Day 306	A Level Maths: A Tier 10-a-day
1 Solve $3^{2x+2} = 7^{3x+3}$. Give your answer to 3 significant figures.	
2 X ~ B(15, 0.3). Find the smallest value of c such that $P(X \geq c) < 0.1$.	
3 Prove that $(n + 4)^2 - (n - 4)^2$ is a multiple of 16 for every integer n.	
4 X is normally distributed with mean 48 and standard deviation σ. Given that $P(X > 66) = 0.0668$, find σ to 3 significant figures.	
5 A ball is projected from a point O on horizontal ground at 13 m s^{-1} at angle α above the horizontal, $\tan\alpha = \frac{5}{12}$, and lands at A. Find (a) the time of flight, (b) the greatest height, (c) OA. Take g = 9.8. Give answers to 3 s.f. if not exact.	

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6 A, B and C have position vectors $\begin{pmatrix}-4\\-3\\5\end{pmatrix}$, $\begin{pmatrix}-2\\0\\7\end{pmatrix}$ and $\begin{pmatrix}k\\6\\11\end{pmatrix}$ relative to O, where k is a constant. Given that A, B and C are collinear, find k and the ratio AB : BC.	
7 Solve $3^{2x} - 10 \times 3^{x} + 9 = 0$.	
8 Particle A (4 kg) lies on a rough table, $\mu = 0.4$, joined by a light string over a smooth pulley to particle B (10 kg), 1.2 m above the floor. Released from rest; B lands without rebounding. Find (a) the acceleration of A before B lands, (b) the further distance A moves. Take $g = 9.8$.	
9 A curve has equation $x^2 - 2xy + 3y^2 = 8$. Find the coordinates of the points where the tangent is parallel to the x-axis.	
10 The 4th term of a geometric sequence is -48 and the 7th term is 384. Find the common ratio and the first term. Find the sum of the first 5 terms.	