# Hillcrest High School

Grade 10

# MATHEMATICS P2

JUNE 2023

**MARKS:** 50

**TIME:** 1 Hour

**EXAMINER:** Mr M. Alborough

**MODERATOR:** Mrs M. Woodrow

**NAME:** _____

**TEACHER:** _____

| Question | 1 | 2 | 3 | 4 | 5 | 6 | 7 | TOTAL |
|---|---|---|---|---|---|---|---|---|
| Marks | 15 | 16 | 4 | 3 | 4 | 4 | 4 | 50 |
| | | | | | | | | |

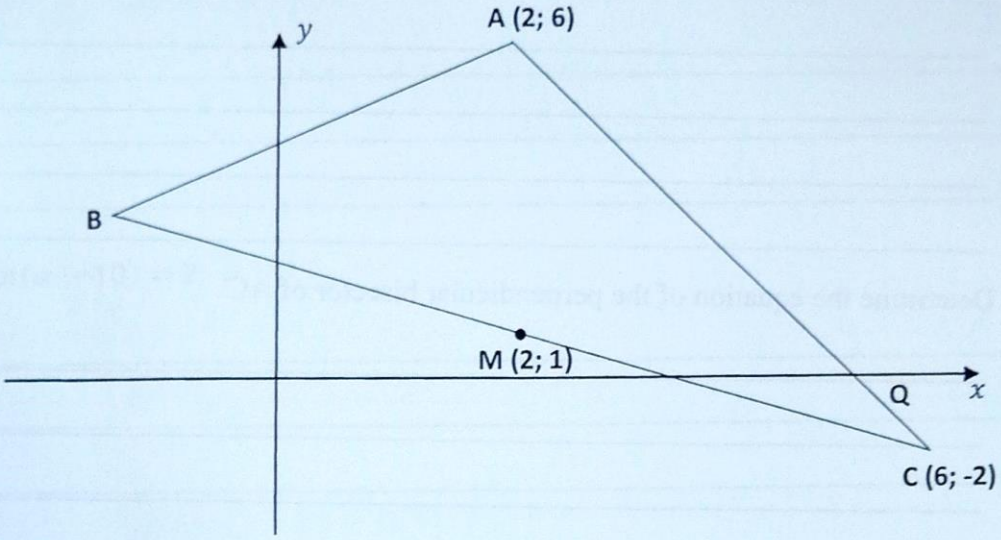
**Instructions:**

1. This test consists of 8 pages.
2. This test consists of 3 sections and 7 questions.
3. Read all questions carefully before answering.
4. Clearly show ALL calculations, diagrams, graphs, etc. which you have used in determining your answers.
5. Answers only will NOT necessarily be awarded full marks.
6. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
7. If necessary, round off answers correct to TWO decimal places, unless stated otherwise.
8. Diagrams are not necessarily drawn to scale.
9. Write neatly and legibly.

## SECTION A: ANALYTICAL GEOMETRY

### QUESTION 1

1. In the diagram, A (2; 6) and C (6; -2) are vertices of ΔABC. The $x$-intercept of BC is at P and of AC is at Q. M is the midpoint of BC.




1.1 Calculate the length of AC. Leave your answer in surd form. (2)

1.2 Calculate the coordinates of B. (2)

1.3 Calculate the gradient of AC. (2)

1.4 Hence, determine the coordinates of Q. (3)

1.5 Determine the equation of the perpendicular bisector of AC. (5)

1.6 Give the coordinates of a point D (not shown) such that ABCD is a parallelogram. (2)

**[15]**

## SECTION B: TRIGONOMETRY

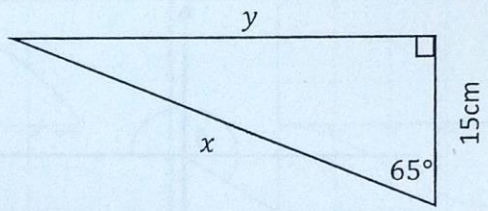
**QUESTION 2**

2.1 Solve for α in the following equations where $\alpha \in [0°; 90°]$.

2.1.1 $3\sin\alpha - 2 = 0$ (2)

2.1.2 $\cot(\alpha - 10) = 2$ (3)

2.2 Given the triangle below:




2.2.1 Calculate the length of $x$. (3)

2.2.2 Calculate the length of $y$. (3)

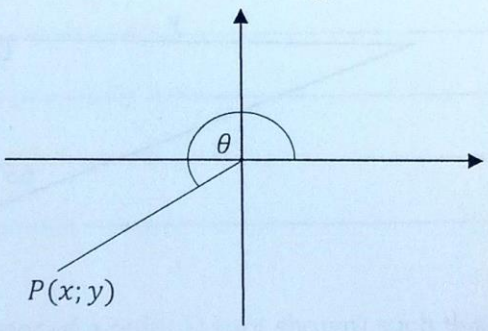
2.3 Simplify the following expression without the use of a calculator. (5)

$$\frac{sin45 \cdot cos45}{sin30} - tan45$$

[16]

**QUESTION 3**

3. Given the following diagram and $sin\theta = \frac{-5}{13}$:




Without the use of a calculator, show that $3\cos^2\theta - \tan\theta \cdot cos\theta = \frac{497}{169}$ (4)

[4]

**QUESTION 4**

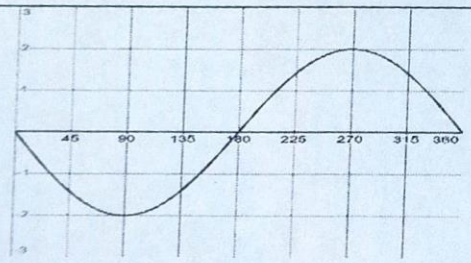
Prove that $tan\theta = \frac{sin\theta}{cos\theta}$ for any value of $\theta$.

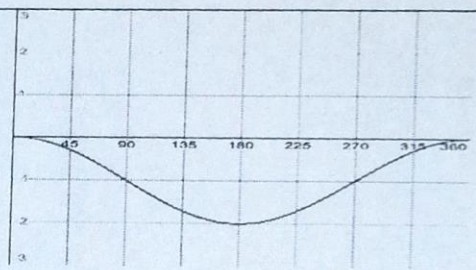
[3]

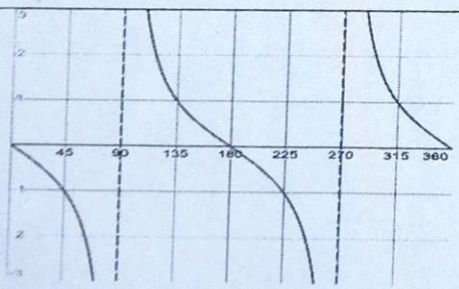
## SECTION C: TRIGONOMETRIC FUNCTIONS

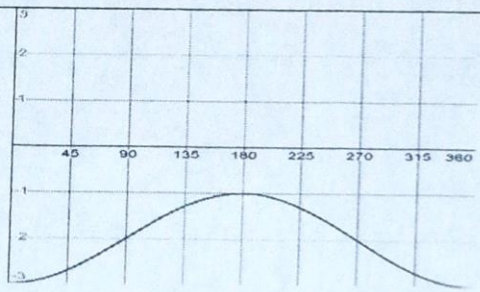
**QUESTION 5**

State the equation of each of the functions below in the form y = …




[4]

## QUESTION 6

6. Given the function $f(x) = -2sinx + 1$

6.1 State the period and the amplitude of $f$. (2)

_____

_____

6.2 State the range of $f$. (2)

_____

_____

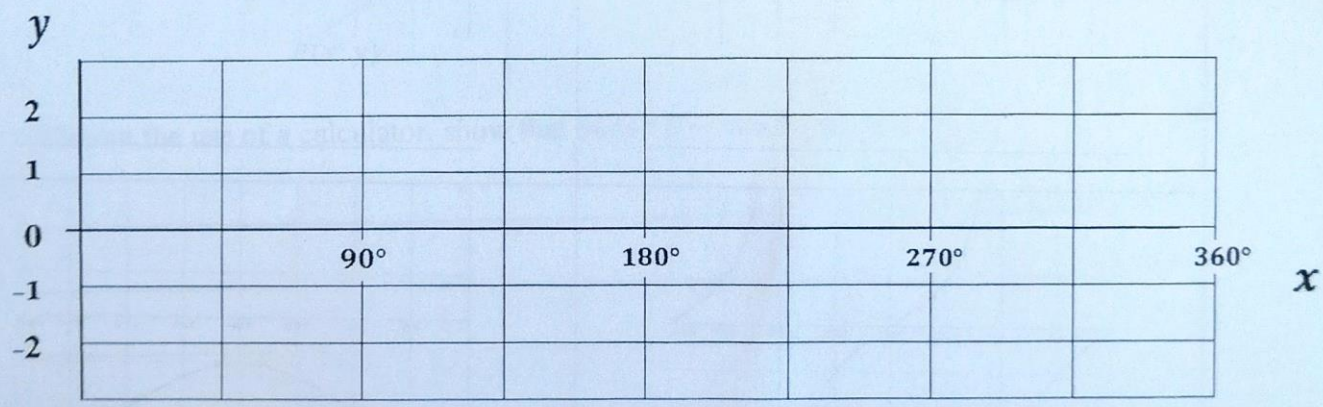
[4]

## QUESTION 7

Sketch the graph of $f(x) = -2sinx + 1$ on the axes provided below for $x \in [0°; 360°]$.

Label your graph and clearly show all important intercepts and asymptotes.

[4]




**THE END!!!**