FORM TP 2022043

TEST CODE **01254032**

MAY/JUNE 2022

CARIBBEAN EXAMINATIONS COUNCIL

CARIBBEAN SECONDARY EDUCATION CERTIFICATE® EXAMINATION

ADDITIONAL MATHEMATICS

Paper 032 – General Proficiency

ALTERNATIVE TO SCHOOL-BASED ASSESSMENT

1 hour 30 minutes

READ THE FOLLOWING INSTRUCTIONS CAREFULLY.

1. This paper consists of ONE compulsory question.
2. Write your answers in the spaces provided in this booklet.
3. Do NOT write in the margins.
4. A list of formulae is provided on page 4 of this booklet.
5. If you need to rewrite any answer and there is not enough space to do so on the original page, you must use the extra page(s) provided at the back of this booklet. **Remember to draw a line through your original answer**.
6. **If you use the extra page(s) you MUST write the question number clearly in the box provided at the top of the extra page(s) and, where relevant, include the question part beside the answer.**

Required Examination Materials

Electronic calculator (non-programmable)
Geometry set

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO.

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LIST OF FORMULAE

Arithmetic Series $T_n = a + (n-1)d \qquad S_2 = \frac{n}{2}\left[2a + (n-1)d\right]$

Geometric Series $T_n = ar^{n-1} \qquad S_n = \frac{a(r^n - 1)}{r - 1} \qquad S_\infty = \frac{a}{1-r}, -1 < r < 1 \text{ or } |r| < 1$

Circle $x^2 + y^2 + 2fx + 2gy + c = 0 \qquad (x + f)^2 + (y + g)^2 = r^2$

Vectors $\hat{\mathbf{v}} = \frac{\mathbf{v}}{|\mathbf{v}|} \qquad \cos\theta = \frac{\mathbf{a} \bullet \mathbf{b}}{|\mathbf{a}| \bullet |\mathbf{b}|} \qquad |\mathbf{v}| = \sqrt{(x^2 + y^2)} \text{ where } \mathbf{v} = x\mathbf{i} + y\mathbf{j}$

Trigonometry

$$\sin(A \pm B) \equiv \sin A \cos B \pm \cos A \sin B$$

$$\cos(A \pm B) \equiv \cos A \cos B \mp \sin A \sin B$$

$$\tan(A \pm B) \equiv \frac{\tan A \pm \tan B}{1 \mp \tan A \tan B}$$

Kinematics $v = u + at \qquad v^2 = u^2 + 2as \qquad s = ut + \frac{1}{2}at^2 \qquad v = \frac{dx}{dt} = \dot{x}$

$$a = \frac{d^2x}{dt^2} = \frac{dv}{dt} = \ddot{x}$$

Calculus $\frac{d}{dx}(ax + b)^n = an(ax + b)^{n-1} \qquad \frac{d}{dx}\sin ax = a\cos ax$

$\frac{d}{dx}\cos ax = -a\sin ax \qquad s = \int v\,dt \qquad v = \int a\,dt$

Statistics $\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n} = \frac{\sum_{i=1}^{n} f_i x_i}{\sum_{i=1}^{n} f_i}, \qquad S^2 = \frac{\sum_{i=1}^{n} (x_i - \bar{x})^2}{n} = \frac{\sum_{i=1}^{n} f_i x_i^2}{\sum_{i=1}^{n} f_i} - (\bar{x})^2$

Probability $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

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1. (a) Mark starts painting at noon. He can paint $(140 - kt)$ square feet per hour where t is the number of hours since he started painting and k is a constant accounting for the fact that Mark slows down as he gets tired.

On Friday, Mark paints 100 square feet between 2 p.m. and 3 p.m. Determine the value of k.

(8 marks)

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(b) The following table shows the results of a survey distributed to 400 adult participants to determine their opinions about receiving a COVID-19 vaccination. The tabulation summarizes the distribution of males/females (M/F) in the sample, as well as whether they were for vaccination (Y) or against vaccination (N).

Gender	For Vaccination (Y)	Against Vaccination (N)	TOTAL
Male (M)	98	102	200
Female (F)	136	64	200
TOTAL	**234**	**166**	**400**

(i) One of the researchers claims that the probability of a randomly selected participant being female or being for vaccinations is about 0.75. Determine whether the researcher's claim is **true**.

(5 marks)

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(ii) Using appropriate steps, show that being **male** and being **against** vaccinations are not independent nor mutually exclusive events.

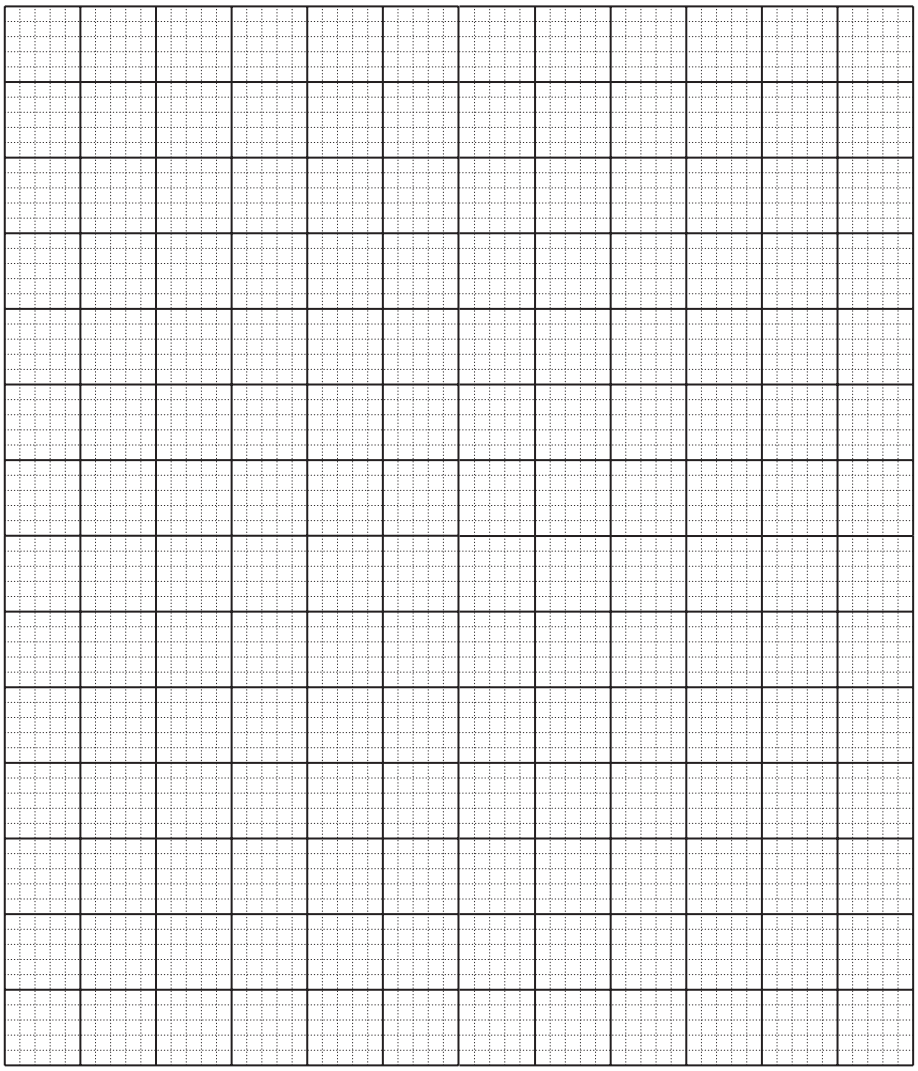
(6 marks)

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(c) (i) Use a graphical method to determine the solutions (in terms of π) to the following simultaneous equations over the range $0 \leq x \leq 2\pi$:

$y = 2 \sin 2x$
$y = \cos x$



(9 marks)

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(ii) Describe the periodicity **and** the amplitude of EACH graph.

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(2 marks)

Total 30 marks

END OF TEST

IF YOU FINISH BEFORE TIME IS CALLED, CHECK YOUR WORK ON THIS TEST.

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