C1 Straight Line Questions

Specimen

9. The curve C has equation

$$y = x^4 + x + 1.$$

Find the equation of the tangent to C at the point (1, 3). [4]

2005 Winter

8. The curve C has equation $y = 3x^{\frac{3}{2}} - \frac{32}{x}$.

(a) Find the equation of the tangent to C at the point where $x = 4$. [7]

(b) Find the equation of the normal to C at the point where $x = 4$. [2]

2005 Summer

6. The curve C has equation

$$y = 16\sqrt{x} + \frac{32}{x} + 2.$$

(a) Find the value of $\frac{dy}{dx}$ when $x = 4$. [3]

(b) Find the equation of the normal to C at the point where $x = 4$. [3]

2006 Winter

3. Find the equation of the normal to the curve $y = 4x^2 - 7x + 2$ at the point (2, 4). [4]

2006 Summer

3. The curve C has equation $y = x^2 - 4x + 7$. The point A has coordinates $(1, 4)$.

(a) Find the equation of the tangent to C at A. [4]

(b) Find the equation of the normal to C at the point A. [2]

2007 Winter

(b) Find the equation of the normal to the curve $y = 2x^2 - 5x + 3$ at the point $(2, 1)$. [3]

2007 Summer

4. *(a)* Find the equation of the tangent to the curve $y = \frac{16}{x} + 3x + 2$ at the point $(4, 18)$. [5]

2008 Winter

3. The curve C has equation $y = 2x^2 - 10x + 16$. The point P has coordinates $(3, 4)$ and lies on C. Find the equation of the tangent to C at P. [4]

2008 Summer

3. The point P lies on the curve C with equation $y = 3x^2 - 8x + 7$. Given that the x-coordinate of P is 2, find the equation of the normal to C at P. [6]

2009 Winter

3. The curve C has equation $y = x^2 - 9x + 13$.

(a) The point P has coordinates $(6, -5)$ and lies on C. Find the equation of the **tangent** to C at P. [4]

(b) The point Q lies on C and is such that the gradient of the **normal** to C at Q is $\frac{1}{7}$.

Find the x-coordinate of Q. [3]

2009 Summer

3. The curve C has equation $y = 2x^2 + 6x + 7$. The point P, whose x-coordinate is -1, lies on the curve C. Find the equation of the tangent to C at P. [5]

2010 Winter

3. The curve C has equation $y = \frac{6}{x^2} + \frac{7x}{4} - 2$. The point P has coordinates $(2, 3)$ and lies on C.

Find the equation of the **normal** to C at P. [6]

2010 Summer

3. The curve C has equation $y = x^2 - 8x + 10$.

(a) The point P has coordinates $(3, -5)$ and lies on C. Find the equation of the **normal** to C at P. [5]

(b) The point Q lies on C and is such that the **tangent** to C at Q has equation

$$y = 4x + c,$$

where c is a constant. Find the coordinates of Q and the value of c. [4]

2011 Winter

8. The curve C has equation $y = x^2 - 6x + 7$.

(a) The point P, whose x-coordinate is 5, lies on the curve C. Find the equation of the tangent to C at P. [5]

The line L has equation $y = \frac{1}{2}x - 2$.

(b) (i) Find the coordinates of the two points of intersection of C and L.

(ii) Verify that L is in fact the normal to C at one of these points of intersection. [8]

2011 Summer

3. The curve C has equation $y = 3x^2 - 9x + 1$. The point P, whose x-coordinate is 2, lies on the curve C. Find the equation of the tangent to C at P. [5]

2012 Winter

3. The curve C has equation $y = 2x^2 - 8x + 13$. The point P, whose x-coordinate is 3, lies on the curve C. Find the equation of the **normal** to C at P. [6]

2012 Summer

3. The curve C has equation $y = 2x^2 - 11x + 13$.

(a) The point P has coordinates $(2, -1)$ and lies on C. Find the equation of the **tangent** to C at P. [4]

(b) The point Q lies on C and is such that the gradient of the **normal** to C at Q is $-\frac{1}{9}$. Find the x-coordinate of Q. [3]

2013 Winter

3. The curve C has equation $y = 3x^2 - 14x + 13$. The point P, whose x-coordinate is 3, lies on the curve C. Find the equation of the **tangent** to C at P. [5]

2013 Summer

3. The curve C has equation $y = 2x^2 - 10x + 7$.

(a) The point P has coordinates $(3, -5)$ and lies on C. Find the equation of the **normal** to C at P. [5]

(b) The point Q lies on C and is such that the **tangent** to C at Q is parallel to the x-axis. Find the x-coordinate of Q. [2]

2014 Winter

3. The curve C has equation $y = \frac{20}{x} + 2x^2 - 11$. The point P has coordinates $(2, 7)$ and lies on C.

Find the equation of the **normal** to C at P. [6]

2014 Summer

3. The curve C has equation $y = \frac{20}{x} + 2x^2 - 11$. The point P has coordinates $(2, 7)$ and lies on C.

Find the equation of the **normal** to C at P. [6]

2015

3. The curve C has equation $y = x^3 - x^2 - 13x + 18$.

(a) The point P, whose x-coordinate is 2, lies on C. Find the equation of the **normal** to C at P. [6]

(b) The point Q, whose x-coordinate is a, lies on C and is such that the **tangent** to C at Q is parallel to the line with equation $y = -8x + 7$.
Find the possible values of a. [3]

2016

3. The curve C has equation $y = \frac{12}{x^2} + 7x - 6$. The point P, whose x-coordinate is 2, lies on C.

Find the equation of the tangent to C at P. [6]

2017

3. The curve C has equation $y = \frac{3}{4}x^2 - 4x - 10$.

(a) The point P has coordinates $(6, -7)$ and lies on the curve C. Find the equation of the **tangent** to C at P. [4]

(b) The point Q lies on C and is such that the gradient of the **normal** to C at Q is -2.
Find the x–coordinate of Q. [3]