HARRISON COLLEGE INTERNAL EXAMINATION MARCH 2016
CARIBBEAN ADVANCED PROFICIENCY EXAMINATION
SCHOOL BASED ASSESSMENT
PURE MATHEMATICS
UNIT 1 TEST 2 (PREVIEW)
1 hour 20 minutes

INSTRUCTIONS TO CANDIDATES

(i) Write your name clearly on each sheet of paper use.
(ii) Answer **ALL** questions.
(iii) Number your questions identically as they appear on the question paper and do **NOT write your solutions to different questions** beside each other.
(iv) 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

a) Mathematical formulae.
b) Scientific calculator (non-programmable, non-graphical)

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1. (a) Determine the equation of the curve which is the locus of the points $\sqrt{3}$ units from the point $(-3, 2)$. [2]
   (b) Find the length of the tangent drawn from the point $A(3, -4)$ to the circle $x^2 + y^2 + 6x - 8y = 0$
2. (a) Prove that $\cos^4\theta - \sin^4\theta + 1 = 2\cos^2\theta$. [4]
   (b) Determine the solutions of the equation $2\tan^2 x = \sec x + 1$ for $0 \leq \theta \leq 2\pi$. [7]
   (c) (i) Given that $\cos A = \frac{3}{5}$ determine the values of
   (a) $\sin 2A$ [2]
   (b) $\cos 2A$ [2]
   (c) $\cos 3A$ [3]
   (ii) Using your answer for (c) (i) (a) and (b) determine which quadrant $2A$ is in giving a reason for your answer. [2]
   (d) (i) Express $f(\theta) = 8\sin\theta + 15\cos\theta$ in the form $R\sin(\theta + \alpha)$ where $R > 0$ and $0 < \alpha < \pi$. [3]
   (ii) Is 16 a possible value for $f(\theta)$. Give a reason for your answer. [2]
   (iii) Solve the equation $f(\theta) = 2$ for $0 \leq \theta \leq 2\pi$. [5]
3. The points A, B, C and D have position vectors $3i + 2k$, $2i - 2j + 5k$, $2j + 7k$ and $-2i + 10j + 7k$ respectively.
   (i) Calculate the angle between OA and OD. [4]
   (ii) Show that BA and BC are perpendicular. [4]
   (iii) Hence, determine the equation of the plane containing the points A and B. [3]
4. (a) A curve is represented parametrically by
   $$x = \frac{2}{\sqrt{t}}, \qquad y = \frac{3}{1+t}$$
   Determine the equation of the curve in Cartesian form. [4]
   (b) A curve C has parametric equations
   $$x = 3\tan t\,, \; y = 4\sec t \quad \text{where } 0 \leq t \leq \pi$$
   Determine the equation of the curve in Cartesian form. [4]

1. (a) $(x+3)^2+(y-2)^2=3$ (b) $5\sqrt{3}$ 2. (b) $0.84, 5.44, \pi$ (c) (i) (a) $\frac{24}{25}$ (b) $-\frac{7}{25}$ (c) $-\frac{117}{125}$ (ii) Quadrant II

(d) (i) $17\sin(\theta+1.08)$ (ii) Yes, max value is 17 (iii) 1.94, 5.32 3. (i) 79.7° (iii) $r.\begin{pmatrix}-2\\4\\2\end{pmatrix}=-2$

4. (a) $y=\frac{3x^2}{x^2+4}$ (b) $\frac{y^2}{16}-\frac{x^2}{9}=1$