Day 323	A Level Maths: A Tier 10-a-day
1 X, the height (cm), is normally distributed with mean 169 and standard deviation 7. Find (a) P(X > 180.2) (b) P(180.2 < X < 188.6), each to 3 s.f.	
2 $g(x) = \frac{1}{18 + 8\sin x + 6\cos x}$ (a) Write 8 sin x + 6 cos x in the form R sin(x + α), with α acute. (b) Find the greatest and least values of g(x) and the smallest positive x at which the greatest value occurs (1 d.p.).	
3 A lift of mass 300 kg carries a person of mass 90 kg. The cable tension is 3705 N and the lift is accelerating. Find (a) the magnitude and direction of the acceleration, (b) the force of the floor on the person. Take g = 9.8.	
4 Solve $3^{x-3} = 9^{2x+3}$.	
5 P(B) = 0.1, P(A) = 0.2 and P(A | B) = 0.15. (a) Find P(A ∩ B) and P(A ∪ B). (b) Find P(B | A). (c) Determine whether A and B are independent.	

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6 A, B and C have position vectors $\begin{pmatrix}-1\\4\\1\end{pmatrix}$, $\begin{pmatrix}-1\\6\\1\end{pmatrix}$ and $\begin{pmatrix}-1\\k\\1\end{pmatrix}$ relative to O, where k is a constant. Given that A, B and C are collinear, find k and the ratio AB : BC.	
7 A particle slides from rest down a rough plane inclined at α to the horizontal, where $\tan\alpha = \frac{4}{3}$. It moves 12.74 m in 2 s. Find (a) the coefficient of friction, (b) the speed after 2 s. Take g = 9.8.	
8 In the expansion of $(1 + kx)^n$, where n is a positive integer, the coefficient of x is 16 and the coefficient of x^2 is 112. Find n and k.	
9 $f(x) = \frac{19x - 1}{(1 - 3x)(1 + x)}$. (a) Express f(x) in partial fractions. (b) Hence expand f(x) up to x^2. (c) State the range of x for which the expansion is valid.	
10 f(x) = 2 + 2 arccos(2x). Find the exact value of x for which $f(x) = \frac{4\pi + 6}{3}$. Hence state the range of f.	