Name and Surname : ………………………………………………………………………...

Grade/Class : 10/………. **Mathematics Teacher** : ………………………….

Hudson Park High School

GRADE 10

MATHEMATICS

2025

November Paper 2

Marks	:	100	Date	:	18 November 2025
Time	:	2 hours			
Examiner(s)	:	SLT VNT PHL VPT SBL	Moderator(s)	:	SLT VNT PHL VPT SBL

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

4. 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.

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

1.1. Given :

x	Frequency
$0 < x \leq 10$	3
$10 < x \leq 20$	10
$20 < x \leq 30$	18
$30 < x \leq 40$	25
$40 < x \leq 50$	13
$50 < x \leq 60$	7

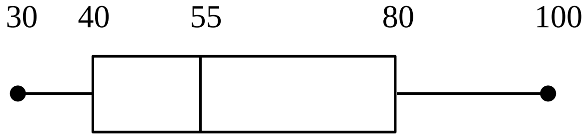
For this data, estimate the :

1.1.1. mean (3)

1.1.2. eighty-first percentile. (2)

1.2. The average mark, in a class of 30 learners was found to be 63 %. Unfortunately, when the marks were being checked, it was found that a mark of 81 % has been mistakenly entered as 18 %. With the 18 % corrected to 81 %, calculate the new average mark for this class. (3)

1.3. A box and whisker diagram was drawn for the test results (as a %) of a Grade 10 Mathematics class consisting of 24 learners :



For this class, determine the :

1.3.1. semi-interquartile range (2)

1.3.2. approximate number of learners who achieved beween 40 % and 55 %. (2)

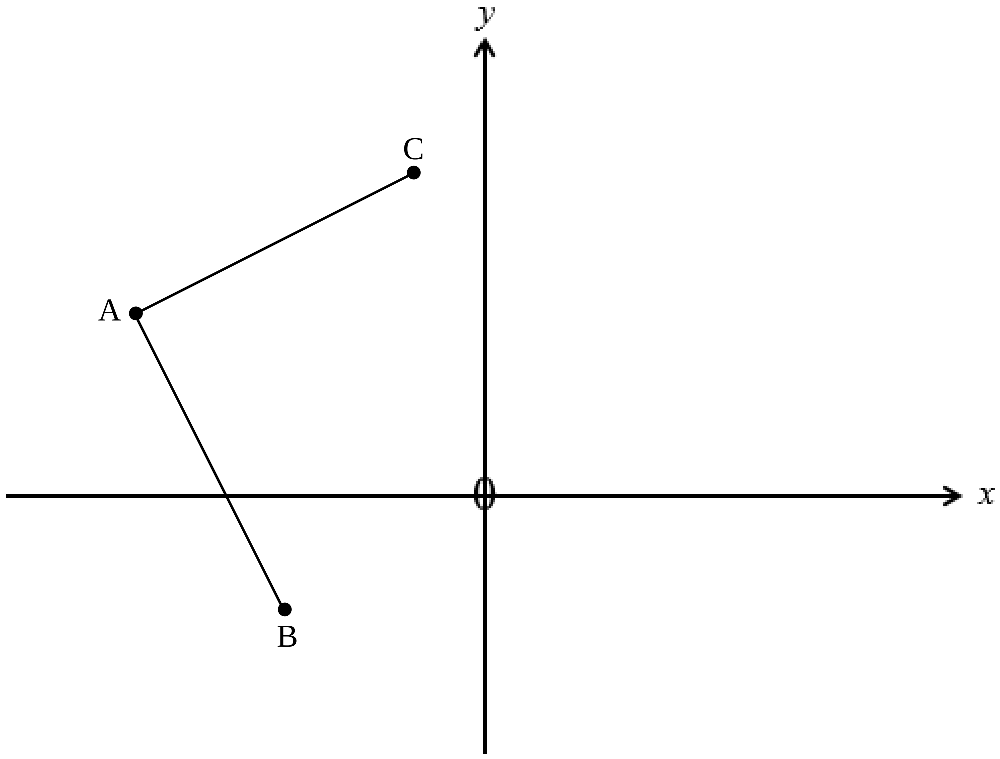
1.4. Given the following set of data : T_1 ; T_2 ; T_3 ; ... ; T_{112} where $T_n = 2n - 3$.

For this set of data, determine the upper quartile. Show all relevant working out. (3)

[15]

QUESTION 2

2. Given : A$(-6;3)$, B$(-4;b)$ and C$(-2;5)$.



2.1. Determine the equation of the line passing through A and C in the form $ax+by+c=0$, where $a,b,c \in \mathbb{Z}$. (4)

2.2. If AC = AB, calculate the value of b, showing that it will be equal to -1. (4)

2.3. Now, prove that AC ⊥ AB. (3)

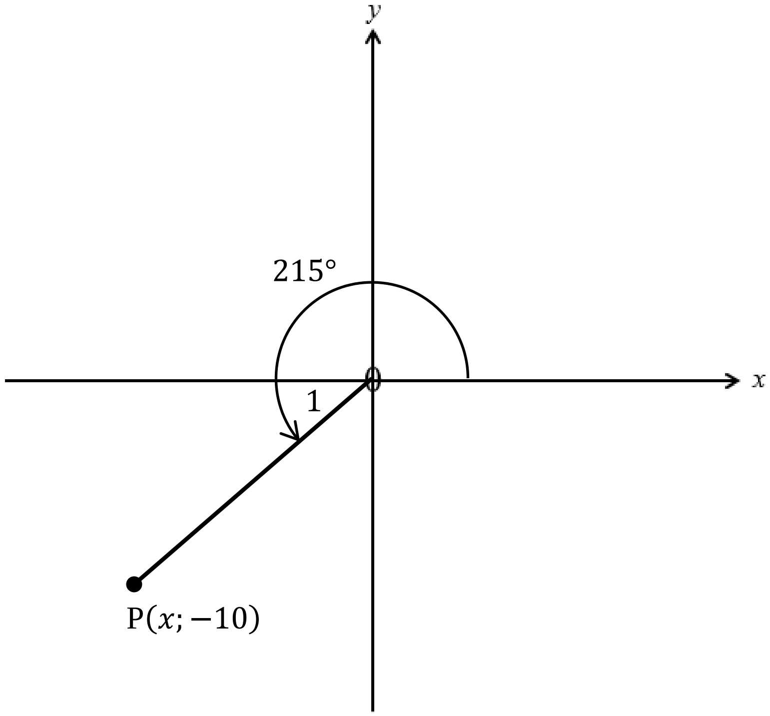
2.4. If ABDC is a square, determine the coordinates of D. (2)

2.5. If the diagonals of square ABDC intersect at point E, determine the coordinates of E. (3)

[16]

QUESTION 3

3.1. $0P = \sqrt{149}$, $x\hat{0}P = 215°$ and $P(x; -10)$:



3.1.1. Calculate the value of x. (1)

3.1.2. Write down the size of $\hat{0}_1$. (1)

3.1.3. WITHOUT THE USE OF A CALCULATOR, determine :

(a) $\sin 215°$ (1)

(b) $\cos 55°$ (1)

3.2. Given : $2\sin\theta + 1 = 0$ and $\cos\theta > 0$.

Use the given information to draw a fully labelled diagram, in the appropriate quadrant. Show all relevant details on your diagram. (3)

3.3. Given : $\cot 10° = k$ where $k > 0$.

Use a fully labelled diagram, in the correct quadrant and showing all relevant details, to determine

$\sec^2 10° - 1$

in terms of k. (4)

3.4. Evaluate the following, given that $x = 20°$ and $y = 75°$:

3.4.1. $5 \sec y$ (1)

3.4.2. $\dfrac{\cot^2(x-y)}{\operatorname{cosec} y\ -\ 10}$ (2)

3.5. Solve for x :

3.5.1. $\dfrac{\sin x}{5} = \dfrac{\sin 40°}{7}$ $\left(x \in (0°; 90°)\right)$ (2)

3.5.2. $12^2 = 10^2 + 11^2 - 2.10.11. \cos x$ $\left(x \in (0°; 90°)\right)$ (2)

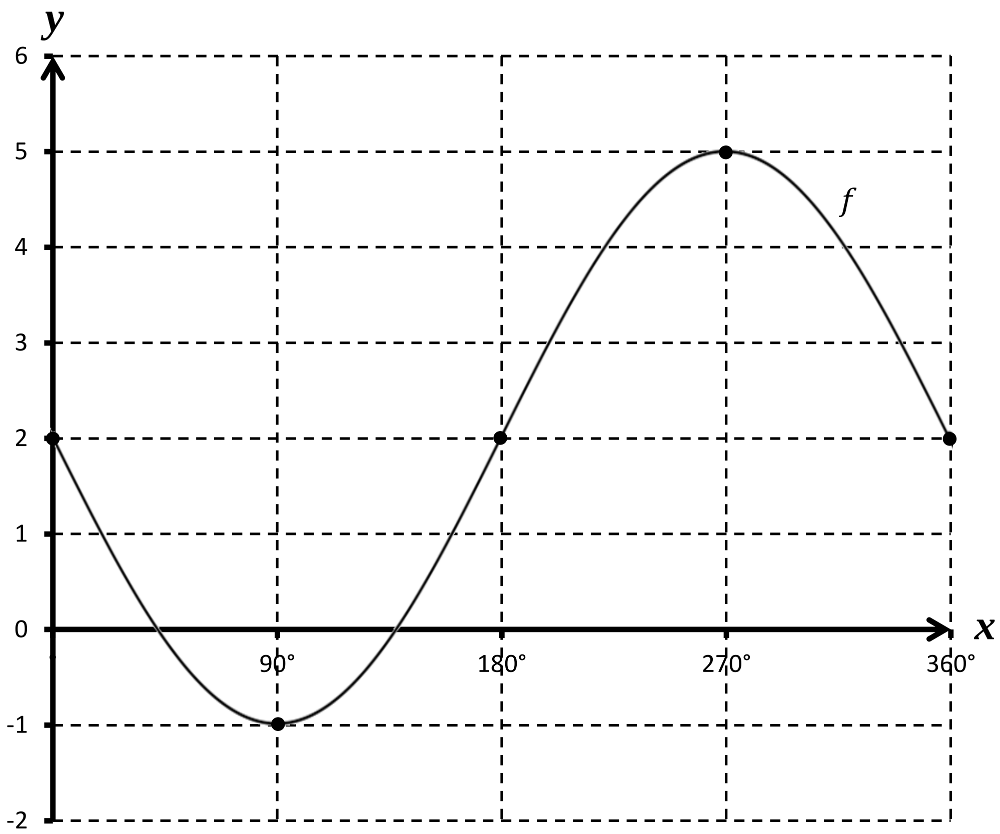
3.5.3. $3 \tan\left(\frac{x}{3}\right) = 1$ $\left(\frac{x}{3} \in (0°; 90°)\right)$ (3)

3.5.4. $2 \sec x - 3 = 0$ $\left(x \in (0°; 90°)\right)$ (3)

[24]

QUESTION 4

4.1. The graph of $f(x) = a\sin x - b$ is drawn for $x \in [0°; 360°]$:



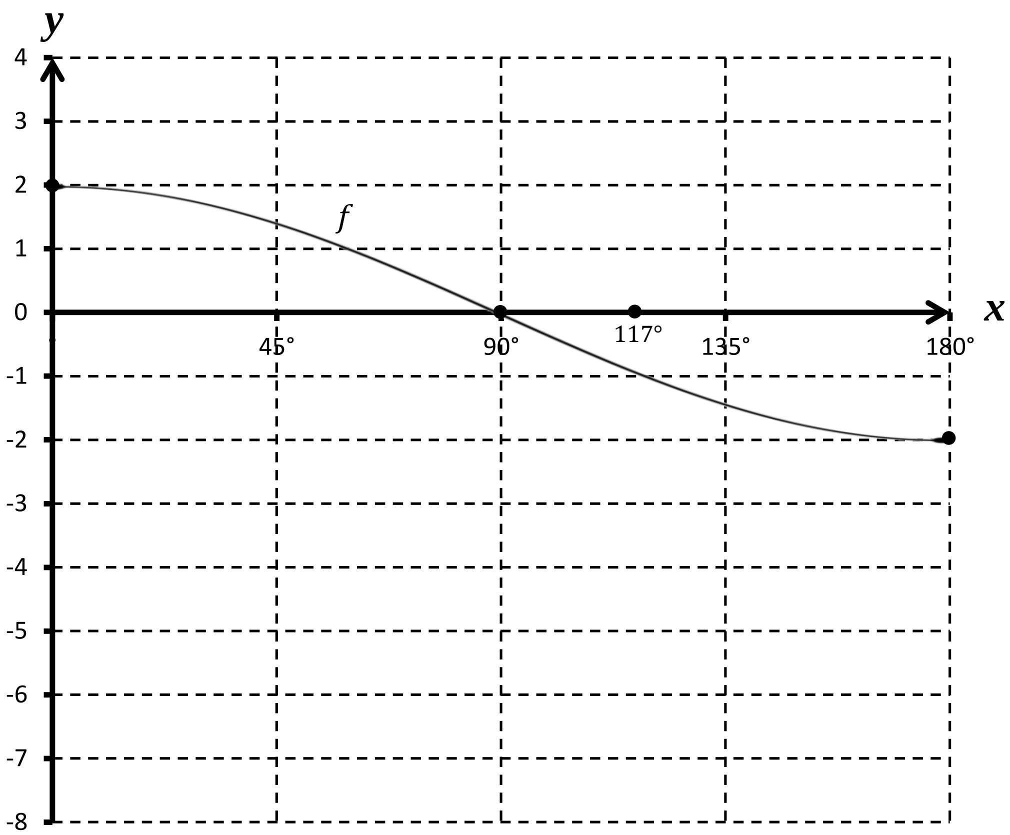
4.1.1. Determine the

(a) values of of a and b. State your answers clearly. (2)

(b) range of g, where $g(x) = -5.f(x) + 4$ (1)

4.1.2. What is the amplitude of f ? (1)

4.2. Sketched is the graph of $f(x) = 2\cos x$ for $x \in [0°; 180°]$:



4.2.1. What is the period of f ? (1)

4.2.2. On the same set of axes as f, sketch the graph of $g(x) = -\tan x - 2$ for $x \in [0°; 180°]$.
The x-intercept of g has been calculated and plotted for you : 117°.
Clearly label and indicate all other asymptotes and intercepts with axes. (3)

4.2.3. Use your graphs to solve for x, if $x \in [0°; 180°]$:

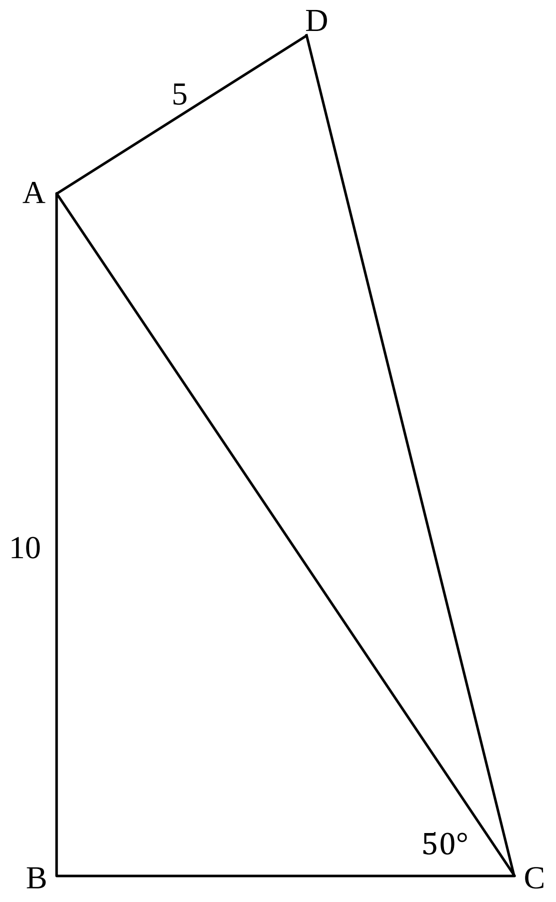
(a) $f(x) - g(x) \geq 0$ (2)

(b) $f(x).\, g(x) < 0$ (2)

[12]

QUESTION 5

5. $\hat{B} = 90°$, $D\hat{A}C = 90°$, AD = 5, AB = 10 and $A\hat{C}B = 50°$:



Calculate :

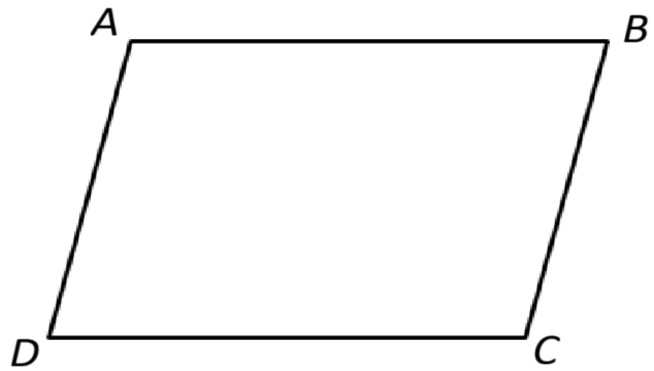
5.1. AC (2)

5.2. $\hat{D}$ (2)

[4]

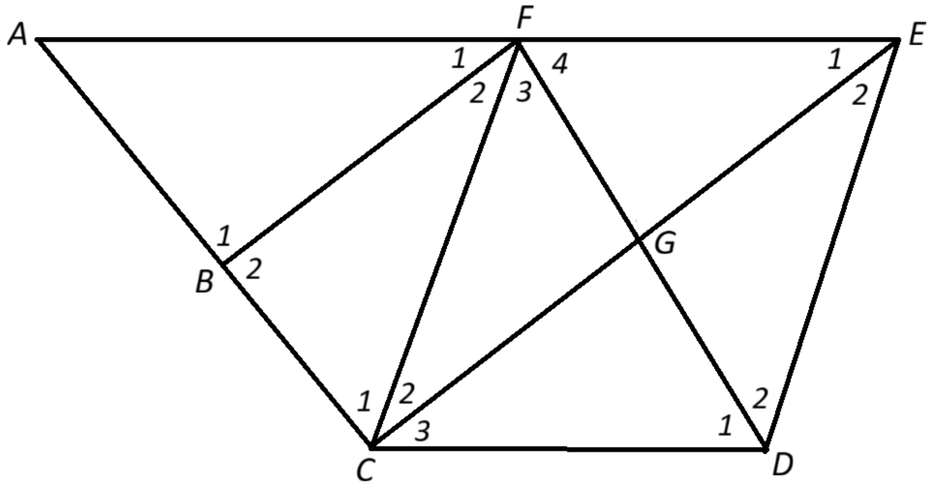
QUESTION 6

6.1. Given parallelogram ABCD :



Prove the theorem which states that : $AB = DC$. (4)

6.2. CDEF is a parallelogram. $EG = FB = 9$ cm, $\hat{F}_2 = 35°$, $\hat{E}_2 = 35°$, $\hat{A} = 30°$ and $AC = EC$:



6.2.1. Calculate:

(a) GC (1)

(b) $\hat{C}_2$ (1)

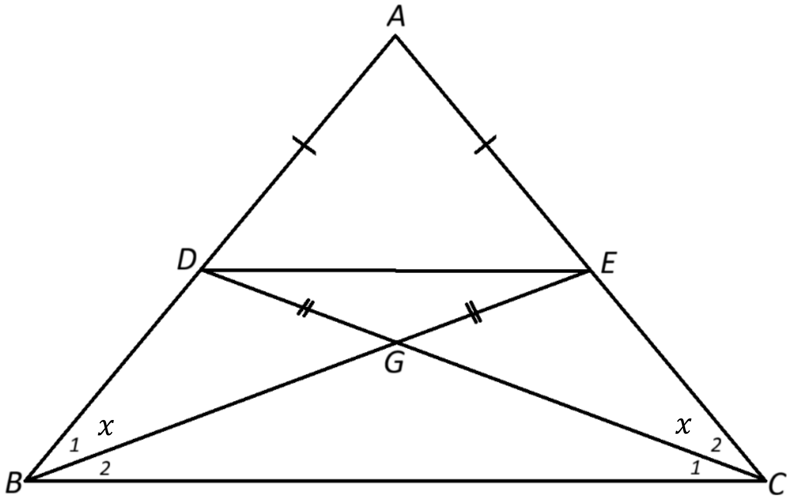
6.2.2. Hence, prove that BCGF is a parallelogram. (3)

6.2.3. Now, prove that $AB = FB$. (4)

[13]

QUESTION 7

7. In the diagram below, it is given that $AD = AE$, $DG = EG$ and $\hat{B}_1 = \hat{C}_2 = x$:



7.1. Prove that $\Delta ABE \equiv \Delta ACD$. (3)

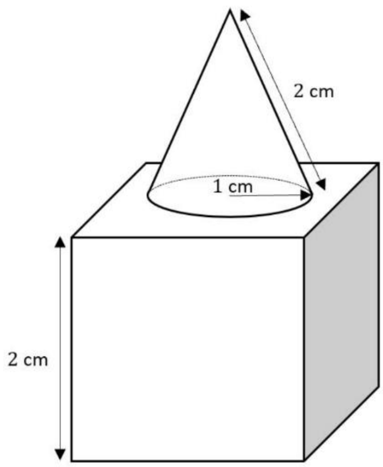
7.2. Hence, prove that the area of $\Delta DGB =$ area of ΔEGC. (3)

[6]

QUESTION 8

$A = bh$	$V = Ah$
$A = \pi r^2$	$V = \frac{1}{3}Ah$
$A = 4\pi r^2$	$V = \frac{4}{3}\pi r^3$
$A = \pi rh$	$C = 2\pi r$
$A = \frac{1}{2}bh$	

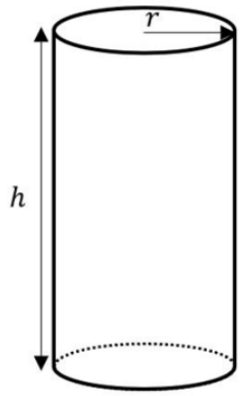
8.1. The following diagram shows a solid cube with a solid cone attached to the top of it. The cube has a side length of 2 cm while the cone has a radius of 1 cm and a slant height of 2 cm.



8.1.1. Calculate the height of the cone (leave your answer in surd form). (2)

8.1.2. Determine the volume of the shape. (3)

8.2. A solid (right) cylindrical object with radius r and height h has a volume of $275\ \text{cm}^3$:

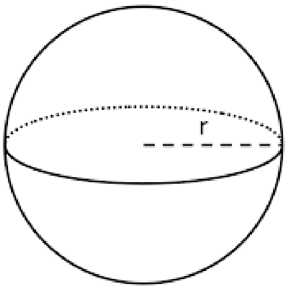


8.2.1. Determine an expression for h, in terms of r. (2)

8.2.2. Hence, show that the total surface area of the cylinder is

$$\text{TSA} = 2\pi r^2 + 550r^{-1}\ .$$ (2)

8.3. If the solid sphere below, with radius of r, has its radius *tripled*, by what factor will its surface area increase ?



(1)

[10]

TOTAL	**100**