Day 146	A Level Maths: B Tier 10-a-day
1 A particle of mass 5 kg is moving on a smooth horizontal surface at 0 m s^{-1} when a constant horizontal force of 24 N, in the direction of motion, acts for 4 s. Find the speed of the particle at the end of this time and the distance it moves.	
2 Find the exact value, in radians, of (a) $\arcsin(-\frac{1}{2})$ (b) $\arctan(-\frac{\sqrt{3}}{3})$	
3 Solve $2^{2x+4} = 8^{4x-2}$.	
4 A model boat moves so that its position vector relative to O at time t s is $\mathbf{r} = (3t^2 + 3t)\mathbf{i} + (3t^3)\mathbf{j}$ metres. Find the velocity when t = 2, and the speed at that time.	
5 A class of width 20, frequency 48, is a bar 2 cm wide, 12 cm tall. (a) Find the bar height for width 30, frequency 24. (b) Find the frequency of a 1 cm by 2.5 cm bar.	

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6 Prove, by exhaustion, that a cube number cannot be written in the form 7k + 4, where k is an integer.	
7 Line l_1: $\mathbf{r} = \begin{pmatrix}7\\1\\1\end{pmatrix} + \lambda\begin{pmatrix}3\\0\\0\end{pmatrix}$. Line l_2: $\mathbf{r} = \begin{pmatrix}3\\3\\0\end{pmatrix} + \mu\begin{pmatrix}-1\\2\\-1\end{pmatrix}$. Show that l_1 and l_2 intersect and find the point.	
8 P(A) = 0.4, P(B) = 0.6, P(A ∩ B) = 0.05. Find (a) P(A ∪ B), (b) P(A | B). (c) Are A and B independent?	
9 Find the exact value of cosec 60°, giving your answer with a rational denominator.	
10 (a) Expand $(5 - 4x)^{-1}$ 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.	