This question paper consists of 7 pages.
INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions:

1. Write your answers in your answer book, which is provided in the exam.
2. This question paper consists of SIX questions. Answer ALL the questions.
3. Clearly show ALL calculations, diagrams, graphs, et cetera that you have used in determining your answers.
4. An approved scientific calculator (non-programmable and non-graphical) may be used, unless stated otherwise.
5. If necessary, answers should be rounded off to TWO decimal places, unless stated otherwise.
6. Diagrams are NOT necessarily drawn to scale.
7. ONE diagram sheet for answering QUESTION 6.1 is attached at the end of this question paper. Write your name and student number on this sheet in the space provided and insert it inside the back cover of your ANSWER BOOK.
8. Number the answers correctly according to the numbering system used in this question paper.
9. It is in your own interest to write legibly and to present the work neatly.
10. Start the answer for each question on a NEW page, for example Question 1 – new page, Question 2 – new page.
11. Any student caught cheating will have his or her question paper and notes confiscated. The College will take disciplinary measures to protect the integrity of these examinations.
12. If there is something wrong with or missing from your question paper or your answer book, please inform your invigilator immediately. If you do not inform your invigilator about a problem, the College will not be able to rectify it afterwards, and your marks cannot be adjusted to allow for the problem.
13. This question paper may be removed from the examination hall after the examination has taken place.

This question paper consists of SIX questions. Answer ALL the questions.

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**NOTE:** Addendum A (Answer Sheet) is attached at the back of the question paper (refer to Question 6.1).
QUESTION 1

ABCD is a quadrilateral with vertices A(2;5), B(−3;10), C(−4;3) and D(1;−2).

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

1.2 Determine the coordinates of M, the midpoint of AC. (2)

1.3 Show that BD and AC bisect each other at right angles at M. (5)

1.4 Calculate the area of ΔABC. (4)

1.5 Determine the equation of DC. (3)

1.6 Determine \( \theta \), the angle of inclination of DC, correct to ONE decimal place. (2)

1.7 Calculate the size of \( \hat{A}DC \). (4) [22]
QUESTION 2

2.1 If \( A(k; -1), B(0; 2) \) and \( C(6; 4) \) are collinear, find the value of \( k \). (3)

2.2 The distance between \( P(-7; a) \) and \( Q(-3; 4) \) is \( 4\sqrt{2} \) units. Calculate the value(s) of \( a \). (4) [7]

QUESTION 3

3.1 In the diagram below, \( \hat{POX} = \alpha \). \( P \) is the point \((-9; 12)\).

\[ P(-9; 12) \]

\[ O \]

\[ x \]

\[ y \]

Determine the following:

3.1.1 The length of \( OP \) (2)

3.1.2 \( \frac{1}{3} \sin \alpha \) (2)

3.1.3 \( \cos(-\alpha) \) (2)

3.2 Given: \( 25 \cos \beta + 7 = 0, \ 180^\circ < \beta < 360^\circ \)

Use an appropriate sketch in the correct quadrant to determine:

3.2.1 \( \tan \beta \) (5)

3.2.2 \( \frac{\cos^2 \beta - 1}{\sin \beta} \) (4) [15]
QUESTION 4

4.1 Simplify the following without using a calculator:

4.1.1 \( \frac{\cos 225^\circ \cdot \tan 210^\circ \cdot \sin 190^\circ}{\cos 100^\circ \cdot \sin 315^\circ} \) \( \quad \text{(8)} \)

4.1.2 \( \frac{\tan(180^\circ + \theta) \cdot \cos(360^\circ - \theta)}{\sin(180^\circ - \theta) \cdot \cos(90^\circ + \theta) + \cos(180^\circ + \theta) \cdot \cos \theta} \) \( \quad \text{(9)} \)

4.2 Determine, without using a calculator, the value of the following in terms of \( t \), if \( \sin 34^\circ = t \):

4.2.1 \( \sin 214^\circ \) \( \quad \text{(1)} \)

4.2.2 \( \cos 56^\circ \) \( \quad \text{(2)} \)

4.2.3 \( \tan 34^\circ \) \( \quad \text{(3)} \) \[23\]

QUESTION 5

5.1 Solve for \( x \) if \( \cos 2x = -\frac{2}{7} \) and \( x \in [0^\circ;360^\circ] \). \( \quad \text{(5)} \)

5.2 Determine the general solution of \( 2 \sin^2 \theta + 3 \cos \theta = 3 \). \( \quad \text{(7)} \)

5.3 Prove the following identity:

\( \tan x + \frac{\cos x}{1 + \sin x} = \frac{1}{\cos x} \) \( \quad \text{(6)} \) \[18\]
QUESTION 6

6.1 Given: \( f(x) = \sin(x - 30^\circ) \) and \( g(x) = 2\cos x \) for \( x \in [-180^\circ;180^\circ] \).
Draw sketch graphs of \( f(x) \) and \( g(x) \) on the same set of axes provided for Question 6.1 on Addendum A.
Clearly show all the turning points, intercepts with axis as well as the coordinates of the end points. (8)

6.2 Use your graphs to answer the following:

6.2.1 Give the amplitude of \( g(x) \). (1)

6.2.2 Give the period of \( f(x) \). (1)

6.2.3 What is the range of \( f(x) \)? (2)

6.2.4 Give the period of the function \( h \), if \( h(x) = g(2x) \). (1)

6.2.5 What does the equation of \( f(x) \) become if \( f(x) \) is shifted \( 30^\circ \) horizontally to the left? (1)

6.2.6 What does the equation of \( g(x) \) become if \( g(x) \) is reflected in the \( x \)-axis? (1) [15]

GRAND TOTAL: 100 MARKS
NAME: ________________________________________________________________

STUDENT NUMBER: ____________________________________________________

QUESTION 6.1

[Diagram of coordinate axes with points labeled]