



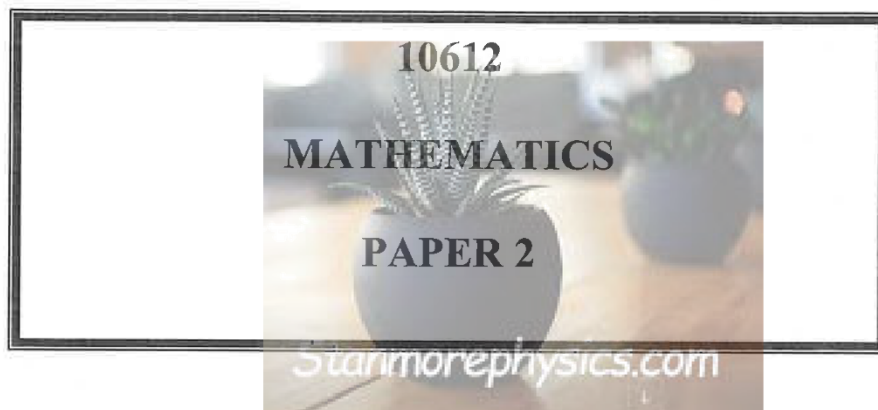
GAUTENG PROVINCE

EDUCATION
REPUBLIC OF SOUTH AFRICA



**GAUTENG DEPARTMENT OF EDUCATION
PREPARATORY EXAMINATION**

2022



TIME: 3 hours

MARKS: 150

14 pages + 1 information sheet and an answer book of 24 pages

MATHEMATICS: Paper 2



10612E

X10



INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before you answer the paper:

1. This question paper consists of 10 questions.
2. Answer ALL the questions in the ANSWER BOOK provided.
3. Clearly show ALL calculations, diagrams, graphs, et cetera that 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

Mrs Molefe decided to research the effectiveness of her online classes. She divided the Grade 12 pupils fairly into Grade 12A and Grade 12B. Grade 12A attended face-to-face classes and Grade 12B attended online classes. Both classes were taught by Mrs Molefe for the same duration.

The table below shows the time spent teaching (in hours) and the average results achieved by the learners in their weekly tests as percentages (%).

TIME SPENT TEACHING (in hours)	2	8	4	6	12	10	11
AVERAGE RESULT OF 12A (as %)	42	62	48	52	64	63	67
AVERAGE RESULT OF 12B (as %)	9	63	45	47	61	64	62

- 1.1 Determine the equation of the least squares regression line of Grade 12A. (3)
- 1.2 Write down the correlation coefficient of the Grade 12A results in respect of the time spent teaching. (1)
- 1.3 Comment on the correlation between the time spent teaching and the average result of Grade 12A. (1)
- 1.4 The equation of the least squares regression line of Grade 12B is $y = 15,74 + 4,54x$. Calculate the difference in the result achieved by each class had Mrs Molefe spent the average time to complete a particular section. (3)
- 1.5 Identify an outlier in Grade 12B. (1)
- 1.6 Indicate a valid reason for this outlier. (1)

[10]

QUESTION 2

Formula 1 (F1) race car drivers have to endure high G-forces at extremely high temperatures. They tend to lose close to 4 kg of weight after every race.

- 2.1 The table below shows the total weight lost by 40 different race car drivers after the duration of one race.

INTERVAL OF WEIGHT LOST (IN GRAMS)	NUMBER OF DRIVERS
$0 \leq w < 500$	1
$500 \leq w < 1\,000$	2
$1\,000 \leq w < 1\,500$	3
$1\,500 \leq w < 2\,000$	8
$2\,000 \leq w < 2\,500$	6
$2\,500 \leq w < 3\,000$	15
$3\,000 \leq w < 3\,500$	5
Total	40

- 2.1.1 Write down the modal class of the data. (1)

- 2.1.2 Calculate the estimated mean weight-loss of the race car drivers. (3)

- 2.2 The recording of the weight lost in a second race was made a month later. The amount of weight lost in race 2 was k grams more than in race 1. It is given that the maximum value of the ogive, representing race 2 was (3 504 ; 40) and the graph was grounded at (4 ; 0).

- 2.2.1 Sketch the ogive (cumulative frequency graph) representing race 2 in the ANSWER BOOK. (4)

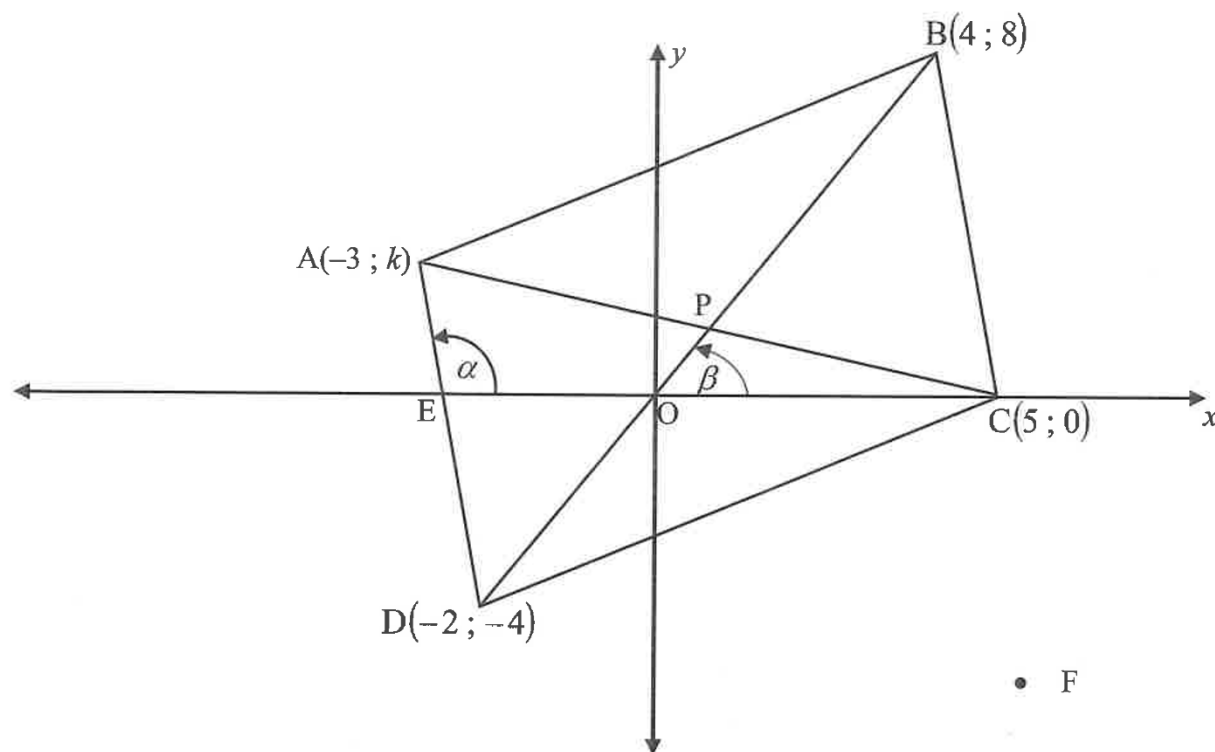
- 2.2.2 How will the range of race 2 compare with the range of race 1? (1)

- 2.2.3 Determine the average weight lost in race 2. (2)

[11]

QUESTION 3

In the diagram below, $A(-3; k)$, $B(4; 8)$, $C(5; 0)$ and $D(-2; -4)$ are vertices of the parallelogram ABCD. Diagonals AC and BD bisect each other at P. The angles of inclination of AD and BD are α and β respectively. AD cuts the x -axis at E. F is a point in the fourth quadrant.

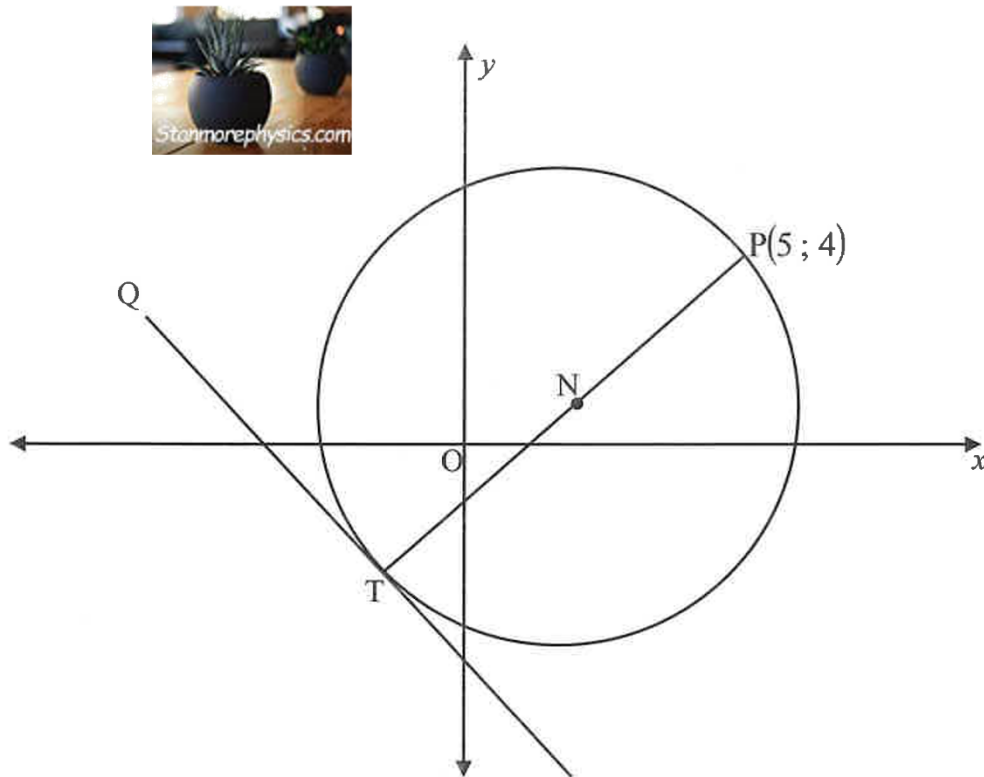


- 3.1 Determine the gradient of BC. (2)
- 3.2 If the distance between points $A(-3; k)$ and $B(4; 8)$ is $\sqrt{65}$, calculate the value of k . (4)
- 3.3 Prove, using analytical geometry methods, that $BP \perp AC$. (3)
- 3.4 Calculate the coordinates of F if it is given that ACFD is a parallelogram. (2)
- 3.5 Calculate the size of $\hat{EDO}$ (correct to ONE decimal place). (6)
- 3.6 Calculate the area of $\triangle ADC$. (4)

[21]

QUESTION 4

In the diagram below, the equation of the circle with centre N is $x^2 + y^2 - 4x - 2y - 13 = 0$. QT is a tangent to the circle at T. TNP is a diameter of the circle. Point P(5 ; 4) lies on the circle.

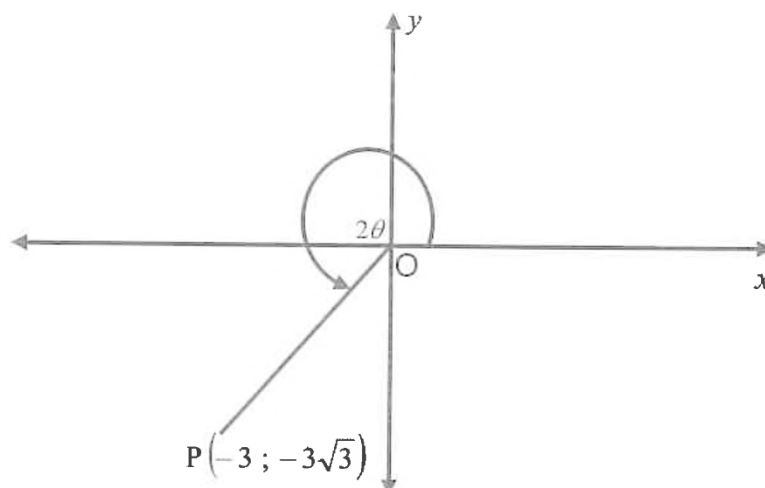


- 4.1 Write the equation of the circle in the form $(x - a)^2 + (y - b)^2 = r^2$. (3)
- 4.2 Write down the coordinates of N and the length of NT. (2)
- 4.3 Determine the equation of the tangent QT in the form $y = mx + c$. (6)
- 4.4 The circle with centre S(a ; b) touches the circle with centre N externally at T. QT is a tangent to both these circles. If $NS = 3NT$, determine the coordinates of S. (7)

[18]

QUESTION 5

- 5.1 In the diagram below, point $P(-3; -3\sqrt{3})$ and reflex angle 2θ are shown.



Determine, **without the use of a calculator**, the value of:

5.1.1 $\cos 2\theta$ (3)

5.1.2 $\sin \theta$ (3)

- 5.2 Simplify the following expression:

$$\cos^2(180^\circ + x) + \cos(-x) \cdot \tan x \cdot \cos(90^\circ + x) \quad (6)$$

- 5.3 Consider the equation $5 \tan \theta - 6 \cos \theta = 0$:

5.3.1 Show that the equation can be rewritten as $6 \sin^2 \theta + 5 \sin \theta - 6 = 0$. (3)

5.3.2 Determine the general solution of $5 \tan \theta - 6 \cos \theta = 0$. (5)

- 5.4 Prove that:

$$\cos(2\alpha + 77^\circ) \cos(\alpha + 407^\circ) - \sin(\alpha + 47^\circ) \sin(2\alpha + 283^\circ) = \cos(\alpha + 30^\circ) \quad (5)$$

- 5.5 Solve for α and β :

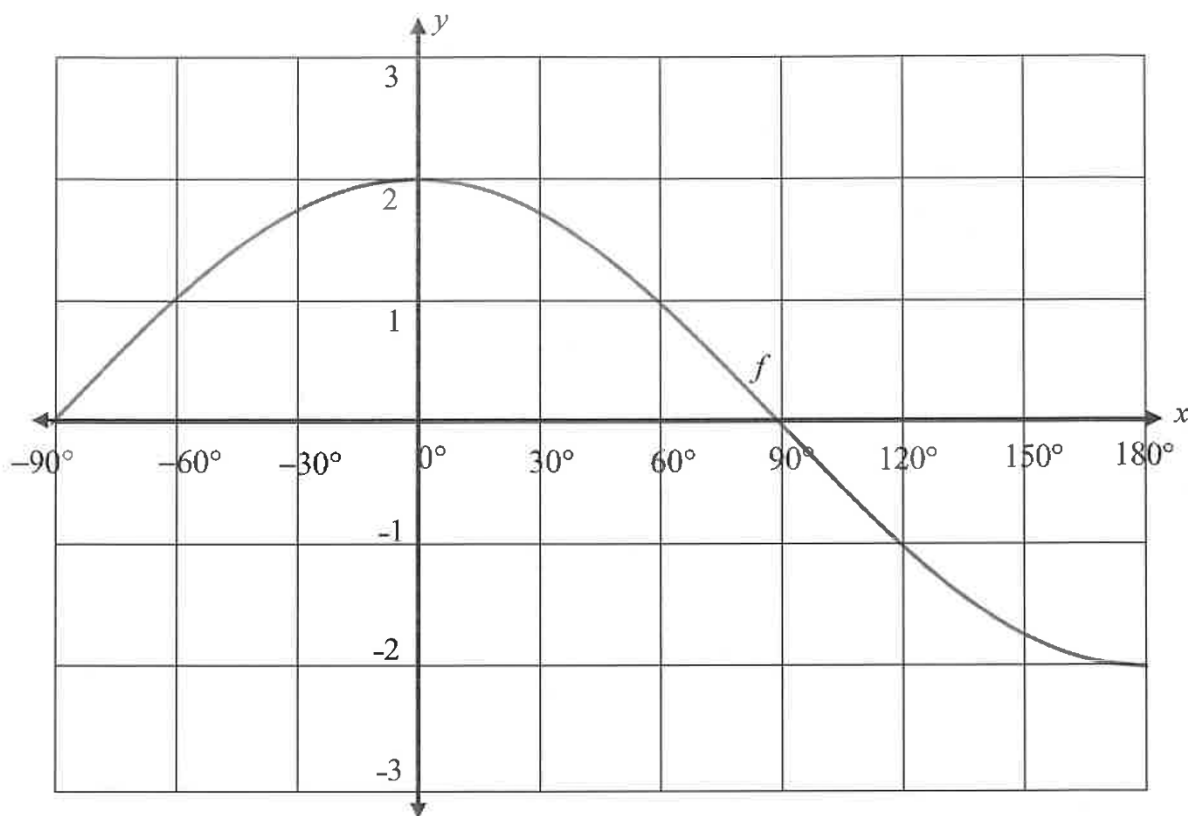
$$\sin(3\alpha - \beta) = \frac{1}{\sqrt{2}} \text{ if } 3\alpha - \beta \in [90^\circ; 270^\circ]$$

$$\tan(2\alpha + \beta) = \frac{1}{\sqrt{3}} \text{ if } 2\alpha + \beta \in [90^\circ; 270^\circ]$$

(4)
[29]

QUESTION 6

In the diagram below, the graph of $f(x) = 2\cos x$ is drawn for the interval $x \in [-90^\circ; 180^\circ]$.

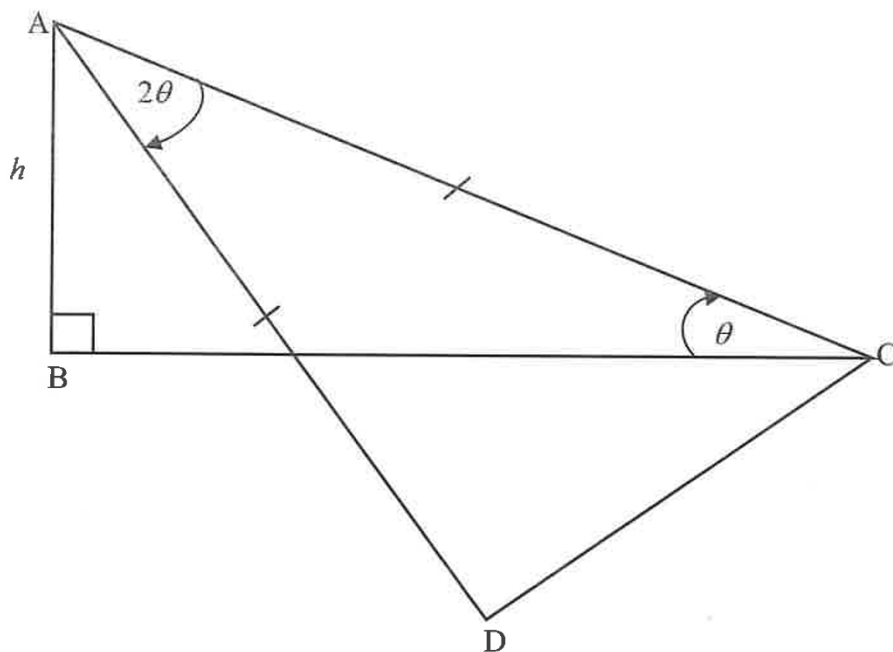


- 6.1 Draw the graph of $g(x) = -\tan \frac{3}{2}x$ for the interval $x \in [-90^\circ; 180^\circ]$ on the grid provided in the ANSWER BOOK. Clearly show ALL asymptotes, intercepts with the axes and endpoint(s) of the graph. (4)
- 6.2 Determine the period of g . (2)
- 6.3 Write down the values of x in the interval $x \in [-90^\circ; 180^\circ]$ for which f is decreasing. (2)
- 6.4 Use the graph of g to determine for which value(s) of x will $g(x) \geq 1$ for $x \in [-90^\circ; 180^\circ]$. (4)
- 6.5 The function h is obtained by translating the graph of g , 30° to the right. Write down the equation of h . (2)

[14]

QUESTION 7

In the diagram below, AB is a pole anchored by two cables at C and D . B , C and D are in the same horizontal plane. The height of the pole is h and the angle of elevation from C to the top of the pole, A , is θ . $\hat{CAD} = 2\theta$ and $AC = AD$.

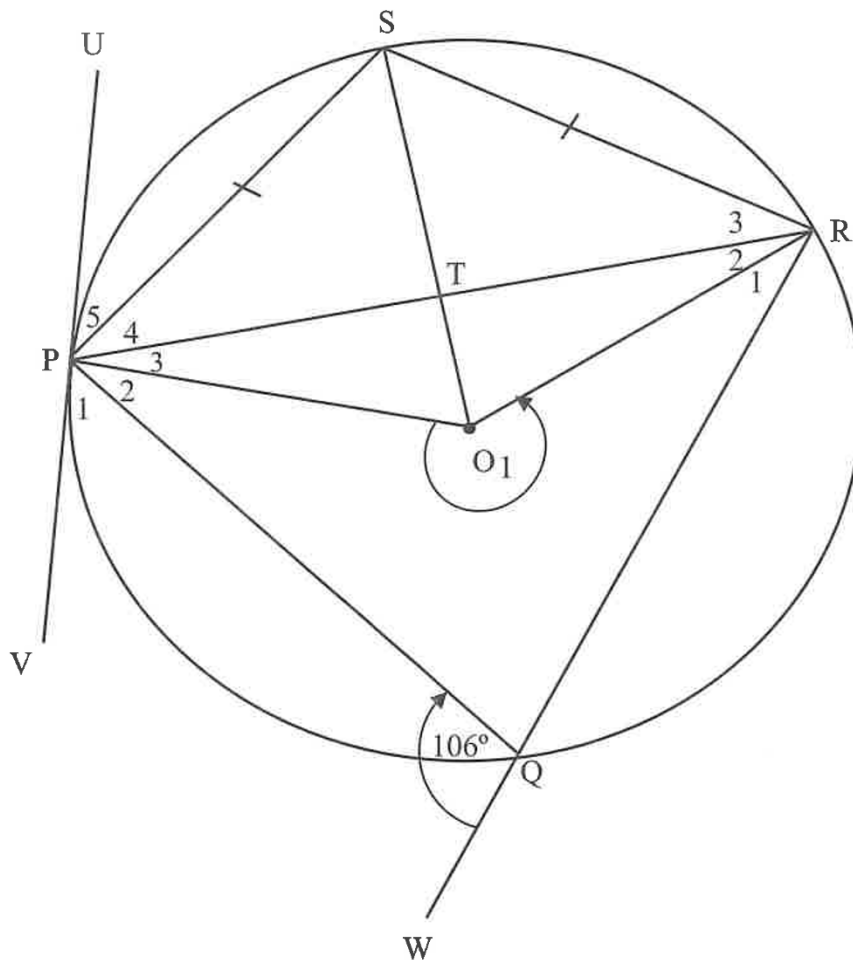


Determine CD , the distance between the two anchors, in terms of h .

(7)
[7]

QUESTION 8

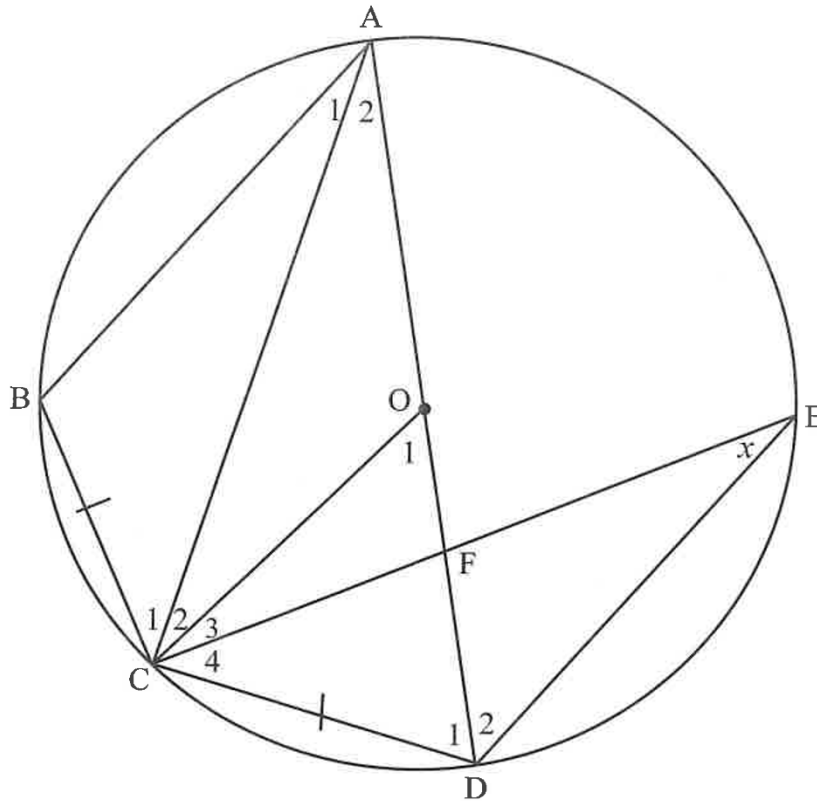
- 8.1 In the diagram below, points P, Q, R and S are points on a circle with centre O. UV is a tangent to the circle at P. PR and OS intersect at T and RQ is produced to W. $\hat{PQW} = 106^\circ$ and $SP = SR$.



Calculate, with reasons, the size of the following angles:

- | | | |
|-------|-------------|-----|
| 8.1.1 | $\hat{PSR}$ | (2) |
| 8.1.2 | $\hat{R}_3$ | (3) |
| 8.1.3 | $\hat{P}_5$ | (2) |
| 8.1.4 | $\hat{O}_1$ | (2) |
| 8.1.5 | $\hat{P}_3$ | (2) |

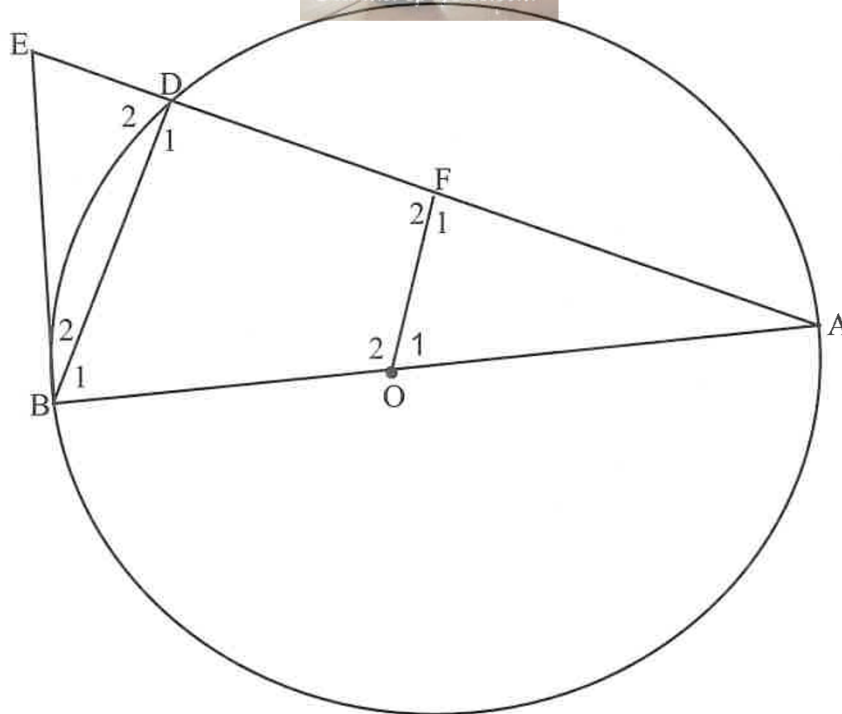
- 8.2 In the diagram below, A, B, C, D and E are points on a circle centred O. AC, OC and ED are drawn. Chords $BC = CD$. Let $\angle CED = x$.



- 8.2.1 Determine, with reasons two other angles which are equal to x . (2)
- 8.2.2 Determine $\angle ABC$ in terms of x . (3)
- 8.2.3 Prove $AB \parallel CO$. (3)
- [19]

QUESTION 9

In the diagram below, BOA is the diameter of the circle centred at O. BE is a tangent to the circle at B and EA cuts the circle at D. F is the midpoint of AD.



9.1 Prove, giving reasons that:

9.1.1 OBEF is a cyclic quadrilateral. (3)

9.1.2 $\triangle ADB \parallel \triangle BDE$. (3)

9.1.3 OB is a tangent to the circle passing through B, D and E. (2)

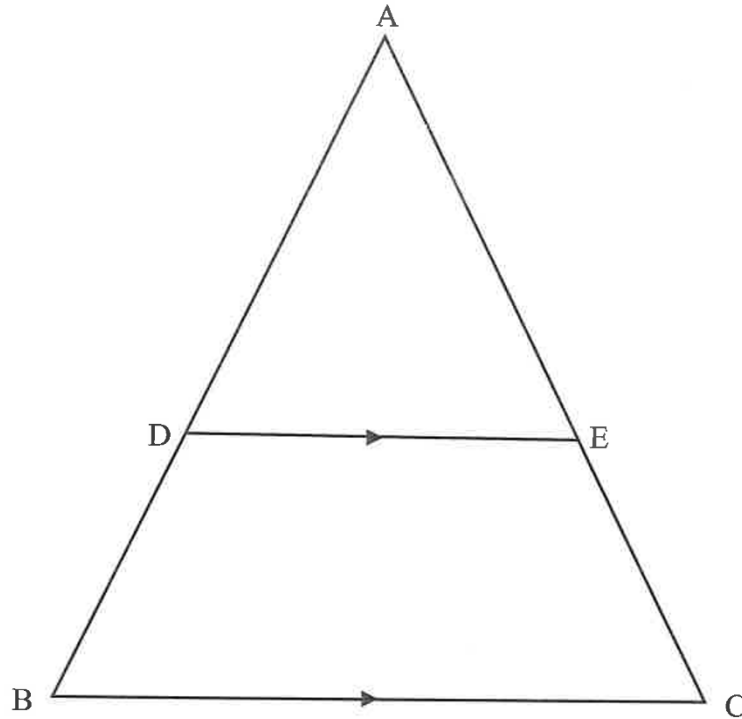
9.2 Prove: $OF^2 = \frac{AD \times DE}{4}$ (3)

[11]

QUESTION 10

- 10.1 In the diagram below, $\triangle ABC$ is drawn. D is a point on AB and E is a point on AC such that $DE \parallel BC$.

Use the diagram to prove the theorem which states that $\frac{AD}{DB} = \frac{AE}{EC}$.

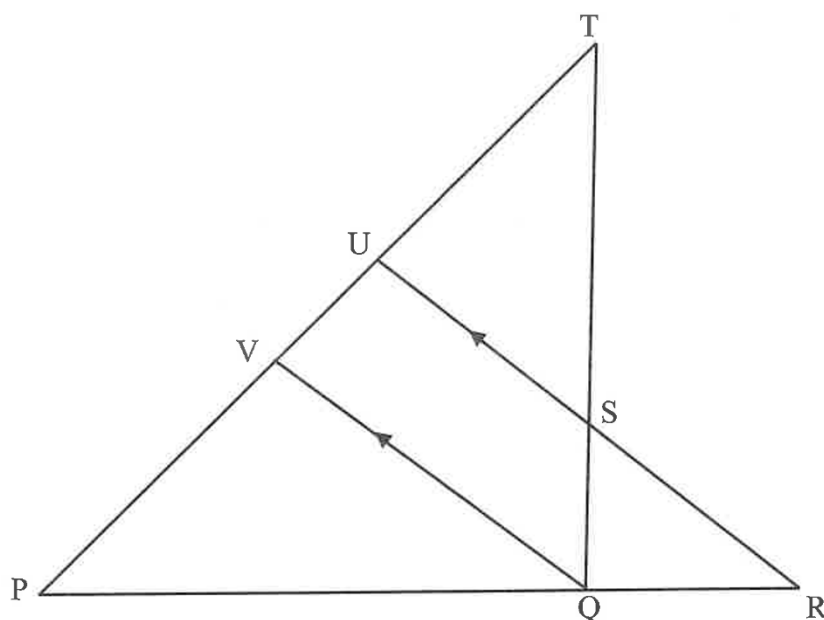


(5)

- 10.2 In the diagram below, $\triangle TPQ$ is drawn. PQ and US are produced to meet at R . UR and TQ intersect at S . $SU \parallel QV$.

$$\frac{TU}{UP} = \frac{2}{5} \text{ and } 3QS = 2ST.$$

Calculate, giving reasons $\frac{PQ}{QR}$.



(5)
[10]

TOTAL: 150

INFORMATION SHEET

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

$$y = mx + c$$

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

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

$$m = \tan \theta$$

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

$$\text{In } \triangle ABC: \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

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

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

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

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

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

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

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

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

$$\bar{x} = \frac{\sum x}{n}$$

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

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

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

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

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



GAUTENG PROVINCE

EDUCATION
REPUBLIC OF SOUTH AFRICA

PREPARATORY EXAMINATION/ VOORBEREIDENDE EKSAMEN

2021

MARKING GUIDELINES/ NASIENRIGLYNE

(10612)

MATHEMATICS (PAPER 2)/WISKUNDE (VRAESTEL 2)

26 pages/bladsye

NOTE:

- If a candidate answers a question TWICE, mark only the FIRST attempt.
- If a candidate has crossed-out an attempt of a question and has not redone the question, mark the crossed-out version.
- Consistent accuracy applies in ALL aspects of the marking guidelines. Stop marking at the second calculation error.
- Assuming answers/values in order to solve a problem is NOT acceptable.

LET WEL:

- As n kandidaat n vraag TWEE KEER beantwoord, sien slegs die EERSTE poging na.
- As n kandidaat n antwoord van n vraag doodtrek en nie oordoen nie, sien die doodgetrekte poging na.
- Volgehoue akkuraatheid word in ALLE aspekte van die nasienriglyne toegepas. Hou op nasien by die tweede berekeningsfout.
- Aannames van antwoorde/waardes om n probleem op te los, word NIE toegelaat NIE.

GEOMETRY/MEETKUNDE	
S	A mark for a correct statement (A statement mark is independent of a reason.)
	n Punt vir n korrekte bewering (n Punt vir n bewering is onafhanklik van die rede.)
R	A mark for a correct reason (A reason mark may only be awarded if the statement is correct.)
	n Punt vir n korrekte rede (n Punt word slegs vir die rede toegeken as die bewering korrek is.)
S/R	Award a mark if the statement AND the reason are both correct.
	(Ken n punt toe as beide die bewering EN die rede korrek is.)

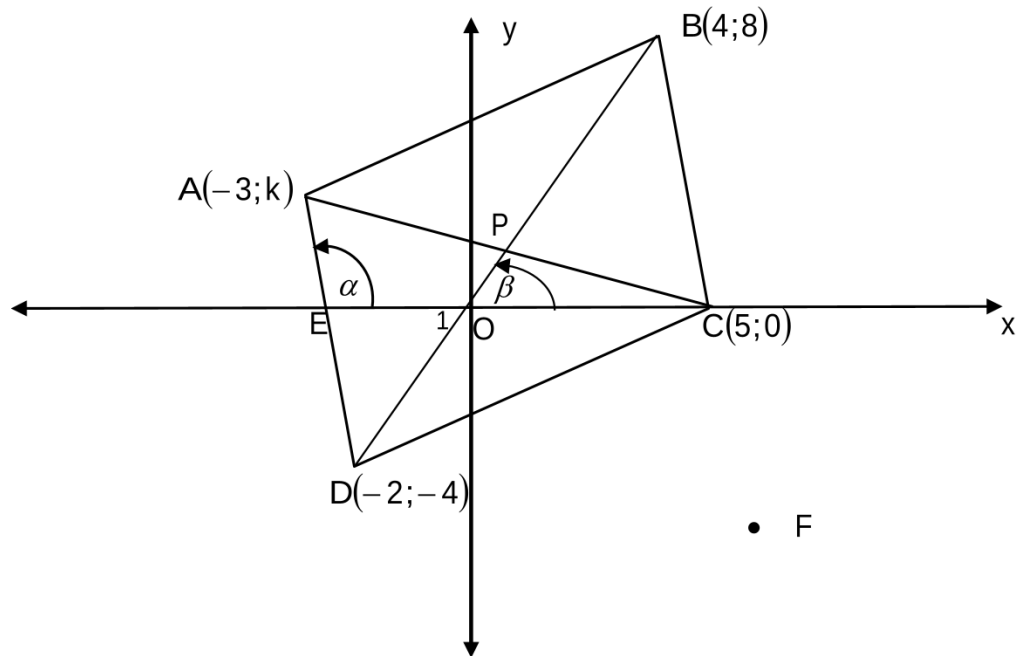
QUESTION/VRAAG 1

1.1	$a = 38,26$ $b = 2,46$ $\hat{y} = 38,26 + 2,46x$ NOT allowed to round to Units , but may round off to 3 decimal or 1 decimal place Mag NIE afrond tot Ene nie, maar mag afrond tot 3 desimale of 1 desimale plek	✓ $a = 38,26$ ✓ $b = 2,46$ ✓ $\hat{y} = 38,26 + 2,46x$ answer only full marks/ antwoord alleenlik volpunte	(3)
1.2	$r = 0,97$	✓ answer/antwoord	(1)
1.3	Very strong positive correlation/ Baie sterk positiewe korrelasie	✓ srong positive/ sterk positief	(1)
1.4	$\bar{x} = (2 + 8 + 4 + 6 + 12 + 10 + 11) \div 7 = 7,57$ $y = [38,26 + 2,46(7,57)] - [15,74 + 4,54(7,57)]$ $y = 6,77$ The difference is/Die verskil is 6,77%	✓ $\bar{x} = 7,57$ ✓ substitute/vervang 7,57 ✓ answer/antwoord (% not necessary to indicate/ % nie nodig om aan te dui)	(3)
1.5	(2;9) OR/OF $x = 2; y = 9$	✓ answer/antwoord ✓ answer/antwoord	(1)
1.6	Lack of attendance by online learner/Gebrek aan bywoning van aanlyn leerling OR/OF Section taught may have been difficult to grasp online/Afdeling wat onderrig was, was moeilik om te verstaan met aanlynklas OR/OF Poor connectivity/Slegte verbinding OR/OF Lack of resources/Gebrek aan hulpbronne OR/OF Insufficient ICT skills/Onvoldoende Rekenaarvaardighede	✓ any valid answer/enige geldige antwoord	(1)
			[10]

QUESTION/VRAAG 2

2.1.1	$2500 \leq w < 3000$	✓ answer/antwoord	(1)
2.1.2	$\frac{250(1) + 750(2) + 1\,250(3) + 1\,750(8) + 2\,250(6) + 2\,750(15) + 3\,250(5)}{40}$ estimated/geskatte $\bar{x} = \frac{90\,500}{40}$ $= 2\,262,5 \text{ grams/gram}$ If numerator is correct and denominator is incorrect 1/3 If numerator is incorrect and denominator is correct 2/3 (CA) Indien teller korrek is en noemer is verkeerd 1/3 Indien teller verkeerd is en noemer is korrek 2/3 (CA)	✓ 90 500 ✓ 40 ✓ answer/antwoord	(3)
2.2.1	Cumulative Frequency Curve (Ogive) Kumulatiewe Frekwensiekurwe (Ogief)	✓ grounding point/ gegronde punt (4 ; 0) and/en (3 504 ; 40) ✓ shape/vorm (if ruler is used to connect points, NO mark for shape/indien liniaal gebruik word om punte te verbind GEEN punt vir vorm) ✓✓ (1 mistake - 1 mark; 2 mistakes - no mark/1 fout – 1 punt; 2 foute – geen punte)	(4)
2.2.2	It will not deviate./it will remain the same. Dit sal nie afwyk nie./dit sal dieselfde bly.	✓ answer/antwoord	(1)
2.2.3	$2\,262,5 + 4$ CA from /van 2.1.2 $= 2\,266,5 \text{ grams/gram}$	✓ addition of 4/4 bygetel ✓ answer/antwoord	(2)
			[11]

QUESTION/VRAAG 3



3.1	$m_{BC} = \frac{8-0}{4-5}$ $m_{BC} = -8$	✓ correct substitution into gradient formula (swop x and y around 0/2)/korrekte vervanging in gradiënt formule (ruil x en y om 0/2/ ✓ answer/antwoord	(2)
3.2	$AB = \sqrt{65} = \sqrt{(-3-4)^2 + (k-8)^2}$ $65 = 49 + k^2 - 16k + 64$ $k^2 - 16k + 48 = 0$ $(k-4)(k-12) = 0$ $k = 4 \text{ or/of } k = 12$ $\therefore k = 4$ OR/OF $AB = \sqrt{65} = \sqrt{(-3-4)^2 + (k-8)^2}$ $65 = 49 + (k-8)^2$ $(k-8)^2 = 16$ $k-8 = \pm 4$ $k = 4 \text{ or/of } k = 12$ $\therefore k = 4$	✓ substitute A and B into distance formula/vervang A en B in die afstandformule ✓ standard form/standaardvorm ✓ factors/faktore ✓ $k = 4$ ✓ substitute A and B into distance formula/vervang A en B in die afstandformule ✓ isolate square/isoleer kwadraat ✓ square root both sides/vierkantwortel weerskante ✓ $k = 4$	(4)

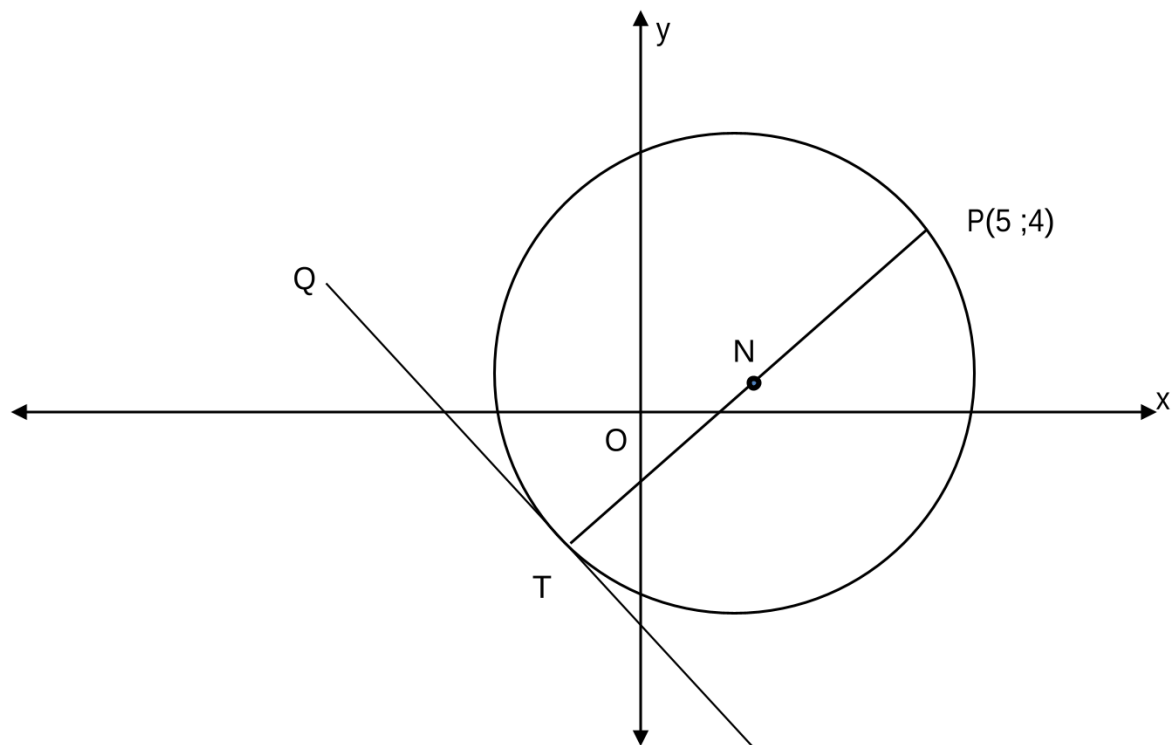
3.3	$m_{BD} = \frac{8 - (-4)}{4 - (-2)} = 2$ $m_{AC} = \frac{4 - 0}{-3 - 5} = -\frac{1}{2}$ $\therefore m_{BD} \times m_{AC} = 2 \times -\frac{1}{2} = -1$ $\therefore BP \perp AC$ OR/OF Coordinates of P = Midpoint of AC = Midpoint of BD/ Koördinate van P = Middelpunt van AC = Middelpunt van BD $= \left(\frac{-3+5}{2}, \frac{4+0}{2} \right) = \left(\frac{-2+4}{2}, \frac{-4+8}{2} \right)$ $= (1; 2)$ $m_{BP} = \frac{8-2}{4-1} = 2$ $m_{AC} = \frac{4-0}{-3-5} = -\frac{1}{2}$ $\therefore m_{BP} \times m_{AC} = 2 \times -\frac{1}{2} = -1$ $\therefore BP \perp AC$	$\checkmark m_{BD} = 2$ $\checkmark m_{AC} = -\frac{1}{2}$ $\checkmark m_{BD} \times m_{AC} = -1$ (must show the multiplication/ moet die vermenigvuldiging aandi $\checkmark m_{BP} = 2$ $\checkmark m_{AC} = -\frac{1}{2}$ $\checkmark m_{BP} \times m_{AC} = -1$ (must show the multiplication/ moet die vermenigvuldiging aandi	(3)
3.4	Midpoint of AF = Midpoint of DC/ Middelpunt van AF = Middelpunt van DC $\frac{x + (-3)}{2} = \frac{-2+5}{2} \text{ and/en } \frac{y+4}{2} = \frac{-4+0}{2}$ $x = 6 \text{ and/en } y = -8$ $\therefore F(6; -8)$ Answer Only: Full Marks/Antwoord alleenlik: Volpunte OR/OF Method: Translation/Metode: Translasie A $\rightarrow$ D: (x; y) $\rightarrow$ (x+1; y-8) $\therefore$ by symmetry/as simmetrie: C $\rightarrow$ F: C(5;0) $\rightarrow$ F(5+1; 0-8) $\therefore F(6; -8)$ Answer Only: Full Marks/Antwoord alleenlik: Volpunte	$\checkmark$ x – coordinate/ x – koördinaat $\checkmark$ y – coordinate/ y – koördinaat $\checkmark$ x – coordinate/ x – koördinaat $\checkmark$ y – coordinate/ y – koördinaat	(2)

3.5	ONLY QUESTION (3.5) IN PAPER WHERE LEARNER WILL BE PENALISED FOR INCORRECT ROUNDING ENIGSTE VRAAG (3.5) IN VRAESTEL WAAR LEERLING GEPENALISEER WORD VIR VERKEERDE AFRONDING $m_{AD} = m_{BC} = -8$ $\tan \alpha = m_{AD}$ $\tan \alpha = -8$ $\alpha = 180^\circ - \tan^{-1}(8)$ $= 180^\circ - 82,87^\circ$ $= 97,13^\circ$ $\tan \beta = m_{BD} = 2$ $\beta = 63,43^\circ$ $\hat{O}_1 = 63,43^\circ$ (vert.opp. $\angle$s/regoorst.$\angle$e) $\hat{E}\hat{D}\hat{O} = \alpha - \beta$ (ext. $\angle$ of Δ/buite $\angle$ van Δ) $= 97,13^\circ - 63,43^\circ$ $= 33,7^\circ$ OR/OF In $\triangle APD$, $\hat{A}\hat{P}\hat{D} = 90^\circ$ $AP = 2\sqrt{5}$ $PD = 3\sqrt{5}$ $\tan \hat{E}\hat{D}\hat{O} = \frac{AP}{PD}$ $\tan \hat{E}\hat{D}\hat{O} = \frac{2\sqrt{5}}{3\sqrt{5}}$ $\hat{E}\hat{D}\hat{O} = 33,69 \approx 33,7^\circ$ (rounded off to ONE decimal place/rond af tot EEN desimale plek) OR/OF In $\triangle APD$, $\hat{A}\hat{P}\hat{D} = 90^\circ$ $AP = 2\sqrt{5}$ & $AD = \sqrt{65}$ $\sin \hat{E}\hat{D}\hat{O} = \frac{AP}{AD}$ $\sin \hat{E}\hat{D}\hat{O} = \frac{2\sqrt{5}}{\sqrt{65}}$ $\hat{E}\hat{D}\hat{O} = 33,69 \approx 33,7^\circ$ (rounded off to ONE decimal place/rond af tot EEN desimale plek) OR/OF	✓ $m_{AD} = -8$ ✓ $\tan \alpha = -8$ ✓ $\alpha = 97,13^\circ$ ✓ $\beta = 63,43^\circ$ ✓ $\alpha - \beta$ ✓ answer/antwoord ✓ $\hat{A}\hat{P}\hat{D} = 90^\circ$ ✓ $AP = 2\sqrt{5}$ ✓ $PD = 3\sqrt{5}$ ✓ trig ratio/ trig verhouding ✓ substitution/ vervanging ✓ answer/antwoord ✓ $\hat{A}\hat{P}\hat{D} = 90^\circ$ ✓ $AP = 2\sqrt{5}$ ✓ $AD = \sqrt{65}$ ✓ trig ratio/ trig verhouding ✓ substitution/ vervanging ✓ answer/antwoord	
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In $\triangle APD$ $\hat{A}PD = 90^\circ$ $PD = 3\sqrt{5}$ $AD = \sqrt{65}$ $\cos \hat{E}DO = \frac{PD}{AD}$ $\cos \hat{E}DO = \frac{3\sqrt{5}}{\sqrt{65}}$ $\hat{E}DO = 33,69 \approx 33,7^\circ$ (rounded off to ONE decimal place/rond af tot EEN desimale plek) OR/OF In $\triangle ABD$ $BD = 6\sqrt{5}$ $AD = \sqrt{65}$ $\cos \hat{E}DO = \frac{AD^2 + BD^2 - AB^2}{2(AD)(BD)}$ $\cos \hat{E}DO = \frac{(\sqrt{65})^2 + (6\sqrt{5})^2 - (\sqrt{65})^2}{2(\sqrt{65})(6\sqrt{5})} = \frac{3}{\sqrt{13}}$ $\hat{E}DO = 33,69 \approx 33,7^\circ$ (rounded off to ONE decimal place/rond af tot EEN desimale plek)	✓ $\hat{A}PD = 90^\circ$ ✓ $PD = 3\sqrt{5}$ ✓ $AD = \sqrt{65}$ ✓ trig ratio/trig verhouding ✓ substitution/vervanging ✓ answer/antwoord ✓ $BD = 6\sqrt{5}$ ✓ $AD = \sqrt{65}$ ✓ cosine rule/kosinusreël ✓ substitution/vervanging ✓ $\frac{3}{\sqrt{13}}$ ✓ answer/antwoord	(6)
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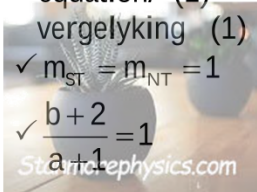
3.6	$AC = \sqrt{(5 - (-3))^2 + (0 - 4)^2} = \sqrt{80} = 4\sqrt{5}$ $DP = \sqrt{(-2 - 1)^2 + (-4 - 2)^2} = \sqrt{45} = 3\sqrt{5}$ $\text{Area of/van } \triangle ADC = \frac{1}{2} AC \times DP$ $\therefore \text{Area of/van } \triangle ADC = \frac{1}{2} (4\sqrt{5}) \times (3\sqrt{5})$ $= 30 \text{ square units/vierkante eehede}$ OR/OF ABCD is a rhombus, because the diagonals bisect perpendicularly and all sides are equal. <i>ABCD is 'n ruit, want die hoeklyne halveer mekaar reghoekig en al die sye is ewe lank.</i> $\therefore \hat{CDO} = \hat{EDO}$ (diags of rhombus bisect $\angle$s of rhombus/diag van ruit halveer die $\angle$e van die ruit) $\therefore \hat{ADC} = 2 \times 33,7^\circ = 67,4^\circ$ $\text{Area of/van } \triangle ADC = \frac{1}{2} \times AD \times DC \times \sin \hat{ADC}$ $\therefore \text{Area of/van } \triangle ADC = \frac{1}{2} \times (\sqrt{65}) \times (\sqrt{65}) \times \sin(67,4^\circ)$ $= 30 \text{ square units/vierkante eenhede}$	✓ length of AC/ lengte van AC ✓ length of DP/ lengte van DP ✓ correct substitution into formula/ korrekte vervanging in formule ✓ answer/antwoord ✓ $\hat{CDO} = \hat{EDO}$ ✓ $\hat{ADC} = 67,4^\circ$ ✓ substitution into formula/ vervanging in formule ✓ answer/antwoord	(4) [21]
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QUESTION/VRAAG 4



4.1	$x^2 + y^2 - 4x - 2y - 13 = 0$ $x^2 - 4x + 4 + y^2 - 2y + 1 = 13 + 4 + 1$ $(x - 2)^2 + (y - 1)^2 = 18$	Answer only: Full marks/ Antwoord alleenlik: Volpunte	✓ completing the square/vierkants-voltooiing ✓ $(x - 2)^2 + (y - 1)^2$ ✓ RHS/RK	(3)
4.2	N(2;1) $NT = \sqrt{18} = 3\sqrt{2}$ OR/OF 2,24		✓ both x and y correct/ albei x en y korrek CA from/van 4.1 ✓ length of NT/lengte van NT	(2)
4.3	Midpoint of TNP/Middelpunt van TNP, N(2;1) $\frac{x_T + 5}{2} = 2$ and/en $\frac{y_T + 4}{2} = 1$ T(-1;-2) OR/OF Method: Translation/Metode: Translasie $P \rightarrow N:$ $(x; y) \rightarrow (x - 3; y - 3)$ $\therefore N \rightarrow T:$ $N(2;1) \rightarrow T(2 - 3; 1 - 3)$ $\therefore T(-1;-2)$		✓ x - value/waarde ✓ y - value/waarde ✓ x - value/waarde ✓ y - value/waarde	

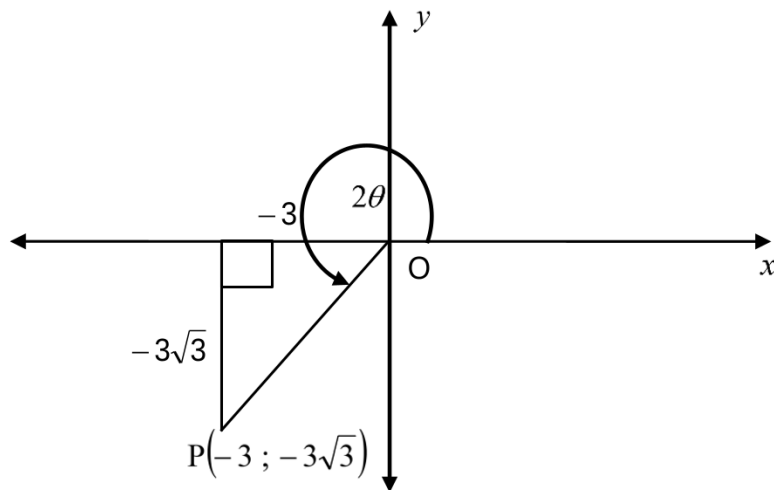
	$m_{NT} = \frac{1 - (-2)}{2 - (-1)} = \frac{3}{3} = 1$ $m_{NT} \times m_{QT} = -1$ $\therefore m_{QT} = -1$ $y - (-2) = -1[x - (-1)]$ $y + 2 = -1(x + 1)$ $y = -x - 3$ OR/OF $y = -x + c$ $-2 = -1(-1) + c$ $c = -3$ $y = -x - 3$ radius $\perp$ tangent radius $\perp$ raaklyn	$\checkmark m_{NT} = 1$ $\checkmark m_{QT} = -1$ $\checkmark$ substitute/vervang m and/en T(-1; -2) CA from/van 4.3 $\checkmark y = -x - 3$	(6)
4.4	$NS = 3NT$ $NS^2 = 9NT^2$ $(a - 2)^2 + (b - 1)^2 = 9(\sqrt{18})^2 = 162 \dots\dots\dots (1)$ $NT \perp QT$ and/en $ST \perp QT \quad \therefore m_{ST} = m_{NT} = 1$ $\frac{b + 2}{a + 1} = 1$ $b + 2 = a + 1$ $b = a - 1 \dots\dots\dots (2)$ Substitute (2) into (1)/vervang (2) in (1) $(a - 2)^2 + (a - 1 - 1)^2 = 162$ $(a - 2)^2 + (a - 2)^2 = 162$ $2(a - 2)^2 = 162$ $(a - 2)^2 = 81$ $\therefore a - 2 = 9 \quad \text{or/of} \quad a - 2 = -9$ $a = 11 \quad \text{or/of} \quad a = -7$ But/maar $a < 0$ $\therefore a = -7$ $b = (-7) - 1 = -8$ $S(-7; -8)$ OR/OF	$\checkmark$ equation/vergelyking $\checkmark m_{ST} = m_{NT} = 1$ $\checkmark \frac{b + 2}{a + 1} = 1$ $\checkmark b = a - 1$ $\checkmark$ substitution/ vervang $\checkmark a = -7$ $\checkmark b = -8$	

NS = 3NT $NS^2 = 9NT^2$ $(a-2)^2 + (b-1)^2 = 9(\sqrt{18})^2 = 162 \dots\dots\dots (1)$ NT ⊥ QT and/en ST ⊥ QT ∴ $m_{ST} = m_{NT} = 1$ $\frac{b+2}{a+1} = 1$ $b+2 = a+1$ $b = a - 1 \dots\dots\dots (2)$ Substitute (2) into (1)/vervang (2) in (1) $(a-2)^2 + (a-1-1)^2 = 162$ $(a-2)^2 + (a-2)^2 = 162$ $a^2 - 4a + 4 + a^2 - 4a + 4 = 162$ $2a^2 - 8a - 154 = 0$ $a^2 - 4a - 77 = 0$ $(a-11)(a+7) = 0$ $a = 11 \quad \text{or/of} \quad a = -7$ But/Maar $a < 0$ ∴ $a = -7$ $b = (-7) - 1 = -8$ S(-7 ; -8) OR/OF NTS is a straight line/NTS <i>is</i> 'n reguitlyn $m_{SN} = 1$ $\frac{b-1}{a-2} = 1$ $b-1 = a-2$ $b = a - 1 \dots\dots\dots(1)$ $ST = 2NT = 2\sqrt{18}$ $ST^2 = 4(18) = 72$	 ✓equation/ (1) vergelyking (1) ✓ $m_{ST} = m_{NT} = 1$ ✓ $\frac{b+2}{a+1} = 1$ ✓ $b = a - 1$ ✓substitution/ vervanging ✓ $a = -7$ ✓ $b = -8$ ✓ $m_{SN} = 1$ ✓ $\frac{b-1}{a-2} = 1$ ✓equation/ (1) vergelyking (1)
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$(a+1)^2 + (b+2)^2 = 72 \dots\dots (2)$ Substitute (1) into (2) / vervang (1) in (2) $(a+1)^2 + (a-1+2)^2 = 72$ $2a^2 + 4a - 70 = 0$ $a^2 + 2a - 35 = 0$ $(a+7)(a-5) = 0$ $a = -7$ or/of $a = 5$ $a = -7$ and/en $b = (-7) - 1 = -8$ $S(-7; -8)$	$2(a+1)^2 = 72$ $(a+1)^2 = 36$ $a+1 = -6$ or/of $a+1 = 6$ $a = -7$ or/of $a = 5$ $a = -7$ $b = -7 - 1 = -8$ $S(-7; -8)$	✓ equation/ (2) vergelyking (2) ✓ substitution/ vervanging ✓ ✓ coordinates/ koördinate	
Answer only: 2/7 Antwoord alleenlik: 2/7			
OR/OF 		✓ diagram ✓ ✓ (2; -2) ✓ ✓ (2; -8) ✓ ✓ $S(-7; -8)$	
OR/OF $\frac{x_T - x_N}{x_S - x_N} = \frac{y_T - y_N}{y_S - y_N} = \frac{1}{3}$ $\frac{-3}{a-2} = \frac{-3}{b-1} = \frac{1}{3}$ $a-2 = -9$ $a = -7$ $b-1 = -9$ $b = -8$ $S(-7; -8)$		✓ dividing of a line segment into a given ratio/verdeel lynsegment in gegewe verhouding ✓ ✓ substitution/ vervanging ✓ equation/ vergelyking ✓ $a = -7$ ✓ equation/ vergelyking ✓ $b = -8$	(7) [18]

QUESTION/VRAAG 5

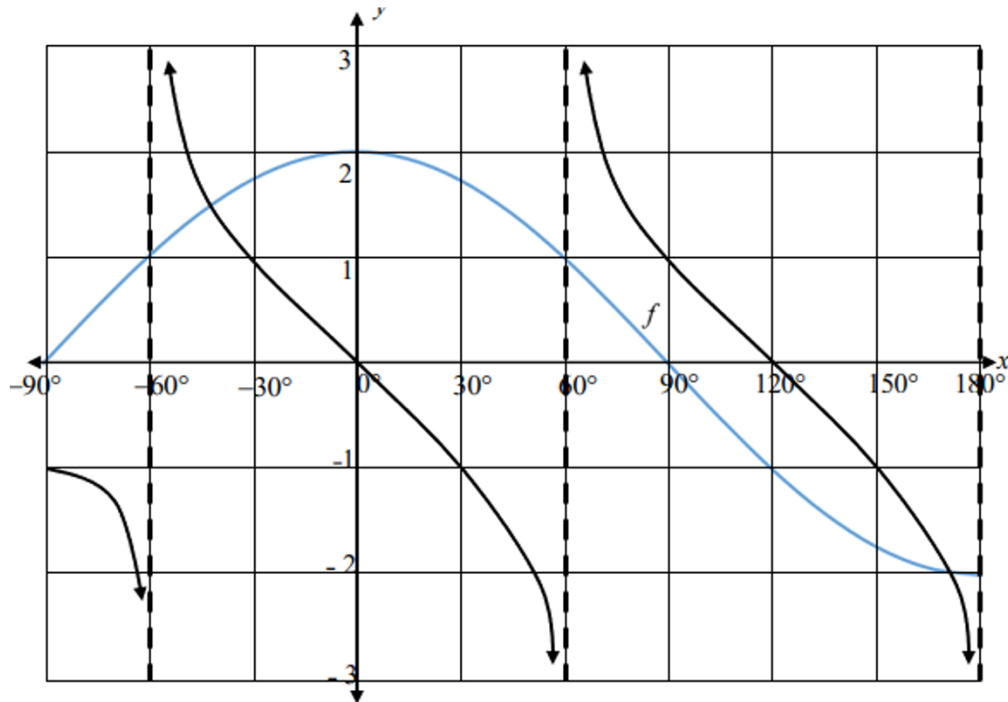
5.1



5.1.1	$OP^2 = (-3)^2 + (-3\sqrt{3})^2$ $OP = 6$ $\cos 2\theta = \frac{-3}{6} = -\frac{1}{2}$	✓ Pythagoras ✓ $OP = 6$ ✓ $\cos 2\theta = -\frac{1}{2}$	(3)
5.1.2	$\cos 2\theta = 1 - 2\sin^2 \theta$ $\therefore 2\sin^2 \theta = 1 - \cos 2\theta$ $\therefore \sin^2 \theta = \frac{1 - \cos 2\theta}{2}$ $= \frac{1 - \left(-\frac{1}{2}\right)}{2}$ $= \frac{3}{4}$ $\therefore \sin \theta = \frac{\sqrt{3}}{2}$ OR/OF $-\frac{1}{2} = 1 - 2\sin^2 \theta$ $\therefore -\frac{3}{2} = -2\sin^2 \theta$ $\therefore \sin^2 \theta = \frac{3}{4}$ $\therefore \sin \theta = \frac{\sqrt{3}}{2}$	✓ double angle identity/ dubbelhoekidentiteit ✓ correct substitution/ korrekte vervanging ✓ answer/antwoord ✓ $-\frac{1}{2} = 1 - 2\sin^2 \theta$ ✓ simplification/ vereenvoudiging ✓ answer/antwoord	(3)

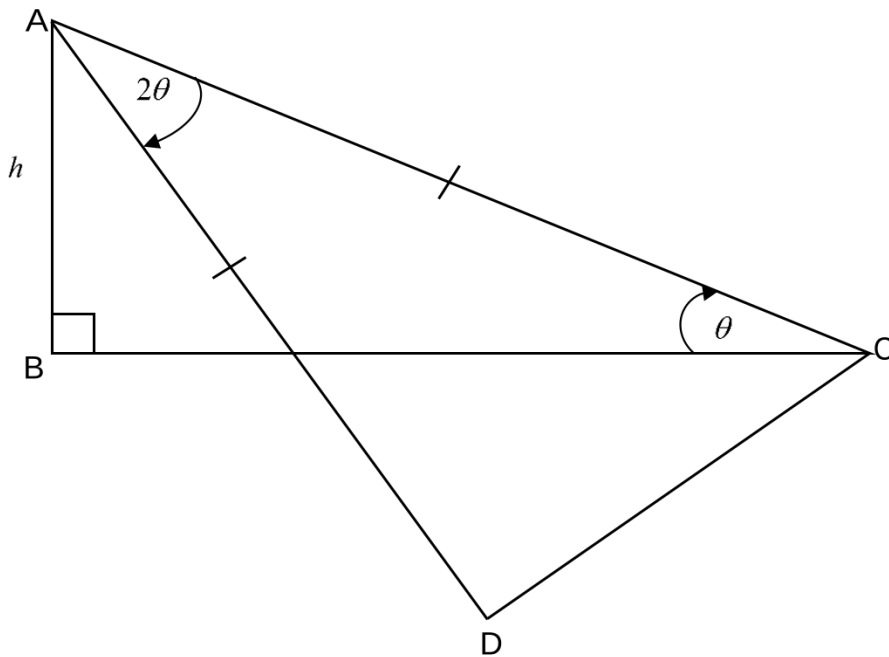
5.2	$\cos^2(180^\circ + x) + \cos(-x) \cdot \tan x \cdot \cos(90^\circ + x)$ $= \cos^2 x + \cos x \cdot \tan x \cdot (-\sin x)$ $= \cos^2 x + \cos x \cdot \frac{\sin x}{\cos x} \cdot (-\sin x)$ $= \cos^2 x - \sin^2 x$ $= \cos 2x$	$\checkmark \cos^2 x$ $\checkmark \cos x$ $\checkmark -\sin x$ $\checkmark \frac{\sin x}{\cos x}$ $\checkmark \cos^2 x - \sin^2 x$ $\checkmark \cos 2x$	(6)
5.3.1	$5 \tan \theta - 6 \cos \theta = 0$ $5 \left(\frac{\sin \theta}{\cos \theta} \right) - 6 \cos \theta = 0$ $5 \sin \theta - 6 \cos^2 \theta = 0$ $5 \sin \theta - 6(1 - \sin^2 \theta) = 0$ $5 \sin \theta - 6 + 6 \sin^2 \theta = 0$ $6 \sin^2 \theta + 5 \sin \theta - 6 = 0$	$\checkmark \tan \theta = \frac{\sin \theta}{\cos \theta}$ $\checkmark \text{multiplying by } \cos \theta /$ $\text{vermenigvuldiging met } \cos \theta$ $\checkmark \cos^2 \theta = 1 - \sin^2 \theta$	(3)
5.3.2	$6 \sin^2 \theta + 5 \sin \theta - 6 = 0$ $(3 \sin \theta - 2)(2 \sin \theta + 3) = 0$ $\sin \theta = \frac{2}{3} \text{ or/of } \sin \theta = -\frac{3}{2}$ $\text{no solution/ geen oplossing}$ $\theta = 41,81^\circ + k \cdot 360^\circ; k \in \mathbb{Z} \text{ or/of } \theta = 138,19^\circ + k \cdot 360^\circ; k \in \mathbb{Z}$	$\checkmark \text{factors (must indicate)/faktore (moet aandui)}$ $\checkmark \text{both values of } \sin \theta /$ $\text{albei waardes van } \sin \theta$ $\checkmark \text{no solution/geen oplossing}$ $\checkmark \theta = 41,81^\circ \text{ or/of } 138,19^\circ$ $\checkmark + k \cdot 360^\circ; k \in \mathbb{Z}$	(5)
5.4	This question has been removed from the question paper. Do not mark this question. Hierdie vraag is uit die vraestel verwyder. Moenie hierdie vraag merk nie.		(0)
5.5	$\sin(3\alpha - \beta) = \frac{1}{\sqrt{2}} \quad \text{ref/verwys } \angle = 45^\circ$ $3\alpha - \beta = 180^\circ - 45^\circ$ $3\alpha - \beta = 135^\circ \dots\dots\dots(1)$ $\tan(2\alpha + \beta) = \frac{1}{\sqrt{3}} \quad \text{ref/verwys } \angle = 30^\circ$ $2\alpha + \beta = 180^\circ + 30^\circ$ $2\alpha + \beta = 210^\circ \dots\dots\dots(2)$ $5\alpha = 345^\circ \quad (1) + (2)$ $\alpha = 69^\circ$ $\beta = 72^\circ$	$\checkmark 3\alpha - \beta = 135^\circ$ $\checkmark 2\alpha + \beta = 210^\circ$ $\checkmark \alpha = 69^\circ$ $\checkmark \beta = 72^\circ$	(4)
			[24]

QUESTION/VRAAG 6



6.1	See the graph above/ Sien bostaande grafiek	✓ asymptotes/asimptote ✓ $x = 0^\circ$; $x = 120^\circ$ ✓ shape/vorm ✓ $(-90^\circ; -1)$ or/of $(90^\circ; 1)$	(4)
6.2	Period of/Periode van $g = \frac{180^\circ}{1,5} = 120^\circ$	✓ method/metode ✓ answer/antwoord Answer only: Full marks/ Antwoord alleenlik: Volpunte	(2)
6.3	$x \in (0^\circ; 180^\circ)$ OR/OR $0^\circ < x < 180^\circ$ If values are incorrect 0/2 Indien waardes verkeerd is 0/2	✓ values/waardes ✓ notation/notasie	(2)
6.4 CA from graph/ vanaf grafiek	$x \in (-60^\circ; -30^\circ]$ OR/OR $-60^\circ < x \leq -30^\circ$ or $x \in (60^\circ; 90^\circ]$ OR/OR $60^\circ < x \leq 90^\circ$ If values are incorrect 0/4 Indien waardes verkeerd is 0/4	✓ both values/albei waardes $-60^\circ; -30^\circ$ ✓ notation/notasie ✓ both values/albei waardes $60^\circ; 90^\circ$ ✓ notation/notasie	(4)
6.5	$h(x) = g(x - 30^\circ)$ $= -\tan\left[\frac{3}{2}(x - 30^\circ)\right]$ $= -\tan\left(\frac{3}{2}x - 45^\circ\right)$	✓ $\frac{3}{2}(x - 30^\circ)$	(2)
			[14]

QUESTION/VRAAG 7



$$\text{In } \triangle ABC: \sin \theta = \frac{h}{AC}$$

$$\therefore AC = \frac{h}{\sin \theta}$$

$$\text{In } \triangle ACD: AC = AD$$

$$\hat{ADC} = \hat{ACD} = \frac{180^\circ - 2\theta}{2} \left[\begin{array}{l} \angle \text{s opp.} = \text{sides; } \angle \text{s of } \triangle = 180^\circ \\ \angle \text{e teenoor} = \text{sye; som vd } \angle \text{ van } \triangle = 180^\circ \end{array} \right]$$

$$\therefore \hat{ADC} = 90^\circ - \theta$$

$$\frac{CD}{\sin 2\theta} = \frac{AC}{\sin(90^\circ - \theta)}$$

$$CD = \frac{AC \cdot \sin 2\theta}{\sin(90^\circ - \theta)}$$

$$= \frac{h}{\sin \theta} \times \frac{2 \sin \theta \cdot \cos \theta}{\cos \theta}$$

$$= 2h$$

OR/OF

✓ AC in terms of h and θ /
AC in terme van h en θ

✓ $\hat{ADC} = 90^\circ - \theta$

✓ correct subst. into sine rule/
korrekte vervanging in sinusreël

✓ CD as subject / CD as onderwerp

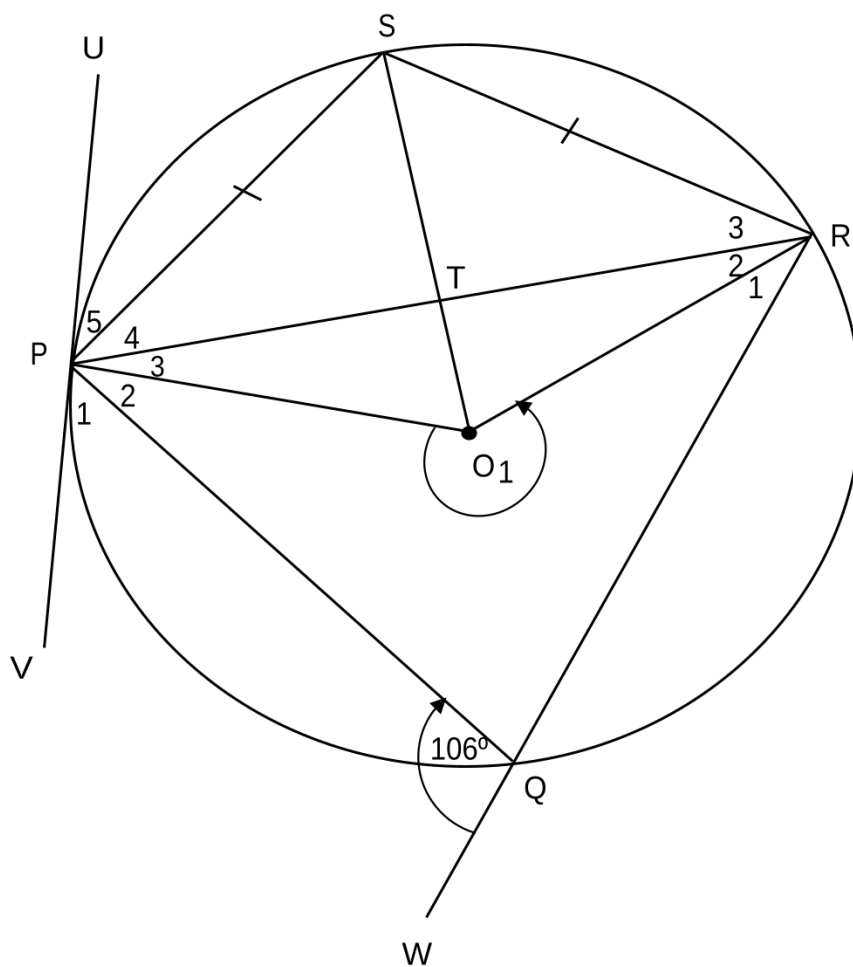
✓ $\sin 2\theta = 2 \sin \theta \cos \theta$

✓ $\sin(90^\circ - \theta) = \cos \theta$

✓ answer / antwoord

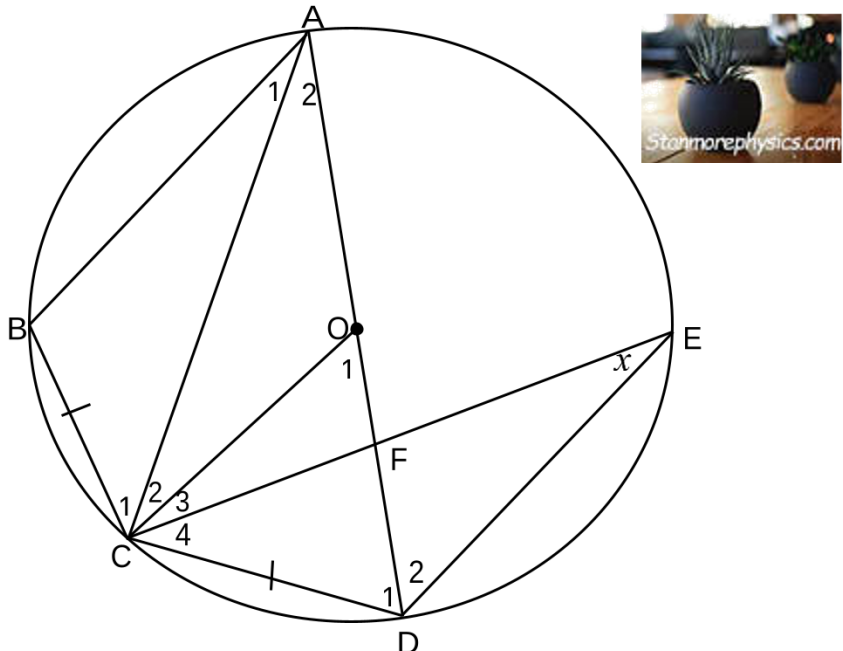
	In $\triangle ABC$: $\sin \theta = \frac{h}{AC}$ $\therefore AC = \frac{h}{\sin \theta}$  In $\triangle ACD$: $AC = AD$ $CD^2 = AC^2 + AD^2 - 2AC \cdot AD \cos 2\theta$ $CD^2 = \left(\frac{h}{\sin \theta}\right)^2 + \left(\frac{h}{\sin \theta}\right)^2 - 2\left(\frac{h}{\sin \theta}\right)^2 \cos 2\theta$ $CD^2 = \frac{h^2}{\sin^2 \theta} + \frac{h^2}{\sin^2 \theta} - 2\frac{h^2}{\sin^2 \theta} (1 - 2\sin^2 \theta)$ $CD^2 = 2\frac{h^2}{\sin^2 \theta} - 2\frac{h^2}{\sin^2 \theta} + 4h^2$ $CD^2 = 4h^2$ $CD = 2h$	✓ AC in terms of h and θ / AC in terme van h en θ ✓ AC = CD ✓ correct subst. into cosine rule / korrekte vervanging in kosinusreël ✓ $\cos 2\theta = 1 - 2\sin^2 \theta$ ✓ multiplication / vermenigvuldiging ✓ simplification / vereenvoudiging ✓ answer / antwoord	(7) [7]
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QUESTION/VRAAG 8



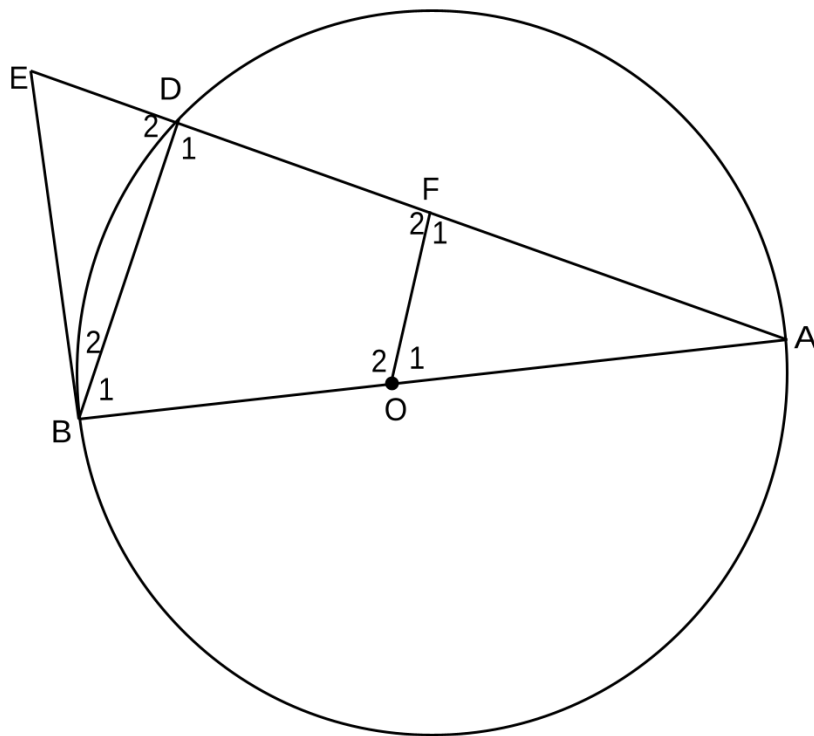
8.1.1	$\hat{P}\hat{S}\hat{R} = 106^\circ$	ext. $\angle$ of cyclic quad/buite $\angle$ van kvh.	✓S ✓R	(2)
8.1.2	$\hat{P}_4 = \hat{R}_3$ $\hat{R}_3 = \frac{180^\circ - 106^\circ}{2}$ $\hat{R}_3 = 37^\circ$	$\angle^s$ opposite = sides/ $\angle^e$ teenoor = sye OR/OF equal chords; equal $\angle^s$ /gelyke koorde; gelyke $\angle^e$ sum of $\angle^s$ in a triangle/som vd $\angle^e$ v driehoek	✓S/R ✓S ✓S	(3)
8.1.3	$\hat{P}_5 = \hat{R}_3 = 37^\circ$	tan chord theorem/raaklyn koordstelling	✓S ✓R	(2)
8.1.4	$\hat{O}_1 = 212^\circ$	$\angle$ centre = $2 \times \angle$ at circumference/ middelpunts $\angle = 2 \times$ omtreks $\angle$	✓R ✓S	(2)

8.1.5	$\hat{P}_3 + \hat{P}_4 + \hat{P}_5 = 90^\circ$ $\hat{P}_3 = 90^\circ - 37^\circ - 37^\circ = 16^\circ$ OR/OF $\hat{P}OR = 148^\circ$ $\hat{P}_3 = \hat{R}_2 = 16^\circ$	radius $\perp$ tangent/radius $\perp$ raaklyn $\angle$'s around a point/ $\angle$ 'e om 'n punt $\angle$'s opposite radii/ $\angle$ 'e teenoor radiusse	$\checkmark R$ $\checkmark \hat{P}_3 = 16^\circ$ $\checkmark R$ $\checkmark \hat{P}_3 = 16^\circ$	(2)
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8.2				
8.2.1	$\hat{A}_2 = \hat{E} = x$ $\hat{E} = \hat{A}_1 = \hat{A}_2 = x$ OR/OF $\hat{C}_2 = \hat{A}_2 = x$ Learner MUST first determine $\hat{A}_2$ in order to get the mark for $\hat{C}_2$ Leerling MOET eers $\hat{A}_2$ bepaal, om die punt vir $\hat{C}_2$ te verdien	$\angle^s$ in the same segment/ $\angle^e$ in dies. segment = chords subtend = $\angle^s$ /gelyke koorde onderspan gelyke $\angle^e$ $\angle^s$ opposite radii/ $\angle$ 'e teenoor radiusse	✓S/R ✓S/R ✓S/R	(2)
8.2.2	$\hat{C}_2 + \hat{C}_3 + \hat{C}_4 = 90^\circ$ $\hat{D}_1 = 90^\circ - x$ $\hat{A}\hat{B}\hat{C} = 90^\circ + x$ $\hat{O}_1 = 2x$ $\hat{D}_1 = 90^\circ - x$ $\hat{A}\hat{B}\hat{C} = 90^\circ + x$	$\angle^s$ in a semi circle/ $\angle^e$ in semi sirkel sum of $\angle^s$ in a triangle/som vd $\angle^e$ v driehoek opposite $\angle^s$ of cyclic quad/oorst $\angle^e$ v kvh OR/OF $\angle$ centre = $2 \times \angle$ at circumference/ middelpunts $\angle = 2 \times$ omtreks $\angle$ sum of $\angle^s$ in a triangle/som vd $\angle^e$ v driehoek opposite $\angle^s$ of cyclic quad/oorst $\angle^e$ v kvh	✓S/R ✓S ✓S/R ✓S/R ✓S ✓S/R	(3)
8.2.3	$\hat{C}_3 + \hat{C}_4 = 90^\circ - x$ $\hat{A}_2 = \hat{C}_2 = x$ $\therefore \hat{A}_1 = \hat{C}_2 = x$ $\therefore AB \parallel CO$	$\angle^s$ opposite radii/ $\angle$ 'e teenoor radiusse $\angle^s$ opposite radii/ $\angle$ 'e teenoor radiusse alternate $\angle^s$ =/verwis. $\angle^e$ gelyk OR/OF	✓S/R ✓S/R ✓R	(3)

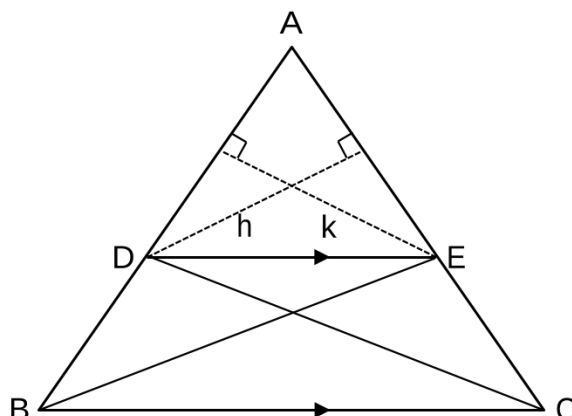
	$\hat{C}_3 + \hat{C}_4 = 90^\circ - x$	$\angle^s$ opposite radii/ $\angle^e$ teenoor radiusse	✓S/R	
	$\hat{A}_1 + \hat{A}_2 = \hat{O}_1 = 2x$	$\angle$ centre = $2 \times \angle$ at circ./	✓S/R	
	$\therefore AB \parallel CO$	middelpunt $\angle = 2 \times$ omtrek $\angle$ corresponding $\angle^s =$ ooreenkomst. $\angle^e$ gelyk	✓R	
				[19]

QUESTION/VRAAG 9



9.1.1	$\hat{F}_2 = 90^\circ$ $\hat{B}_1 + \hat{B}_2 = 90^\circ$ $\therefore \hat{F}_2 + \hat{B} = 180^\circ$ OBEF is a cyclic quad/ OBEF is 'n koordevierhoek	line from centre to midpoint of chord/ lyn v middelpunt na middelpunt v koord radius $\perp$ tangent/radius $\perp$ raaklyn opp. $\angle^s$ are supplementary/ converse of opp. $\angle^s$ of a cyclic quad/ oorst. $\angle^e$ is supplementêr/omgekeerde v oorst $\angle^e$ v kvh OR/OF line from centre to midpoint of chord/ lyn v middelpunt na middelpunt v koord radius $\perp$ tangent/radius $\perp$ raaklyn ext. $\angle$ = interior opposite $\angle$ / converse of exterior. $\angle$ of a cyclic quad/ $\angle$ = oorst binne $\angle^e$ /omgekeerde van buite $\angle$ van kvh	✓ S/R ✓ S/R ✓ R ✓ S/R ✓ S/R ✓ R	(3)
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QUESTION/VRAAG 10



Construction must be in words or indicated on sketch. No construction – 0/5 for question.

90° must be mentioned or indicated – if not 4/5

Konstruksie moet op skets aangedui wees, of in woorde. Geen konstruksie – 0/5 vir vraag.

90° moet genoem word of aangedui wees – indien nie 4/5

10.1

Construction: Join DC and BE and perpendicular heights k and h
Konstruksie: Verbind DC en BE en loodregte hoogtes k en h

$$\frac{\text{Area } \triangle ADE}{\text{Area } \triangle DEB} = \frac{\frac{1}{2} \cdot AD \cdot k}{\frac{1}{2} \cdot DB \cdot k} = \frac{AD}{DB}$$

$$\frac{\text{Area } \triangle ADE}{\text{Area } \triangle DEC} = \frac{\frac{1}{2} \cdot AE \cdot h}{\frac{1}{2} \cdot EC \cdot h} = \frac{AE}{EC}$$

$$\therefore \frac{\text{Area } \triangle ADE}{\text{Area } \triangle DEB} = \frac{\text{Area } \triangle ADE}{\text{Area } \triangle DEC}$$

$$\therefore \frac{AD}{DB} = \frac{AE}{EC}$$



same base, same height/
dies. basis, dies. hoogte

✓ construction/ konstruksie

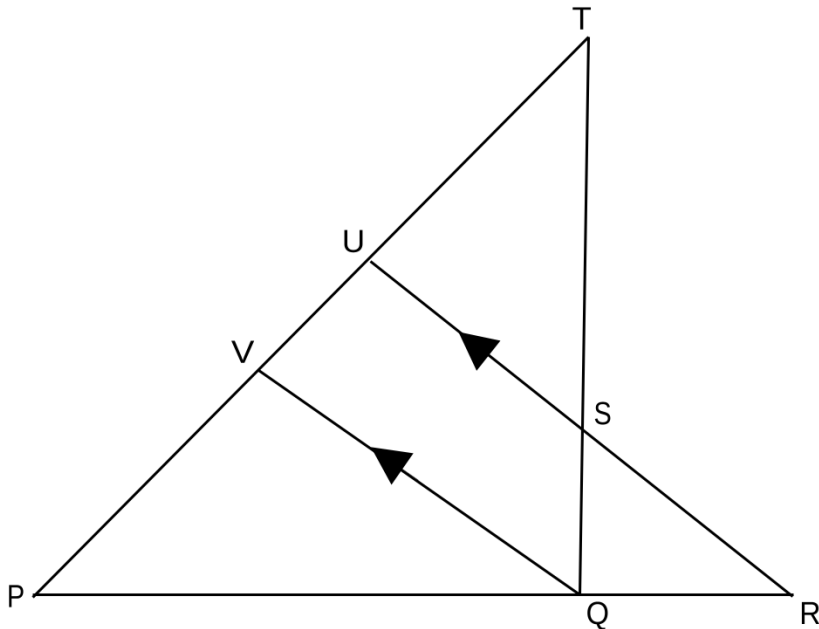
✓S

✓S

✓ S/R

✓S

(5)

				
10.2	$\frac{QS}{ST} = \frac{VU}{UT}$ $\frac{2}{3} = \frac{VU}{2}$ $VU = \frac{4}{3}$ $PV = 5 - \frac{4}{3} = \frac{11}{3}$ $\frac{PV}{VU} = \frac{PQ}{QR}$ $\frac{PQ}{QR} = \frac{11}{3} \div \frac{4}{3}$ $\frac{PQ}{QR} = \frac{11}{4}$	Proportion theorem, $RU \parallel QV$/ line $\parallel$ one side of Δ/eweredigheids stelling $RU \parallel QV$/lyn $\parallel$ een sy van Δ Proportion theorem, $RU \parallel QV$/ line $\parallel$ one side of Δ/eweredigheids stelling $RU \parallel QV$/lyn $\parallel$ een sy van Δ	✓S/R ✓ $VU = \frac{4}{3}$ ✓ $PV = \frac{11}{3}$ ✓S ✓S	(5)
				[10]

TOTAL/TOTAAL: 145

The mark out of 145 must be converted to a mark out of 150.
 Die punt uit 145 moet herlei word na 'n punt uit 150.

