Day 229	IGCSE 10-a-day
1 $y = x^3 + 2x^2 - 6x$ (a) Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$. (b) Work out the value of $\frac{d^2y}{dx^2}$ when $x = 3$.	
2 $A = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$ and $B = \begin{pmatrix} -4 \\ 1 \end{pmatrix}$. (a) Work out A + B. (b) Work out 2A − 3B.	
3 Expand and simplify $(x + 2)^2(x - 3)$	
4 A tank is a cuboid with a square base of side x metres and height h metres, and has a closed top. Its volume is 125 m^3. (a) Show that the total outside surface area, A m^2, is $A = 2x^2 + \frac{500}{x}$. (b) Find the minimum possible value of A, showing that it is a minimum.	
5 Beth puts £3,500 in a savings account. Compound interest is paid at 4% in year 1, 3% in year 2 and 5% in year 3. Work out the amount in the account at the end of year 3. Give your answer to the nearest penny. (Calculator)	

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6 $y = -2x^3 - 6x^2 - 5$ (a) Show that there is a stationary point at $x = 0$. (b) By finding the gradient when $x = -\frac{1}{2}$ and when $x = \frac{1}{2}$, decide whether it is a maximum or a minimum.	
7 Write $\frac{12}{2+\sqrt{2}}$ in the form $p + q\sqrt{2}$ where p and q are integers.	
8 The probability that the 8:15 train is late on any day is $\frac{1}{5}$. Events on different occasions are independent. Work out the probability that this happens at least once in 3 days. Give your answer correct to 3 significant figures. (Calculator)	
9 ABCD is a rectangle with AB = 2 cm and AD = 6 cm. A point P inside the rectangle is such that AP ≤ 2 cm and P is nearer to A than to B. Work out the area of the region in which P can lie. Give your answer in terms of π and surds.	
10 £10,000 is invested for 2 years at r% per year compound interest. At the end of 2 years the investment is worth £12,544. Work out the value of r. (Calculator)	