

## Lesson 6

### A-Level Pure Mathematics : Year 2 Differentiation IV

#### 6.1 Practice Makes Progression (Homework)

*Any solution based entirely on graphical  
or numerical methods is not acceptable*

Marks Available : 26

#### Question 1

*A-Level Specimen Exam Question from June 2000, Paper P3, Q4 edited (Edexcel)*

A curve is given by parametric equations

$$x = 4 \sin^3 t, \quad y = \cos 2t, \quad 0 \leq t \leq \frac{\pi}{4}$$

(a) Show that  $\frac{dy}{dx} = -\frac{1}{3 \sin t}$

[ 4 marks ]

(b) Find an equation of the normal to the curve where  $t = \frac{\pi}{6}$

[ 4 marks ]

**Question 2**

*A-Level Examination Question from June 2007, Paper C4, Q6 edited (Edexcel)*

A curve has parametric equations

$$x = \tan^2 t, \quad y = \sin t, \quad 0 \leq t \leq \frac{\pi}{2}$$

- ( a ) Show  $\frac{dy}{dx} = \frac{\cos^k t}{2 \sin t}$  where  $k$  is an integer whose value is to be found

[ 3 marks ]

- ( b ) Find the exact gradient of the curve at the point where  $t = \frac{\pi}{4}$

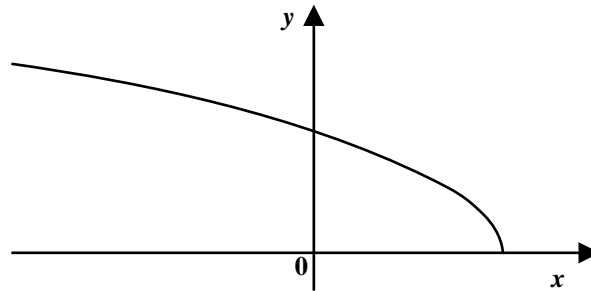
[ 3 marks ]

- ( c ) Find a Cartesian equation of the curve in the form  $y^2 = f(x)$

[ 4 marks ]

### Question 3

A-Level Examination Question from June 2009, Paper C4, Q5 edited (Edexcel)



The graph is of the curve with parametric equations

$$x = 2 \cos 2t, \quad y = 6 \sin t, \quad 0 \leq t \leq \frac{\pi}{2}$$

- (a) Find the gradient of the curve at the point where  $t = \frac{\pi}{3}$

[ 4 marks ]

- (b) Find a Cartesian equation of the curve in the form

$$y = f(x), \quad -2 \leq x \leq 2$$

[ 4 marks ]

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Teachers may obtain detailed worked solutions to the exercises by email from [mhh@shrewsbury.org.uk](mailto:mhh@shrewsbury.org.uk)