Day 280	IGCSE 10-a-day
1 Find $\frac{dy}{dx}$ when $y = 3x^5 - 6x^3 + x^2 + 2$	
2 Here are six numbers. $\sqrt{2} \times \sqrt{6}$, $\sqrt{3} \times \sqrt{5}$, $\frac{1}{\sqrt{3}}$, $(2 + \sqrt{5})(2 - \sqrt{5})$, $\sqrt{50}$, $(\sqrt{6} + 2)(\sqrt{6} - 2)$ Write down the rational numbers.	
3 Work out the exact value of $\cos 30° \div \cos 60°$ Give your answer in its simplest form, as a fraction or surd. Do not use a calculator.	
4 The position vectors of A and B are $\begin{pmatrix}1\\3\end{pmatrix}$ and $\begin{pmatrix}-9\\-7\end{pmatrix}$. The point P lies on AB so that AP : PB = 3 : 2. Find the position vector of P.	
5 Sparkle Cleaners has a call-out fee of £1 plus £4 per hour. Fresh Start has a call-out fee of £23.50 plus £2.50 per hour. (a) Work out the number of hours for which the two costs are the same. (b) Which is cheaper for 23 hours, and by how much?	

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6 Two shapes are mathematically similar. The smaller has height 40 cm and area 28 cm^2. The larger has area 10.08 cm^2. Work out the height of the larger shape.	
7 $y = -2x^3 - 6x^2 + 9$ Use the second derivative to show that the curve has a maximum at x = 0.	
8 Isla invested £1,000 in a savings account for 2 years. Compound interest was paid at a fixed rate per year. At the end of the 2 years the account held £1,060.90. Work out the annual rate of interest. (Calculator)	
9 A curve has equation $y = 2x^3 - 6x^2 + 12x$. (a) Show that the curve has no stationary points. (b) Find the least value of the gradient of the curve.	
10 $A = \begin{pmatrix} -4 & 1 \\ 5 & 1 \end{pmatrix}$ and $B = \begin{pmatrix} -12 \\ 24 \end{pmatrix}$. AX = B, where X is a 2 × 1 matrix. Find X.	