Day 130	A Level Maths: A Tier 10-a-day
1 A sector of a circle of radius 13 cm has perimeter 49.4 cm. Find (a) the angle of the sector in radians, (b) the area of the sector.	
2 Solve $x - 7\sqrt{x} + 10 = 0$.	
3 A particle P has constant acceleration $(4\mathbf{i} + 2\mathbf{j})$ m s^{-2}. When t = 0, P is at $(2\mathbf{i} + 3\mathbf{j})$ m moving with velocity $(-8\mathbf{i} + 3\mathbf{j})$ m s^{-1}. Find (a) when P moves parallel to $\mathbf{j}$, (b) its position vector then.	
4 The equation $3x^2 + (k + 6)x + (k + 6) = 0$ has two distinct real roots. Find the set of possible values of k.	
5 A crate of mass 6 kg is pulled at constant speed along rough horizontal ground, $\mu = 0.5$, by a force of P N at angle θ above the horizontal, $\tan\theta = \frac{4}{3}$. Find P and the normal reaction. Take g = 9.8.	

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6 Find the exact value of $\sin(\arcsin\frac{3}{5} + \arcsin\frac{8}{17})$.	
7 Parts are defective with probability 0.15, independently. A box of 9 parts is rejected if it has at least 3 defective. From 12 such boxes, find the probability that exactly 3 are rejected (3 s.f.).	
8 l_1: $\mathbf{r} = \begin{pmatrix}4\\1\\-3\end{pmatrix} + \lambda\begin{pmatrix}2\\1\\-2\end{pmatrix}$ l_2: $\mathbf{r} = \begin{pmatrix}-4\\-1\\4\end{pmatrix} + \mu\begin{pmatrix}-2\\0\\2\end{pmatrix}$ Determine whether l_1 and l_2 intersect. If they do, find the point of intersection.	
9 $f(x) = x^3 - x^2 - 11x - 10$. (a) Show that $(x + 2)$ is a factor of $f(x)$. (b) Solve $f(x) = 0$, giving surds in simplest form.	
10 A bag has 2 red and 6 blue counters. Two are taken at random without replacement. Given that the counters are the same colour, find the probability they are both red.	