

## (75) Integration (Finding $c$ and Finding Functions)

### WORKING AT D/E

(1) A curve with equation  $y = f(x)$  passes through the point (1,2).

Given that  $\frac{dy}{dx} = 3x^2 + 4x - 7$ , show that  $y = x^3 + 2x^2 - 7x + 6$

(2) (a) Find  $\int \left(\frac{4}{3}x^{\frac{1}{2}}\right) dx$

A curve with equation  $y = f(x)$  and passes through the point (9,12).

(b) Given that  $f'(x) = \frac{4}{3}x^{\frac{1}{2}}$  find  $f(x)$ .

(3) The gradient function of  $g(x) = \frac{2}{x^2}$

Given that the point (-0.25, 8) lies on the graph with equation  $y = g(x)$ , find an expression for  $g(x)$

### WORKING AT B/C

(1) A curve has equation  $y = f(x)$

Given that  $\frac{dy}{dx} = 5x\sqrt{x}$  and that (1,3) is a point the curve, find an expression for  $f(x)$ .

(2) A curve has equation  $y = f(x)$ . The point (1,0) lies on the curve.

Given that  $f'(x) = 1 - \frac{8}{x^3}$ , find  $f(x)$  in the form  $Ax^n + Bx + C$  where  $A, B$  and  $C$  are integers and  $n$  is a rational fraction.

(3) The gradient function of a curve is given as  $\frac{dy}{dx} = 4x^2$

(a) Write down what type of equation the curve has.

(b) Given that the point (3, 35) lies on the curve, draw a sketch of the curve showing where the curve crosses the  $y$  axis.

### WORKING AT A\*/A

(1) Beryl has created a logo for her art project using a computer animation package.

The area ( $A$ ) of the onscreen logo she designs is such that the rate of change of the area with respect to time ( $t$ ) is given as  $-3t^2 + 6t + 4$

The animation appears on the screen from a dot and disappears 4 seconds later.

(a) Find an equation for the model in the form  $A = f(t)$

(b) Find the area of the logo after one second.

(c) Find when the logo is at its largest. Give your answer to 3 S.F.

(2)  $x = f(t)$ ,  $0 < t < 5$

(a) Given that  $f'(t) = \frac{8t-1}{t^3}$  and when  $t = 1$ ,  $x = 4$ , find  $x$  when  $t = 2$

(b) Write down the set of values for which  $f(t)$  is decreasing.

(c) Find the greatest value of  $f(t)$ ,