| Day 239 | IGCSE 10-a-day |
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| **1** $\mathbf{a} = \begin{pmatrix} 6 \\ -6 \end{pmatrix}$ and $\mathbf{b} = \begin{pmatrix} 7 \\ -3 \end{pmatrix}$.<br>(a) Work out $\mathbf{a} + \mathbf{b}$.<br>(b) Work out $3\mathbf{a} - 3\mathbf{b}$. | |
| **2** $y = -x^3 - 9x^2 + 4x - 7$<br>(a) Find $\frac{d^2y}{dx^2}$.<br>(b) Find the value of x for which $\frac{d^2y}{dx^2} = 0$, and work out the gradient of the curve at this value of x. | |
| **3** x is an obtuse angle and $\sin x = \frac{7}{10}$.<br>(a) Find the exact value of cos x.<br>(b) Find the exact value of tan x. Give each answer as a fraction or a surd. Do not use a calculator. | |
| **4** Solve the simultaneous equations<br>$y = x^2 - 3x + 3$<br>$y = -2x + 3$ | |
| **5** Work out $(8 \times 10^4) + (9.8 \times 10^3)$<br>Give your answer in standard form. | |

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| **6** The curve $y = 2x^3 + 6x^2 - 18x - 2$ has two stationary points, A and B.<br>Work out the vertical distance between A and B. | |
| **7** Here are the first five terms of a quadratic sequence.<br>16, 28, 42, 58, 76<br>Find an expression for the nth term. | |
| **8** $f(x) = \frac{2x + 3}{x - k}$, where k is a constant and $x \neq k$.<br>The function f is its own inverse, so $f^{-1}(x) = f(x)$.<br>Find the value of k. | |
| **9** P is the point $(p, 4p^2)$ on the curve $y = 4x^2$, where $p \neq 0$.<br>The normal to the curve at P meets the y-axis at the point Q.<br>Show that the y coordinate of Q is $4p^2 + \frac{1}{8}$. | |
| **10** Fatima invested £15,000 in a savings account for 2 years.<br>Compound interest was paid at a fixed rate per year.<br>At the end of the 2 years the account held £15,913.50.<br>Work out the annual rate of interest.<br>(Calculator) | |