Leave blank

**5.** A curve is described by the equation

$$x^3 - 4y^2 = 12xy.$$

(a) Find the coordinates of the two points on the curve where $x = -8$.

**(3)**

(b) Find the gradient of the curve at each of these points.

**(6)**

N 2 6 2 8 2 A 0 1 0 2 4

Leave blank

**4.** A curve has equation $3x^2 - y^2 + xy = 4$. The points $P$ and $Q$ lie on the curve. The gradient of the tangent to the curve is $\frac{8}{3}$ at $P$ and at $Q$.

(a) Use implicit differentiation to show that $y - 2x = 0$ at $P$ and at $Q$.

**(6)**

(b) Find the coordinates of $P$ and $Q$.

**(3)**

H 3 0 4 2 7 A 0 1 0 2 8

Leave blank

1. A curve $C$ has the equation $y^2 - 3y = x^3 + 8$.

    (a) Find $\dfrac{dy}{dx}$ in terms of $x$ and $y$.

    **(4)**

    (b) Hence find the gradient of $C$ at the point where $y = 3$.

    **(3)**

Leave blank

**4.** The curve $C$ has the equation $ye^{-2x} = 2x + y^2$.

(a) Find $\dfrac{dy}{dx}$ in terms of $x$ and $y$.

(5)

The point $P$ on $C$ has coordinates $(0, 1)$.

(b) Find the equation of the normal to $C$ at $P$, giving your answer in the form $ax + by + c = 0$, where $a$, $b$ and $c$ are integers.

(4)

**3.** The curve $C$ has the equation

$$\cos 2x + \cos 3y = 1, \quad -\frac{\pi}{4} \leqslant x \leqslant \frac{\pi}{4}, \quad 0 \leqslant y \leqslant \frac{\pi}{6}$$

(a) Find $\dfrac{dy}{dx}$ in terms of $x$ and $y$.

**(3)**

The point $P$ lies on $C$ where $x = \dfrac{\pi}{6}$.

(b) Find the value of $y$ at $P$.

**(3)**

(c) Find the equation of the tangent to $C$ at $P$, giving your answer in the form $ax + by + c\pi = 0$, where $a$, $b$ and $c$ are integers.

**(3)**

**Question 3 continued**

**Turn over**

Leave blank

**3.** A curve $C$ has equation

$$2^x + y^2 = 2xy$$

Find the exact value of $\dfrac{\mathrm{d}y}{\mathrm{d}x}$ at the point on $C$ with coordinates $(3, 2)$.

(7)

H 3 5 3 8 6 A 0 8 3 2