



Province of the
EASTERN CAPE
EDUCATION

**NASIONALE
SENIOR SERTIFIKAAT**

GRAAD 11

NOVEMBER 2019

WISKUNDE V2 (EKSEMPLAAR)

PUNTE: 150

TYD: 3 uur

Hierdie vraestel bestaan uit 14 bladsye.

INSTRUKSIES EN INLIGTING

Lees die volgende instruksies sorgvuldig voordat vrae beantwoord word.

1. Hierdie vraestel bestaan uit 11 vrae.
2. Beantwoord AL die vrae in die ANTWOORDEBOEK wat voorsien is.
3. Toon duidelik ALLE berekeninge, diagramme, grafieke, ensovoorts aan wat jy gebruik het om jou antwoorde te bepaal.
4. Antwoorde alleen sal NIE noodwendig volpunte toegeken word nie.
5. Jy mag 'n goedgekeurde wetenskaplike sakrekenaar (nieprogrammeerbaar en niegrafies) gebruik, tensy anders vermeld.
6. Indien nodig, rond antwoorde af tot TWEE desimale plekke, tensy anders vermeld.
7. Diagramme is NIE noodwendig volgens skaal geteken nie.
8. Skryf netjies en leesbaar.

VRAAG 1

'n **Kilokalorie** is 'n eenheid van energie. Byvoorbeeld, as voedsel 20 kilokalorieë bevat, is dit 'n manier om te beskryf hoeveel energie jou liggaam kan kry wanneer jy voedsel eet.

Die lys hieronder toon die hoeveelheid energie, in **kilokalorieë** per 100 g, van 10 verskillende peuselstafies. ("snack bars")

440; 520; 480; 560; 615

550; 620; 680; 540; 490



- 1.1 Bereken die gemiddelde kilokalorieë per 100 g stafie. (2)
- 1.2 Bereken die standaardafwyking van kilokalorieë per 100 g stafie. (1)
- 1.3 Gebruik die gegewe energie hoeveelhede en teken 'n mond-en-snor diagram in die antwoordeboek. (5)
- 1.4 Beskryf die skeefheid van die verspreiding van energie hoeveelhede. (2)
- 1.5 10 verskillende ontbyt graanpapsoorte wat energievlakke van kilokalorieë per 100g bevorder was gekies. Die gemiddelde energievlak van ontbyt graanpapsoorte was 545,7 kilokalorieë en die standaardafwyking van die energievlakke van die ontbyt graanpapsoorte was 28 kilokalorieë.
- Watter kossoort, peuselstafies of ontbyt graanpapsoorte het die grootste variasie/verskeidenheid in energievlakke? Verduidelik jou antwoord. (3)
- [13]**

VRAAG 2

Port Elizabeth word beskou as die winderige stad (windy city) van Suid-Afrika. Die tabel hieronder toon die frekwensie van windsnelhede wat in die middag by Port Elizabeth Internasionale lughawe, gedurende die maand van Oktober 2018, gemeet is.



Windsnelheid (km/h)	Frekwensie	Kumulatiewe Frekwensie
$10 < x \leq 12$	1	1
$12 < x \leq 14$	2	3
$14 < x \leq 16$		6
$16 < x \leq 18$	4	10
$18 < x \leq 20$	7	
$20 < x \leq 22$	7	24
$22 < x \leq 24$	4	28
$24 < x \leq 26$		30
$26 < x \leq 28$	1	

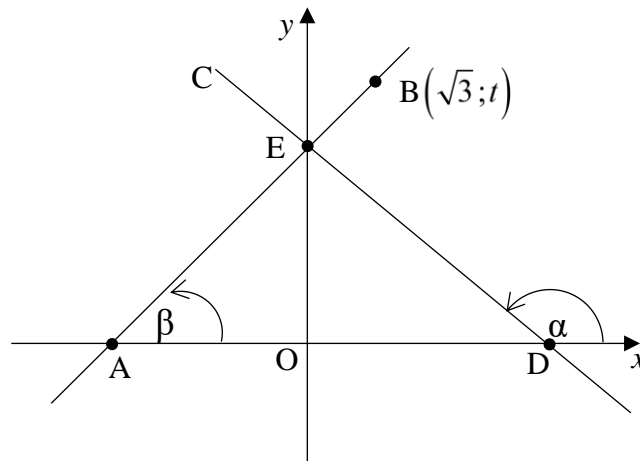
- 2.1 Voltooi die tabel in jou antwoordeboek. (2)
- 2.2 Teken 'n ogief op die rooster in jou ANTWOORDEBOEK. (3)
- 2.3 Gebruik jou grafiek en bepaal:
- 2.3.1 die mediaan van die windsnelhede. (2)
- 2.3.2 die aantal dae wat die windsnelheid 23km/h oorskry het. (2)
- [9]

VRAAG 3

In die diagram hieronder maak lynstuk AB 'n hoek van β met die x -as en lynstuk CD maak 'n hoek van α met die x -as. A en D is punte op die x -as. Die koördinate van B is $(\sqrt{3}; t)$.

AB en CD sny by E, 'n punt op die y -as en $\hat{A}ED = 63,69^\circ$

Die vergelyking van CD is $3x + 2y = 6$

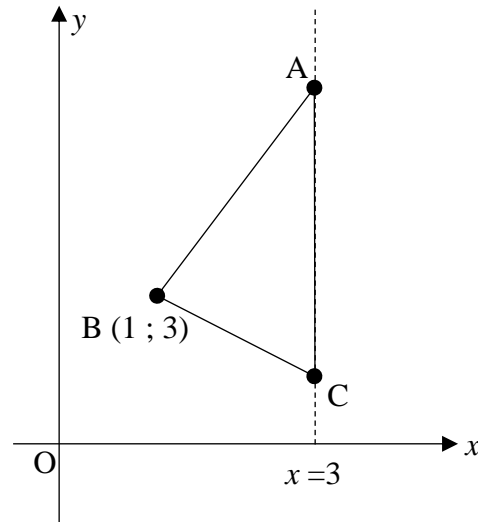


- 3.1 Bepaal die koördinate van E. (2)
- 3.2 Bepaal die gradiënt van CD. (2)
- 3.3 Bereken die waarde van α . (2)
- 3.4 Bepaal, vervolgens, die waarde van β (1)
- 3.5 Bepaal die vergelyking van AB in die vorm $y = mx + c$. (3)
- 3.6 Bereken die waarde van t . (2)
- 3.7 Bepaal die oppervlakte van $\triangle ABD$. (5)

[17]

VRAAG 4

Die diagram hieronder toon 'n $\triangle ABC$ met $\hat{B} = 90^\circ$ en punt B met koördinate $(1 ; 3)$. A en C lê op die lyn $x = 3$. Die lengte van AB is $2\sqrt{5}$ eenhede en die lengte van AC is 5 eenhede.



- 4.1 Bepaal die koördinate van A. (4)
- 4.2 Gee die koördinate van C. (2)
- 4.3 Toon aan dat $(3 ; 4,5)$ die middelpunt van AC is. (2)
- 4.4 Bepaal die koördinate van $D(a ; b)$ sodat ABCD 'n parallelogram is. (3)
- 4.5 ABCD is gereflekteer in die lyn $x = 5$ en 3 eenhede af geskuif na $A' B' C' D'$ toe. Skryf die koördinate van B' neer. (2)

[13]

VRAAG 5**MOET NIE 'N SAKREKENAAR VIR HIERDIE VRAAG GEBRUIK NIE.**

5.1 Gegee $\cos \theta = -\frac{1}{3}$ en $0^\circ \leq \theta \leq 180^\circ$

Bepaal, met behulp van 'n diagram, die waarde van die volgende:

5.1.1 $\tan(180^\circ + \theta)$ (3)

5.1.2 $3\sin(\theta - 90^\circ)$ (2)

5.2 Gegee: $\frac{\sin(-210^\circ)}{\cos(300^\circ)} + \frac{\cos(x + 90^\circ)}{\sin(360^\circ + x)}$

5.2.1 Vereenvoudig die volgende uitdrukking: $\frac{\sin(-210^\circ)}{\cos(300^\circ)} + \frac{\cos(x + 90^\circ)}{\sin(360^\circ + x)}$ (5)

5.2.2 Vir watter waardes van x is die uitdrukking in VRAAG 5.2.1 ongedefinieerd vir $-360^\circ \leq x \leq 360^\circ$? (2)

5.3 Bewys dat: $\tan \theta \sqrt{\frac{1}{\sin^2 \theta} - 1} = 1$ (4)

5.4 Bepaal die algemene oplossing vir die volgende vergelyking:

$$2\sin^2 \theta = 1 + \sin \theta \quad (6)$$

[22]

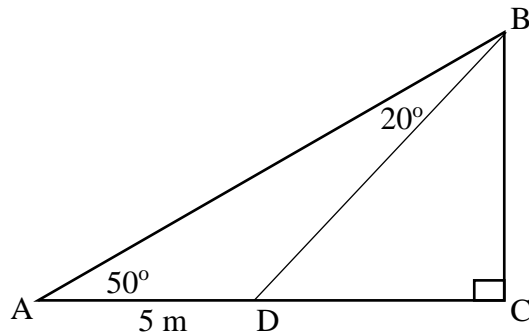
VRAAG 6

- 6.1 Teken, op dieselfde asstelsel, die grafieke van $f(x) = -2\cos x$ en $g(x) = \sin 2x$, vir die interval $-90^\circ \leq x \leq 180^\circ$, op die rooster wat in die ANTWOORDEBOEK voorsien is. Toon die koördinate van die afsnitte op die asse en die draaipunte van die grafieke aan. (6)
- 6.2 Gebruik jou grafiek om die waarde(s) van x te vind waar:
- 6.2.1 $g(x) - f(x) = 2$ (1)
- 6.2.2 $f(x) \leq g(x)$ (2)
- 6.2.3 $f(x)$ en $g(x)$ beide toenemend is. (2)
- 6.3 As $f(x)$ in die x -as gereflekteer word en 30° horisontaal na regs geskuif word, gee die vergelyking van hierdie nuwe grafiek, $h(x)$ (2)

[13]

VRAAG 7

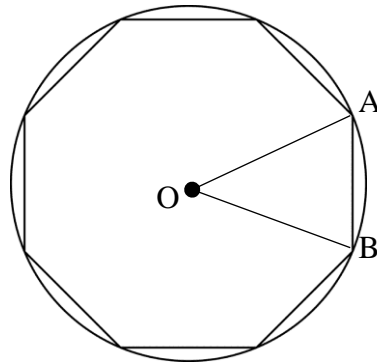
7.1 In die diagram hieronder is, $\hat{A} = 50^\circ$; $\hat{C} = 90^\circ$; $\hat{ABD} = 20^\circ$ en $AD = 5$ m.



7.1.1 Gee die grootte van \hat{BDC} . (1)

7.1.2 Bereken die lengte van BC. (5)

7.2 Die diagram toon 'n ingeskrewe reëlmatige agthoek, in 'n sirkel met radius r cm en middelpunt O. A en B is twee hoekpunte van die agthoek op die omtrek van die sirkel.



7.2.1 Bepaal die omtrek van die agthoek in terme van r . (3)

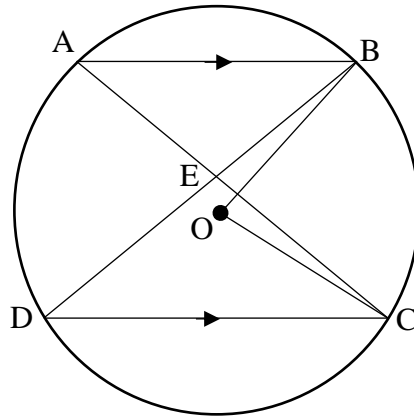
7.2.2 Toon aan dat die oppervlakte van die agthoek, $2\sqrt{2}r^2$ cm², is. (4)

[13]

Gee redes vir jou bewerings in VRAE 8 en 9.

VRAAG 8

8.1 In die diagram hieronder is A, B, C en D punte op die omtrek van 'n sirkel met middelpunt O. AC en DB sny by E. $AB \parallel DC$ en $\hat{B}OC = 90^\circ$.



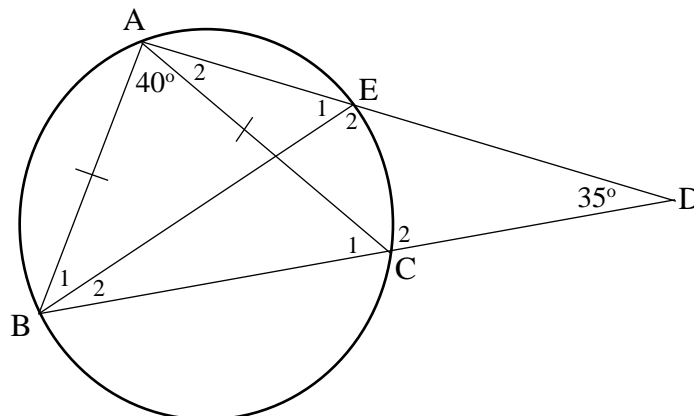
8.1.1 Bepaal, met redes, 3 hoeke elk gelyk aan 45° (3)

8.1.2 Bewys, vervolgens, dat:

(a) $CE = DE$ (2)

(b) CD die middellyn is van die sirkel wat deur ECD gaan, (2)

8.2 In die diagram hieronder is A, B, C en E punte op die omtrek van 'n sirkel. BC verleng ontmoet AE verleng by punt D. $AB = AC$. $\hat{D} = 35^\circ$ en $\hat{A}_1 = 40^\circ$



8.2.1 Bepaal, met redes:

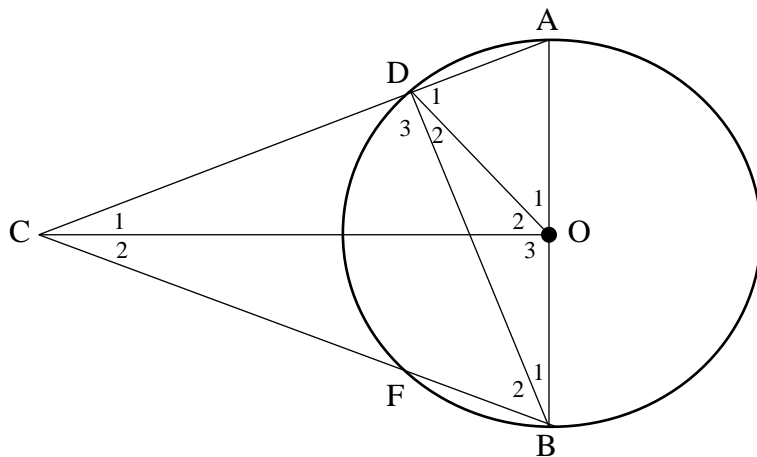
(a) \hat{C}_1 (2)

(b) \hat{A}_2 (2)

(c) \hat{B}_2 (2)

8.2.2 Bewys, vervolgens, dat BE vir $\hat{A}BC$ halveer. (3)

8.3 AB is die middellyn van 'n sirkel met middelpunt O wat deur punte D en F gaan. $CO \perp AB$. ADC en BFC is reguitlyne.



Bewys, met melding van redes, dat:

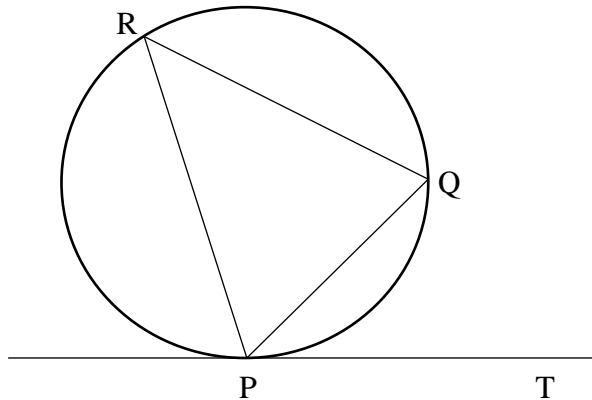
8.3.1 CDOB 'n koordevierhoek is. (4)

8.3.2 as $\hat{B}_1 = x$, dan is $\hat{D}_2 = \hat{C}_1$ (2)

[22]

VRAAG 9

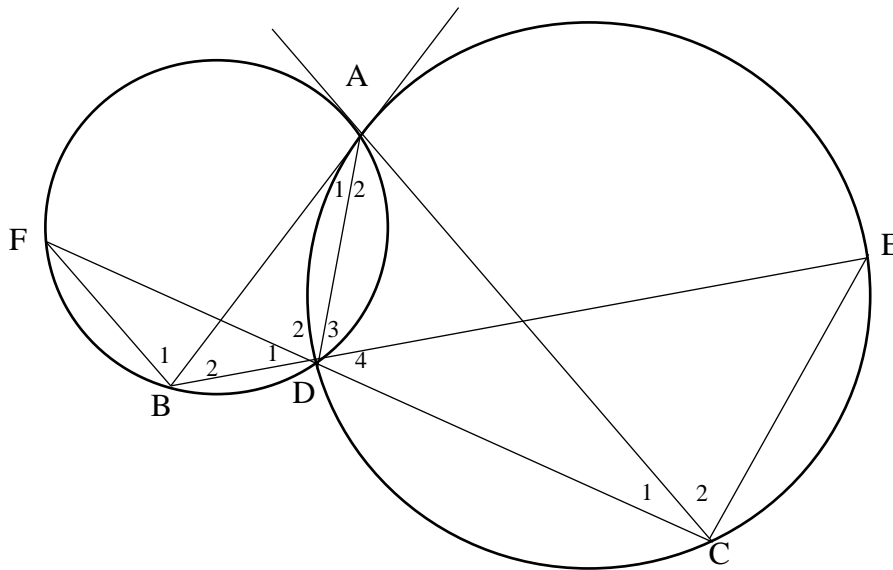
9.1 In die diagram hieronder is PT 'n raaklyn aan die sirkel PQR by P.



Bewys die Stelling wat meld dat $\hat{QPT} = \hat{R}$ (5)

9.2 In die diagram hieronder is AB 'n raaklyn aan die groter sirkel, terwyl AC 'n raaklyn aan die kleiner sirkel is. AD is 'n gemene koord. BDE en CDF is reguitlyne.

Laat $\hat{A}_1 = x$ en $\hat{A}_2 = y$



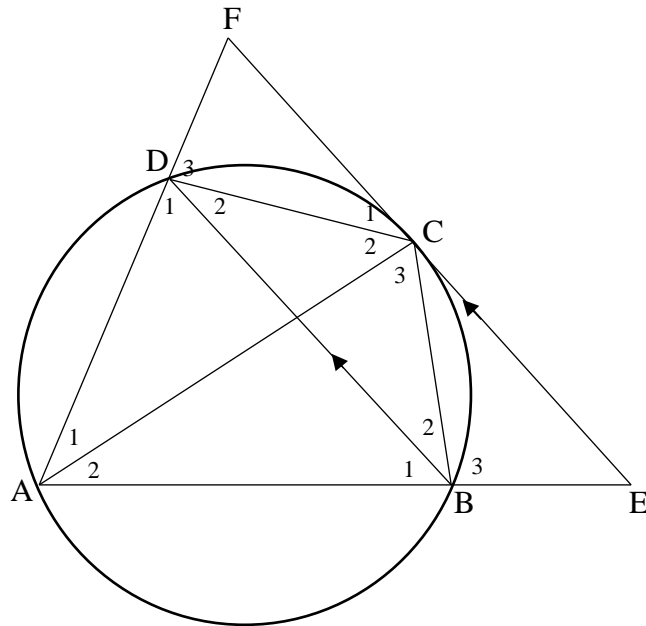
Bepaal, in terme van x en/of y

9.2.1 \hat{B}_2 (2)

9.2.2 \hat{D}_3 (2)

9.3 Bewys dat $AB \parallel EC$ (3)

9.4 In die diagram hieronder is ABCD 'n koordevierhoek. Die raaklyn by C ontmoet AD verleng by F en AB verleng by E. $BD \parallel EF$.



Bewys, met melding van redes, dat:

9.4.1 $\hat{C}_3 = \hat{F}$ (3)

9.4.2 $\hat{ACF} = \hat{CDF}$ (3)

[18]

VRAAG 10

Die ‘The Shard’-gebou, is saamgestel uit ’n verskeidenheid glas-segmente wat saamsmelt om ’n verlengde piramide te vorm. Hierdie ongewone gebou is naby die Teemsrivier in Londen geleë en is een van die hoogste geboue in die Verenigde Koninkryk. Die basis is ’n vierkant van 50 m deur 50 m en die loodregte hoogte is 306 m.



Beantwoord die vrae wat volg, deur gebruik te maak van die buite-oppervlakte formule van ’n piramide hieronder.

Totale buite-oppervlakte van ’n piramide =
 basis oppervlakte + $\frac{1}{2} \times \text{omtrek van die basis} \times \text{skuinshoogte}$

- 10.1 Bepaal die buite-oppervlakte van die glas-sye van die “The Shard” gebou. (4)
- 10.2 Bepaal die hoogtehoek van die skuins glaskante met die horisontale basis. (2)
- [6]**

VRAAG 11

Die hoogtelyn van driehoek ABC wat h mm lank is, deel die basis, AB van die driehoek in lynstukke wat x mm en y mm lank is.

As $h^2 = x y$, bewys dat die driehoek reghoekig is. [4]

TOTAAL: 150



LEARNER'S NAME: <i>LEERDERNAAM:</i>	
---	--

GRADE 11 <i>GRAAD 11</i>	
-----------------------------	--

**NATIONAL/NASIONALE
SENIOR
CERTIFICATE/SERTIFIKAAT**

GRADE 11/GRAAD 11

NOVEMBER 2019

**MATHEMATICS P2/WISKUNDE V2
SPECIAL ANSWER BOOK/SPEZIALE ANTWOORDEBOEK**

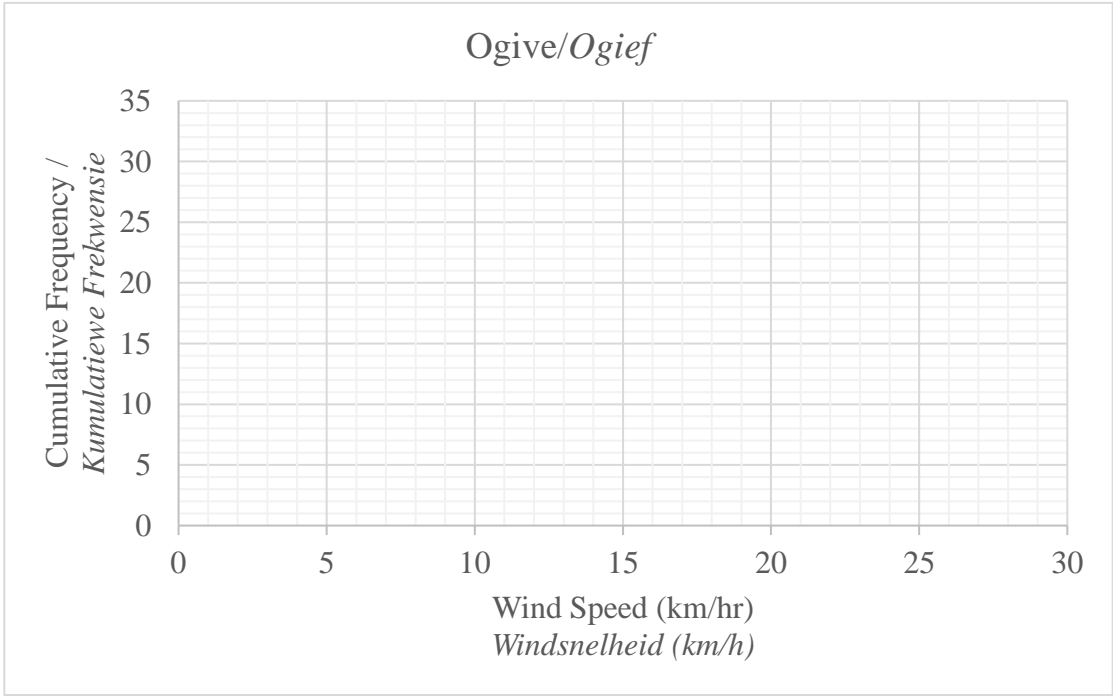
Marker/Merker			Moderator's Initials / Moderator se paraaf															
Question <i>Vraag</i>	Mark <i>Punt</i>	Initial <i>Parafeer</i>	Marks <i>Punte</i>	S M	Marks <i>Punte</i>	D M	Marks <i>Punte</i>	P M	Marks <i>Punte</i>	NM								
1																		
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		
11																		
TOTAL <i>TOTAAL</i>																		

This special answer book consists of 22 pages./
Hierdie spesiale antwoordeboek bestaan uit 22 bladsye.

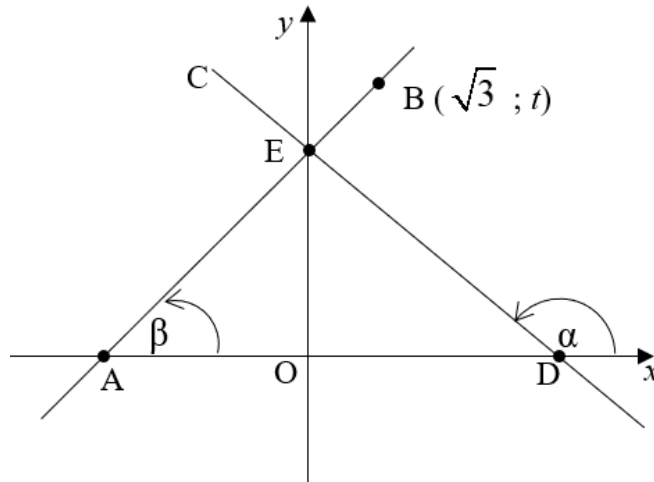
QUESTION 1/VRAAG 1

440 ; 520 ; 480 ; 560 ; 615 ; 550 ; 620 ; 680 ; 540 ; 490		
1.1		(2)
1.2		(1)
1.3		(5)
1.4		(2)
1.5		(3)
		[13]

QUESTION 2/VRAAG 2

2.1	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="padding: 5px;">Wind Speed (km/hr) <i>Windsnelheid</i> (km/h)</th> <th style="padding: 5px;">Frequency <i>Frekwensie</i></th> <th style="padding: 5px;">Cumulative Frequency <i>Kumulatiewe</i> <i>Frekwensie</i></th> </tr> </thead> <tbody> <tr><td style="padding: 5px;">$10 < x \leq 12$</td><td style="padding: 5px;">1</td><td style="padding: 5px;">1</td></tr> <tr><td style="padding: 5px;">$12 < x \leq 14$</td><td style="padding: 5px;">2</td><td style="padding: 5px;">3</td></tr> <tr><td style="padding: 5px;">$14 < x \leq 16$</td><td style="padding: 5px;"></td><td style="padding: 5px;">6</td></tr> <tr><td style="padding: 5px;">$16 < x \leq 18$</td><td style="padding: 5px;">4</td><td style="padding: 5px;">10</td></tr> <tr><td style="padding: 5px;">$18 < x \leq 20$</td><td style="padding: 5px;">7</td><td style="padding: 5px;"></td></tr> <tr><td style="padding: 5px;">$20 < x \leq 22$</td><td style="padding: 5px;">7</td><td style="padding: 5px;">24</td></tr> <tr><td style="padding: 5px;">$22 < x \leq 24$</td><td style="padding: 5px;">4</td><td style="padding: 5px;">28</td></tr> <tr><td style="padding: 5px;">$24 < x \leq 26$</td><td style="padding: 5px;"></td><td style="padding: 5px;">30</td></tr> <tr><td style="padding: 5px;">$26 < x \leq 28$</td><td style="padding: 5px;">1</td><td style="padding: 5px;"></td></tr> </tbody> </table>	Wind Speed (km/hr) <i>Windsnelheid</i> (km/h)	Frequency <i>Frekwensie</i>	Cumulative Frequency <i>Kumulatiewe</i> <i>Frekwensie</i>	$10 < x \leq 12$	1	1	$12 < x \leq 14$	2	3	$14 < x \leq 16$		6	$16 < x \leq 18$	4	10	$18 < x \leq 20$	7		$20 < x \leq 22$	7	24	$22 < x \leq 24$	4	28	$24 < x \leq 26$		30	$26 < x \leq 28$	1		(2)
Wind Speed (km/hr) <i>Windsnelheid</i> (km/h)	Frequency <i>Frekwensie</i>	Cumulative Frequency <i>Kumulatiewe</i> <i>Frekwensie</i>																														
$10 < x \leq 12$	1	1																														
$12 < x \leq 14$	2	3																														
$14 < x \leq 16$		6																														
$16 < x \leq 18$	4	10																														
$18 < x \leq 20$	7																															
$20 < x \leq 22$	7	24																														
$22 < x \leq 24$	4	28																														
$24 < x \leq 26$		30																														
$26 < x \leq 28$	1																															
2.2	<p style="text-align: center;"><i>Ogive/Ogief</i></p> 	(3)																														
2.3.1		(2)																														
2.3.2		(2)																														
		[9]																														

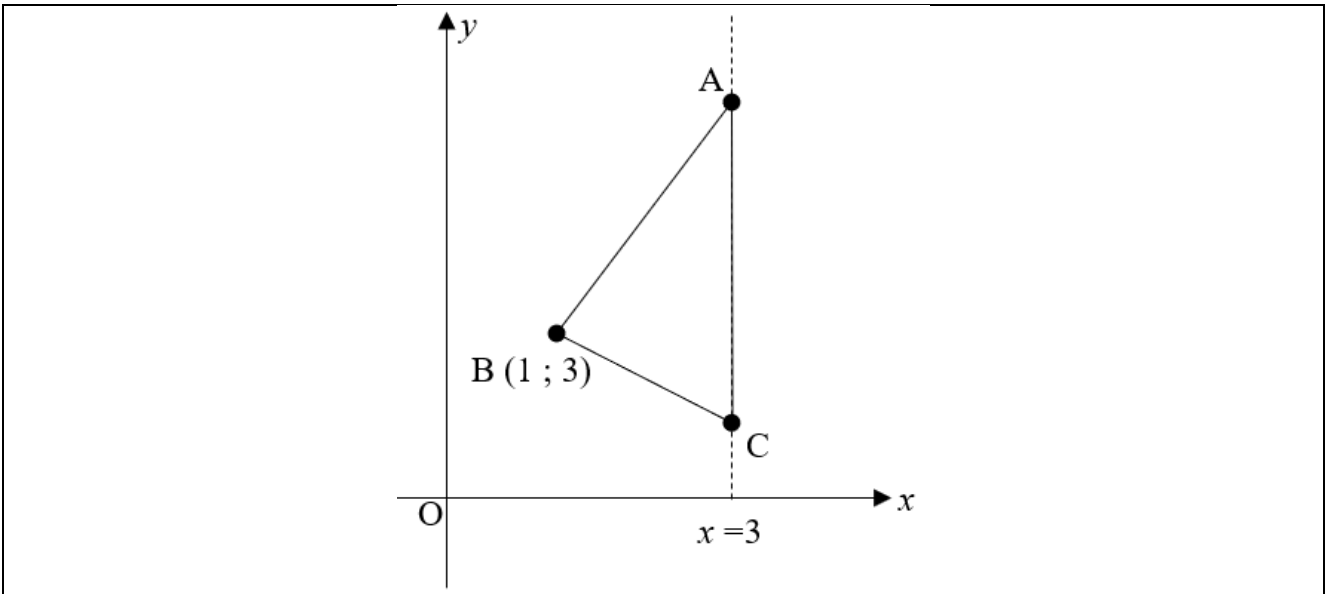
QUESTION 3/VRAAG 3



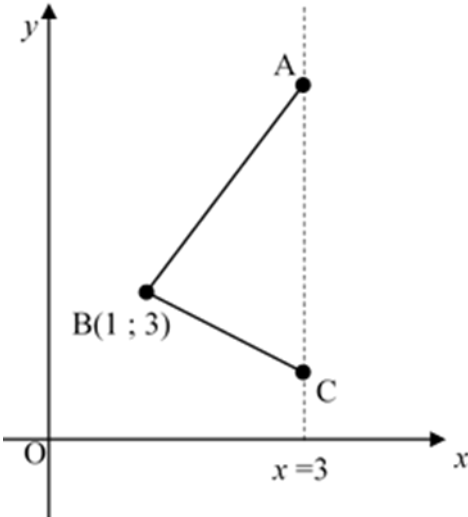
3.1	<div style="border-bottom: 1px solid black; height: 20px; width: 100%;"></div> <div style="border-bottom: 1px solid black; height: 20px; width: 100%;"></div> <div style="border-bottom: 1px solid black; height: 20px; width: 100%;"></div> <div style="border-bottom: 1px solid black; height: 20px; width: 100%;"></div>	(2)
3.2	<div style="border-bottom: 1px solid black; height: 20px; width: 100%;"></div> <div style="border-bottom: 1px solid black; height: 20px; width: 100%;"></div> <div style="border-bottom: 1px solid black; height: 20px; width: 100%;"></div> <div style="border-bottom: 1px solid black; height: 20px; width: 100%;"></div> <div style="border-bottom: 1px solid black; height: 20px; width: 100%;"></div>	(2)
3.3	<div style="border-bottom: 1px solid black; height: 20px; width: 100%;"></div> <div style="border-bottom: 1px solid black; height: 20px; width: 100%;"></div> <div style="border-bottom: 1px solid black; height: 20px; width: 100%;"></div> <div style="border-bottom: 1px solid black; height: 20px; width: 100%;"></div> <div style="border-bottom: 1px solid black; height: 20px; width: 100%;"></div>	(2)
3.4	<div style="border-bottom: 1px solid black; height: 20px; width: 100%;"></div>	(1)

3.5		(3)
3.6		(2)
3.7		(5)
	[17]	

QUESTION 4/VRAAG 4



4.1		(4)
4.2		(2)

4.3		(2)
4.4		(3)
4.5		(2)

[13]

QUESTION 5/VRAAG 5

5.1		
5.1.1		(3)
5.1.2		(2)
5.2.1		(5)
5.2.2		(2)

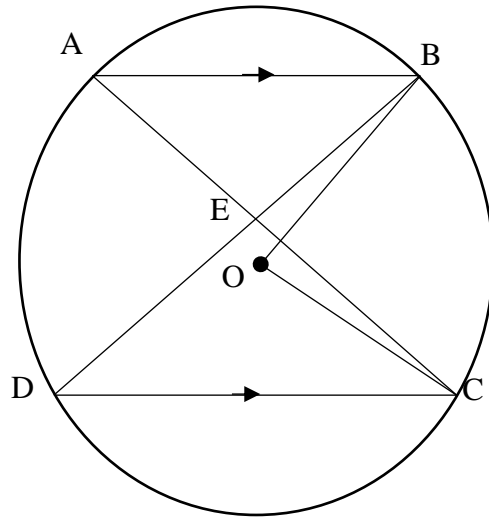
5.3		(4)
5.4		(6)
	(6)	
	[22]	

QUESTION 6/VRAAG 6

6.1		(6)
6.2.1		(1)
6.2.2		(2)
6.2.3		(2)
6.3		(2)
		[13]

QUESTION 8/VRAAG 8

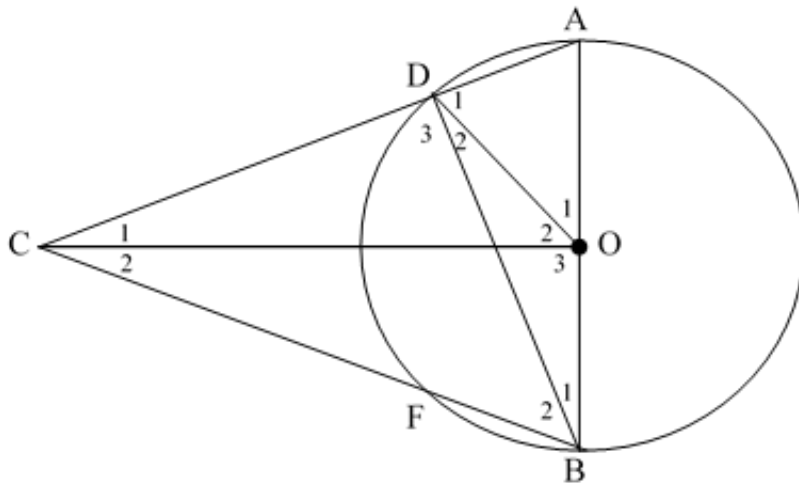
8.1



8.1.1	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	(3)
8.1.2(a)	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	(2)
8.1.2(b)	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	(2)

8.2									
8.2.1(a)		(2)							
8.2.1(b)		(2)							
8.2.1(c)		(2)							
8.2.2	<table border="1" style="width: 100%; height: 100%;"> <tr><td style="height: 20px;"></td></tr> <tr><td style="height: 20px;"></td></tr> <tr><td style="height: 20px;"></td></tr> <tr><td style="height: 20px;"></td></tr> <tr><td style="height: 20px;"></td></tr> <tr><td style="height: 20px;"></td></tr> <tr><td style="height: 20px;"></td></tr> </table>								(3)

8.3



8.3.1

(4)

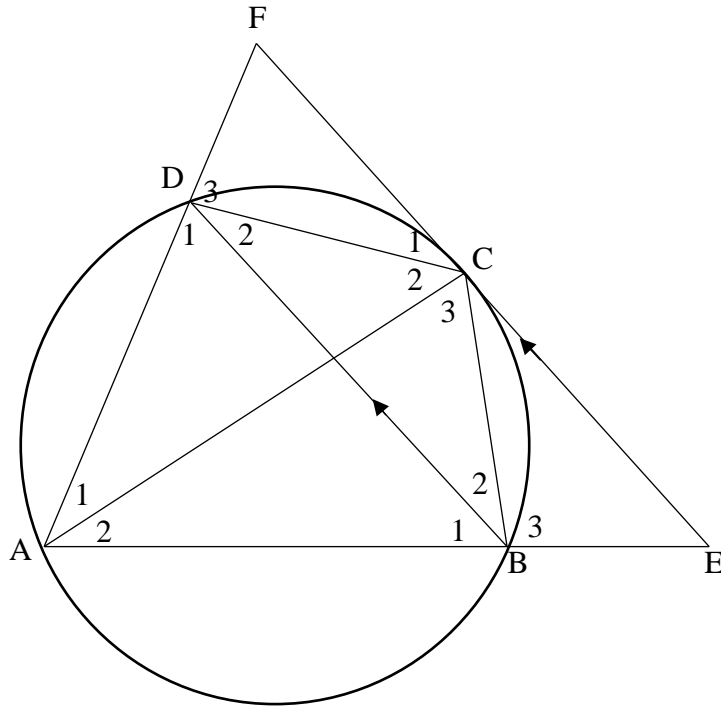
8.3.2

(2)

[22]

<p>9.2</p>		
<p>9.2.1</p>		
		<p>(2)</p>
<p>9.2.2</p>		
		<p>(2)</p>
<p>9.3</p>		<p>(3)</p>

9.4



9.4.1

(3)

9.4.2

(3)

[18]

QUESTION 10/VRAAG 10

10.1		(4)
10.2		(2)
		[6]

QUESTION 11/VRAAG 11

11		
	(4)	
	[4]	

TOTAL/TOTAAL: 150



Province of the
EASTERN CAPE
EDUCATION

**NATIONAL
SENIOR CERTIFICATE
*NASIONALE
SENIOR SERTIFIKAAT***

GRADE/*GRAAD* 11

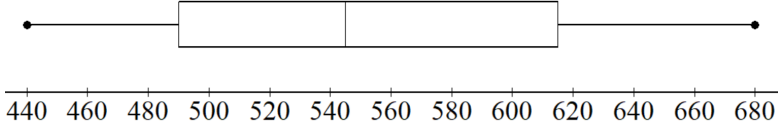
NOVEMBER 2019

**MATHEMATICS P2/*WISKUNDE V2*
MARKING GUIDELINE/*NASIENRIGLYN***

MARKS/*PUNTE*: 150

This marking guideline consists of 13 pages.
Hierdie nasien riglyn bestaan uit 13 bladsye.

QUESTION 1/VRAAG 1

1.1	$\bar{x} = 549,5$	✓✓ answer/antwoord	(2)
1.2	SD = 69,08	✓ answer/antwoord	(1)
1.3	Min/Min : 440 Q ₁ : 490 Q ₂ : 545 Q ₃ : 615 Max/Maks : 680 	✓ Min and max/ <i>Min en maks</i> ✓ Q ₁ ✓ Q ₂ ✓ Q ₃ ✓ box correctly in place / <i>diagram korrek</i> <i>geteken</i>	(5)
1.4	Data skewed slightly right as mean > median	✓✓ slightly skewed to the right/ positively skewed <i>effens skeef na regs / positief skeef</i>	(2)
1.5	Snack bars have greater variety in energy levels as the SD is greater than that of the cereals which means the data is more widely spread about the mean. <i>Peuselstaffies het 'n groter verskeidenheid in</i> <i>energievlakke omdat die SA groter as die van</i> <i>die graanpapsoorte, wat beteken dat die data</i> <i>meer wyd verspreid rondom die gemiddelde is.</i>	✓ snack bars / <i>peuselstaffies</i> ✓ greater SD hence / <i>groter SA</i> ✓ greater spread about the mean / <i>groter verspreiding om die</i> <i>gemiddelde</i>	(3)
			[13]

QUESTION 2/VRAAG 2

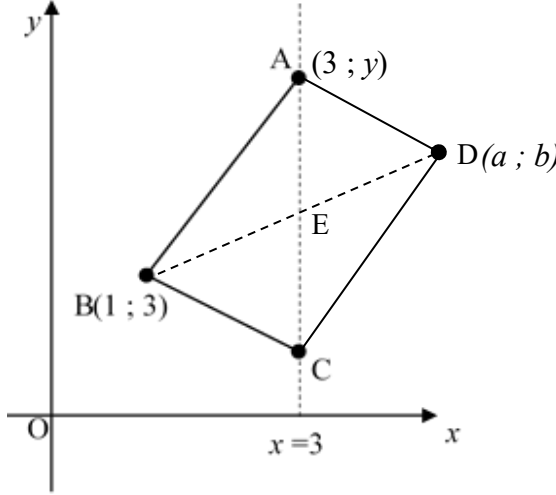
<p>2.1</p>	<table border="1"> <thead> <tr> <th>Wind Speed (km/hr) <i>Windsnelheid(km/h)</i></th> <th>Frequency <i>Frekwensie</i></th> <th>Cumulative Frequency <i>Kumulatiewe Frekwensie</i></th> </tr> </thead> <tbody> <tr> <td>$10 < x \leq 12$</td> <td>1</td> <td>1</td> </tr> <tr> <td>$12 < x \leq 14$</td> <td>2</td> <td>3</td> </tr> <tr> <td>$14 < x \leq 16$</td> <td>3</td> <td>6</td> </tr> <tr> <td>$16 < x \leq 18$</td> <td>4</td> <td>10</td> </tr> <tr> <td>$18 < x \leq 20$</td> <td>7</td> <td>17</td> </tr> <tr> <td>$20 < x \leq 22$</td> <td>7</td> <td>24</td> </tr> <tr> <td>$22 < x \leq 24$</td> <td>4</td> <td>28</td> </tr> <tr> <td>$24 < x \leq 26$</td> <td>2</td> <td>30</td> </tr> <tr> <td>$26 < x \leq 28$</td> <td>1</td> <td>31</td> </tr> </tbody> </table>	Wind Speed (km/hr) <i>Windsnelheid(km/h)</i>	Frequency <i>Frekwensie</i>	Cumulative Frequency <i>Kumulatiewe Frekwensie</i>	$10 < x \leq 12$	1	1	$12 < x \leq 14$	2	3	$14 < x \leq 16$	3	6	$16 < x \leq 18$	4	10	$18 < x \leq 20$	7	17	$20 < x \leq 22$	7	24	$22 < x \leq 24$	4	28	$24 < x \leq 26$	2	30	$26 < x \leq 28$	1	31	<p>✓ complete freq. column <i>voltooi frekwensie kolom</i></p> <p>✓ complete cum. freq. column / <i>voltooi kum. frekwensie kolom</i></p>	<p>(2)</p>
Wind Speed (km/hr) <i>Windsnelheid(km/h)</i>	Frequency <i>Frekwensie</i>	Cumulative Frequency <i>Kumulatiewe Frekwensie</i>																															
$10 < x \leq 12$	1	1																															
$12 < x \leq 14$	2	3																															
$14 < x \leq 16$	3	6																															
$16 < x \leq 18$	4	10																															
$18 < x \leq 20$	7	17																															
$20 < x \leq 22$	7	24																															
$22 < x \leq 24$	4	28																															
$24 < x \leq 26$	2	30																															
$26 < x \leq 28$	1	31																															
<p>2.2</p>	<p style="text-align: center;"><i>Ogive / Ogief</i></p>	<p>✓ upper boundary values <i>boonste grens waardes</i></p> <p>✓ correct points <i>korrekte punte</i></p> <p>✓ smooth curve <i>egalige kurwe</i></p>	<p>(3)</p>																														
<p>2.3.1</p>	<p>Median wind speed = 17,5 km/hr <i>Gemiddelde windsnelheid = 17,5 km/h</i></p>	<p>✓✓ answer with units <i>antwoord met eenhede</i></p>	<p>(2)</p>																														
<p>2.3.2</p>	<p>$31 - 29 = 2$ days/<i>dae</i></p>	<p>✓ 29 ✓ answer / <i>antwoord</i></p>	<p>(2)</p>																														
			<p>[9]</p>																														

QUESTION 3 / VRAAG 3

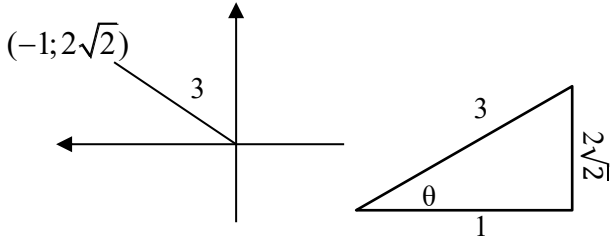
3.1	$3(0) + 2y = 6$ $y = 3$ E (0 ; 3)	✓ substitution / <i>vervanging</i> $x = 0$ ✓ answer / <i>antwoord</i>	(2)
3.2	$y = -\frac{3}{2}x + 3$ $m_{CD} = -\frac{3}{2}$	✓ standard form / <i>standaardvorm</i> ✓ answer / <i>antwoord</i>	(2)
3.3	$\tan^{-1}\left(-\frac{3}{2}\right) = -56.31^\circ$ $\therefore \alpha = 180^\circ - 56.31^\circ$ $\therefore \alpha = 123.69^\circ$ OR Ref. angle / Verw. hoek $= \tan^{-1}\left(\frac{3}{2}\right) = 56.31^\circ$ $\therefore \alpha = 180^\circ - 56.31^\circ$ $\therefore \alpha = 123.69^\circ$	✓ \tan^{-1} ✓ answer / <i>antwoord</i>	(2)
3.4	$\beta = 123.69^\circ - 63.69^\circ$ $\beta = 60^\circ$	✓ answer / <i>antwoord</i>	(1)
3.5	Gradient of/van AB : $\tan(60^\circ) = \sqrt{3}$ E(0 ; 3) $\therefore y = \sqrt{3}x + 3$	✓ use of tan / <i>gebruik van tan</i> ✓✓ answer / <i>antwoord</i>	(3)
3.6	$t = \sqrt{3}(\sqrt{3}) + 3$ $t = 6$	✓ substitute/ <i>vervang</i> $x = \sqrt{3}$ ✓ answer / <i>antwoord</i>	(2)

<p>3.7</p>	<p> $0 = \sqrt{3}x + 3$ $\frac{-3}{\sqrt{3}} = x$ $\therefore x = -\sqrt{3}$, hence/vervolgens $A(-\sqrt{3}; 0)$ $3x + 2(0) = 6$ $x = 2$, hence/vervolgens $D(2; 0)$ </p> <p> Length of AD (base of ΔABD) <i>Lengte van AD (basis van ΔABD)</i> $= \sqrt{3} + 2 = 3,73$ Height/<i>Hoogte</i> = 6 </p> <p> Hence area ΔABD / <i>Vervolgens is oppervlakte van ΔABD</i> $= \frac{1}{2} \times 3,73 \times 6$ $= 11,19 \text{ units}^2/\text{eenhede}^2$ </p> <p> OR </p> <p> Length of AD (base of ΔABD) <i>Lengte van AD (basis van ΔABD)</i> $= \sqrt{3} + 2$ </p> <p> Hence area ΔABD / <i>Vervolgens is oppervlakte van ΔABD</i> $= \frac{1}{2} \times (\sqrt{3} + 2) \times 6$ $= 11,20 \text{ units}^2$ </p>	<p> \checkmark calculation of A / <i>berekening van A</i> </p> <p> \checkmark calculation of D / <i>berekening van D</i> </p> <p> \checkmark height / <i>hoogte</i> </p> <p> \checkmark area formula / <i>oppervlakte formule</i> \checkmark answer / <i>antwoord</i> </p>	<p>(5)</p>
			<p>[17]</p>

QUESTION 4 / VRAAG 4

4.1	 <p> $(2\sqrt{5})^2 = (3-1)^2 + (y-3)^2$ $20 = 4 + (y-3)^2$ $16 = (y-3)^2$ OR/OF $20 = 4 + y^2 - 6y + 9$ $3 \pm 4 = y$ OR/OF $0 = y^2 - 6y - 7$ $y = 7$ or -1 OR/OF $0 = (y-7)(y+1)$ $A(3; 7)$ </p>	<p> ✓ distance formula <i>afstand formule</i> ✓ $x = 3$ and/en $(y - 3)$ ✓ solving for y <i>oplossing vir y</i> </p> <p> ✓ coordinates <i>koördinate</i> </p>	(4)
4.2	C(3; 2)	<p> ✓✓ coordinates <i>koördinate</i> </p>	(2)
4.3	$\left(\frac{3+3}{2}; \frac{7+2}{2}\right) = (3; 4,5)$	<p> ✓✓ substitution in corr formula <i>vervanging in korrekte formule</i> </p>	(2)
4.4	$\left(\frac{1+a}{2}; \frac{3+b}{2}\right) = (3; 4,5)$ $\frac{1+a}{2} = 3 \Rightarrow 1+a = 6 \Rightarrow a = 5$ $\frac{3+b}{2} = 4,5 \Rightarrow 3+b = 9 \Rightarrow b = 6$ D(5;6) OR/OF using the gradient of AB = $\frac{4}{2}$ = gradient of BC Hence C(3;2) moved up 4 and across 2 \Rightarrow D(5;6)	<p> ✓ use of midpoint theorem <i>Gebruik van middelpunt stelling</i> </p> <p> ✓✓ coordinates of D <i>koördinate van D</i> </p> <p> ✓ gradient/<i>gradiënt</i> </p> <p> ✓✓ coordinates of D </p>	(3)
4.5	B'(9;0)		(2)
[13]			

QUESTION 5/VRAAG 5

5.1		✓ diagram / <i>diagram</i>	
5.1.1	$\begin{aligned} \tan(180^\circ + \theta) \\ &= \tan \theta \\ &= -2\sqrt{2} \end{aligned}$	✓ reduction / <i>reduksie</i> ✓ answer / <i>antwoord</i>	(3)
5.1.2	$\begin{aligned} 3\sin(\theta - 90^\circ) \\ &= 3(-\cos \theta) \\ &= 3\left(-\frac{1}{3}\right) \\ &= -1 \end{aligned}$	✓ reduction / <i>reduksie</i> ✓ answer / <i>antwoord</i>	(2)
5.2.1	$\begin{aligned} \frac{\sin(-210^\circ)}{\cos(300^\circ)} + \frac{\cos(x+90^\circ)}{\sin(360^\circ+x)} \\ \frac{\sin 30^\circ}{\cos 60^\circ} + \frac{-\sin x}{\sin x} \\ \frac{1}{2} \\ = \frac{2}{1} + -1 \\ = 1 - 1 \\ = 0 \end{aligned}$	✓✓ sin and cos reduction <i>sin en cos reduksie</i> ✓✓ cos and sin reduction <i>cos en sin reduksie</i> ✓ answer / <i>antwoord</i>	(5)
5.2.2	$\begin{aligned} \sin(360^\circ + x) \neq 0 \\ 360^\circ + x \neq 0^\circ + k \cdot 360^\circ \text{ or/of } 360^\circ + x \neq 180^\circ + k \cdot 360^\circ \\ x \neq -360^\circ; -180^\circ; 0; 180^\circ; 360^\circ \end{aligned}$	✓✓ answers / <i>antwoorde</i>	(2)
5.3	$\begin{aligned} \text{LHS/LK} : \tan \theta \sqrt{\frac{1}{\sin^2 \theta} - 1} \\ = \frac{\sin \theta}{\cos \theta} \sqrt{\frac{1 - \sin^2 \theta}{\sin^2 \theta}} \\ = \frac{\sin \theta}{\cos \theta} \sqrt{\frac{\cos^2 \theta}{\sin^2 \theta}} \\ = \frac{\sin \theta}{\cos \theta} \times \frac{\cos \theta}{\sin \theta} \\ = 1 \\ = \text{RHS/RK} \end{aligned}$	✓ single fraction/ <i>enkel breuk</i> ✓ changing tan/ <i>verander tan</i> ✓ identity / <i>identiteit</i> ✓ taking square root / <i>vierkantwortel</i>	(4)

5.4	$2\sin^2 \theta = 1 + \sin \theta$ $2\sin^2 \theta - \sin \theta - 1 = 0$ $(2\sin \theta + 1)(\sin \theta - 1) = 0$ $\sin \theta = -\frac{1}{2} \text{ or/of } \sin \theta = 1$ $\therefore \theta = -30^\circ + k.360^\circ \text{ or/of } \theta = 210^\circ + k.360^\circ$ <p>OR/OF $\theta = 330^\circ + k.360^\circ \text{ or/of } \theta = 210^\circ + k.360^\circ$ or/of $\theta = 90^\circ + k.360^\circ ; k \in \mathbb{Z}$</p>	<p>✓ standard form / <i>standaardvorm</i></p> <p>✓ factorising / <i>faktorisering</i></p> <p>✓ solving / <i>los op</i></p> <p>✓✓✓ solutions / <i>oplossings</i> Penalise 1 mark if no $k \in \mathbb{Z}$ <i>Penaliseer 1 punt indien geen $k \in \mathbb{Z}$</i></p>	(6)
			[22]

QUESTION 6 / VRAAG 6

<p>6.1</p>		<p><i>f</i></p> <ul style="list-style-type: none"> ✓ turning pts/draaipunte ✓ x-intercepts/x-afsnitte ✓ y-intercept / y-afsnit <p><i>g</i>:</p> <ul style="list-style-type: none"> ✓ intercepts / afsnitte ✓ turning pts/draaipunte ✓ shape / vorm 	<p>(6)</p>
<p>6.2.1</p>	<p>$x = 0^\circ$</p>	<p>✓ answer/antwoord</p>	<p>(1)</p>
<p>6.2.2</p>	<p>$x \in [-90^\circ ; 90^\circ]$ OR/OF $-90^\circ \leq x \leq 90^\circ$</p>	<p>✓✓ interval end points / interval eindpunte</p>	<p>(2)</p>
<p>6.2.3</p>	<p>$x \in (0^\circ ; 45^\circ)$ OR/OF $0^\circ < x < 45^\circ$ $x \in (135^\circ ; 180^\circ)$ OR/OF $135^\circ < x < 180^\circ$</p>	<p>✓ answer/antwoord ✓ answer/antwoord</p>	<p>(2)</p>
<p>6.3</p>	<p>$h(x) = 2\cos(x - 30^\circ)$</p>	<p>✓ positive cos / positiewe cos ✓ $(x - 30^\circ)$</p>	<p>(2)</p>
			<p>[13]</p>

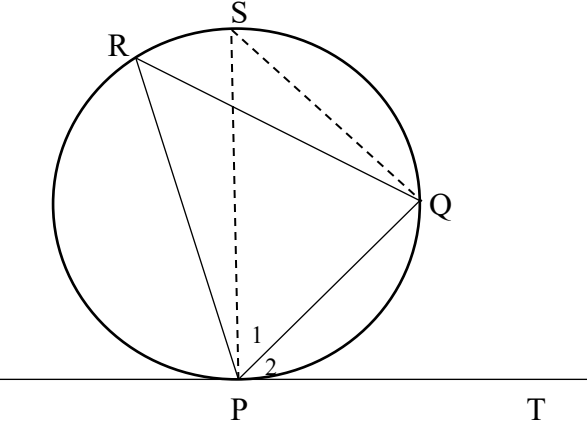
QUESTION 7 / VRAAG 7

7.1.1	$\widehat{BDC} = 70^\circ$	✓ answer / antwoord	(1)
7.1.2	$\frac{BD}{\sin 50^\circ} = \frac{5}{\sin 20^\circ}$ $BD = \frac{5 \sin 50^\circ}{\sin 20^\circ}$ $BD = 11,20 \text{ m}$ $\sin 70^\circ = \frac{BC}{11,2}$ $BC = 11,2 \times \sin 70^\circ$ $BC = 10,52 \text{ m}$	✓ sine rule / sinusreël ✓ correct substitution / korrekte vervanging ✓ answer for AC / antwoord vir AC ✓ sine ratio/sinus verhouding ✓ answer / antwoord	(5)
7.2.1	$AB^2 = r^2 + r^2 - 2 \times r \times r \times \cos 45^\circ$ $AB^2 = 2r^2(1 - \cos 45^\circ)$ $AB^2 = r^2 \left(2 - 2 \times \frac{\sqrt{2}}{2}\right)$ $AB = r(\sqrt{2} - \sqrt{2})$ $\text{Perimeter/Omtrek} = 8 \times AB = 8r\sqrt{2} - \sqrt{2}$	✓ use of cos rule gebruik van cos-reël ✓ expression for AB uitdrukking vir AB ✓ answer / antwoord	(3)
7.2.2	Area of the octagon / <i>Oppervlakte van agthoek</i> $= 8 \times \text{area } \triangle AOB$ $= 8 \times \frac{1}{2} \times r \times r \times \sin 45^\circ$ $= 8 \times \frac{1}{2} \times r \times r \times \frac{\sqrt{2}}{2}$ $= 2\sqrt{2}r^2$	✓ $\times 8$ ✓ angle in triangle/hoek in driehoek ✓ area formula/oppervlakte formule ✓ $\sin 45^\circ$ value / waarde	(4)
			[13]

QUESTION 8 / VRAAG 8

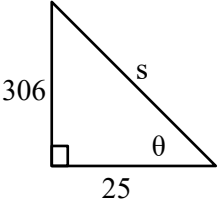
8.1.1	$\hat{A} = 45^\circ$ (\angle at centre = $2 \times \angle$ at circum.) <i>(Middelpunts $\angle = 2 \times$ Omtreks \angle)</i> $\hat{D} = 45^\circ$ (\angle s in the same seg./ \angle e in dieselfde segm.) $\hat{A}\hat{C}\hat{D} = 45^\circ$ OR/OF $\hat{A}\hat{B}\hat{D} = 45^\circ$ (<i>alt \angle's \parallel lines</i>)	\checkmark (S) and (R) (S) en (R) \checkmark S \checkmark R	(3)
8.1.2 (a)	R.T.P./Te Bewys: $CE = DE$ Proof/Bewys : $\hat{A}\hat{C}\hat{D} = \hat{D}$ (proved above / <i>bo bewys</i>) $\therefore CE = DE$ (equal sides opp equal \angle 's) (<i>gelyke sye teenoor gelyke hoeke</i>)	\checkmark S \checkmark R	(2)
8.1.2 (b)	R.T.P./Te Bewys : CD is the diameter of a circle passing through E, C and D gaan <i>CD is die middellyn van die sirkel deur punte E, C en D gaan</i> Proof/Bewys : $\hat{E} = 90^\circ$ (3 \angle 's/e Δ) $\therefore CD$ is diameter (line subtends 90°) <i>CD is die middellyn (lyn onderspan 90°)</i>	\checkmark S \checkmark R	(2)
8.2.1 (a)	$\hat{C}_1 = 70^\circ$ (equal \angle 's opp equal sides / <i>gelyke \anglee teenoor gelyke sye</i>)	\checkmark S \checkmark R	(2)
8.2.1 (b)	$\hat{A}_2 = 35^\circ$ (exterior \angle of Δ / <i>buitehoek van driehoek</i>)	\checkmark S \checkmark R	(2)
8.2.1 (c)	$\hat{B}_2 = 35^\circ$ (\angle 's in same segment / <i>\anglee in dieselde segment</i>)	\checkmark S \checkmark R	(2)
8.2.2	R.T.P./Te Bewys : $\hat{B}_1 = \hat{B}_2$ Proof/Bewys : $\hat{B}_2 = 35^\circ$ (proved above / <i>bo bewys</i>) $\hat{A}\hat{B}\hat{C} = \hat{C}_1 = 70^\circ$ (equal \angle 's opp equal sides / <i>gelyke \anglee teenoor gelyke sye</i>) $\therefore \hat{B}_1 = 70^\circ - 35^\circ$ $\therefore \hat{B}_1 = \hat{B}_2$ $\therefore BE$ bisects $\hat{A}\hat{B}\hat{C}$ / <i>BE halveer $\hat{A}\hat{B}\hat{C}$</i>	\checkmark S \checkmark R $\checkmark \hat{B}_1 = \hat{B}_2$	(3)
8.3.1	R.T.P./Te Bewys : $CDOB$ is a cyclic quadrilateral / <i>is 'n koordevierhoek</i> Proof/Bewys : $\hat{O}_3 = 90^\circ$ ($CO \perp AB$ given / <i>gegee</i>) $\hat{A}\hat{D}\hat{B} = 90^\circ$ (angle in a semi-circle)/(<i>hoek in halwe sirkel</i>) $\hat{D}_3 = 90^\circ$ (angles on st line) / (<i>hoeke op 'n reguitlyn</i>) $\therefore CDOB$ is a cyclic quadrilateral / <i>is 'n koordevierhoek</i> (\angle 's in same seg)	\checkmark S/R \checkmark S/R \checkmark S \checkmark S	(4)
8.3.2	R.T.P./Te Bewys. : $\hat{D}_2 = \hat{C}_1$ Proof/Bewys : $\hat{D}_2 = \hat{B}_1 = x$ (equal \angle 's opp equal radii)/ (<i>gelyke \anglee teenoor gelyke radiusse</i>) $\hat{B}_1 = \hat{C}_1 = x$ (\angle 's in the same segment of cyclic quad.) (<i>\anglee in dieselfde segment van koordevierhoek</i>) $\therefore \hat{D}_2 = \hat{C}_1$	\checkmark S/R \checkmark S/R	(2)
			[22]

QUESTION 9 / VRAAG 9

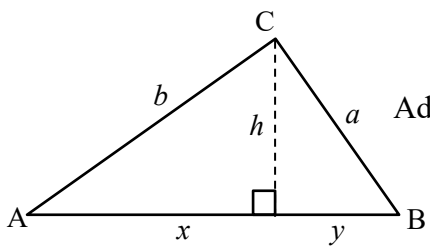
9.1	 <p>R.T.P/Te Bewys : $\hat{P}_2 = \hat{R}$ Construction: Draw diameter SP. Join SQ Konstruksie: Teken middellyn SP. Verbind SQ Proof/Bewys : $\hat{P}_1 + \hat{P}_2 = 90^\circ$ (tang \perp diameter)/ (raaklyn \perp middellyn) $\hat{S}\hat{Q}P = 90^\circ$ (\angle in semi-circle)/(\angle in halwe sirkel) $\hat{P}_1 + \hat{S} = 90^\circ$ (\angle's in Δ) / (\anglee in Δ) But/Maar $\hat{S} = \hat{R}$ (\angle's in same segment) / (\anglee in dieselfde segment) $\therefore \hat{P}_1 + \hat{R} = \hat{P}_1 + \hat{P}_2 = 90^\circ$ Hence/Vervolgens is $\hat{R} = \hat{P}_2$</p>	<p>✓ construction/ konstruksie</p> <p>✓ S/R ✓ S/R ✓ S/R</p> <p>✓ S/R</p>	(5)
9.2.1	$\hat{B}_2 = y$ (tan chord thrm) / (raaklyn koord stelling)	✓ S ✓ R	(2)
9.2.2	$\hat{D}_3 = x + y$ (ext \angle of Δ) / (buite \angle van Δ)	✓ S ✓ R	(2)
9.3	R.T.P/Te Bewys : $AB \parallel EC$ Proof/Bewys : $\hat{C}_2 = \hat{D}_3 = x + y$ (\angle 's in same segment) (\angle 'e in dieselfde segment) $\hat{B}\hat{A}\hat{C} = x + y$ $\therefore AB \parallel EC$ (equal alt \angle 's) / (gelyke verw. \angle e)	<p>✓ S ✓ R</p> <p>✓ R</p>	(3)
9.4.1	R.T.P/Te Bewys : $\hat{C}_3 = \hat{F}$ Proof/Bewys : $\hat{C}_3 = \hat{D}_1$ (\angle 's in same segment) / (\angle 'e in dieselfde segment) $\hat{D}_1 = \hat{F}$ (corresp \angle 's \parallel lines) / (ooreenk. \angle : \parallel lyne) $\therefore \hat{C}_3 = \hat{F}$	<p>✓ S ✓ R ✓ S</p>	(3)

<p>9.4.2</p>	<p>R.T.P / <i>Te Bewys</i> : $\hat{A}CF = \hat{C}DF$ Proof / <i>Bewys</i> : $\hat{A}CF = 180^\circ - (\hat{A}_1 + \hat{F})$ (\angle's of Δ)/(<i>Le van Δ</i>) $\hat{C}DF = 180^\circ - (\hat{C}_1 + \hat{F})$ (\angle's of Δ)/(<i>Le van Δ</i>) But $\hat{C}_1 = \hat{A}_1$ (tan chord thrm) / (<i>raaklyn koord stelling</i>) $\therefore \hat{A}CF = \hat{C}DF$</p> <p style="text-align: center;">OR/OF</p> <p>$\hat{A}CF = \hat{C}_1 + \hat{C}_2$ and/en $\hat{C}_1 = \hat{B}_2$ (tan chord thrm)/(<i>raaklyn koord stelling</i>) $\hat{C}_2 = \hat{B}_1$ (\angle's in same segment)/(<i>Le in dies. segment</i>) $\hat{C}DF = \hat{B}_1 + \hat{B}_2$ (ext \angle cyclic quad) / (<i>buite \angle van k.v</i>)</p>	<p>✓ S ✓ S ✓ R ✓ S ✓ S ✓ R</p>	<p>(3) [18]</p>
--------------	--	---	-----------------------------

QUESTION 10 / VRAAG 10

<p>10.1</p>	<p>Surface area of sides = $\frac{1}{2} \times$ perimeter of the base \times slant ht <i>Buite oppervlakte van sye = $\frac{1}{2} \times$ omtrek van basis \times skuinshg</i></p> <p>Slant height/<i>Skuinshoogte</i>: $306^2 = 25^2 + (s)^2$ Pythagoras $s = 304,98$ m</p>  <p style="text-align: center;">$SA = \frac{1}{2} \times 4(50) \times 304,98$ $= 30498 \text{ m}^2$</p>	<p>✓ Pytha eqn <i>Pyth. verg.</i> ✓ 25m ✓ substitution in formula <i>vervanging in formule</i> ✓ answer / <i>antwoord</i></p>	<p>(4) [6]</p>
<p>10.2</p>	<p>$\tan^{-1} \theta = \frac{306}{25}$ $\theta = 85,33^\circ$</p>	<p>✓ arctan ✓ answer / <i>antwoord</i></p>	<p>(2)</p>

QUESTION 11 / VRAAG 11

 <p style="text-align: center;">$a^2 = h^2 + y^2$ $b^2 = h^2 + x^2$ Adding/<i>Optel</i> : $a^2 + b^2 = 2h^2 + x^2 + y^2$ $= 2(xy) + x^2 + y^2$ $a^2 + b^2 = (x + y)^2$ $BC^2 + AC^2 = AB^2$</p> <p>Hence triangle is rht \angle'd given : $h^2 = xy$ <i>Die driehoek is vervolgens reghoekig, gegee dat: $h^2 = xy$</i></p>	<p>✓ use of Pythag <i>gebruik van Pyth.</i></p> <p>✓ adding / <i>optel</i> ✓ substitution / <i>vervanging</i></p> <p>✓ factorising / <i>faktorisering</i></p> <p style="text-align: right;">[4]</p>
---	--

TOTAL/TOTAAL: 150