

Tangents and Normals

For AQA Level 2 Certificate in Further Mathematics (8365)

Name _____

Total marks: **24**

Answer **all** questions in the spaces provided. Show your working: marks are given for correct method. You may use a calculator.

- 1** The point $(-1, 2)$ lies on the curve $y = 2x^2$
Circle the gradient of the normal to the curve at $(-1, 2)$

[1 mark]

☐ -4

☐ $-\frac{1}{4}$

☐ $\frac{1}{4}$

☐ 4

- 2** A curve has equation $y = x^3 - 2x^2 + 5$
The point $P(2, 5)$ lies on the curve.
Work out the equation of the tangent to the curve at P .
Give your answer in the form $y = mx + c$

[3 marks]

Answer _____

- 3** A curve has equation $y = x^2 - \frac{8}{x}$

P is the point on the curve where $x = 2$

Show that the normal to the curve at P has equation $x + 6y = 2$

[4 marks]

- 4** A curve has equation $y = x^3 - 3x^2 - 7x + 2$

The tangents to the curve at the points A and B are both parallel to the line $y = 2x - 5$

Work out the x -coordinates of A and B .

[3 marks]

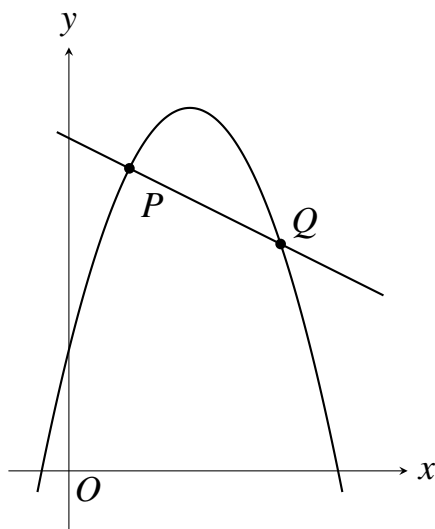
Answer _____

- 5 A curve has equation $y = kx^3 - 6x$ where k is a constant.
The normal to the curve at the point where $x = -1$ is parallel to the line $x + 3y = 4$
Work out the value of k .

[3 marks]

$k =$ _____

- 6 Here is a sketch of the curve $y = 2 + 4x - x^2$



Not drawn accurately

The point $P(1, 5)$ lies on the curve.

The normal to the curve at P meets the curve again at Q .

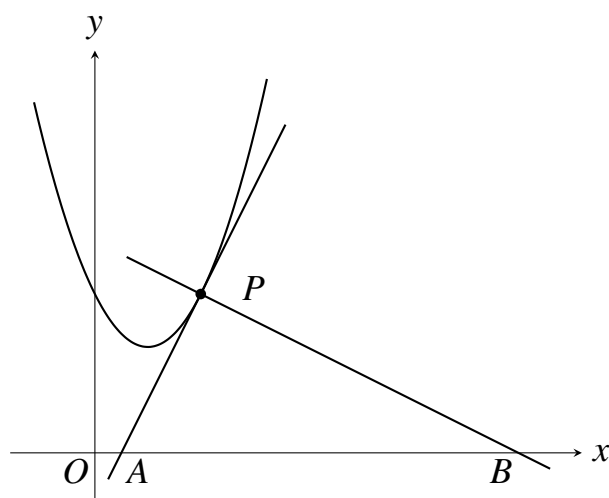
Work out the coordinates of Q .

You must show your working.

[5 marks]

Answer (_____ , _____)

- 7 Here is a sketch of the curve $y = x^2 - 2x + 3$
 P is the point on the curve where $x = 2$



Not drawn accurately

The tangent to the curve at P meets the x -axis at A .
The normal to the curve at P meets the x -axis at B .
Work out the area of triangle PAB .

[5 marks]

Answer _____