



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

MATHEMATICS P2

NOVEMBER 2026

MARKS: 150

TIME: 3 hours

**This question paper consists of 13 pages, 1 information sheet and
a 29-page SPECIAL ANSWER BOOK.**



INSTRUCTIONS AND INFORMATION

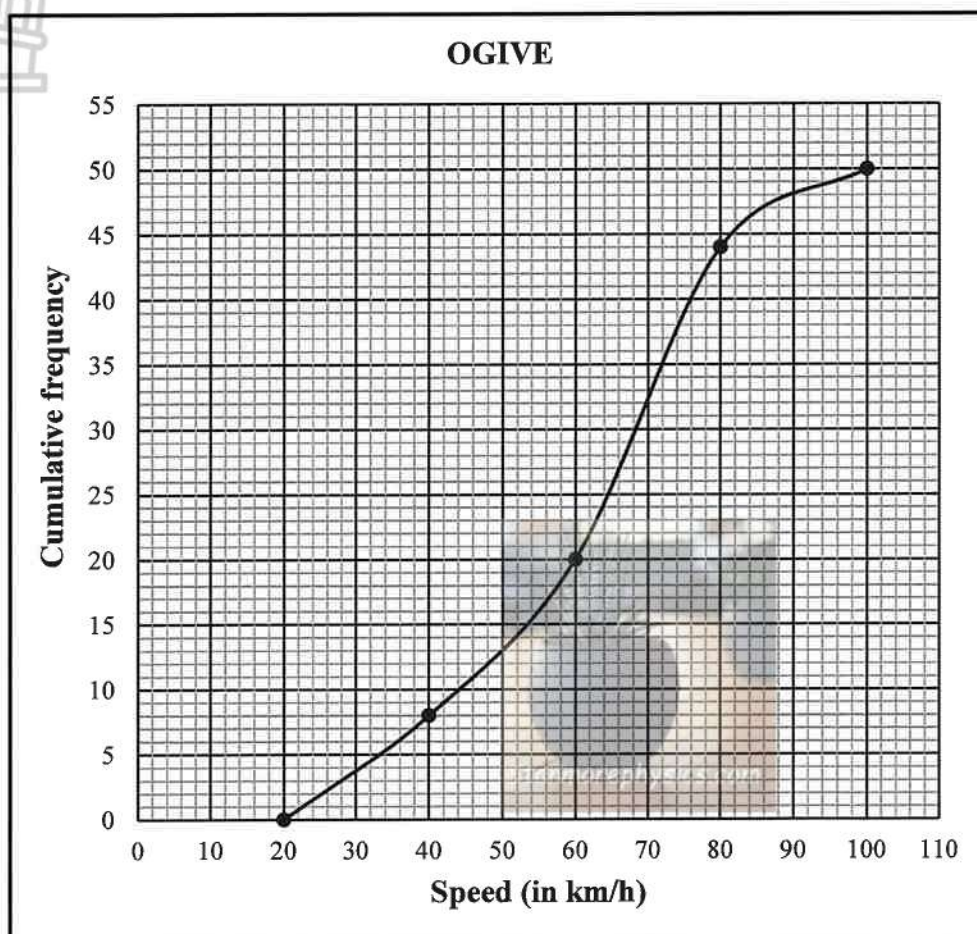
Read the following instructions and information carefully before answering the questions.

1. This question paper consists of 11 questions.
2. Answer ALL the questions in the SPECIAL ANSWER BOOK provided.
3. Clearly show ALL calculations, diagrams, graphs, etc. which you have used in determining your answers.
4. Answers only will NOT necessarily be awarded full marks.
5. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
6. If necessary, round off answers to TWO decimal places, unless stated otherwise.
7. Diagrams are NOT necessarily drawn to scale.
8. An information sheet with formulae is included at the end of the question paper.
9. Write neatly and legibly.



QUESTION 1

A traffic officer recorded the speed (in km/h) at which motorists drove past a point on the road for a period of 1 hour. The information was summarised and presented in the cumulative frequency graph (ogive) below.



- 1.1 How many vehicles passed the traffic officer during this time? (1)
- 1.2 Write down the median speed at which the motorists drove past this point. (1)
- 1.3 How many motorists were travelling more than 60 km/h when they passed the traffic officer? (1)
- 1.4 Complete the frequency table provided in the ANSWER BOOK. (2)
- 1.5 Calculate the estimated average speed recorded by the traffic officer. (3)
- [8]**



QUESTION 2

- 2.1 A homeowner used an inverter on each day that there was load shedding. The table below shows the battery life remaining (as a percentage) after the inverter was used for a certain number of hours on each day. The battery of the inverter was fully charged before it was used on each occasion.

NUMBER OF HOURS USED	3	1	4	10	2	5	1	6	8	9
BATTERY LIFE REMAINING (IN PERCENTAGE)	65	96	50	47	73	62	63	58	52	32

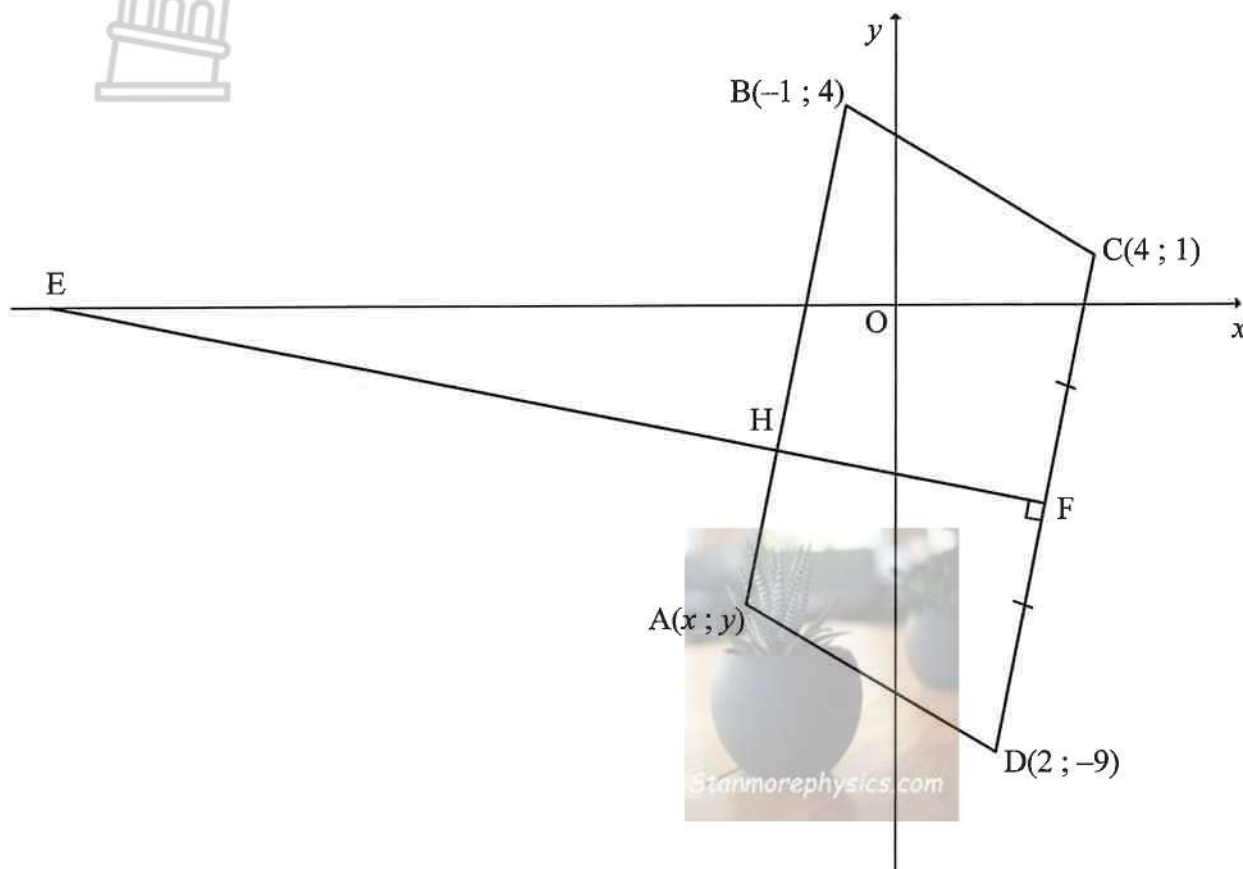
- 2.1.1 Draw a scatter plot of the data on the grid provided in the ANSWER BOOK. (3)
- 2.1.2 Determine the equation of the least squares regression line. (3)
- 2.1.3 Predict the percentage battery life remaining after the inverter had been used for 7 hours on a certain day. (2)
- 2.1.4 Calculate the standard deviation of the battery life remaining after the inverter was used. (1)
- 2.2 When the inverter was charged in the first month after it was bought, the battery lasted 100 hours before the inverter needed to be charged again. In the second month after the inverter was bought, the battery lasted 98 hours before the inverter needed to be charged again. In each month thereafter, the number of hours that the battery lasted decreased by 2% in respect to the previous month.
- How many months, after buying the inverter, will the battery of the inverter last for 54,55 hours, before it needs to be charged again? (4)

[13]



QUESTION 3

In the diagram, $A(x; y)$, $B(-1; 4)$, $C(4; 1)$ and $D(2; -9)$ are the vertices of parallelogram ABCD. F is the midpoint of CD. E is a point on the x-axis such that $EF \perp CD$. EF intersects AB at H.

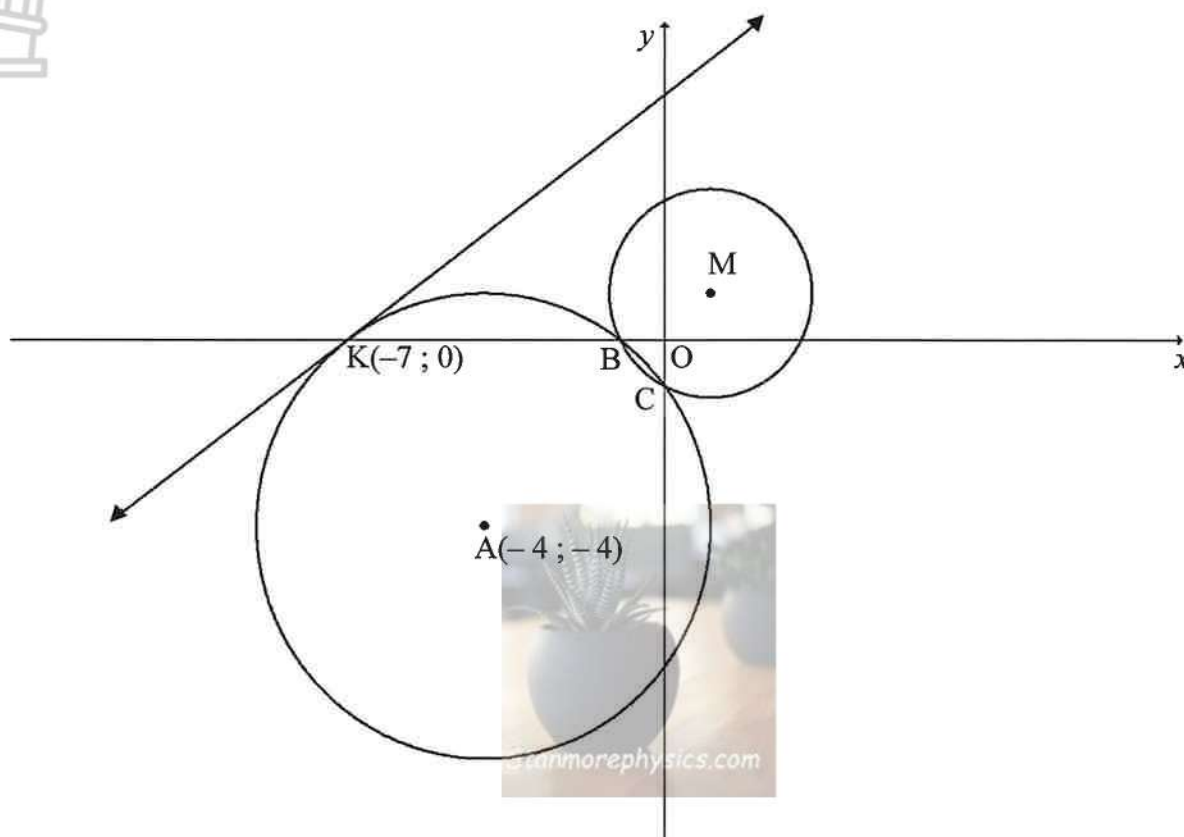


- 3.1 Calculate the gradient of CD. (2)
 - 3.2 Calculate the coordinates of F. (2)
 - 3.3 Show that the coordinates of E are $(-17; 0)$. (3)
 - 3.4 Calculate the area of $\triangle CDE$. (4)
 - 3.5 Calculate the size of $\hat{ABC}$. (4)
 - 3.6 Determine the equation of the circle passing through E, H and A in the form $(x-a)^2 + (y-b)^2 = r^2$ (6)
- [21]**



QUESTION 4

In the diagram, the larger circle with centre $A(-4; -4)$ intersects the y -axis at C and the x -axis at $K(-7; 0)$ and B . A tangent is drawn to the larger circle at K . The smaller circle with centre M intersects the larger circle at B and C .



- 4.1 Show that the equation of the larger circle is $(x+4)^2 + (y+4)^2 = 25$. (1)
- 4.2 Calculate the gradient of AK . (1)
- 4.3 Determine the equation of the tangent at K in the form $y = mx + c$. (3)
- 4.4 The equation of the smaller circle is $x^2 + y^2 - 2x - 2y - 3 = 0$. Calculate the coordinates of M , the centre of the smaller circle. (3)
- 4.5 Hence, write down the length of the radius of the smaller circle. (1)
- 4.6 Calculate the coordinates of T if T is a reflection of B about the line $y = -4$. (4)
- 4.7 Show that K , A and T are collinear. (2)
- 4.8 Calculate the percentage by which the radius of the smaller circle must reduce for the two circles to touch externally. (5)

[20]



QUESTION 5

5.1 If $\cos 12^\circ = k$, determine, **without using a calculator**, the following in terms of k :

5.1.1 $\sin 12^\circ$ (2)

5.1.2 $\tan(-12^\circ)$ (2)

5.1.3 $1 - 2 \sin^2 39^\circ$ (2)

5.2 **Without using a calculator**, show that:

$$\frac{\sin(90^\circ - \theta) \cos^2(360^\circ - \theta) + \sin^2 \theta \sin(180^\circ + \theta)}{\cos \theta + \sin(360^\circ - \theta)} = 1 + \sin \theta \cos \theta$$
 (6)

5.3 Determine the value of θ , in the interval $\theta \in [180^\circ; 360^\circ]$, for which

$$\frac{2 \sin^2 \theta + \sin 2\theta}{\sin \theta - \cos \theta} \text{ is undefined.}$$
 (3)
[15]

QUESTION 6

6.1 6.1.1 Use the compound angle expansion of $\cos(A - B)$ to write $\cos 25^\circ$ in terms of 35° and 10° . (2)

6.1.2 Hence, or otherwise, calculate the value of the following expression **without using a calculator**:

$$\cos 25^\circ - 2 \sin 10^\circ \sin 35^\circ$$
 (3)

6.2 Prove that:

$$4 \sin \theta \cos^3 \theta - 4 \cos \theta \sin^3 \theta = \sin 4\theta$$
 (3)

6.3 It is given that $\sin A = \frac{4}{5}$ and $0^\circ < A < 90^\circ$.

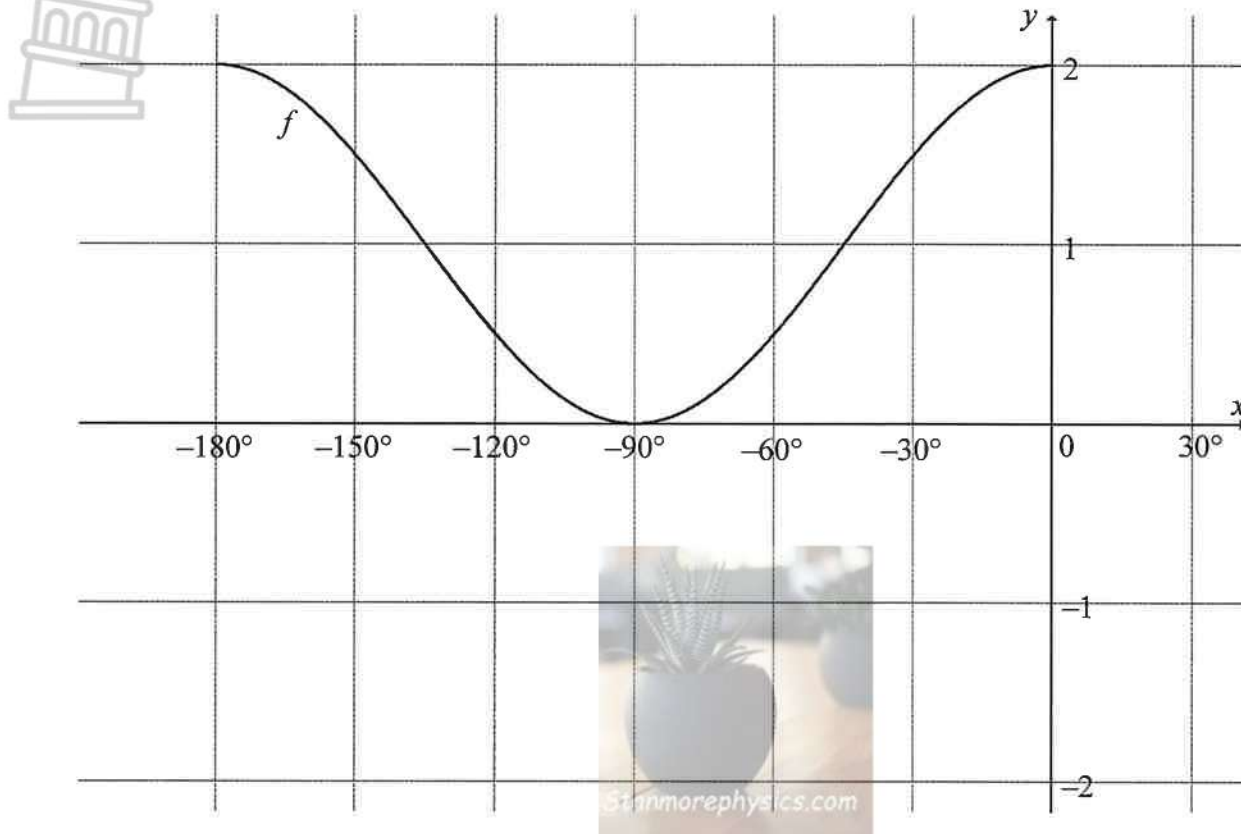
6.3.1 Calculate the size of A . (1)

6.3.2 Hence, determine the general solution of $4 \cos x - 3 \sin x = 1$ (6)
[15]



QUESTION 7

In the diagram, the graph of $f(x) = \cos 2x + 1$ is drawn for the interval $x \in [-180^\circ; 0^\circ]$.

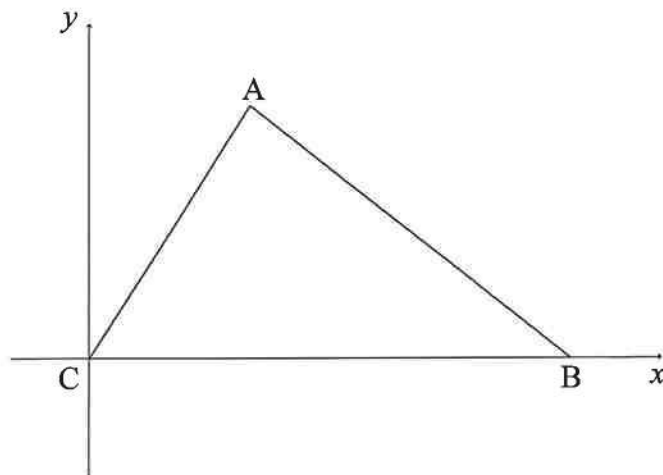


- 7.1 Write down the range of f . (1)
- 7.2 Write down the period of f . (1)
- 7.3 On the system of axes provided in the ANSWER BOOK, sketch the graph of $g(x) = -\cos x - 1$ for the interval $x \in [-180^\circ; 0^\circ]$. (3)
- 7.4 A is a point on f and B is a point on g such that AB is parallel to the y-axis.
- 7.4.1 Show that $AB = 2\cos^2 x + \cos x + 1$. (2)
- 7.4.2 Calculate the minimum distance of AB in the given domain. (2)
- [9]



QUESTION 8

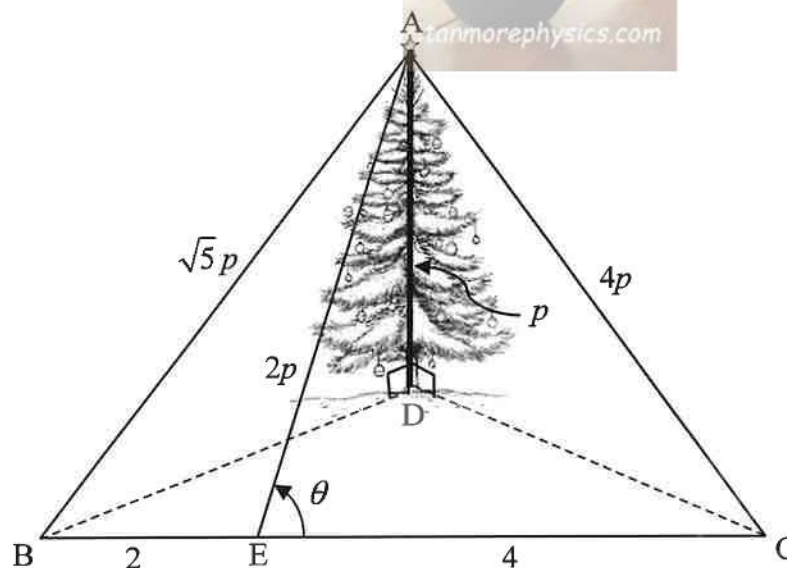
- 8.1 In the diagram, $\triangle ABC$ is drawn with C at the origin and B on the x -axis.



Use the diagram to prove that $c^2 = a^2 + b^2 - 2ab \cos C$. (4)

- 8.2 In the diagram, A is the top of a Christmas tree and D is a point directly below A . Three young children stand in a straight line at points B , E and C respectively, looking at the star at the top of the Christmas tree. D , B , E and C lie on the same horizontal plane.

$AD = p$ metres, $AB = \sqrt{5}p$ metres, $AE = 2p$ metres, $AC = 4p$ metres, $BE = 2$ metres and $EC = 4$ metres. $\hat{AEC} = \theta$



- 8.2.1 In $\triangle ACE$, show that $\cos \theta = \frac{4 - 3p^2}{4p}$ (2)

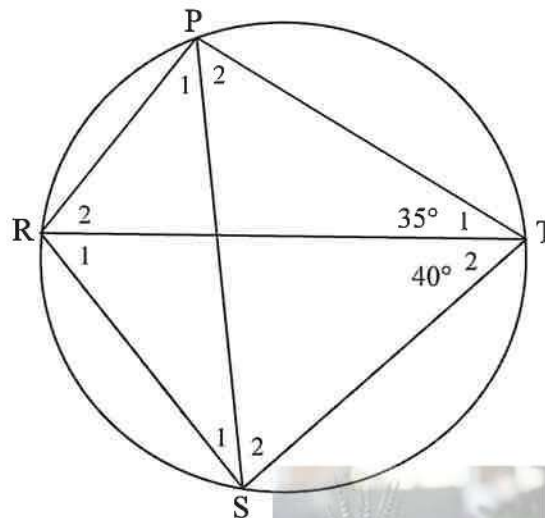
- 8.2.2 Hence, or otherwise, calculate the height of the Christmas tree. (5)
[11]



Give reasons for your statements in QUESTIONS 9, 10 and 11.

QUESTION 9

- 9.1 In the diagram, cyclic quadrilateral PRST and chords PS and RT are drawn.
 $\hat{T}_1 = 35^\circ$ and $\hat{T}_2 = 40^\circ$.



Calculate, with reasons, the size of:

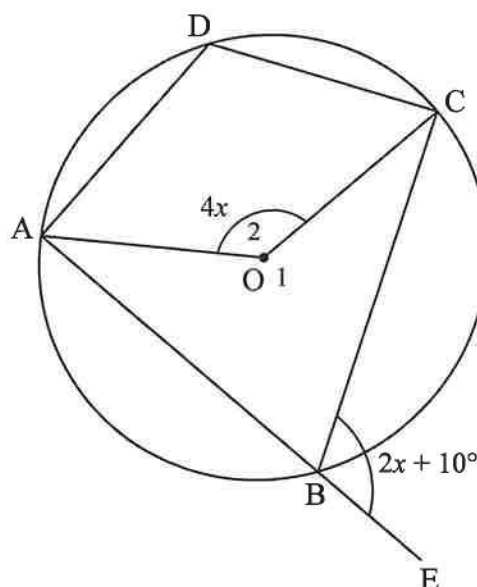
9.1.1 $\hat{P}_1$

(2)

9.1.2 $\hat{P}\hat{R}\hat{S}$

(2)

- 9.2 In the diagram, a circle with centre O is given. ABCD is a cyclic quadrilateral. AB is produced to E. AO and OC are drawn. $\hat{O}_2 = 4x$ and $\hat{CBE} = 2x + 10^\circ$.



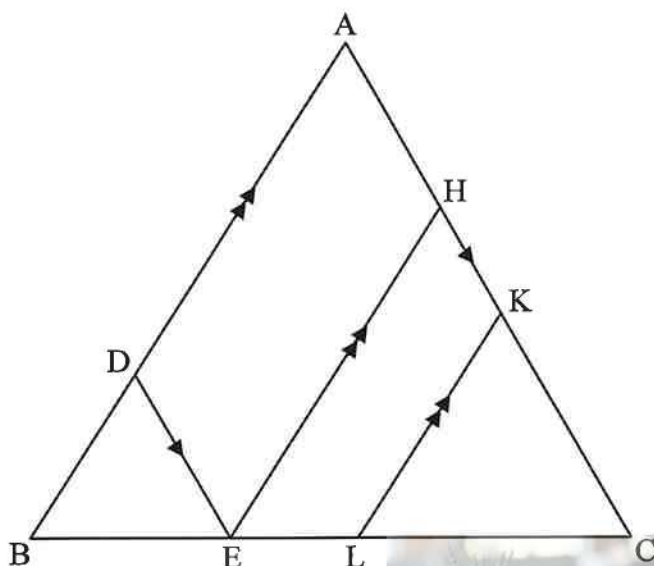
Calculate, with reasons, the size of $\hat{D}$.

(6)
 [10]



QUESTION 10

In the diagram, $\triangle ABC$ is drawn. D lies on AB, E lies on BC and H lies on AC such that $DE \parallel AC$ and $AB \parallel HE$. K lies on AC and L lies on BC such that $KL \parallel HE$. It is also given that $BE : EL : LC = 2 : 1 : 3$.



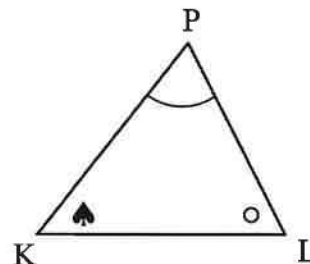
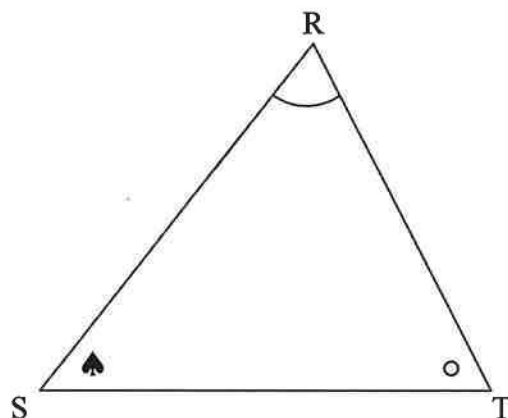
10.1 If $KC = 12$ cm, calculate the length of HK . (3)

10.2 Hence, calculate $\frac{\text{Area of } \triangle BDE}{\text{Area of } DECA}$ (4)
[7]



QUESTION 11

11.1 In the diagram, $\triangle RST$ and $\triangle PKL$ are drawn such that $\hat{R} = \hat{P}$, $\hat{S} = \hat{K}$ and $\hat{T} = \hat{L}$.



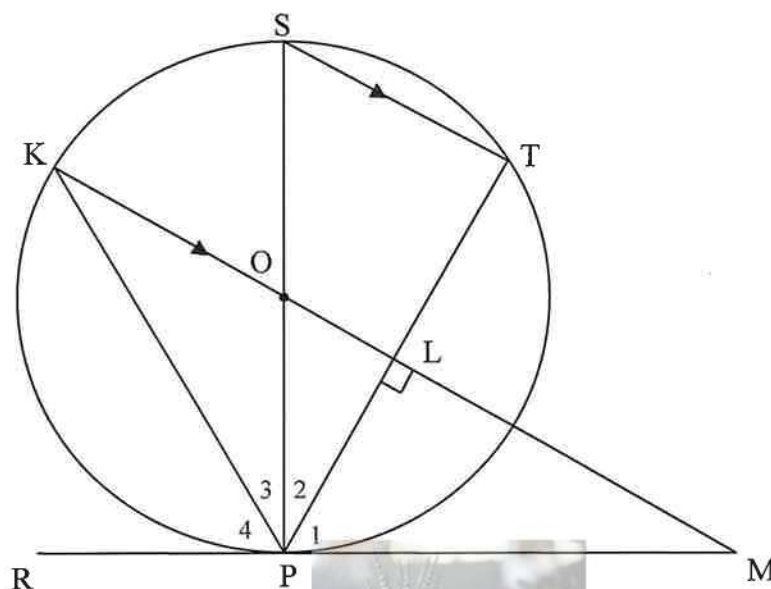
Use the diagram in the ANSWER BOOK to prove the theorem which states that if two triangles are equiangular, then the corresponding sides are in proportion, i.e. that $\frac{RS}{PK} = \frac{RT}{PL}$.



(6)



- 11.2 In the diagram below, a circle with centre O is given. POS is a diameter of the circle. K and T are points on the circle. RM is a tangent to the circle at P . KM is a straight line passing through O . ST is drawn such that $ST \parallel KM$ and $PT \perp KM$ at L . KP is drawn.

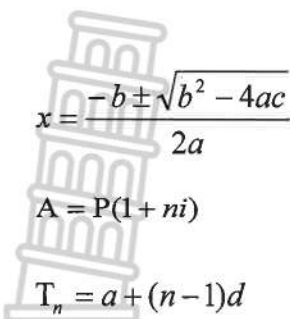


- 11.2.1 Give a reason for $TL = LP$. (1)
- 11.2.2 Prove that $\triangle PML \parallel \triangle OMP$. (4)
- 11.2.3 Prove that $\frac{PT}{ML} = \frac{PS}{MP}$ (5)
- 11.2.4 Show that $\frac{MP}{PT} = \frac{1}{2} \sqrt{\frac{OM}{OL}}$ (5)
- [21]

TOTAL: 150



INFORMATION SHEET



$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$A = P(1 + ni)$$

$$A = P(1 - ni)$$

$$A = P(1 - i)^n$$

$$A = P(1 + i)^n$$

$$T_n = a + (n - 1)d$$

$$S_n = \frac{n}{2}[2a + (n - 1)d]$$

$$T_n = ar^{n-1}$$

$$S_n = \frac{a(r^n - 1)}{r - 1}; r \neq 1$$

$$S_\infty = \frac{a}{1 - r}; -1 < r < 1$$

$$F = \frac{x[(1 + i)^n - 1]}{i}$$

$$P = \frac{x[1 - (1 + i)^{-n}]}{i}$$

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x + h) - f(x)}{h}$$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$M\left(\frac{x_1 + x_2}{2}; \frac{y_1 + y_2}{2}\right)$$

$$y = mx + c$$

$$y - y_1 = m(x - x_1)$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \tan \theta$$

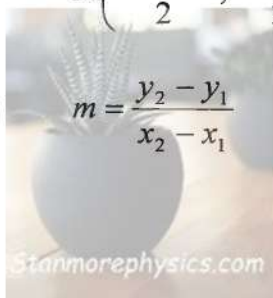
$$(x - a)^2 + (y - b)^2 = r^2$$

In $\triangle ABC$:

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc \cdot \cos A$$

$$\text{area } \triangle ABC = \frac{1}{2}ab \cdot \sin C$$



$$\sin(\alpha + \beta) = \sin \alpha \cdot \cos \beta + \cos \alpha \cdot \sin \beta$$

$$\sin(\alpha - \beta) = \sin \alpha \cdot \cos \beta - \cos \alpha \cdot \sin \beta$$

$$\cos(\alpha + \beta) = \cos \alpha \cdot \cos \beta - \sin \alpha \cdot \sin \beta$$

$$\cos(\alpha - \beta) = \cos \alpha \cdot \cos \beta + \sin \alpha \cdot \sin \beta$$

$$\cos 2\alpha = \begin{cases} \cos^2 \alpha - \sin^2 \alpha \\ 1 - 2\sin^2 \alpha \\ 2\cos^2 \alpha - 1 \end{cases}$$

$$\sin 2\alpha = 2 \sin \alpha \cdot \cos \alpha$$

$$\bar{x} = \frac{\sum_{i=1}^n x_i}{n}$$

$$\sigma^2 = \frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n}$$

$$P(A) = \frac{n(A)}{n(S)}$$

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

$$\hat{y} = a + bx$$

$$b = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sum (x - \bar{x})^2}$$



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REPUBLIC OF SOUTH AFRICA

Candidate Barcode label/Stafieskodeplakker

NSC Answer Book
NSS-antwoordeboek

National Senior Certificate/Nasionale Senior Sertifikaat (Grade 12/Graad 12) – November 2026 Confidential/Vertroulik

CENTRE NUMBER SENTRUMNOMMER							
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Sequence No. on mark sheet
Volgnommer op puntetafel

DATE DATUM	
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BOOK NUMBER <i>BOEKNOMMER</i>	OF <i>VAN</i>	BOOKS <i>BOEKE</i>
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SUBJECT CODE VAKKODE					
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PAPER NUMBER VRAESTELNOMMER	2
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SUBJECT NAME VAKNAAM	MATHEMATICS/ <i>WISKUNDE</i>
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MARKER/NASIENER				MODERATOR'S INITIALS IN RELEVANT BLOCK MODERATOR SE VOORLETTERS IN RELEVANTE BLOKKIE											
Question Vraag	Marks Punte			Marker's Code & Initials Nasiener se kode & Voorletters	Marks Punte	SM	Marks Punte	DCM AHN	Marks Punte	CM HN	Marks Punte	IM	Marks Punte	EM	
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CONTROLLED AND CERTIFIED CORRECT
(SURNAME AND INITIALS OF EA)
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READ INSTRUCTIONS ON THE NEXT PAGE.
LEES INSTRUKSIES OP VOLGENDE BLADSY.

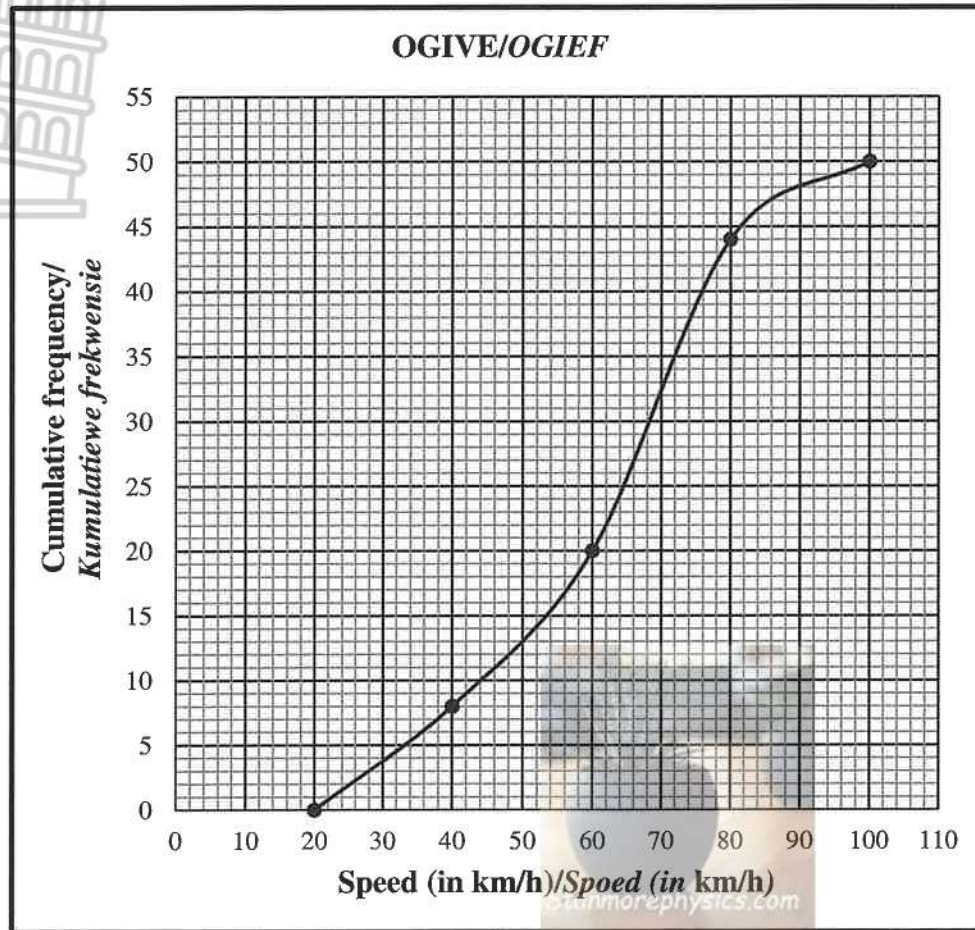
This answer book consists of 29 pages./Hierdie antwoordeboek bestaan uit 29 bladsye.



PLEASE FOLLOW THESE INSTRUCTIONS CAREFULLY	VOLG ASSEBLIEF HIERDIE INSTRUKSIES NOUKEURIG
- Clearly write your examination number and centre number in the space provided and attach your barcode label in the space provided. - Remember that your own name (or the name of your school) may not appear anywhere on or in this answer book. - Answer ALL questions in the spaces provided. - NO pages may be torn from this answer book. - Read the instructions printed on your timetable carefully as well as any other instructions which may be given in each examination paper. - Candidates may NOT retain an answer book or remove it from the examination room. - Answers must be written in black/blue ink as distinctly as possible. Do NOT write in the margins. - Write the numbers of the questions you have answered on the front cover of the answer book where marks are to be recorded. - If you require additional space for your answers: - Use the additional space provided at the end of the answer book. - When answering a question in the additional space, indicate clearly the question number in the column on the LHS. - Rule off after each answer. - Draw a neat line through any work/rough work that must not be marked.	- Skryf jou eksamennommer en sentrumnummer duidelik in die ruimtes soos verskaf en plak jou stafieskodeplakker in die ruimte soos verskaf. - Onthou dat jou eie naam (of die naam van jou skool) nie op of in hierdie antwoordeboek mag voorkom nie. - Beantwoord ALLE vrae in die ruimtes wat voorsien is. - GEEN bladsye mag uit hierdie antwoordeboek geskeur word NIE. - Lees die instruksies wat op jou eksamenrooster gedruk is, sorgvuldig deur, asook enige ander instruksies wat op elke eksamenvraestel gegee word. - GEEN antwoordeboek mag deur die kandidaat behou of uit die eksamenlokaal verwyder word NIE. - Skryf die antwoorde so duidelik moontlik met swart/blou ink. Moet NIE in die kantlyne skryf NIE. - Skryf die nommers van die vrae wat jy beantwoord het op die voorblad van die antwoordeboek waar die punte aangebring word. - In geval jy bykomende ruimte benodig vir jou antwoorde: - Gebruik die bykomende ruimte wat aan die einde van die antwoordeboek voorsien word. - As 'n vraag in die bykomende ruimte beantwoord word, dui duidelik die vraagnommer in die kolom aan die LK aan. - Trek 'n lyn na elke antwoord. - Trek 'n netjiese lyn deur enige werk/rofwerk wat nie nagesien moet word nie...



QUESTION/VRAAG 1



	Solution/ <i>Oplossing</i>	Marks <i>Punte</i>										
1.1		(1)										
1.2		(1)										
1.3		(1)										
1.4	<table><tr><th>Speed (in km/h)/ <i>Spoed (in km/h)</i></th><th>Frequency/ <i>Frekwensie</i></th></tr><tr><td>$20 \leq t < 40$</td><td></td></tr><tr><td>$40 \leq t < 60$</td><td></td></tr><tr><td>$60 \leq t < 80$</td><td></td></tr><tr><td>$80 \leq t < 100$</td><td></td></tr></table>	Speed (in km/h)/ <i>Spoed (in km/h)</i>	Frequency/ <i>Frekwensie</i>	$20 \leq t < 40$		$40 \leq t < 60$		$60 \leq t < 80$		$80 \leq t < 100$		(2)
	Speed (in km/h)/ <i>Spoed (in km/h)</i>	Frequency/ <i>Frekwensie</i>										
	$20 \leq t < 40$											
	$40 \leq t < 60$											
	$60 \leq t < 80$											
	$80 \leq t < 100$											

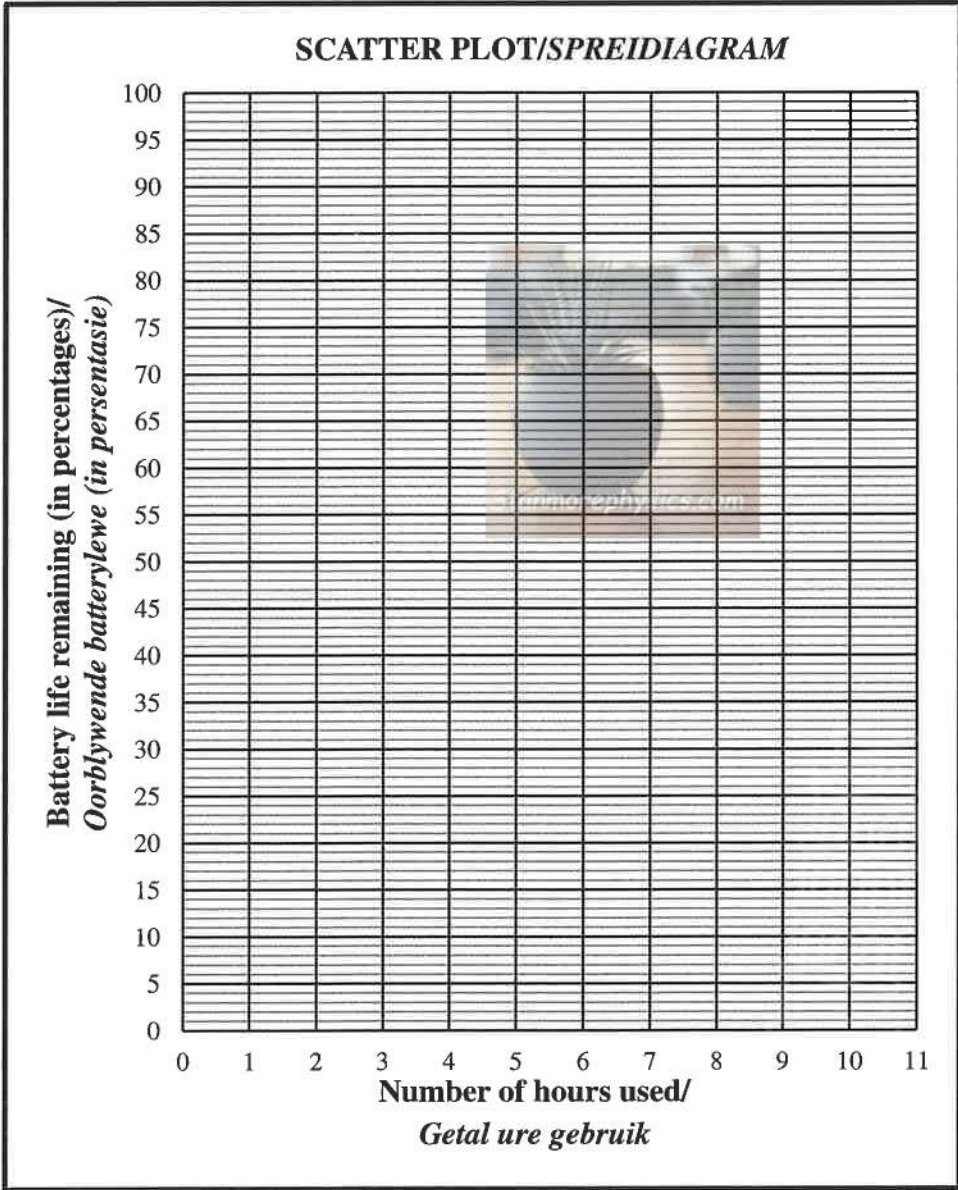




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QUESTION/VRAAG 2

NUMBER OF HOURS USED/ GETAL URE GEBRUIK	3	1	4	10	2	5	1	6	8	9
BATTERY LIFE REMAINING (IN PERCENTAGE)/ OORBLYWENDE BATTERYLEWE (IN PERSENTASIE)	65	96	50	47	73	62	63	58	52	32

	Solution/Oplissing	Marks Punte
2.1.1	SCATTER PLOT/SPREIDIAGRAM 	(3)

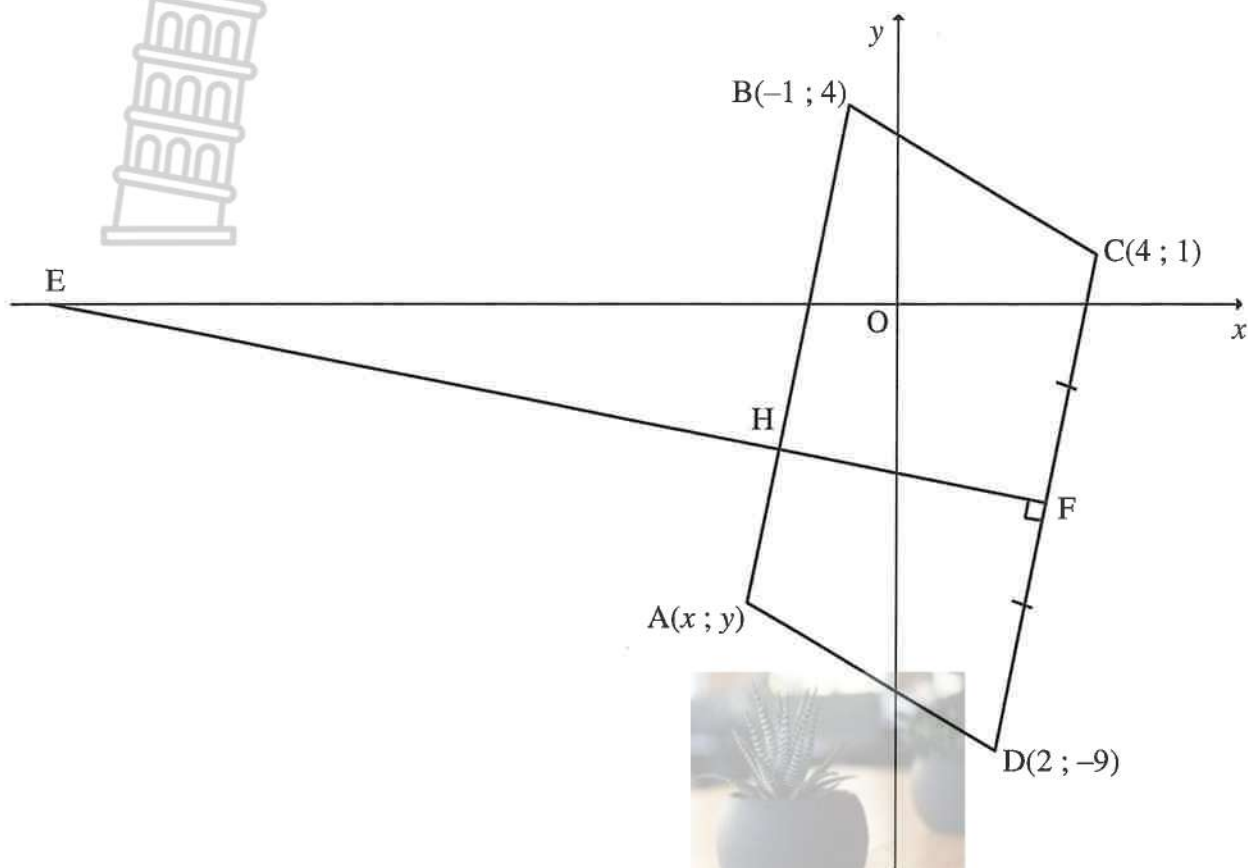


	Solution/Oplissing	Marks Punte
2.1.2		(3)
2.1.3		(2)
2.1.4		(1)
2.2		(4)
		(4)

[13]



QUESTION/VRAAG 3

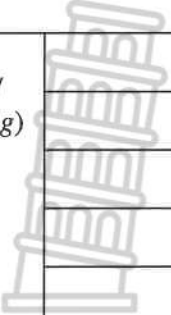


	Solution/Oplossing	Marks Punte
3.1		(2)
3.2		(2)



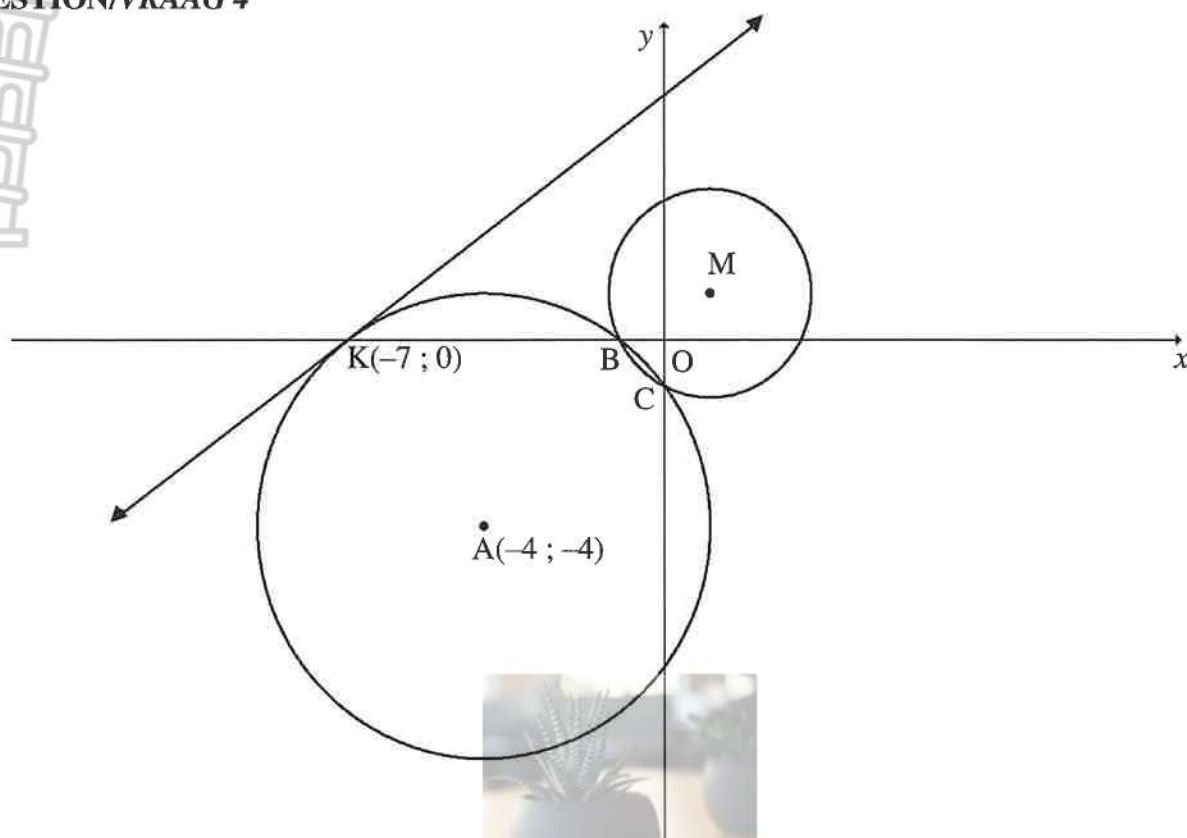
	Solution/Oplissing	Marks Punte
3.3		(3)
3.4		(4)
3.5		(4)



3.5 (cont./ vervolg)		
3.6		(4)
		(6)
		[21]



QUESTION/VRAAG 4

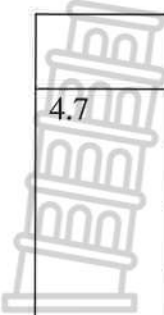


	Solution/Oplossing	Marks Punte
4.1		(1)
4.2		(1)



	Solution/Oplossing	Marks Punte
4.3		(3)
4.4		(3)
4.5		(1)
4.6		(4)



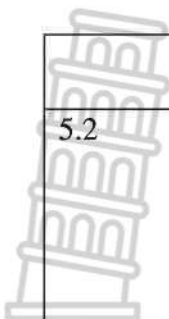
	Solution/Oplissing	Marks Punte
4.7		
4.8		(2)
		(5)
		[20]



QUESTION/VRAAG 5

	Solution/Oplissing	Marks Punte
5.1.1		(2)
5.1.2		(2)
5.1.3		(2)





	Solution/Oplossing	Marks Punte
5.2		
5.3		(6)
		(3)

[15]

QUESTION/VRAAG 6

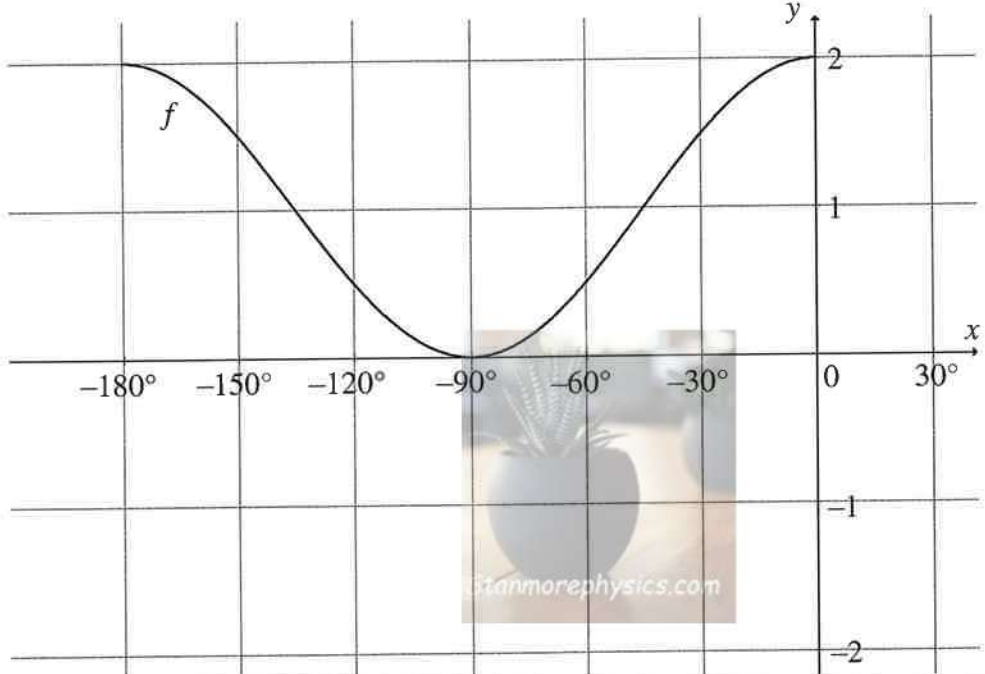
	Solution/Oplissing	Marks Punte
6.1.1		(2)
6.1.2		(3)
6.2		(3)



	Solution/Oplossing	Marks Punte
6.3.1		(1)
6.3.2		(6)
		[15]

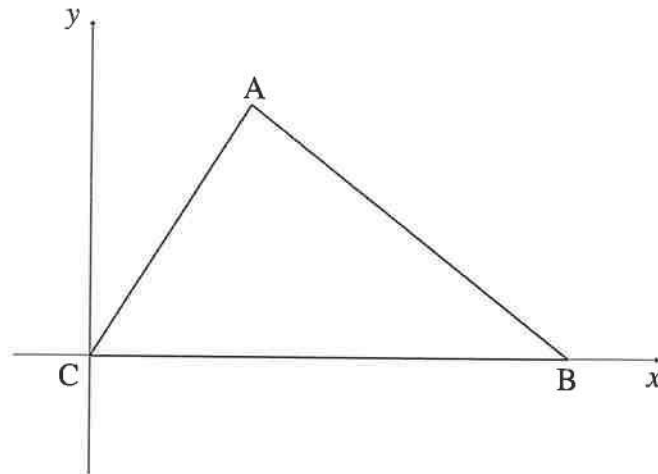


QUESTION/VRAAG 7

	Solution/Oplissing	Marks Punte
7.1		(1)
7.2		(1)
7.3		(3)
7.4.1		(2)
7.4.2		(2)
[9]		

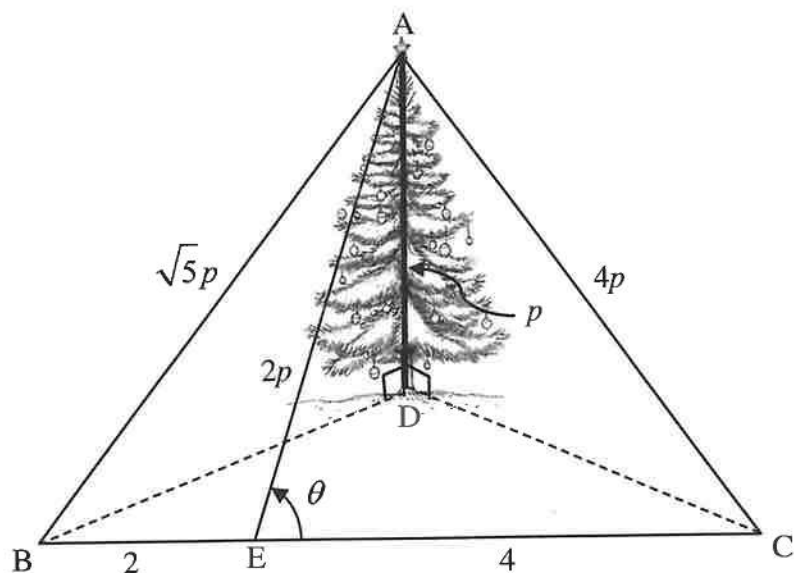


QUESTION



(4)

8.2



	Solution/Oplossing	Marks Punte
8.2.1		(2)
8.2.2		



8.2.2
(cont./
vervolg)



(5)

[11]

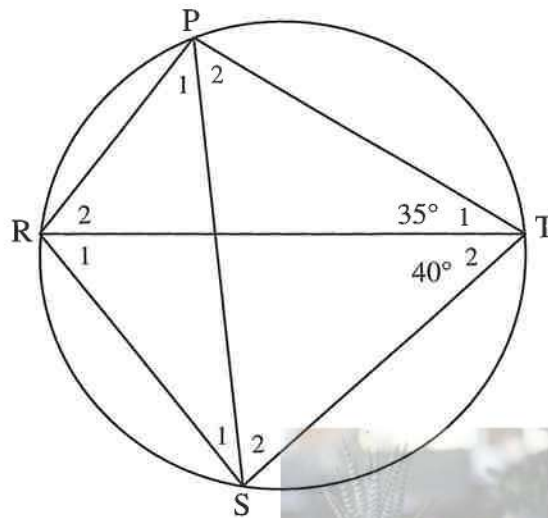


Give reasons for your statements in QUESTIONS 9, 10 and 11.

Gee redes vir jou bewerings in VRAAG 9, 10 en 11.

QUESTION/VRAAG 9

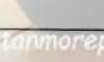
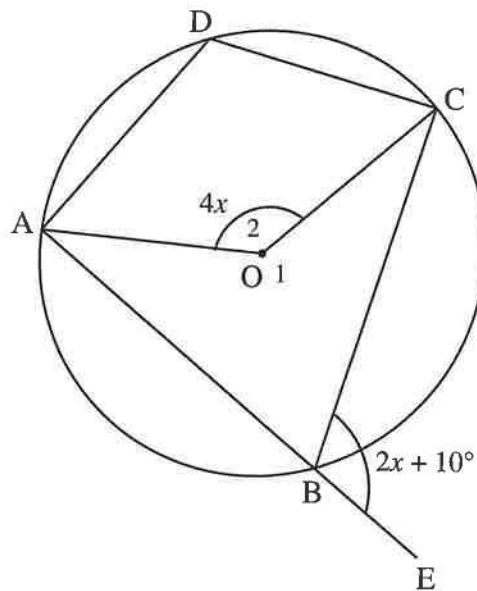
9.1



	Solution/Oplossing	Marks Punte
9.1.1		(2)
9.1.2		(2)

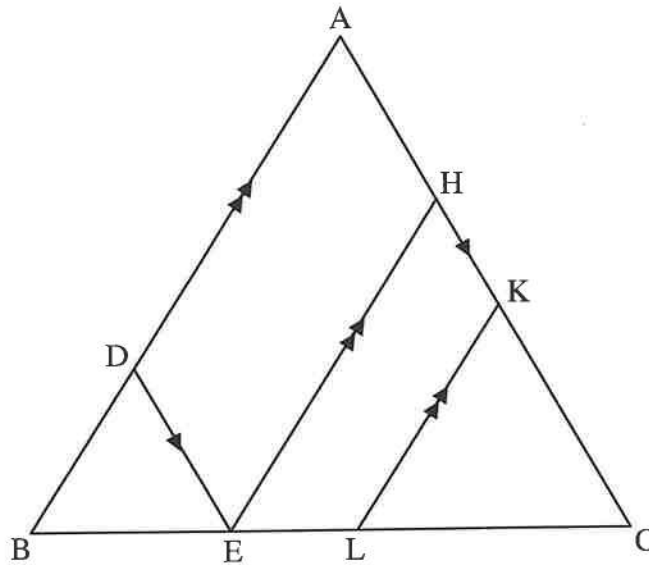


9.2



QUESTION/VRAAG 10

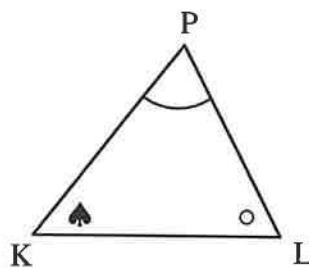
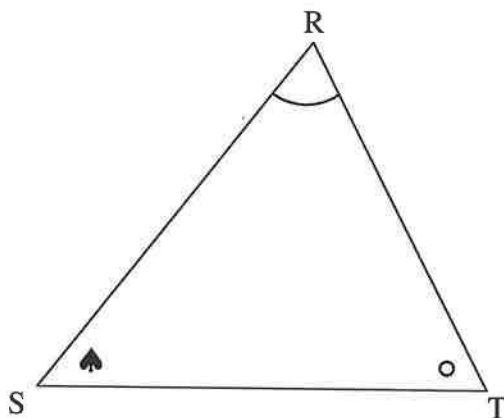
10.1



	Solution/Oplossing	Marks Punte
10.1		(3)
10.2		(4)
		[7]

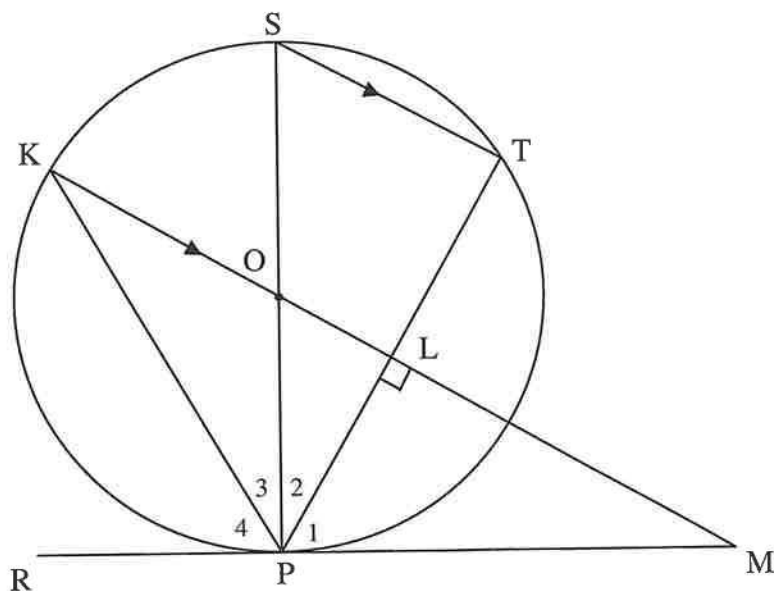


11.1



(6)

11.2



	Solution/Oplossing	Marks Punte
11.2.1		(1)
11.2.2	stanmorephysics.com	(4)



11.2.3 





	Add
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TOTAL/TOTAAL: 150







