

**HARRISON COLLEGE INTERNAL EXAMINATION 2012
CARIBBEAN ADVANCED PROFICIENCY EXAMINATION**

SCHOOL BASED ASSESSMENT

**PURE MATHEMATICS
UNIT 2 - TEST 3**

TIME: 1 Hour & 30 minutes

This examination paper consists of 2 printed pages.
The paper consists of 8 questions.
The maximum mark for this examination is 60.

INSTRUCTIONS TO CANDIDATES

1. Write your name clearly on each sheet of paper used.
2. Answer **ALL** questions.
3. Number your questions carefully and do **NOT** write your solutions to different questions beside one another.
4. Unless otherwise stated in the question, any numerical answer that is not exact, **MUST** be written correct to three (3) significant figures.

EXAMINATION MATERIALS ALLOWED

1. Mathematical formulae
 2. Electronic calculator (non-programmable, non-graphical)
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1. A CARICOM committee of 6 people is to be chosen at random from 12 country representatives.
 - (a) In how many different ways can the committee be chosen? [2]

The 12 country representatives consist of 5 people from Barbados, 4 from Trinidad and 3 from Jamaica. The committee is to be chosen randomly. Find the **PROBABILITY** (leaving your answer in fractional form) that the committee will consist of
 - (b) 2 people from Barbados, 2 from Trinidad and 2 from Jamaica. [3]
 - (c) exactly 3 people from Barbados. [3]

2. Each of the 8 letters of the word BARBADOS is printed on a separate card. The cards are arranged in a row.
 - (i) How many different arrangements of the letters are possible? [2]
 - (ii) In how many of these arrangements are the Bs together? [2]

The 8 cards are now shuffled and 2 cards are selected at random, one at a time, without replacement.

 - (iii) Find the probability that at least one of these 2 cards has B printed on it. Give your answer in fractional form. [4]

3. The independent events A and B are such that $P(A) = 0.6$ and $P(A \cup B) = 0.7$. Find
 - (a) $P(B)$. [4]
 - (b) the probability that either A occurs or B occurs, but not both. [2]

4. (a) Express the complex number $\frac{(2-3i)^2}{2+i}$ in the form $a + ib$ where a and b are real numbers. [4]

(b) (i) Write down the quadratic equation with real coefficients and constant given that one of the roots is $z = 3 - 5i$.

Give your answer in the form $az^2 + bz + c = 0$ [4]

(ii) Hence, or otherwise, solve $z^3 - z^2 + 4z + 170 = 0$ given that $z = 3 - 5i$ is a solution. [3]

5. (i) Express $1 + i\sqrt{3}$ in modulus argument form. [3]

(ii) Hence, by using de Moivre's theorem, find $(1 + i\sqrt{3})^5$ in the form $a + ib$. [2]

6. Sketch and describe the following loci in separate Argand diagrams

(i) $|z + 6| = |z - 4i|$ [3]

(ii) $|z - 1 + 4i| = 3$ [3]

7. A system of equations is given by

$$x + 2y + z = k$$

$$2x + y + 4z = 6$$

$$x - 4y + 5z = 9$$

where k is constant.

(i) Write the augmented matrix of the system. [2]

(ii) Reduce the augmented matrix to echelon form. [3]

(iii) Find the value of k for which the equations are consistent. [2]

(iv) For this value of k , find the general solution of these equations. [3]

8. The matrix A is given by

$$\mathbf{A} = \begin{pmatrix} 2 & 1 & k \\ 1 & k & -1 \\ 3 & 4 & 2 \end{pmatrix}$$

Find the values of k for which A is singular. [6]