QQQ – Pure Year 2 – Chapter 8 – Parametric Equations (Version 1)

Total Marks: 23

(23 = Platinum, 21 = Gold, 18 = Silver, 16 = Bronze)

---

1. A curve C has parametric equations

$$x = \frac{t^2 + 5}{t^2 + 1} \qquad y = \frac{4t}{t^2 + 1} \qquad t \in \mathbb{R}$$

Show that all points on C satisfy

$$(x - 3)^2 + y^2 = 4$$

(3)

(Total 3 marks)

Edexcel October 2021 Paper 1 Q13

2. A curve C has parametric equations

$$x = 3 + 2\sin t, \qquad y = 4 + 2\cos 2t, \qquad 0 \leqslant t < 2\pi$$

(a) Show that all points on C satisfy $y = 6 - (x - 3)^2$ **(2)**

(b) **(i)** Sketch the curve C.

(ii) Explain briefly why C does not include all points of $y = 6 - (x - 3)^2, \ \ x \in \mathbb{R}$ **(3)**

The line with equation $x + y = k$, where k is a constant, intersects C at two distinct points.

(c) State the range of values of k, writing your answer in set notation. **(5)**

(Total 10 marks)

Edexcel June 2018 Paper 1 Q14

3.

(a) At time t hours **after a high tide**, the height, h metres, of the tide and the velocity, v knots, of the tidal flow can be modelled using the parametric equations

$$v = 4 - \left(\frac{2t}{3} - 2\right)^2$$

$$h = 3 - 2\sqrt[3]{t - 3}$$

High tides and low tides occur alternately when the velocity of the tidal flow is zero.

A high tide occurs at 2 am.

(i) Use the model to find the height of this high tide. **[1 mark]**

(ii) Find the time of the first **low** tide after 2 am. **[3 marks]**

(iii) Find the height of this low tide. **[1 mark]**

(b) Use the model to find the height of the tide when it is flowing with maximum velocity. **[3 marks]**

(c) Comment on the validity of the model. **[2 marks]**

(Total 10 marks)

AQA June 2019 Paper 1 Q15