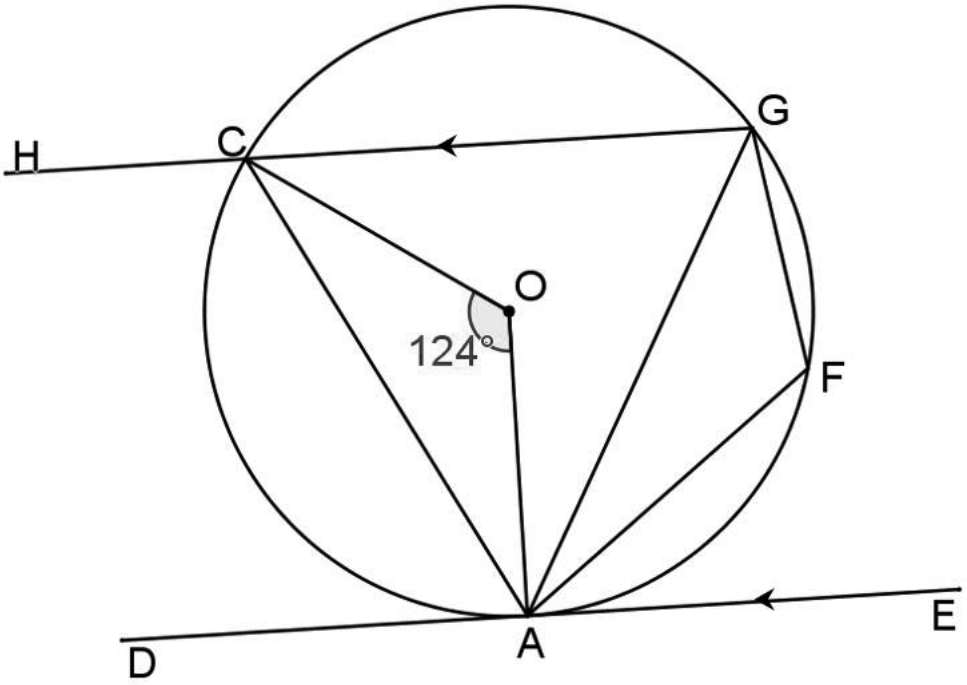


6.2.1 Bepaal, met redes, die grootte van $F\hat{D}C$. (4)

6.2.2 Vervolgens, bewys met redes, dat CF = CD. (2)

6.2.3 Bepaal, meld redes, of CE 'n middellyn van die sirkel is. (2)

6.3 In die diagram hieronder is DAE 'n raaklyn tot die sirkel met middelpunt O.
CAFG is 'n koordevierhoek met CG ∥ DAE, GC is verleng na H en $C\hat{O}A = 124°$.



Bepaal, met redes, die grootte van die volgende:

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]

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 $= \frac{1}{3}Bh$

7.1 As die buite-oppervlakte van 'n silinder 56π m^2 is en die sirkelvormige basis het 'n middellyn van 8 meter, bepaal die hoogte van die silinder. (4)

7.2 'n Metaalblik is 11 cm hoog en het 'n middellyn van 7,5 cm.

Hoeveel vierkante millimeter papier, tot die naaste heelgetal, sal dit neem om 'n etiket (omslag) vir die blikkie te maak? (Wenk: omslag sluit die boonste en onderste uit) (4)

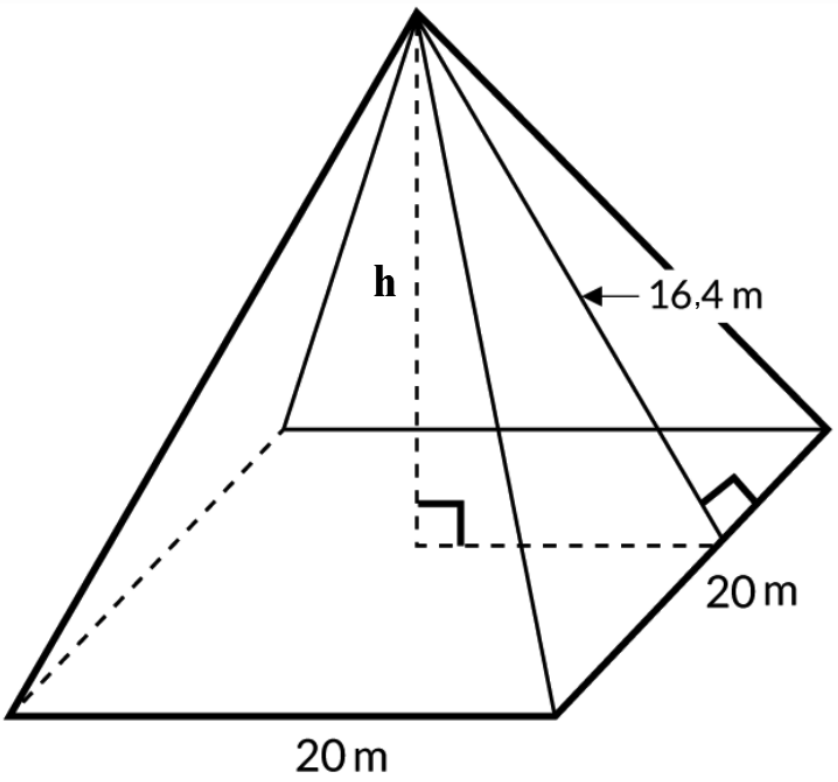
7.3 Die radius van 'n keël is 5 cm. Die hoogte is 8 cm.

7.3.1 Bepaal die volume van die keël. (3)

7.3.2 Veronderstel die radius van die keël word verdubbel en die hoogte bly dieselfde. Wat is die volume van die nuwe keël? (1)

7.3.3 Wat is die verhouding van die volume van die nuwe keël tot die volume van die oorspronklike keël? (2)

7.4 Die figuur hieronder is 'n diagram van 'n piramide met 'n vierkantige basis, met sye 20 m en die skuinshoogte van 16,4 m.



7.4.1 Bepaal die hoogte, h, van die piramide, tot die naaste meter. (3)

7.4.2 Vervolgens, bereken die volume van die piramide. (3)

7.5 'n Kubus met sye 60 mm, gemaak uit lood, word gesmelt. Die gesmelte lood word in 'n sfeer gegiet.

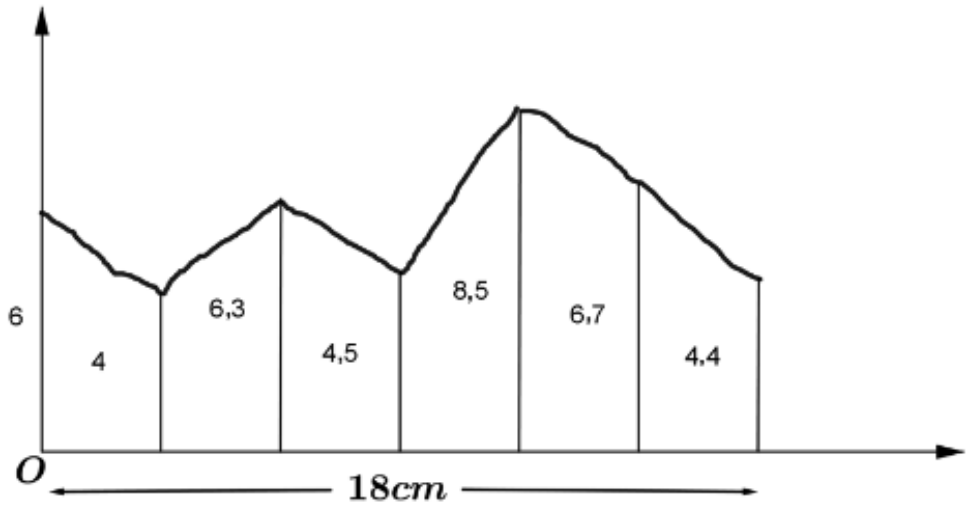
Bereken:

7.5.1 Die volume van die sfeer (2)

7.5.2 Die radius van die sfeer (5)
[27]

VRAAG 8

Die diagram hieronder beskryf 'n onreëlmatige figuur. Alle afmetings is in cm.



Bereken die oppervlakte van die onreëlmatige figuur deur gebruik te maak van die middelordinaat-reël. Gee jou antwoord in mm^2. (7)

[7]

TOTAAL: 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*)

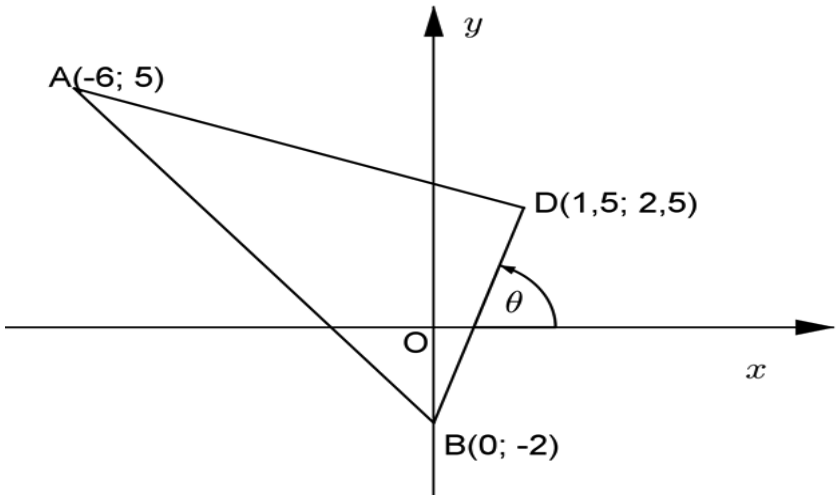
QUESTION/*VRAAG*	MARKS/*PUNTE*			HOD/*HVD* (Level 1 mod./*Vlak 1 mod.*)			DISTRICT/*DISTRIK* (Level 2 mod./*Vlak 2 mod.*)			PROVINCIAL/*PROVINSIAAL* (Level 3 mod./*Vlak 3 mod.*)		
1												
2												
3												
4												
5												
6												
7												
8												
TOTAL/*TOTAAL*												

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]

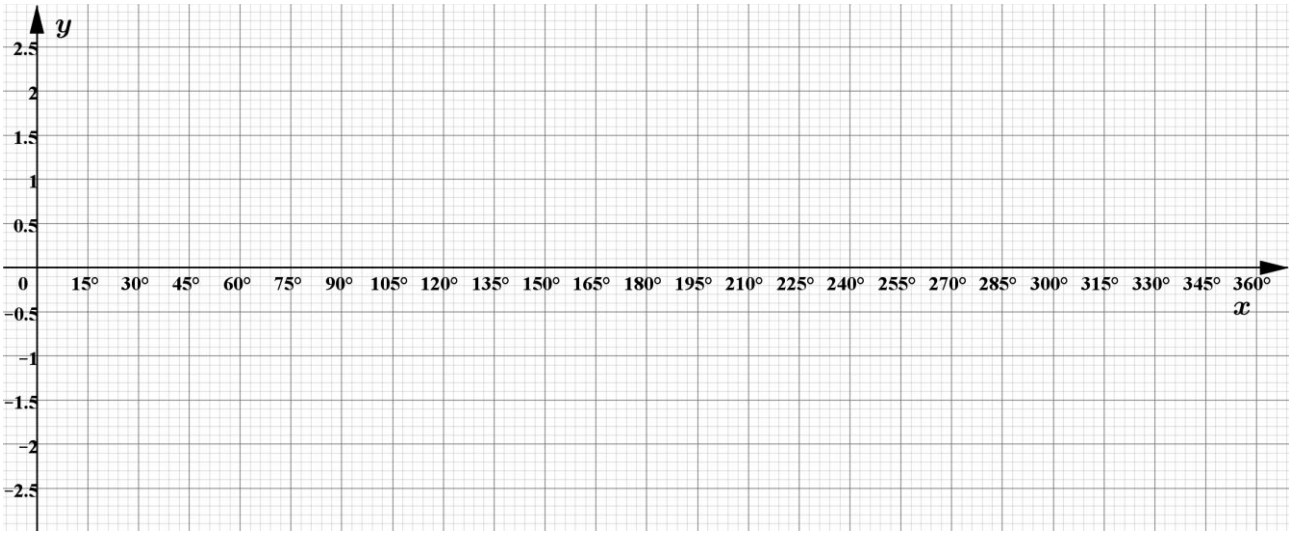
QUESTION/*VRAAG* 2

	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

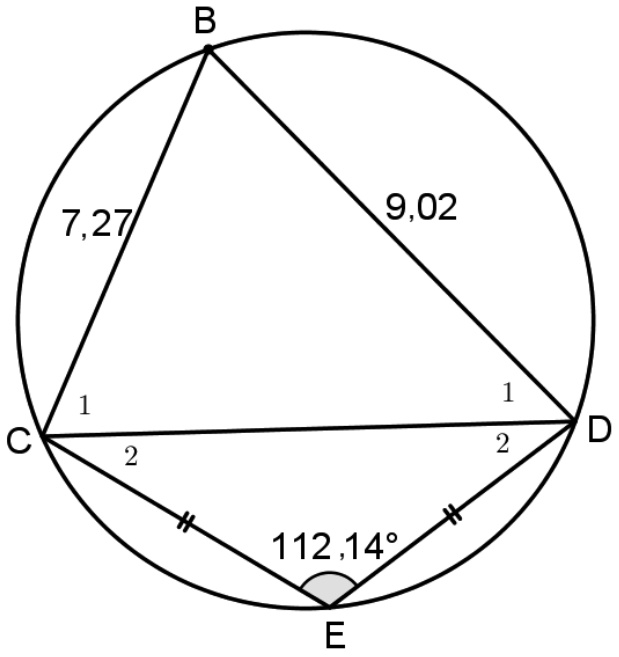
3.1



(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

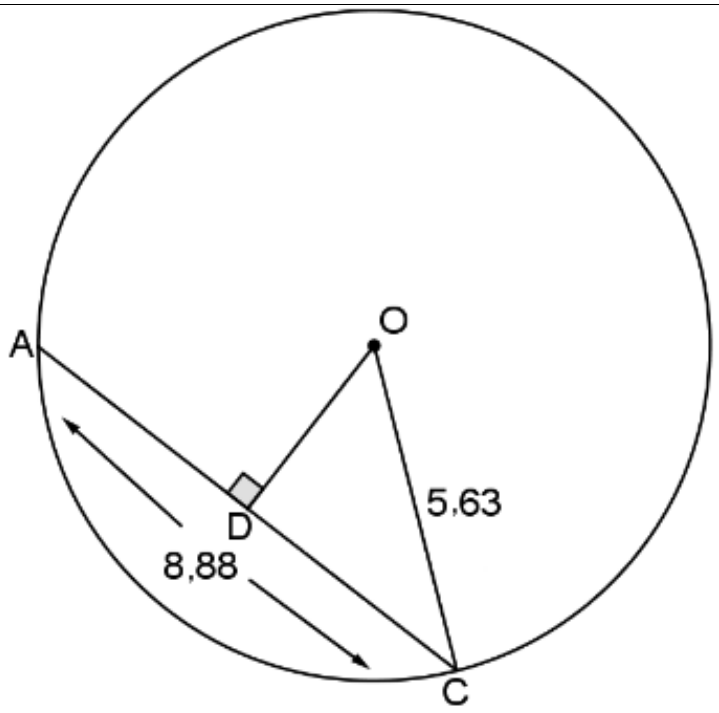


	Solution/*Oplossing*	**Marks** ***Punte***
4.1		(4)
4.2		(4)

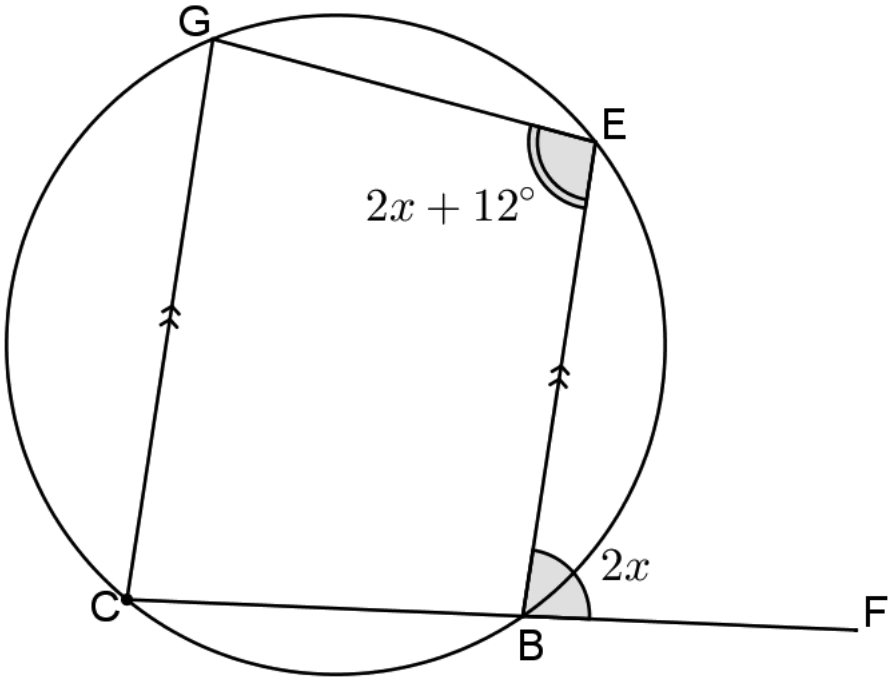
	Solution/*Oplossing*	**Marks** ***Punte***
4.3		
		(4)
		[12]

QUESTION/*VRAAG* 5

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



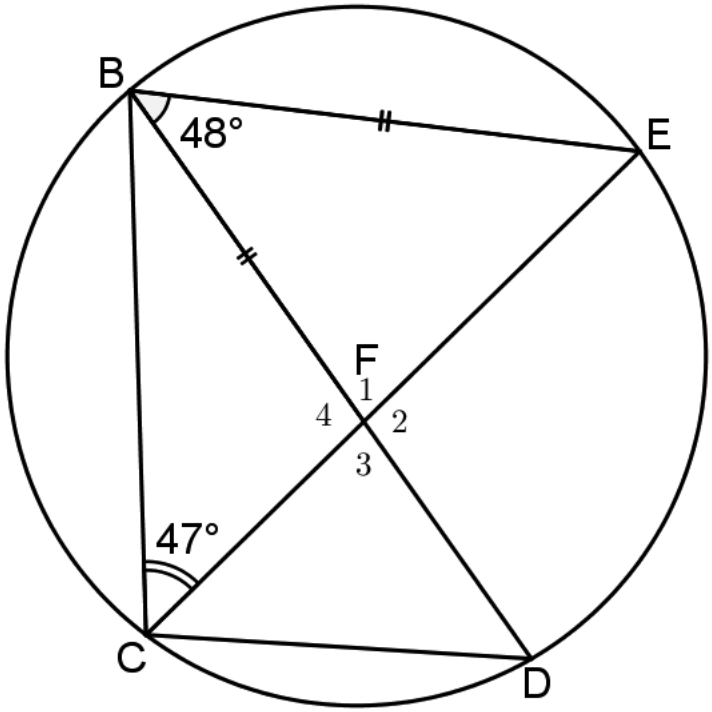
	Solution/*Oplossing*	**Marks** ***Punte***
5.2		(5)



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

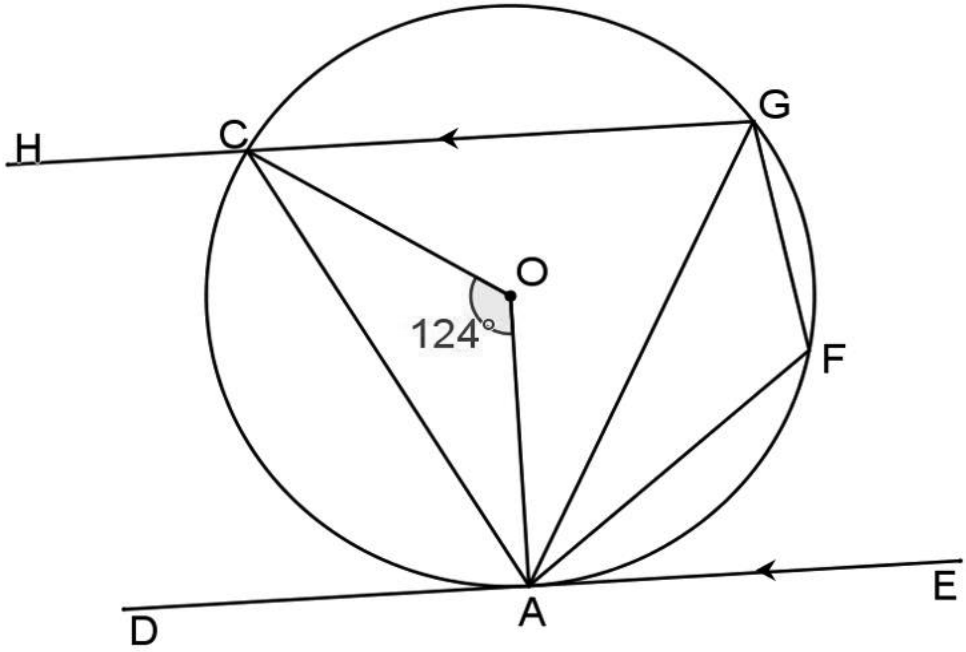
QUESTION/*VRAAG* 6

	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]

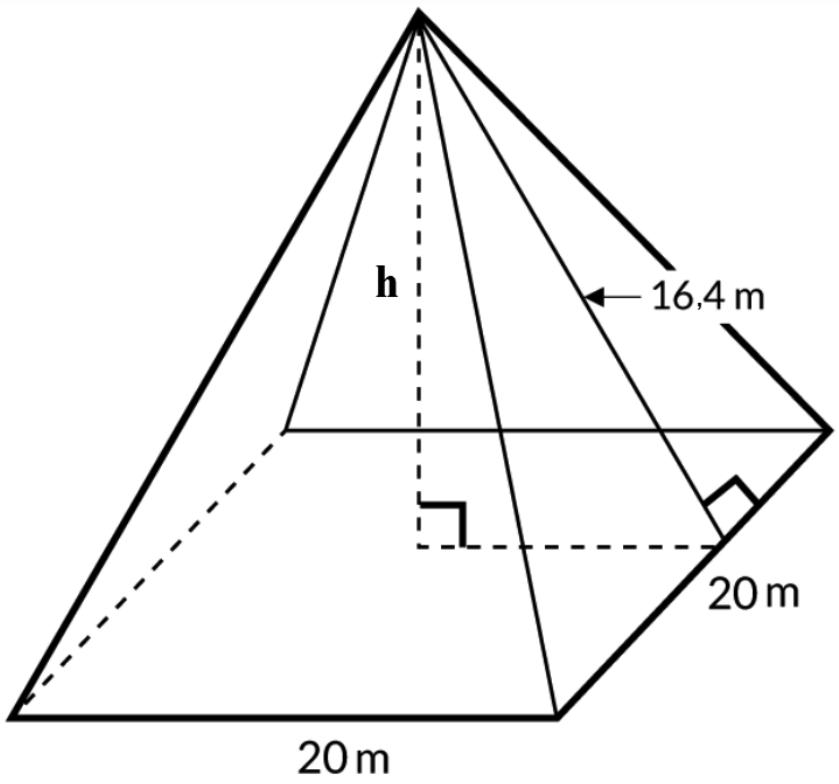
QUESTION/*VRAAG* 7

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)

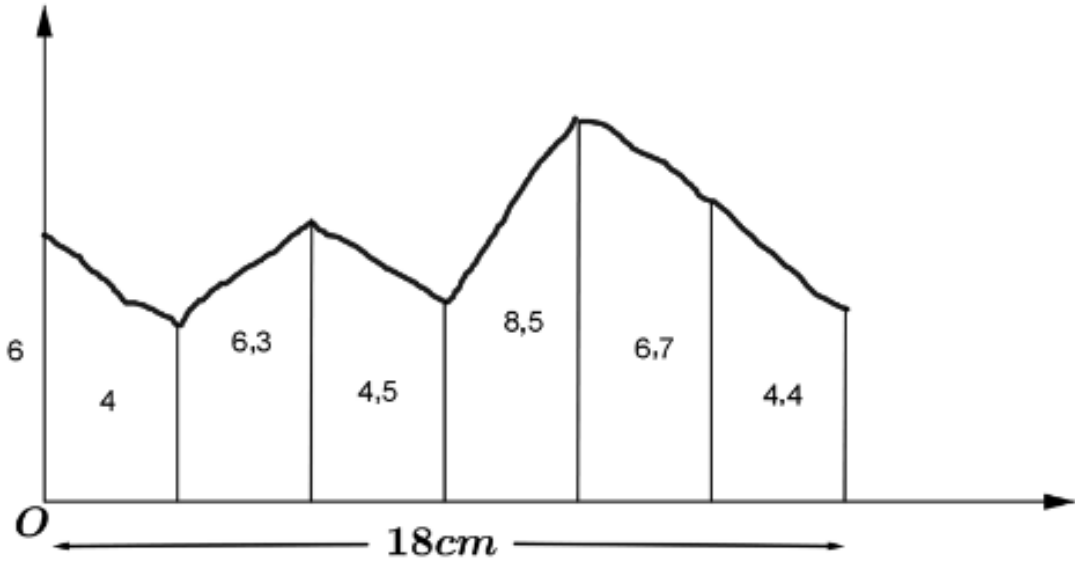
7.4



	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:

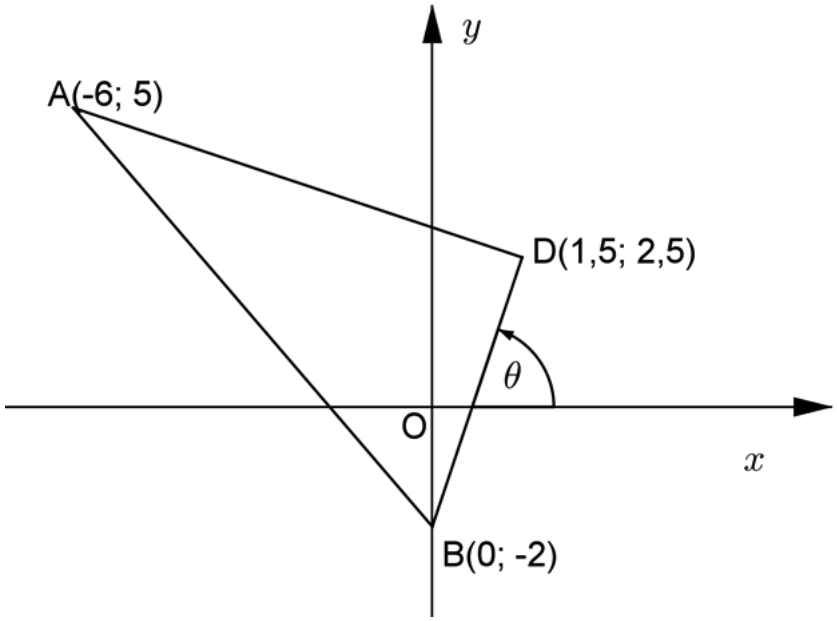
- Continuous accuracy (CA) applies only where indicated in this marking guideline.
- Assuming values/answers in order to solve a problem is unacceptable.

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.*

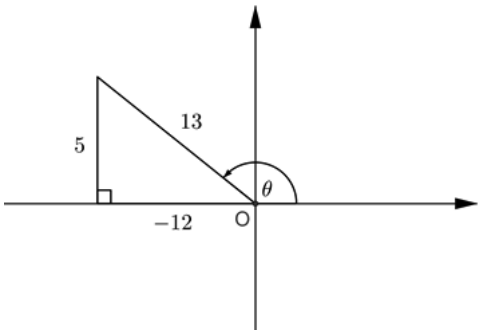
MARKING CODES / *NASIENKODES*	
M	**Method / *Metode***
A	**Accuracy / *Akkuraatheid***
AO	**Answer only / *Slegs antwoord***
CA	**Consistent accuracy / *Deurlopende akkuraatheid***
F	**Formula / *Formule***
I	**Identity / *Identiteit***
R	**Rounding / *Afronding***
S	**Simplification / *Vereenvoudiging***
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)

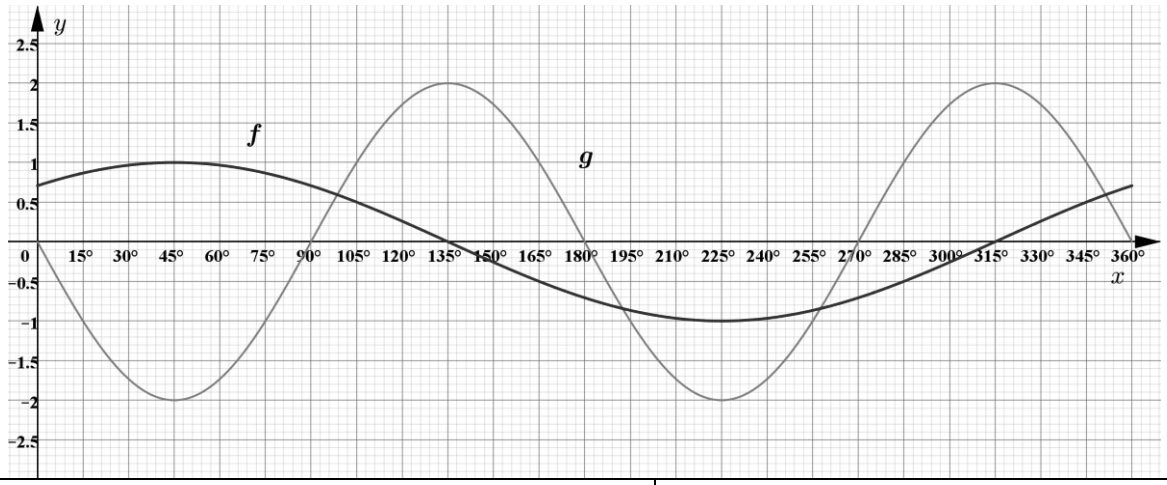
1.5	$M_{AB} = \left(\frac{x_1 + x_2}{2}; \frac{y_1 + y_2}{2}\right)$ $= \left(\frac{-6+0}{2}; \frac{5-2}{2}\right)$ $= \left(-3; \frac{3}{2}\right)$	✓**F** ✓**SF A** ✓ **CA**	(3)
1.6	$\tan\theta = m_{BD}$ $= 3$ $\theta = \tan^{-1}(3)$ $= 71{,}565°$	✓**M** ✓**CA** value of θ in degree / *waarde van* θ *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]

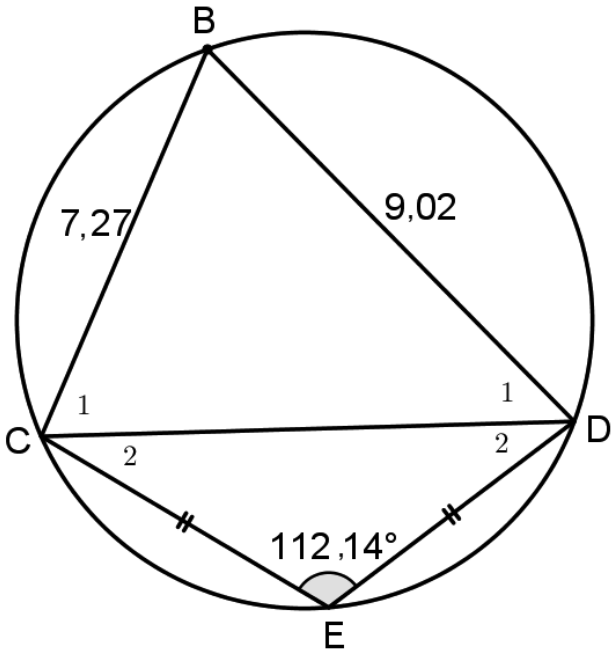
QUESTION/*VRAAG* 3

3.1



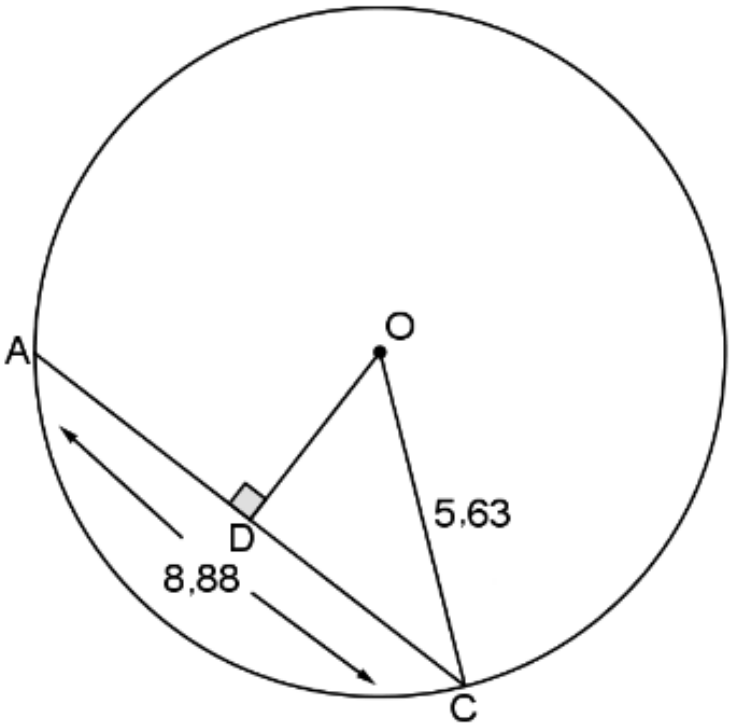
	***f*:** ✓**A** endpoints / *eindpunte* ✓**A** *x*-intercepts at / *x-afsnitte by* 135° & 315° ✓**A** TP / DP (45°; 1) & (225°; -1)	**g:** ✓**A** endpoints / *eindpunte* ✓**A** *x*-intercepts at / *x-afsnitte by* 0°, 90°, 180°, 270° & 360° ✓**A** TP / DP (45°; -2), (135°; 2), (225°; -2) & (315°; 2)	(6)
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]

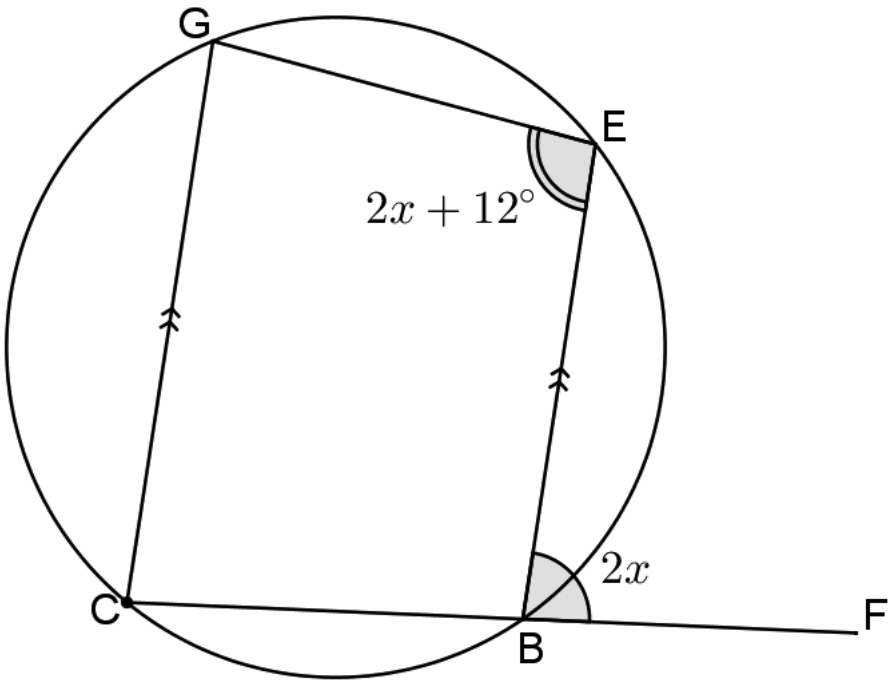
QUESTION/*VRAAG* 4



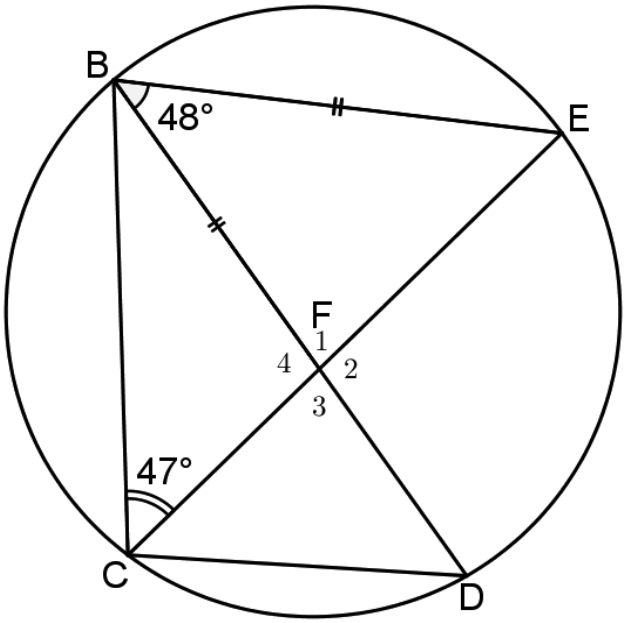
4.1	$\hat{B} = 67,86°$ $\left(\begin{matrix}\text{opp } \angle\text{s of cyclic quad} \\ \textit{teenoorst } \angle\textit{e v kdvk}\end{matrix}\right)$ Area of/*van* $\Delta BCD = \frac{1}{2} BC \times BD \sin B$ $= \frac{1}{2} \times 7,27 \times 9,02 \sin 67,86°$ $= 30,37$ sq units / *vk eenhede*	✓**ST** ✓**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)

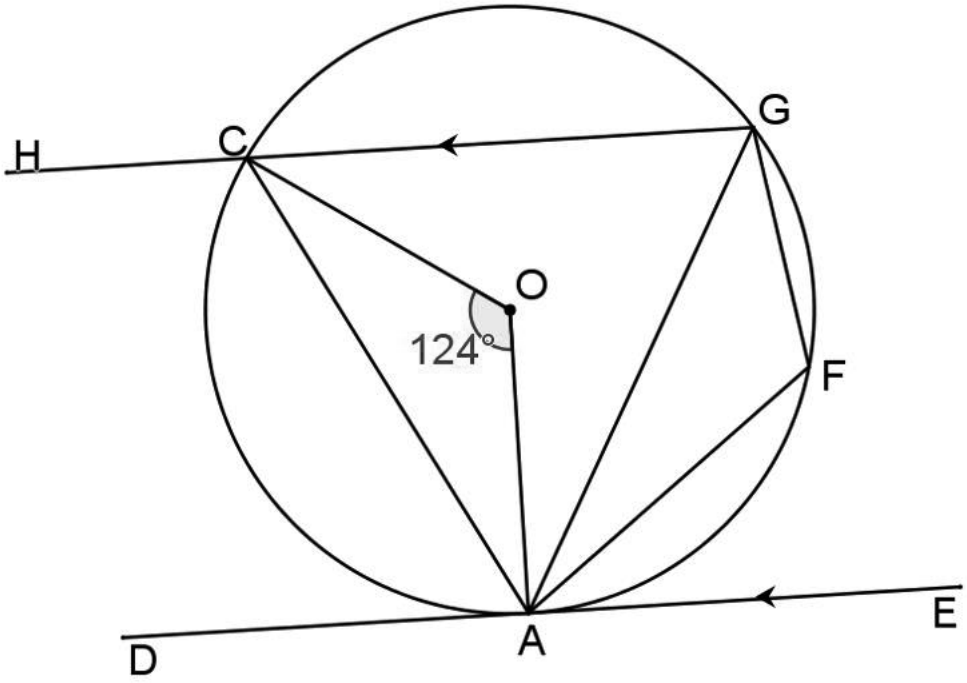
4.3	$\hat{C}_2 = \hat{D}_2 \quad \begin{pmatrix} \angle s \text{ opp} = \text{sides} \\ \angle e \text{ teenoor } = sye \end{pmatrix}$ $= \frac{180° - 112,14°}{2} \quad \begin{pmatrix} \text{Int } \angle \text{s of } \Delta \\ \text{Binne } \angle e \text{ van } \Delta \end{pmatrix}$ $= 33,93°$ $\frac{CE}{\sin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

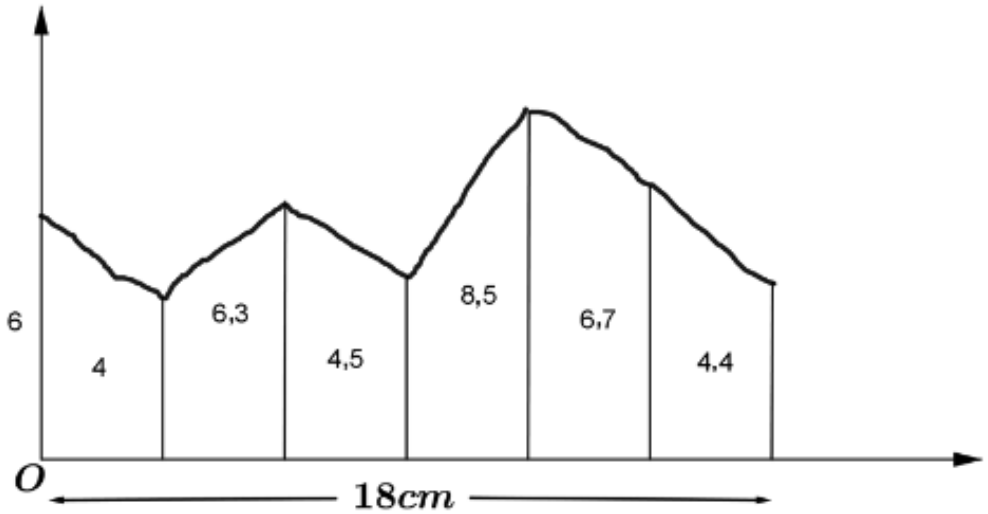
6.2.3	$C\hat{B}F = 19°$ $\begin{pmatrix}\text{Ext } \angle \text{ of } \Delta \\ \textit{Buite } \angle \textit{ van } \Delta\end{pmatrix}$ $C\hat{B}E = 19° + 48° = 67°$ $\therefore$ CE is not a diameter $\begin{pmatrix}\text{does not subtends } \angle \text{ of } 90° \\ \textit{onderspan nie } \angle \textit{ van } 90°\end{pmatrix}$ **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