InkMaths

QUESTION WORKBOOK

Implicit and parametric differentiation

Differentiation · Year 12–13

8 questions · 33 marks

PRINT EDITION

inkphysics.co.uk/maths

SECTION A · Warm-up

A1 Differentiate y^3 with respect to x, and then differentiate the product xy with respect to x. [2]

A2 A curve has equation $y^2 = 4x$. Find dy/dx in terms of y, and hence find the gradient of the curve at the point (4, 4). [2]

SECTION B · Standard

B1 Find the gradient of the circle $x^2 + y^2 = 100$ at the point (6, 8). [4]

B2 The curve C has equation $2x^2 + 3y^2 - xy = 16$. Find dy/dx in terms of x and y, and hence find the gradient of C at the point (2, 2). [5]

B3 A curve has parametric equations $x = t^2$, $y = t^3$. Find dy/dx in terms of t, and find the coordinates and the gradient of the point on the curve where $t = 2$. [4]

SECTION C · Stretch

C1 The curve C has equation $x^2 + xy + y^2 = 12$. Find the coordinates of the two points on C at which the tangent is parallel to the x-axis. [6]

C2 A curve has parametric equations $x = 3\cos t$, $y = 2\sin t$, $0 \leq t < 2\pi$. Find an equation of the tangent to the curve at the point where $t = \pi/3$, giving your answer in the form $ax + by = c$ with a, b and c exact. [6]

C3 Given that $x = \sin y$, where $-\pi/2 \leq y \leq \pi/2$, show that $dy/dx = 1/\sqrt{(1 - x^2)}$. [4]