Northern Cape
Department of Education

PROVINSIALE VOORBEREIDENDE EKSAMEN/
PROVINCIAL PREPARATORY EXAMINATION

GRAAD/GRADE 12

WISKUNDE/MATHEMATICS

VRAESTEL/PAPER 2

SEPTEMBER 2026

PUNTE/MARKS: 150

TYD/TIME: 3 uur/hours

Hierdie vraestel bestaan uit 14 bladsye, 1 inligtingsblad en 'n antwoordeboek van 25 bladsye./
This question paper consists of 14 pages, 1 information sheet and an answer book of 25 pages.

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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.

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QUESTION 1

The table below shows the marks (out of 150) of eleven Grade 10 learners. This was for Paper 1 and Paper 2 for the final examination in 2025.

Paper 1	56	39	62	80	114	109	82	135	130	103	81
Paper 2	29	36	59	35	79	91	76	110	108	96	62

1.1 Determine the equation of the least squares regression line for the data. (3)

1.2 A certain learner wrote Paper 1 and scored a mark of 113. She was unable to write Paper 2 due to illness. Predict the mark she could have scored for Paper 2. (2)

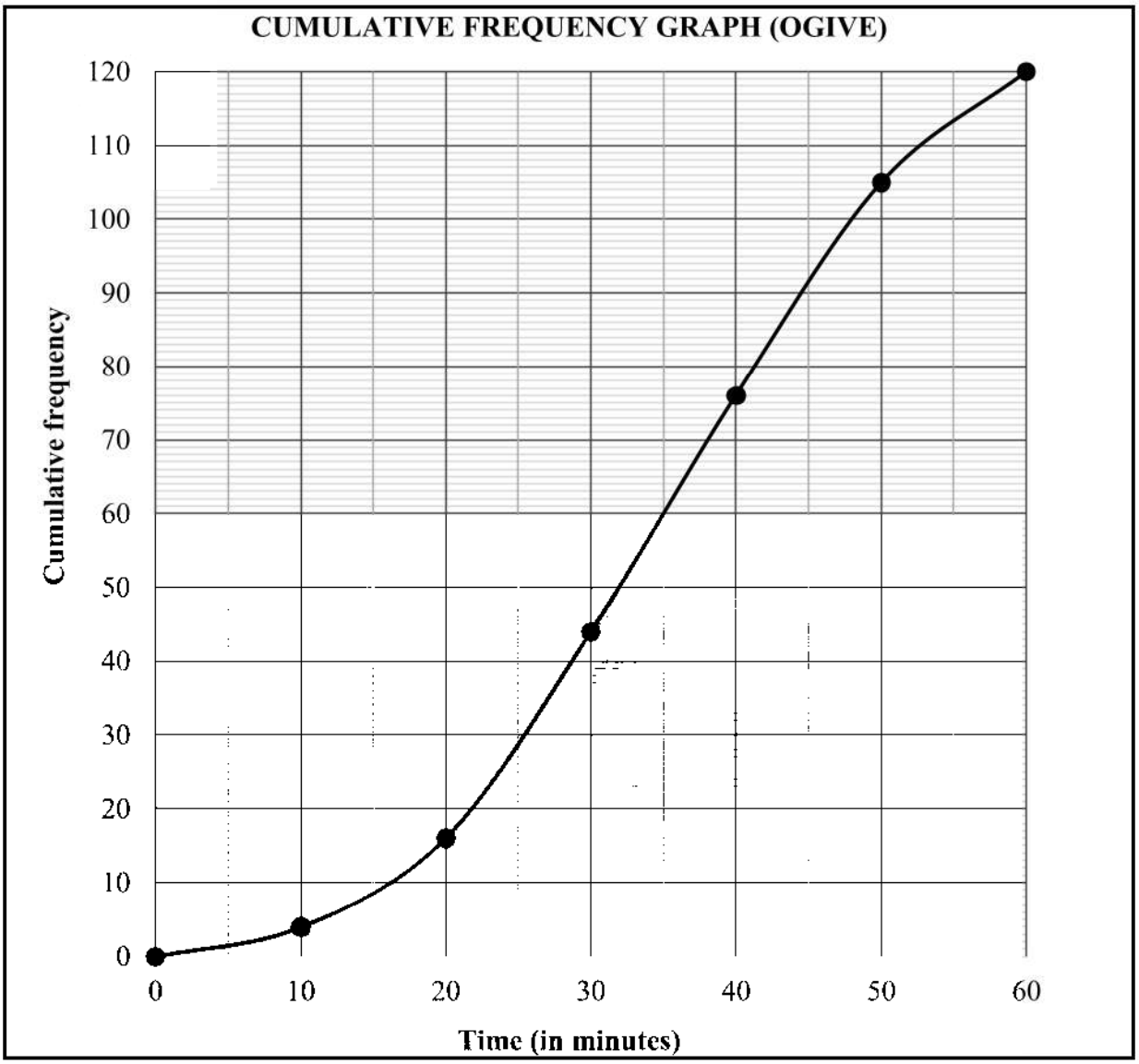
1.3 Use the correlation coefficient to determine whether the prediction in QUESTION 1.2 is valid. (2)

1.4 Determine the number of learners who lie above one standard deviation of the mean for Paper 1. (3)
[10]

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QUESTION 2

The cumulative frequency graph (ogive) below shows the time it takes learners to get to school.



2.1 How many learners were recorded? (1)

2.2 Use the ogive to estimate the interquartile range for the data. (3)

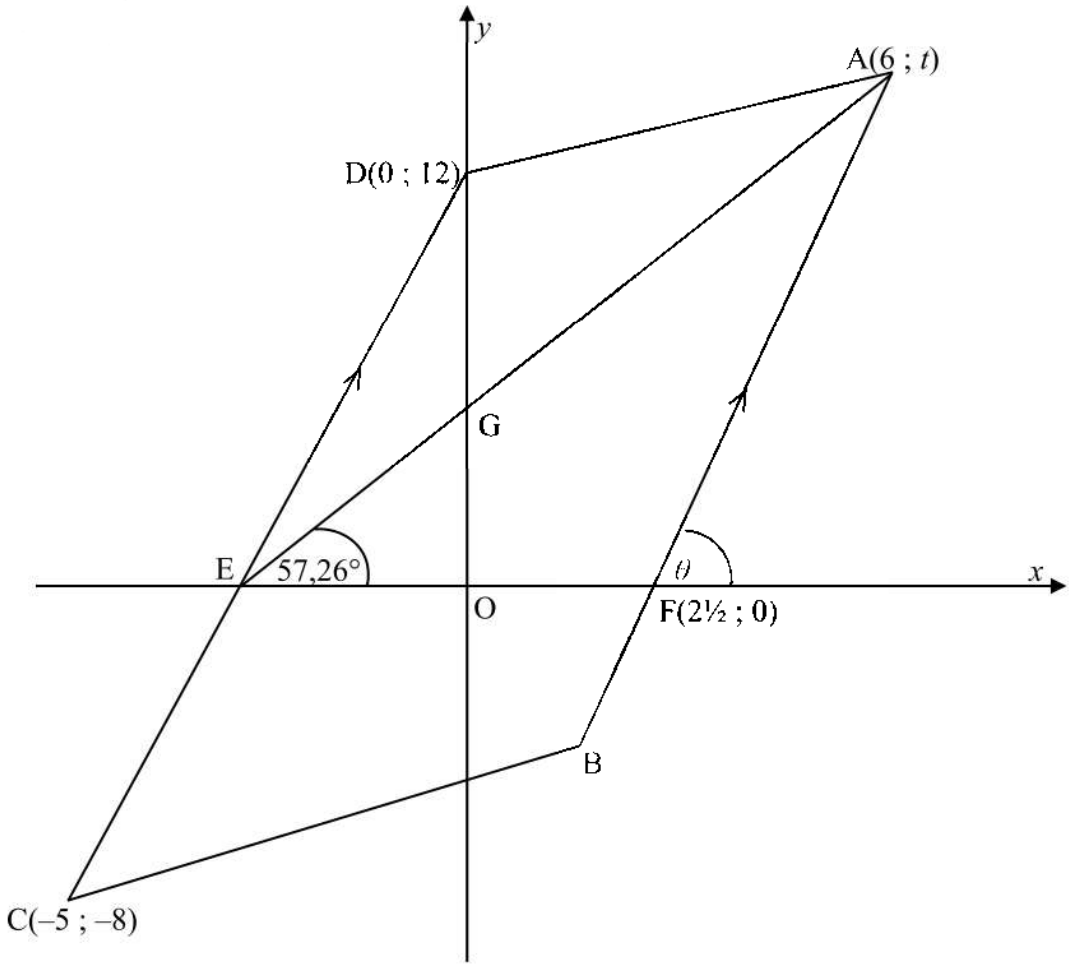
2.3 Estimate the median time taken to travel to school. (2)

2.4 Calculate the number of learners whose travel to school took 40 minutes and more. (2)
[8]

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QUESTION 3

In the diagram, A(6 ; t), B, C(–5 ; –8) and D(0 ; 12) are the vertices of quadrilateral ABCD. E and F(2½ ; 0) are the x-intercepts of CD and AB respectively. The angles of inclination of AE and AB are 57,26° and θ respectively. AB ∥ CD.



3.1 Calculate the gradient of CD. (2)

3.2 Hence, determine the equation of AB. (3)

3.3 Calculate the value of t. (2)

3.4 Calculate the size θ. (2)

3.5 Calculate the coordinates of E. (3)

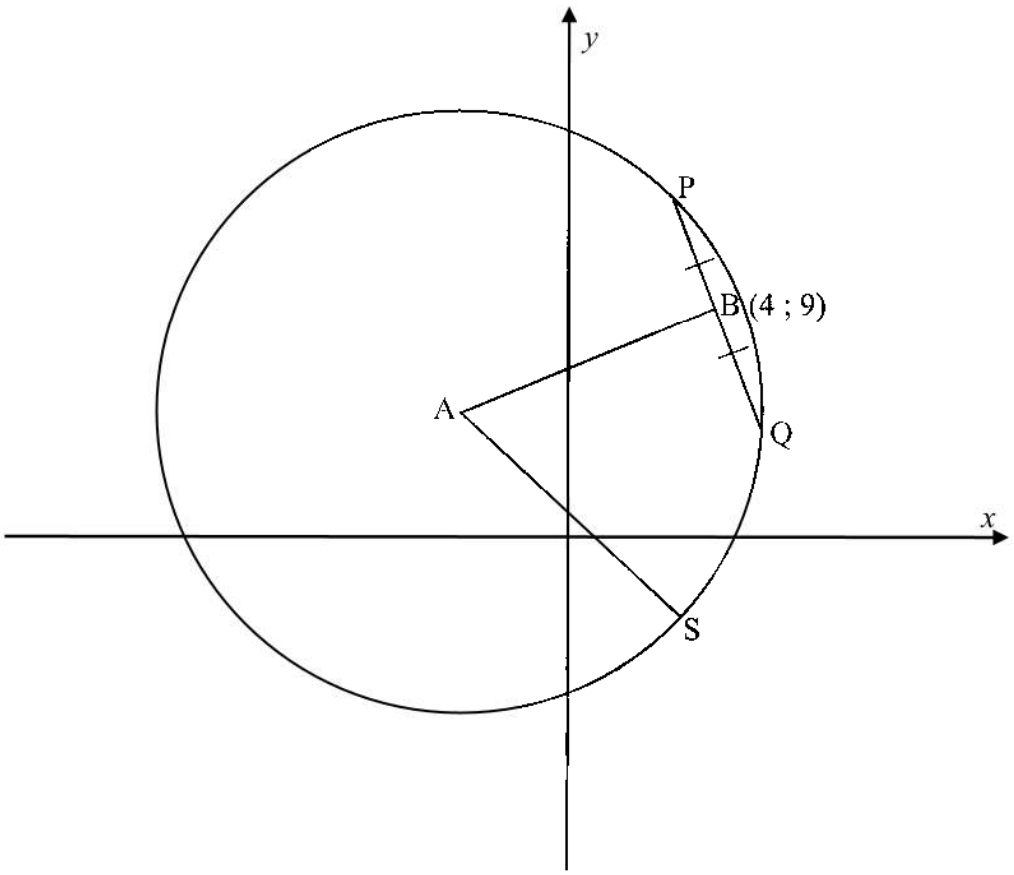
3.6 If the equation of CB is $3y - x = -19$, determine the coordinates of B. (4)

3.7 Calculate the area of quadrilateral AGOF (correct to ONE decimal place). (7)
[23]

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QUESTION 4

In the diagram, the equation of the circle with centre A is $x^2 + y^2 + 4x - 12y - 10 = 0$. PQ is a chord of the circle. S, P and Q are points on the circumference. B(4 ; 9) is the midpoint of PQ.



4.1 Write down the coordinates of A. (3)

4.2 Give a reason why AB ⊥ PQ. (1)

4.3 Determine the equation of PQ in the form $y = mx + c$. (4)

4.4 Determine the coordinates of P and Q respectively. (5)

4.5 Determine the value(s) of k such that the line $y = 2x + k$ does NOT intersect the circle centred at A. (7)

[20]

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QUESTION 5

5.1 It is given that $17\sin\theta + 8 = 0$ where $\theta \in (0° ; 270°)$. Determine the value of the following without using a calculator:

5.1.1 $\tan\theta$ (2)

5.1.2 $\cos(180° - \theta)$ (2)

5.1.3 $\sin\left(\frac{\theta}{2} - 15°\right).\cos\left(\frac{\theta}{2} - 15°\right)$ (6)

5.2 Given: $\frac{\tan(180° - x).\cos(-x).\cos(180° + x)}{4\cos(90° + x)}$

5.2.1 Simplify the expression above fully to a single trigonometric ratio. (6)

5.2.2 Hence, determine the values of x in the interval $x \in [0° ; 360°]$ for which $\sqrt{\frac{\tan(180° - x).\cos(-x).\cos(180° + x)}{4\cos(90° + x)}}$ will be real. (2)

[18]

QUESTION 6

6.1 Given: $f(x) = \dfrac{\sin 2x \,.\, \cos 2x}{2\sin^2 2x - 2\cos^2 2x}$

6.1.1 Simplify $f(x)$ to a single trigonometric ratio. (4)

6.1.2 Hence, write down the equations of the asymptotes of f for $x \in [0° ; 90°]$. (2)

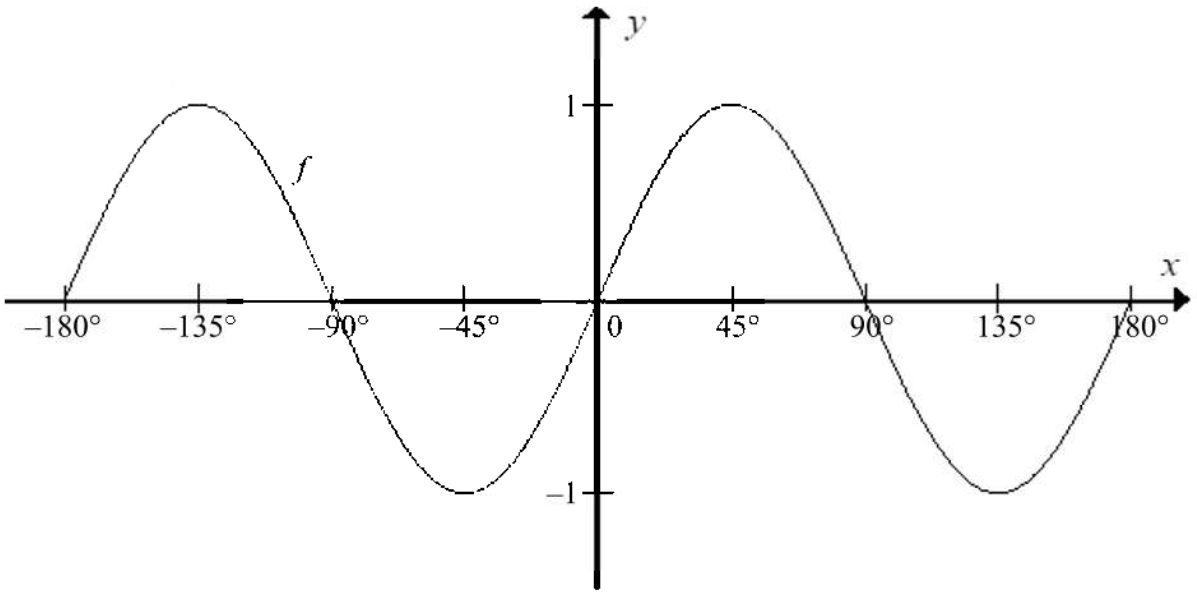
6.2 Determine the general solution for the following if it is a converging geometric series and $\cos x \neq 0$:

$$\sum_{r=0}^{\infty} (\sin x)^{2r} = 2\tan x$$

(7)
[13]

QUESTION 7

In the diagram, the graph of $f(x) = \sin 2x$ is drawn for $x \in [-180° ; 180°]$.



7.1 Write down the period of f. (1)

7.2 Write down the range of $\frac{1}{2}f(x) + 1$. (2)

7.3 On the set of axes provided in the ANSWER BOOK, draw the graph of $g(x) = -\cos(x - 45°)$ for $x \in [-180° ; 180°]$. Clearly show ALL the intercepts with the axes and the coordinates of the turning point. (4)

7.4 Determine the maximum difference of $f(x) - g(x)$ for $x \in [-180° ; 180°]$ (2)

7.5 Determine the number of solutions to the equation $f(x) - g(x) = 0$ for $x \in [-180° ; 180°]$. (2)

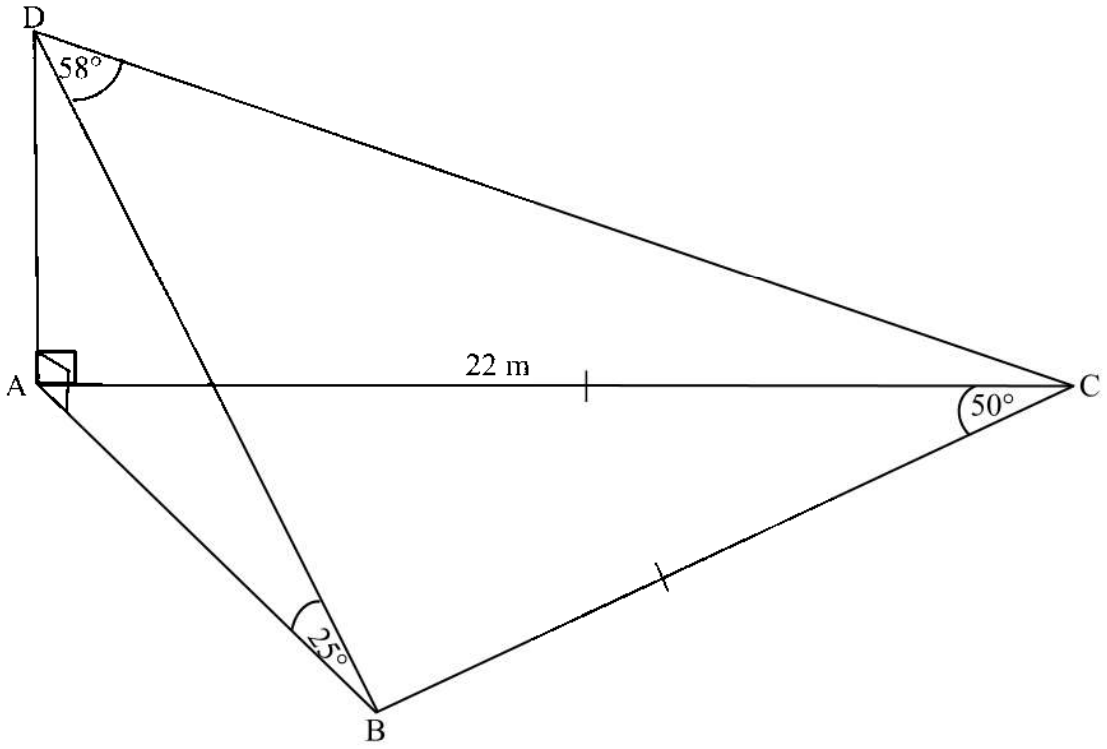
7.6 Determine the values of x for which $\cos(90° + 2x) \cdot \cos(x - 45°) \geq 0$ in the interval $x \in [-180° ; 180°]$. (4)

[15]

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QUESTION 8

In the diagram, A, B and C are points in the same horizontal plane. AD is a vertical tower anchored at B and C. The angle of elevation of D from B is 25°, $A\widehat{C}B = 50°$ and $B\widehat{D}C = 58°$.
AC = BC = 22 metres.



Calculate the following:

8.1 The area of ΔABC (3)

8.2 The length of AB (2)

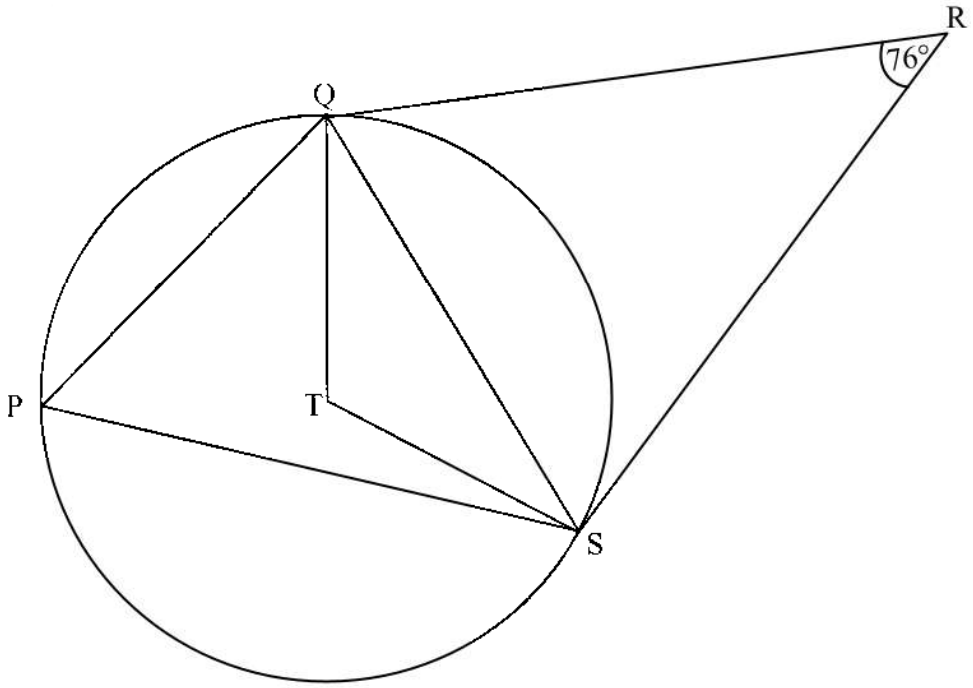
8.3 The length of DB (2)

8.4 The magnitude of $D\widehat{B}C$ (3)
[10]

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

QUESTION 9

In the diagram, T is the centre of the circle. QR and RS are tangents to Q and S respectiviley. $Q\hat{R}S = 76°$



Calculate, with reasons, the size of:

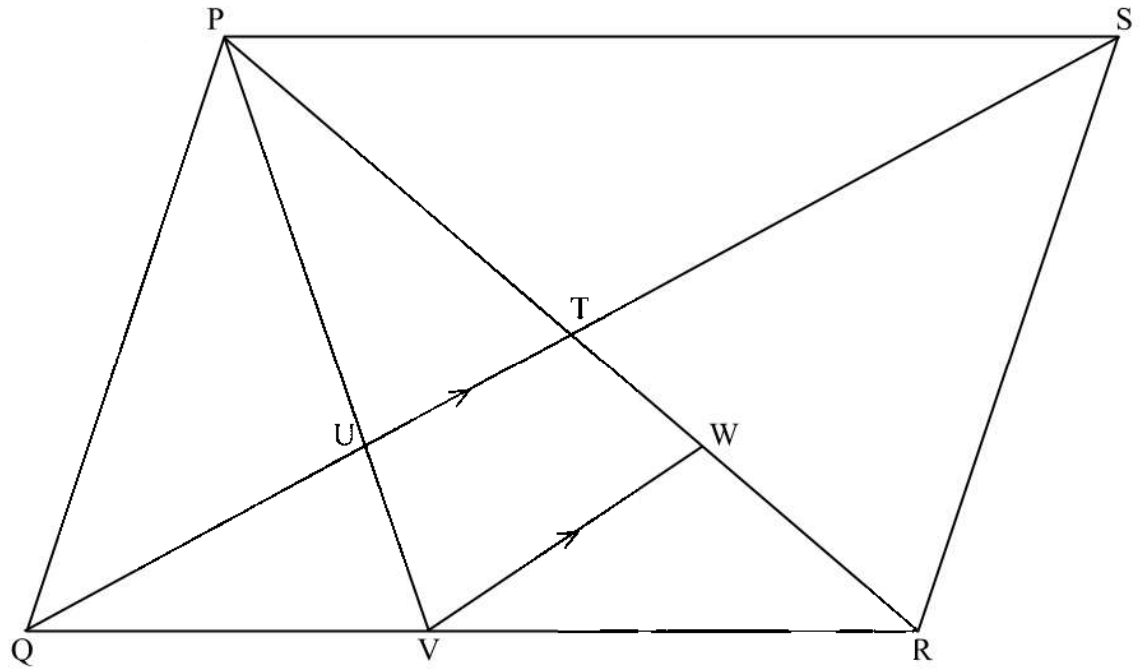
9.1 $R\hat{Q}S$ (4)

9.2 $Q\hat{P}S$ (2)

9.3 $Q\hat{T}S$ (2)
[8]

QUESTION 10

In the diagram, PQRS is a parallelogram with UT∥VW and $\frac{QV}{VR} = \frac{2}{3}$.



Determine, with reasons, the value of:

10.1 $\frac{TR}{WR}$ (2)

10.2 $\frac{PU}{UV}$ (3)

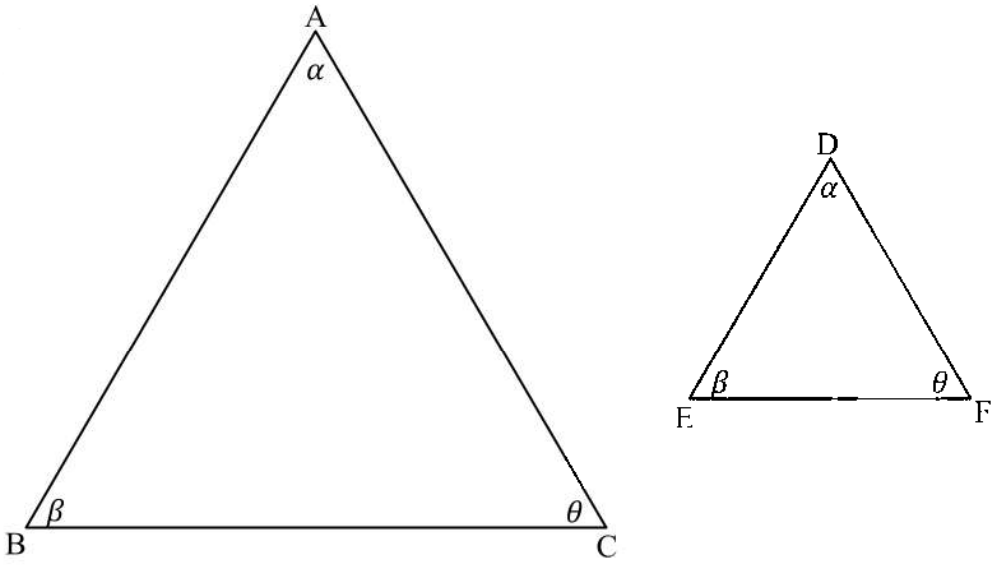
10.3 $\frac{\text{Area of } \Delta PUT}{\text{Area of } \Delta PVW}$ (3)

[8]

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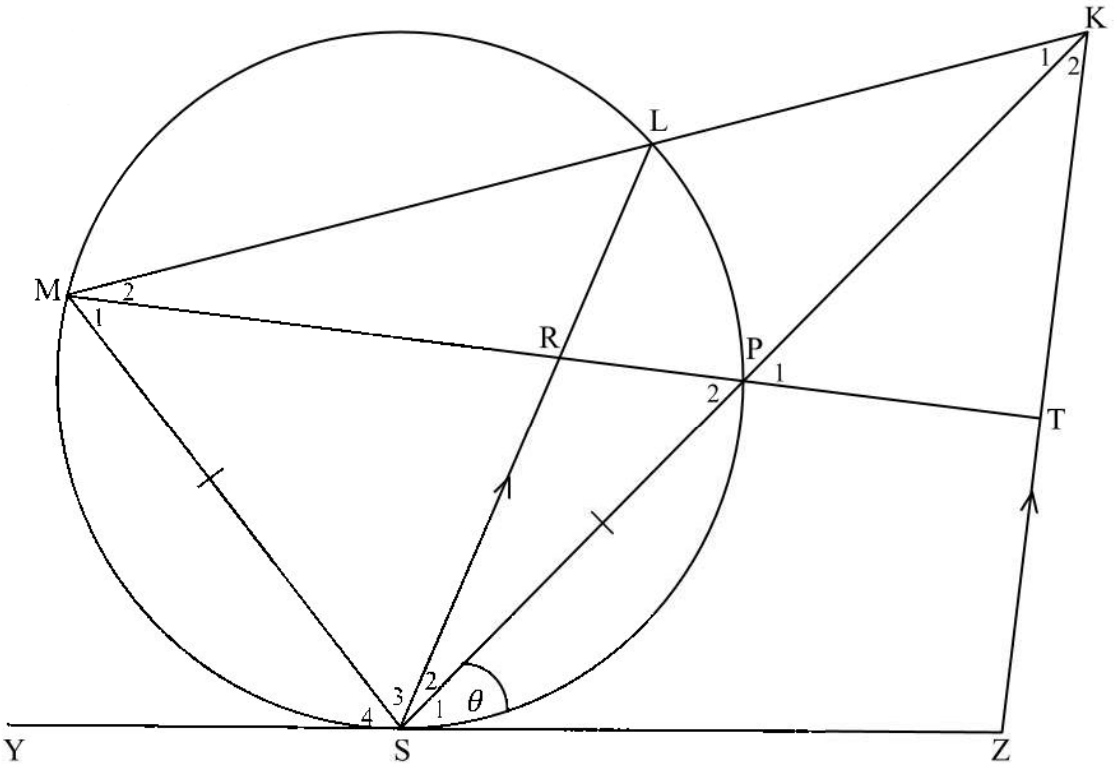
QUESTION 11

11.1 In the diagram below, ΔABC and ΔDEF are drawn with $\hat{A} = \hat{D}$, $\hat{B} = \hat{E}$ and $\hat{C} = \hat{F}$.



Use the diagram to prove the theorem which states that, if two triangles are equiangular, then the corresponding sides are proportional, i.e. $\frac{DE}{AB} = \frac{DF}{AC}$. (6)

11.2 In the diagram, YSZ is the tangent to the circle at S. SL||KZ and MS = PS. It is further given that $\hat{S}_1 = \theta$.



11.2.1 Determine the value of $M\hat{S}P$ in terms of θ. (3)

11.2.2 Prove that $\Delta KZS \;|||\; \Delta SRP$. (3)

11.2.3 Prove that $KT = \dfrac{TZ \cdot KP}{MS}$. (5)

[17]

TOTAL: 150

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INFORMATION SHEET

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

$A = P(1 + ni)$ $\quad A = P(1 - ni)$ $\quad A = P(1 - i)^n$ $\quad A = P(1 + i)^n$

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

$T_n = ar^{n-1}$ $\quad S_n = \frac{a(r^n - 1)}{r - 1}\ ; r \neq 1$ $\quad S_\infty = \frac{a}{1 - r}\ ; -1 < r < 1$

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

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

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $\quad \mathrm{M}\left(\frac{x_1 + x_2}{2}\ ;\ \frac{y_1 + y_2}{2}\right)$

$y = mx + c$ $\quad y - y_1 = m(x - x_1)$ $\quad m = \frac{y_2 - y_1}{x_2 - x_1}$ $\quad m = \tan\theta$

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

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

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

area $\Delta ABC = \frac{1}{2}ab.\sin C$

$\sin(\alpha + \beta) = \sin\alpha\,.\cos\beta + \cos\alpha\,.\sin\beta$ $\quad \sin(\alpha - \beta) = \sin\alpha\,.\cos\beta - \cos\alpha\,.\sin\beta$

$\cos(\alpha + \beta) = \cos\alpha\,.\cos\beta - \sin\alpha\,.\sin\beta$ $\quad \cos(\alpha - \beta) = \cos\alpha\,.\cos\beta + \sin\alpha\,.\sin\beta$

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

$\sin 2\alpha = 2\sin\alpha\,.\cos\alpha$

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

$P(A) = \frac{n(A)}{n(S)}$ $\quad P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$

$\hat{y} = a + bx$ $\quad b = \frac{\sum(x - \bar{x})\,(y - \bar{y})}{\sum(x - \bar{x})^2}$

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