

Further Maths Revision Paper 3

This paper consists of 5 questions covering CP1, CP2, FP1 and FM1.
(AS Further Maths: Q1 and 3)

1

Use the t -formula to solve

$$3 \sin \theta - 2 \cos \theta = 1$$

in the interval $0^\circ \leq \theta \leq 360^\circ$

2

Two identical elastic strings of length 1m and modulus of elasticity 4.9N are each attached to a particle of mass 0.5kg.

Their other two ends are fixed to two points 4m apart in a vertical line.

- (a) Find the height of the particle above the lower fixed point A in the equilibrium position.

The particle is now pulled down to A and released from rest.

- (b) Find the greatest height above A to which the particle rises

3

(a) Verify that the complex number $\alpha = e^{\frac{2\pi i}{5}}$ is a root of the equation $z^5 - 1 = 0$.

(b) Show that $1 + \alpha + \alpha^2 + \alpha^3 + \alpha^4 = 0$

(c) Find a quadratic equation whose roots are $\alpha + \alpha^4$ and $\alpha^2 + \alpha^3$

(d) Hence, or otherwise, show that

$$\cos \frac{2\pi}{5} = \frac{\sqrt{5} - 1}{4}$$

4

(a) The roots of the equation $x^3 + px^2 + qx - 30 = 0$ are in the ratio $2 : 3 : 5$
Find p and q .

(b) If the roots of the equation

$$4x^3 + 7x^2 - 5x - 1 = 0$$

are α, β, γ find the equation whose roots are $\alpha\beta, \beta\gamma, \gamma\alpha$

5

Find the equations of the tangents to the hyperbola $3x^2 - 4y^2 = 1$ which make equal angles with the axes.