



**basic education**  
 Department  
 Basic Education  
 REPUBLIC OF SOUTH AFRICA

Candidate Barcode label/Stafieskodeplakker

SC/NSC Answer Book  
 SS/NSS-antwoordeboek

Senior Certificate/National Senior Certificate/*Senior Sertifikaat/Nasionale Senior Sertifikaat* (Grade 12/*Graad 12*) 2023

CENTRE NUMBER SENTRUMNOMMER									
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EXAMINATION NUMBER EKSAMENNOMMER																		
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DATE DATUM					
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BOOK NUMBER BOEKNOMMER		OF VAN		BOOKS BOEKE
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SUBJECT CODE VARKODE					
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PAPER NUMBER VRAESTELNOMMER	2
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SUBJECT NAME VAKNAAM	<b>TECHNICAL MATHEMATICS/TEGNIESE WISKUNDE</b>
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MARKER/NASIENER			MODERATOR'S INITIALS IN RELEVANT BLOCK/ MODERATORPARAAF IN BETROKKE BLOKKIE					RE-MARK/RE-CHECK/ HERNASIEN/HERKONTROLEER			
Question Vraag	Marks Punte	Marker's Code & Initials	Marks Punte	SM	DCM	CM	IM	EM	Question Vraag	Marks Punte	Initials Paraaf
1									1		
2									2		
3									3		
4									4		
5									5		
6									6		
7									7		
8									8		
9									9		
10									10		
11									11		
12									12		
13									13		
14									14		
15									15		
16									16		

				<b>TOTAL TOTAAL</b>				

<b>TOTAL TOTAAL</b>			
<b>HASH TOTAL KAFTOTAAL</b>			

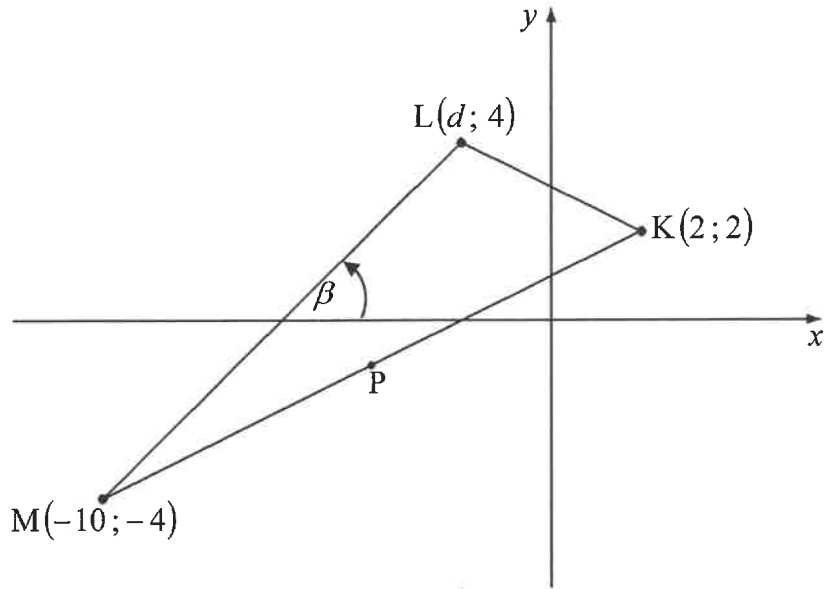
CONTROLLED AND CERTIFIED CORRECT  
 SURNAME AND INITIALS OF EA)

PLEASE READ INSTRUCTIONS ON THE NEXT PAGE  
 LEES ASSEBLIEF INSTRUKSIES OP VOLGENDE BLADSY

**This answer book consists of 28 pages/Hierdie antwoordeboek bestaan uit 28 bladsye.**

PLEASE FOLLOW THESE INSTRUCTIONS CAREFULLY	VOLG ASSEBLIEF HIERDIE INSTRUKSIES NOUKEURIG
<p>1. Your examination number and centre number must be clearly written in the space provided and attach your examination number sticker in the space provided.</p>	<p>1. Skryf jou eksamennommer en sentrumnummer duidelik in die ruimtes verskaf en plak jou eksamennommeretiket in die ruimte verskaf.</p>
<p>2. Remember that your own name (or the name of your school) may not appear anywhere on or in this answer book.</p>	<p>2. Onthou dat jou eie naam (of die naam van jou skool) nie op of in hierdie antwoordeboek mag voorkom nie.</p>
<p>3. Answer ALL questions in the spaces provided.</p>	<p>3. Beantwoord ALLE vrae in die ruimtes wat verskaf is.</p>
<p>4. No pages may be torn from this answer book.</p>	<p>4. Geen bladsye mag uit hierdie antwoordeboek geskeur word nie.</p>
<p>5. Read the instructions printed on your timetable carefully as well as any other instructions which may be given in each examination paper.</p>	<p>5. Lees die instruksies wat op jou eksamenrooster gedruk is sorgvuldig deur, asook enige ander instruksies wat in elke eksamenvraestel gegee word.</p>
<p>6. Candidates may not retain an answer book or remove it from the examination room. Answer books must be returned to the Invigilator at the end of the examination session.</p>	<p>6. Geen antwoordeboek mag deur die kandidaat behou of uit die eksamenlokaal verwyder word nie. Antwoordeboeke moet aan die einde van die eksamensessie aan die toesighouer terugbesorg word.</p>
<p>7. Answers must be written in black/blue ink as distinctly as possible. Do NOT write in the margins.</p>	<p>7. Skryf die antwoorde so duidelik moontlik met swart/blou ink. MOENIE in die kantlyn skryf NIE.</p>
<p>8. 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.</p>	<p>8. Dui die vrae wat jy beantwoord het op die voorblad van die antwoordeboek aan, waar die punte aangebring word, deur 'n kringetjie om die nommers van die vrae wat jy beantwoord het, te trek.</p>
<p>9. Draw a line through any work/rough work that must not be marked.</p>	<p>9. Trek 'n netjiese lyn deur enige werk/rofwerk wat nie nagesien moet word nie.</p>
<p>10. In the event that you use the additional space provided:                      10.1 Write down the question number question.                      10.2 Leave a line and rule off after your answer.</p>	<p>10. In geval jy die bykomende ruimte wat verskaf is, gebruik:                      10.1 Skryf die vraagnommer neer.                      10.2 Laat 'n lyn oop en trek 'n lyn na jou antwoord.</p>

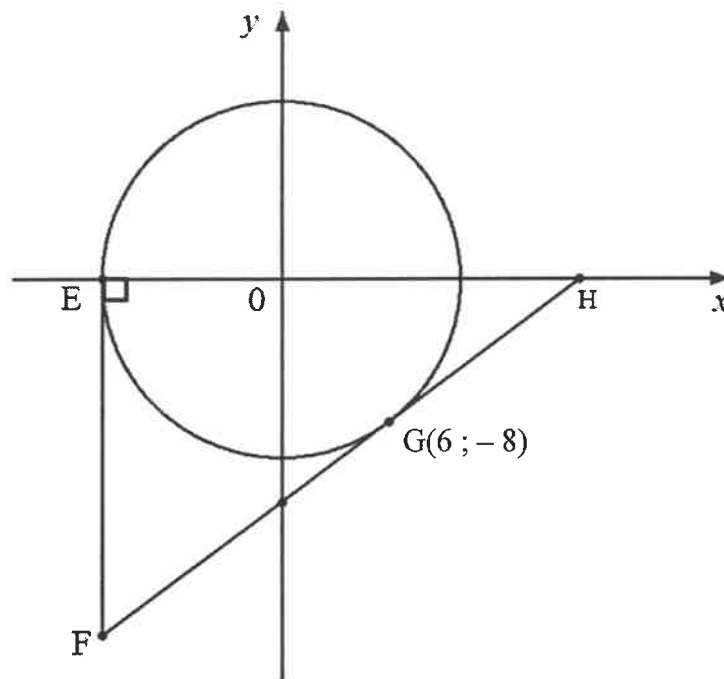
**QUESTION/VRAAG 1**



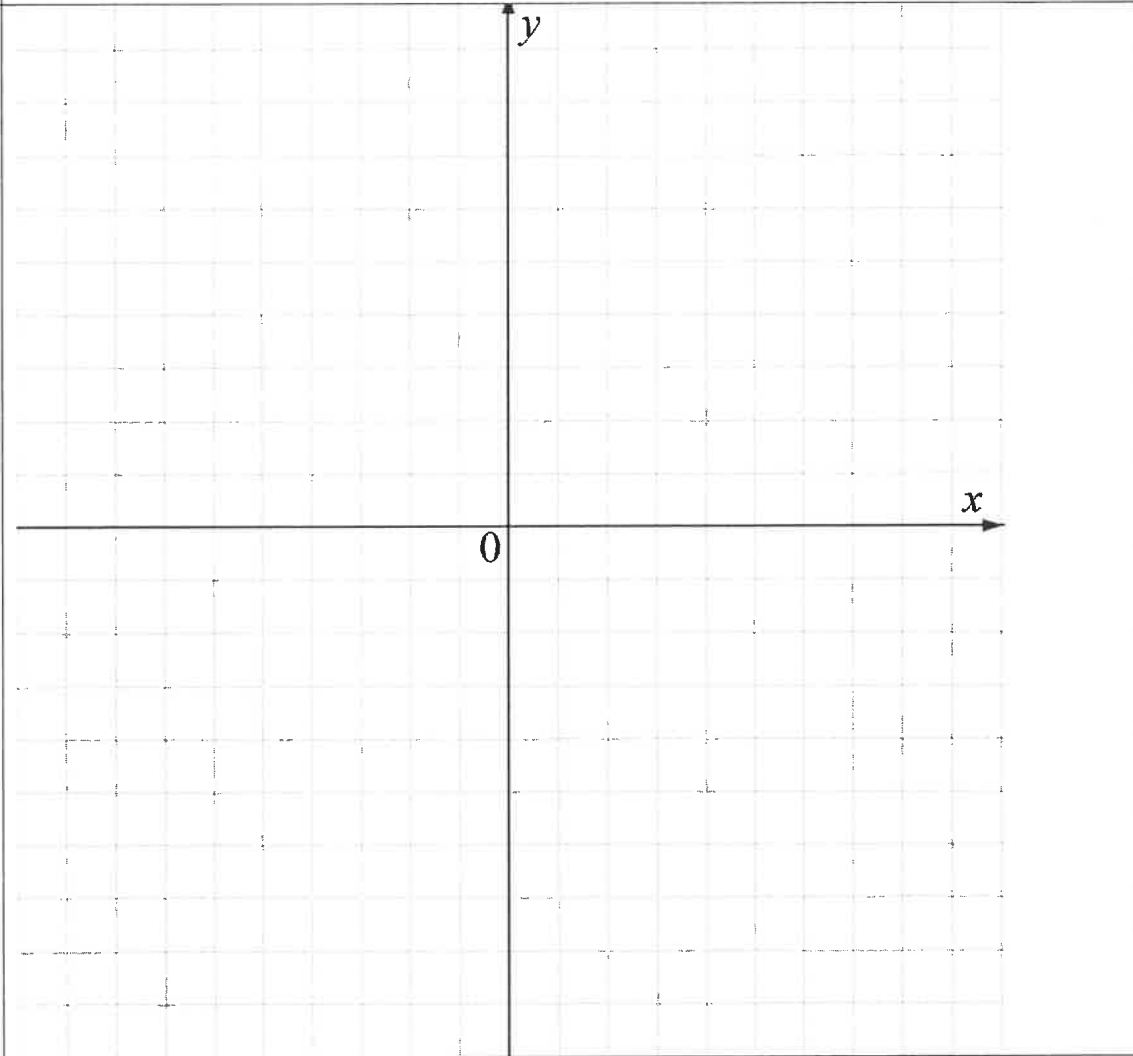
	<b>Solution/Oplissing</b>	<b>Marks Punte</b>
1.1		(1)
1.2.1		(2)
1.2.2		(2)
1.2.3		(2)

	<b>Solution/Oplossing</b>	<b>Marks Punte</b>
1.3.1		(1)
1.3.2		(2)
	<b>[10]</b>	

**QUESTION/VRAAG 2**



	<b>Solution/Oplossing</b>	<b>Marks Punte</b>
2.1.1		(3)
2.1.2		(5)

	<b>Solution/Oplissing</b>	<b>Marks Punte</b>
2.2		(1)
2.3		(5)
2.4		(3)
		<b>[17]</b>

**QUESTION/VRAAG 3**

	<b>Solution/Oplossing</b>	<b>Marks Punte</b>
3.1.1		(1)
3.1.2		(2)
3.2		(5)

	<b>Solution/Oplossing</b>	<b>Marks Punte</b>
3.3		

(5)

[13]

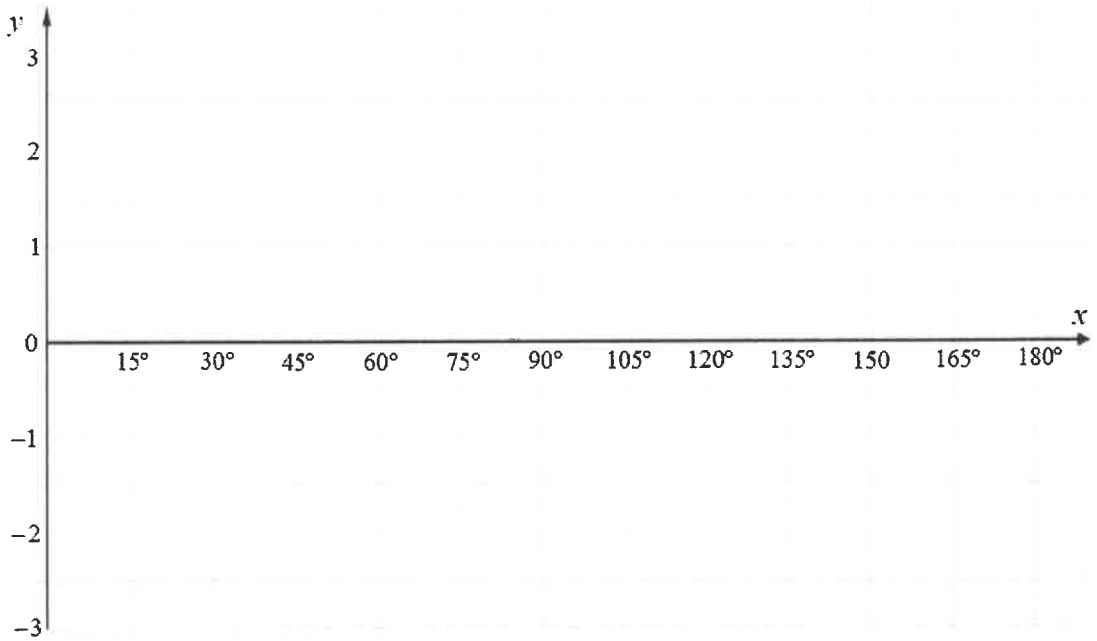


**QUESTION/VRAAG 4**

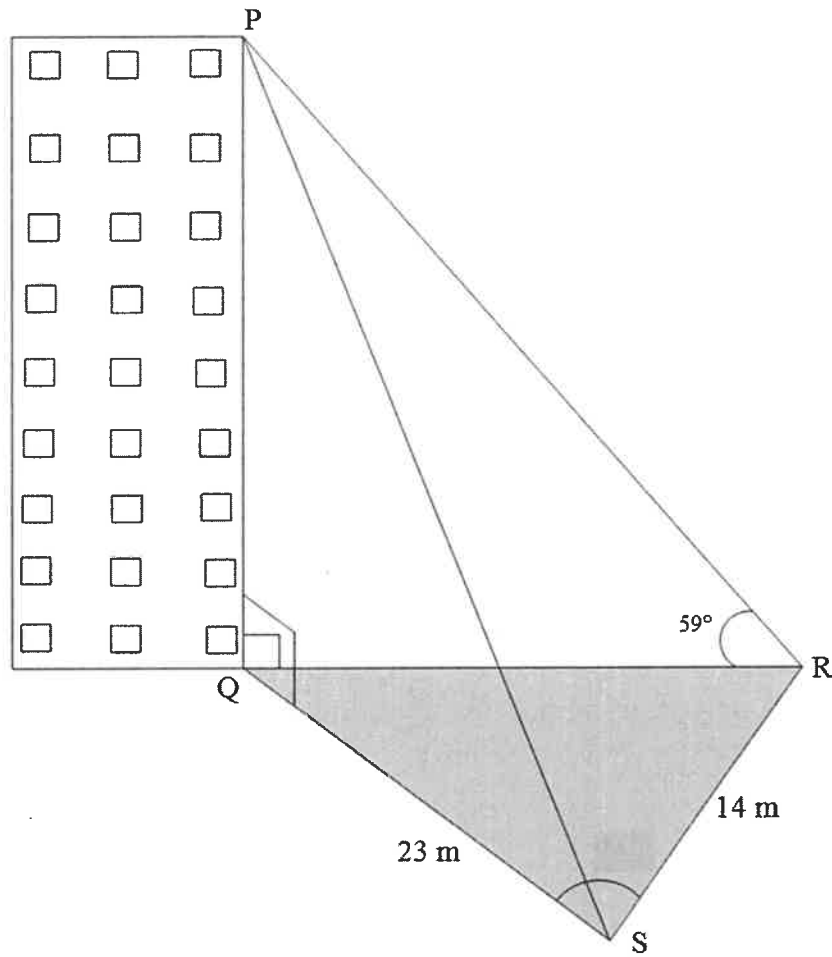
	<b>Solution/Oplissing</b>	<b>Marks Punte</b>
4.1		(1)
4.2.1		(1)
4.2.2		(1)
4.3		(6)

	<b>Solution/Oplissing</b>	<b>Marks Punte</b>
4.4		

**QUESTION/VRAAG 5**

	<b>Solution/Oplissing</b>	<b>Marks Punte</b>
5.1		(6)
5.2.1	<hr/> <hr/>	(2)
5.2.2	<hr/> <hr/>	(1)
5.2.3	<hr/> <hr/>	(1)
5.3	<hr/> <hr/>	(2)
		<b>[12]</b>

**QUESTION/VRAAG 6**



	<b>Solution/Oplissing</b>	<b>Marks Punte</b>
6.1		(1)
6.2		(2)
6.3		(1)

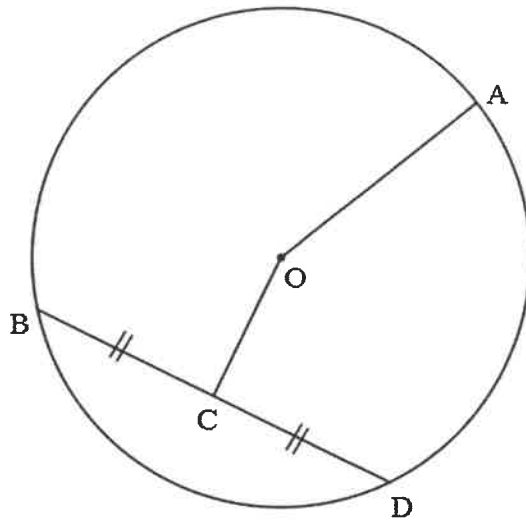
	<b>Solution/Oplissing</b>	<b>Marks Punte</b>
6.4		
6.5		
6.6		
		<b>[9]</b>

Give reasons for your statements in QUESTIONS 7, 8 and 9.  
 Verskaf redes vir jou bewerings in VRAAG 7, 8 en 9.

**QUESTION/VRAAG 7**

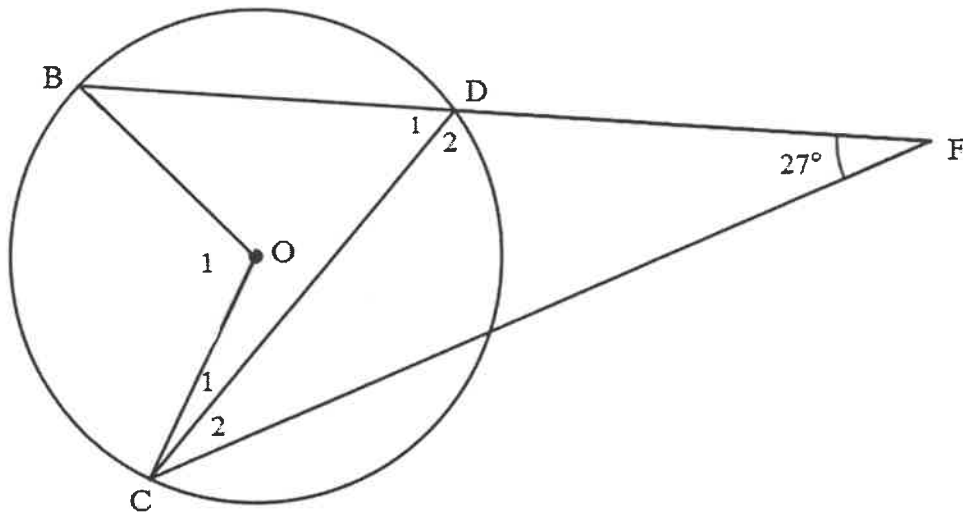
	Solution/Oplossing	Marks Punte
7.1		(1)

7.2



	Solution/Oplossing	Marks Punte
7.2.1		(1)
7.2.2		(4)

7.3

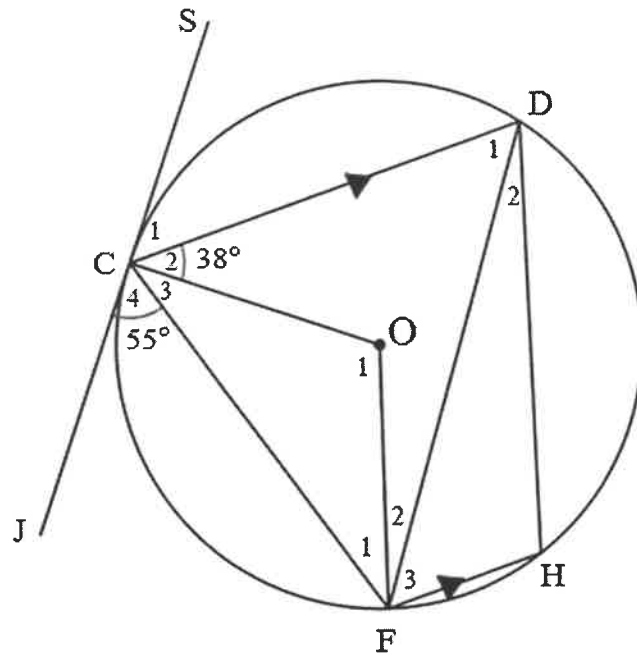


	Solution/Oplissing	Marks Punte
7.3.1		
		(1)
7.3.2		
		(2)
7.3.3		
		(3)
		[12]

**QUESTION/VRAAG 8**

	Solution/Oplissing	Marks Punte
8.1		(1)

8.2

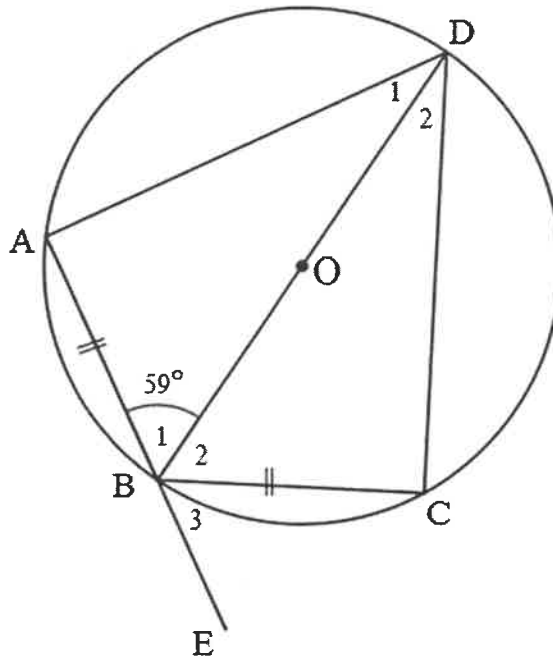


8.2.1		(2)
8.2.2		(2)



	<b>Solution/Oplissing</b>	<b>Marks Punte</b>
8.2.3		(3)
8.2.4		(2)

8.3



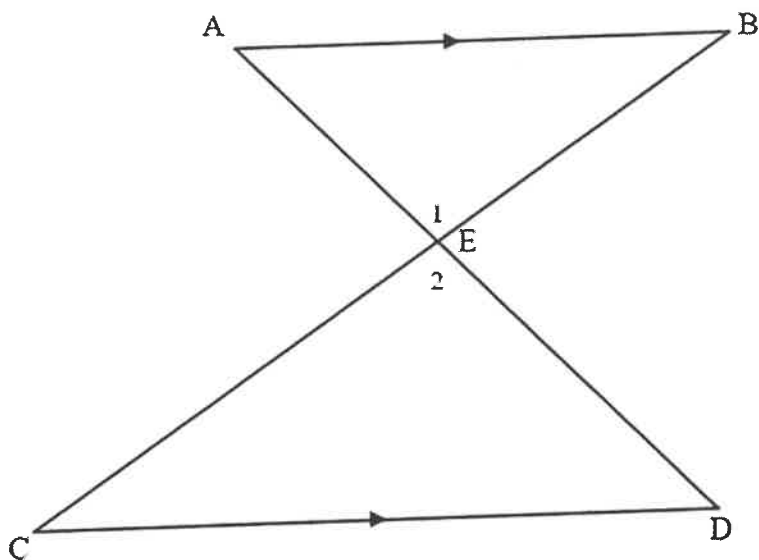
	Solution/Oplissing	Marks Punte
8.3.1	<div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div>	(3)
8.3.2	<div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div>	(2)

	<b>Solution/Oplissing</b>	<b>Marks Punte</b>
8.3.3		
	(2)	
	<b>[17]</b>	

**QUESTION/VRAAG 9**

	<b>Solution/Oplissing</b>	<b>Marks Punte</b>
9.2		(2)
9.3		(3)

9.3

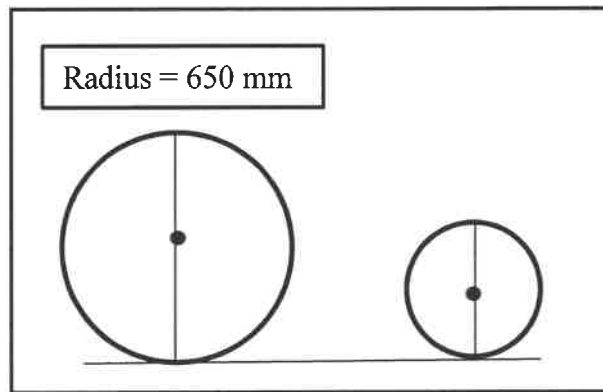


	Solution/Oplissing	Marks Punte
9.3.1		(3)
9.3.2		(4)
		<b>[12]</b>

**QUESTION/VRAAG 10**

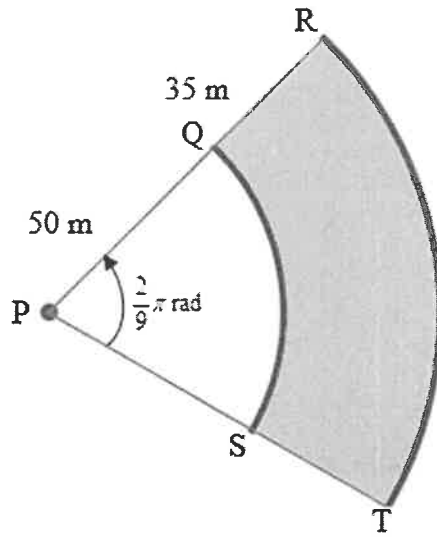
	<b>Solution/Oplissing</b>	<b>Marks Punte</b>
10.1		(1)
10.2		(1)

10.3



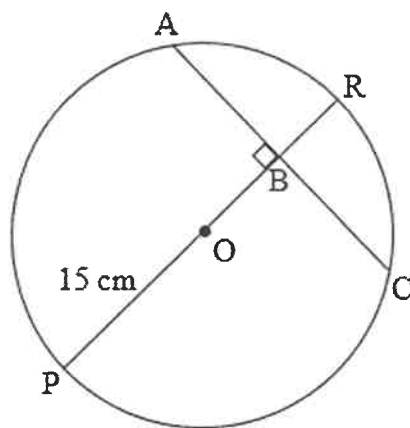
10.3.1		(4)
10.3.2		(3)

10.4



	Solution/Oplissing	Marks Punte
10.4		(5)

10.5

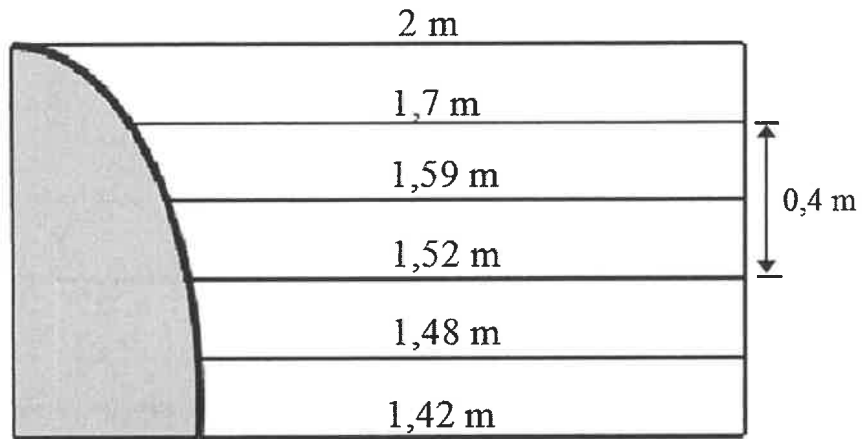


	<b>Solution/Oplissing</b>	<b>Marks Punte</b>
		(5)
		<b>[19]</b>



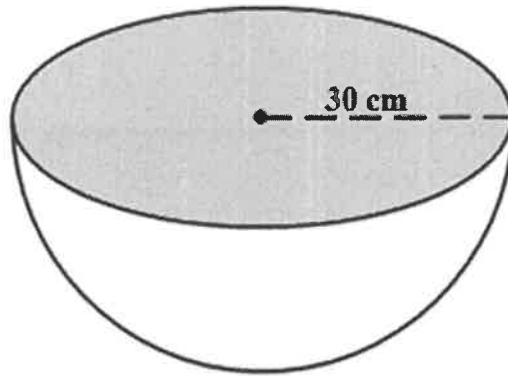
**QUESTION/VRAAG 11**

11.1



	<b>Solution/Oplissing</b>	<b>Marks Punte</b>
11.1.1		(1)
11.1.2		(3)
11.1.3		(3)

11.2



The following formulae may be used/Die volgende formules kan gebruik word:

Surface area of a sphere/Buite-oppervlakte van 'n sfeer =  $4\pi r^2$   
 Volume of a sphere/Volume van 'n sfeer =  $\frac{4}{3}\pi r^3$   
 1 ml = 1 cm<sup>3</sup>

	<b>Solution/Oplissing</b>	<b>Marks Punte</b>
11.2.1		(3)
11.2.2		(5) [15]

**TOTAL/TOTAAL: 150**



	<b>Additional space/Bykomende ruimte</b>	<b>Marks Punte</b>