| Day 5 | A Level Maths: B Tier 10-a-day |
|---|---|
| **1** Simplify $\frac{1 - \cos 2x}{2 \sin x}$, giving your answer as a single trigonometric term. | |
| **2** Regression line (x from 2 to 10): y = 3.2 + 0.8x. x is the advertising spend, y the weekly sales.<br>(a) Interpret the gradient.<br>(b) Estimate y when x = 10 and comment. | |
| **3** A particle moves on a straight line. Its displacement from O at time t seconds is $s = t^3 + 6t^2 - t$ metres.<br>Find its velocity and acceleration when t = 5. | |
| **4** f(x) = ln x + x − 5. Use the Newton-Raphson method with<br>$x_0 = 4$ to find $x_1$ and $x_2$, to 4 d.p. | |
| **5** A police car starts from rest and accelerates at 0.5 m $s^{-2}$. At that moment it is passed by a speeding van travelling at constant speed 17 m $s^{-1}$.<br>Find how long it takes to catch up, and the distance travelled. | |

| Day 5 | A Level Maths: B Tier 10-a-day |
|---|---|
| **6** The line $y = x - 9$ meets the circle $x^2 + (y + 3)^2 = 50$ at the points A and B. Find the coordinates of A and B, and the exact length of the chord AB. | |
| **7** Solve $\frac{dy}{dx} = \frac{2y}{x}$ for $x > 0$, given that $y = 3$ when $x = 1$. | |
| **8** Line $l_1$ has equation $x - 7y = 7$ and line $l_2$ has equation $x + 3y = -3$. The lines meet at P. Find the area of the triangle formed by $l_1$, $l_2$ and the x-axis. | |
| **9** Data are modelled by $y = ab^x$, where a and b are constants. A plot of $\log_{10} y$ against x is a straight line with intercept 0.699 and gradient 0.699. Find a and b to 2 significant figures. | |
| **10** (a) Expand $(2 + x)^{-1}$ in ascending powers of x up to and including the term in $x^3$. (b) State the range of values of x for which the expansion is valid. | |