

**HARRISON COLLEGE INTERNAL EXAMINATION, MARCH 2018**

**CARIBBEAN ADVANCED PROFICIENCY EXAMINATION**

**SCHOOL BASED ASSESSMENT **PREVIEW****

**PURE MATHEMATICS**

**UNIT 1 – TEST 2**

**Time: 1 Hour & 20 minutes**

1. Solve, for  $-\pi \leq \theta \leq \pi$ , the equation  $3\tan^2\theta + 4\sec\theta = 1$  [7]

Total 7 marks

2. Prove that

$$\sec 2A + \tan 2A \equiv \frac{\cos A + \sin A}{\cos A - \sin A}$$

Total 5 marks

3. Find the general solution of the equation  $\sin x + \sin 5x = 0$ . [6]

4. Express  $5\cos x - 3\sin x$  in the form  $R\cos(x + \alpha)$ , where  $R > 0$  and  $0^\circ \leq \alpha \leq 90^\circ$ , giving the exact value of  $R$  and the values of  $\alpha$  correct to 1 decimal place.

Hence solve the equation  $5\cos x - 3\sin x = 4$  for  $0^\circ \leq x \leq 360^\circ$ . [6]

Total 6 marks

5. Obtain the Cartesian equation of the curve with parametric equations

$$x = 2 \operatorname{cosec} t + 3 \text{ and } y = \cot t - 1$$

[5]

6. i) Find the point(s) of intersection of the circles with equations

$$x^2 + y^2 - 6x - 4y + 9 = 0 \text{ and } x^2 + y^2 - 2x - 6y + 9 = 0. \quad [8]$$

ii) Find the equation of the line passing through the two points of intersection. [4]

Total 12 marks

7. A plane passes through the point  $P(3, 0, -5)$  and is perpendicular to the vector  $\begin{pmatrix} 3 \\ -2 \\ -5 \end{pmatrix}$ . Find the

i) Vector equation of the plane [2]

ii) Cartesian equation of the plane [2]

iii) Distance from the origin to the plane [2]

8. i) Find the point of intersection of the lines  $\begin{pmatrix} 3 \\ 7 \\ -1 \end{pmatrix} + \mu \begin{pmatrix} 3 \\ -2 \\ -2 \end{pmatrix}$  and  $\begin{pmatrix} -6 \\ 17 \\ -3 \end{pmatrix} + \lambda \begin{pmatrix} 1 \\ -2 \\ 2 \end{pmatrix}$ . [3]

ii) Determine the angle between the two lines. [3]

Total 6 marks

Answers:

1.  $\frac{2\pi}{3}, \frac{-2\pi}{3}$

2. Proof

3.  $\frac{n\pi}{3}, n\pi \pm \frac{\pi}{4}$

4.  $\sqrt{34}\cos(x + 31^\circ), 15.7^\circ, 282.3^\circ$

5.  $4y^2 - x^2 + 8y + 6x - 1 = 0$

6. *points of intersection*  $\left(\frac{9}{5}, \frac{18}{5}\right)$  and  $(1,2)$ , equation of line through points  $y = 2x$

7.  $r \cdot \begin{pmatrix} 3 \\ -2 \\ -5 \end{pmatrix} = 34, 3x - 2y - 5z = 34, \frac{34}{\sqrt{38}}$

8.  $(-3, 11, 3), 76.0^\circ$