Name and Surname : ....

Grade/Class : 11/.........   **Mathematics Teacher** : ....

Hudson Park High School

GRADE 11

MATHEMATICS

June Examination

Paper 2

Marks : 100

Date : 10 June 2025

Time : 2 hours

Examiner : SLT

Moderator(s) : PHL VNT VPT

INSTRUCTIONS

1. Illegible work, in the opinion of the marker, will earn zero marks.

2. Number your answers clearly and accurately, exactly as they appear on the question paper.

3. **A blank space of at least two lines should be left after each answer.**

4. **Fill in the details requested on the front of this Question Paper and the Answer Booklet before you start answering any questions.**

   Hand in your submission in the following manner :

   (on top) **Answer Booklet**
   (below) **Question Paper**

   Please **DO NOT STAPLE** your **Answer Booklet and Question Paper** together.

   NB : NO A4 LINED PAPER MAY BE USED : there is "Additional Space" at the end of the Answer Booklet.

5. Employ relevant formulae and show all working out.
   Answers alone *may* not be awarded full marks.

6. (Non-programmable and non-graphical) Calculators may be used, unless their usage is specifically prohibited.

7. Answers must be written in blue or black ink, as distinctly as possible, on both sides of the page. An HB pencil (but not lighter eg. 2H) may be used for diagrams.

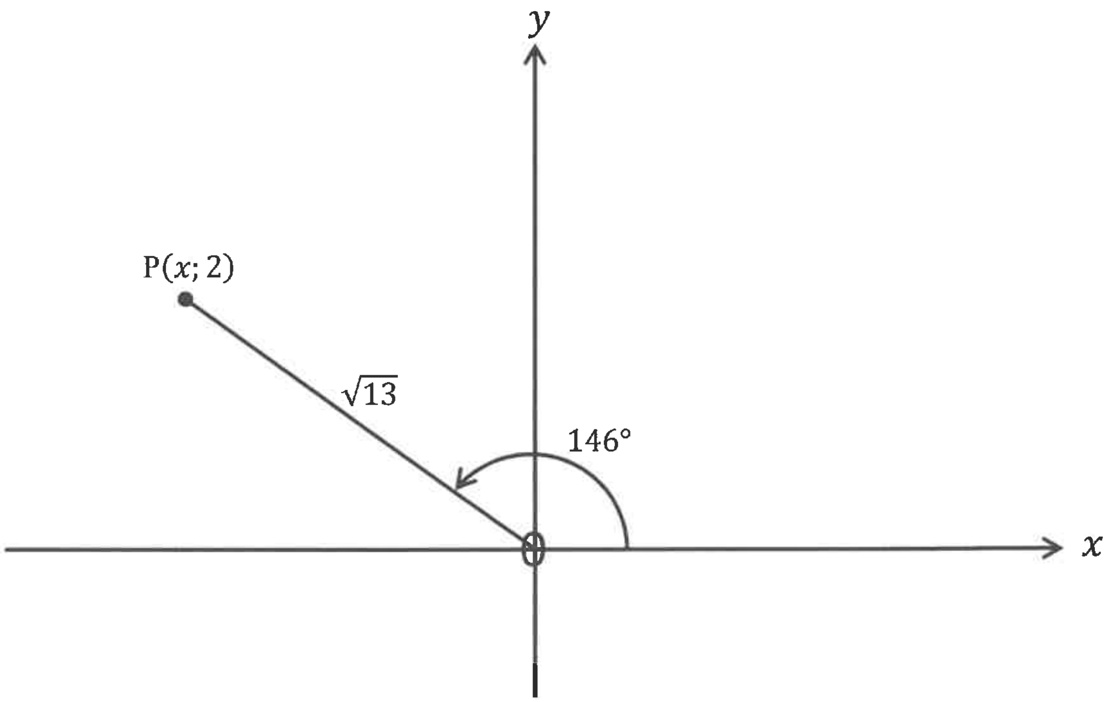
8. Round off answers to 2 decimal places, where necessary, unless instructed otherwise.

9. If (Euclidean) GEOMETRIC statements are made, REASONS must be stated appropriately.

QUESTION 1

CALCULATORS MAY NOT BE USED IN THIS QUESTION

1.1. Given : $P(x;2)$, $0P = \sqrt{13}$ and $x\hat{0}P = 146°$:



1.1.1. Calculate the value of x. (1)

1.1.2. Hence, determine :

(a) $\cos 146°$ (1)

(b) $\sin^2(-146°)$ (1)

(c) $\tan 56°$ (1)

1.2. Given :

- $\tan\alpha - p = 0$ (where $p > 0$)
  and
- $\sin\alpha < 0$

1.2.1. Draw a fully labelled diagram, in the correct quadrant, showing all relevant details. (2)

1.2.2. Hence, determine $\cos(-\alpha - 180°)$ in terms of p. (2)

[8]

QUESTION 2

2.1. **CALCULATORS MAY NOT BE USED IN THIS QUESTION**

2.1.1. Draw the special diagrams used to evaluate trigonometric ratios of :

(a) $30°$ and $60°$ (1)

(b) $45°$ (1)

(c) $0°, 90°, 180°, 270°$ and $360°$ (1)

2.1.2. Simplify fully :

(a) $\tan(-1575°)$ (2)

(b) $\sin 1710°$ (2)

(c) $\dfrac{1-\cos(-\theta)}{\sin(-\theta).\cos(\theta-270°)}$ (6)

(d) $\dfrac{\sin 210°.\cos 193°}{\tan 103°.\sin 347°}$ (7)

2.2 Given : $5+\sqrt{3}\tan\frac{x}{3} = 4\cos 4320°$

2.2.1. Determine the general solution of the given equation. (2)

2.2.2. Hence, determine the solution(s) of the given equation in the interval $x \in [-360° ; 720°]$. (1)

2.3. Solve for x :

2.3.1. $\sin x = 0{,}8$ (2)

2.3.2. $2\sin(x+10°) - 3\cos(x+10°) = 0$ (2)

2.3.3. $\sin 2(x+10°) + \cos 3(x+10°) = 0$ (5)

2.3.4. $2\cos^2 x = -3\sin x$ (6)

2.4. Factorise fully : $8 - 2\sin x\cos x - 23\cos^2 x$ (3)

2.5. Given : $\dfrac{1}{\tan^2 x} - \cos^2 x = \dfrac{\cos^4 x}{\sin^2 x}$

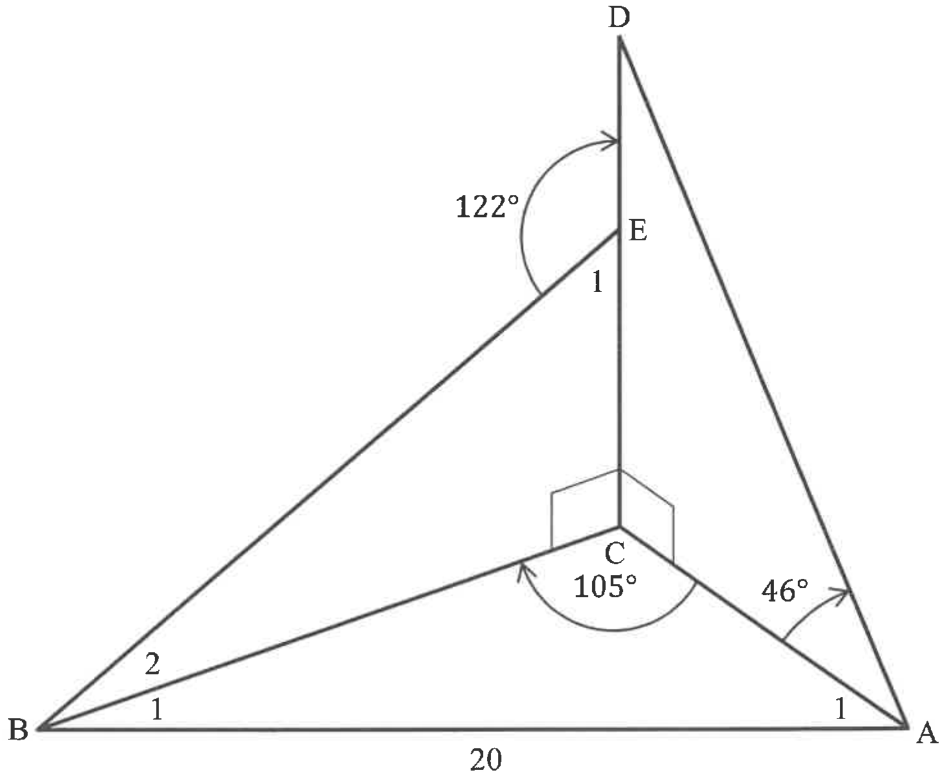
2.5.1. Prove the given identity. (4)

2.5.2. Determine the value(s) of x for which the given identity will be not be valid. (2)

[47]

QUESTION 3

3. CED is a vertical tower, such that CD = 16 m. A, B and C are in the same horizontal plane such that AB = 20 m. The angle of elevation of D from A is 46°. The angles $A\hat{C}B$ and $B\hat{E}D$ are 105° and 122° respectively.



Calculate :

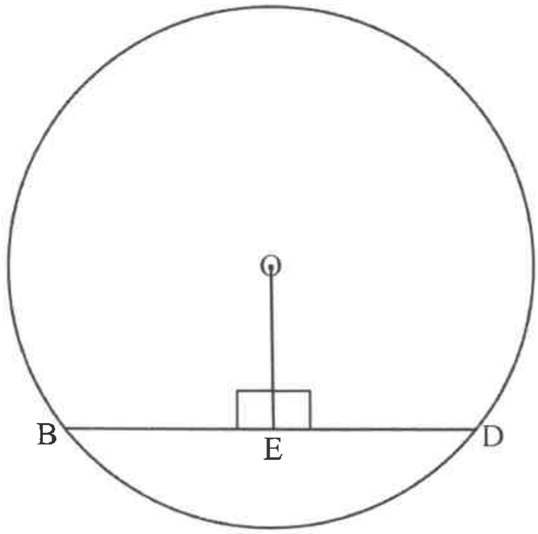
3.1. AC (2)

3.2. CE (6)

[8]

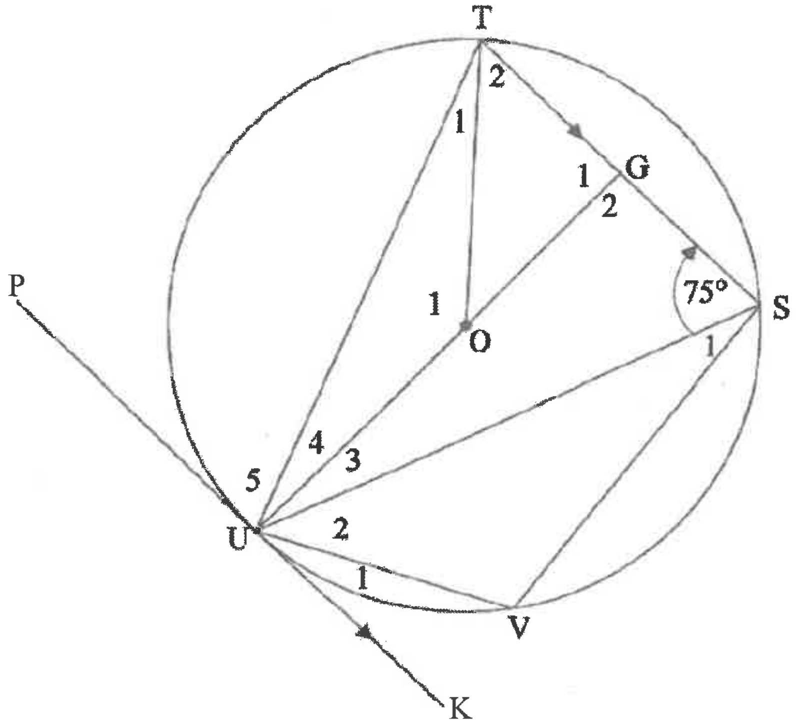
QUESTION 4

4.1. O is the centre of the circle and OE $\perp$ BD :



Prove the theorem which states that BE = ED. (5)

4.2. The circle having centre O, passes through U, T, S and V. PUK is a tangent to the circle at U. UOG is a straight line, TS || PK and $T\hat{S}U = 75°$:



4.2.1. Calculate the sizes of :

(a) $\hat{O}_1$ (2)

(b) $\hat{U}_5$ (2)

(c) $\hat{T}_1$ (3)

(d) $\hat{V}$ (3)

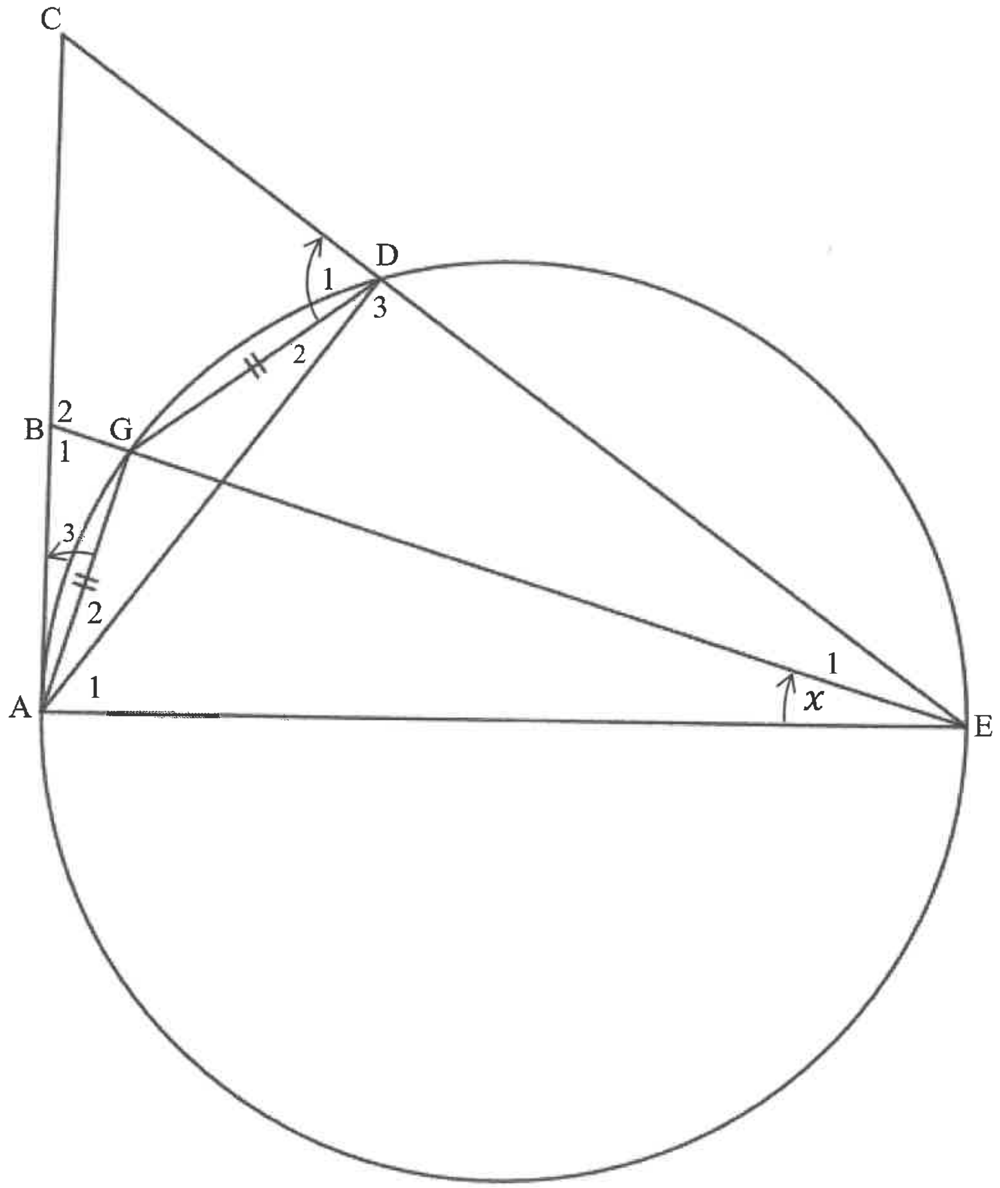
(e) $\hat{G}_1$ (1)

4.2.2. If it is further given that TS = 10 units, calculate the length of TG. (2)

[18]

QUESTION 5

5. A, G, D and E are points on the circle with diameter AE. CA is a tangent to the circle at A. AG = GD and $A\hat{E}B = x$:



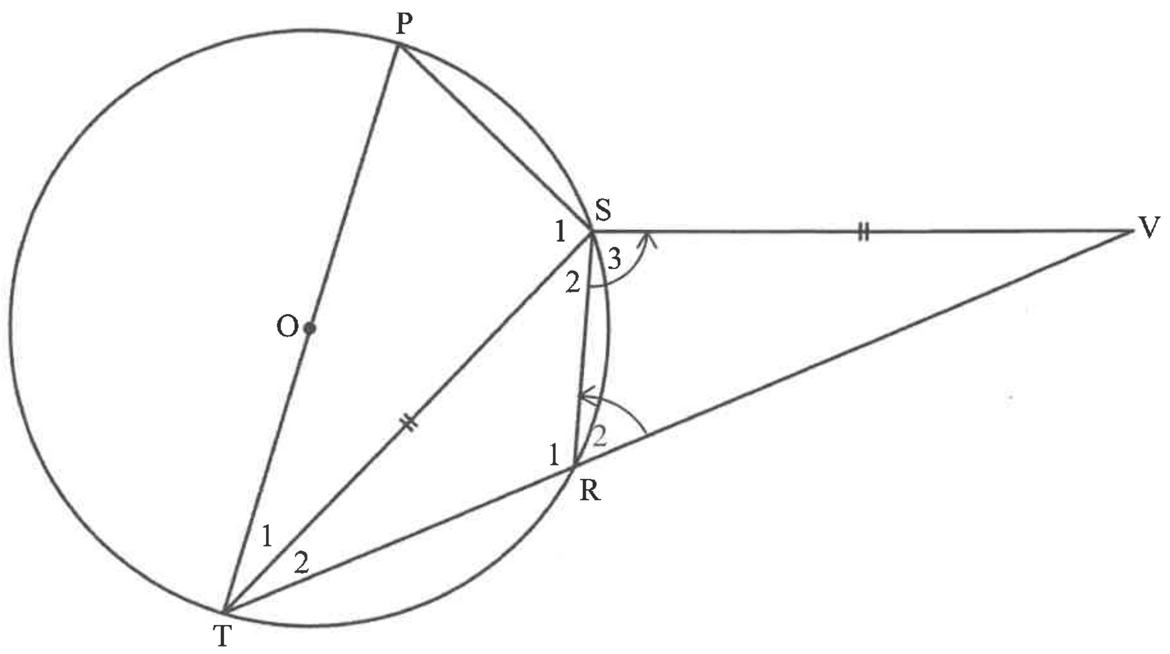
5.1. Name FOUR other angles each equal to x. (6)

5.2. Prove that BCDG is a cyclic quadrilateral. (4)

[10]

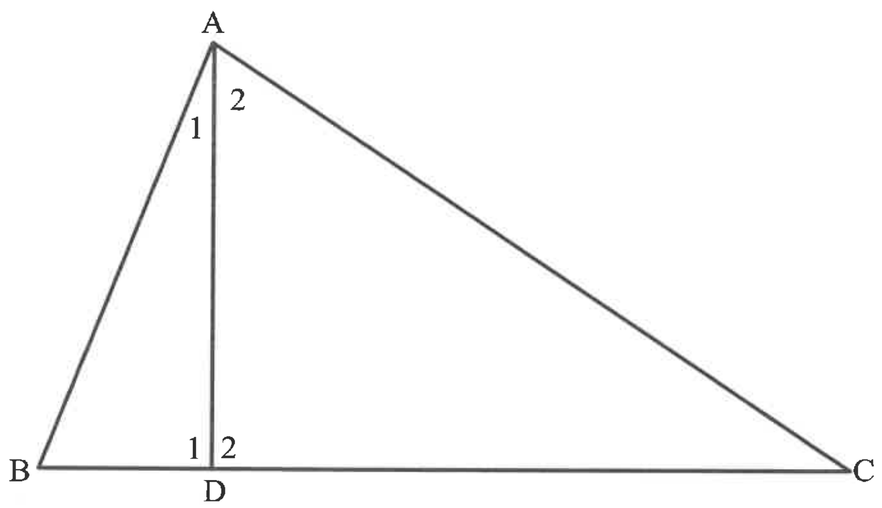
QUESTION 6

6.1. O is the centre of the circle PRST. ST bisects $P\hat{T}R$ and TS = SV :



Prove that RV is the diameter of the circle passing through points R, S and V. (6)

6.2. In ΔABC, $B\hat{A}C = 90°$ and $AD \perp BC$:



Prove that AC is a tangent to the circle passing through points A, B and D. (3)

[9]

TOTAL	**100**

5. INFORMATION SHEET

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

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

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

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

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

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

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

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

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

In ΔABC: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$ $a^2 = b^2 + c^2 - 2bc.\cos A$ $area\ \Delta ABC = \frac{1}{2}ab.\sin C$

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

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

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

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

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

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