Day 99	A Level Maths: A Tier 10-a-day
1 Solve $3^{x+3} = 5^{2x}$. Give your answer to 3 significant figures.	
2 A(−14, 3) and B(10, −7) are the ends of a diameter of a circle. (a) Find the equation of the circle, in the form $x^2 + y^2 + ax + by + c = 0$. (b) Show that C(−2, −15) lies on the circle.	
3 By writing 195° as 150° + 45°, show that $\tan 195° = 2 - \sqrt{3}$.	
4 The line l has equation $x + 2y = -8$. (a) Find the coordinates of the foot of the perpendicular from P(4, −2) to l. (b) Hence find the shortest distance from P to l, in exact form.	
5 The points A, B and C have coordinates (4, 0, 0), (5, 3, 2) and (−3, −1, −2). Find angle ABC, in degrees to 1 d.p.	

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6 A 1500 kg car has engine power 80 kW and constant resistance 500 N. Find (a) its greatest steady speed on a horizontal road, (b) its acceleration at 12 m s^{-1} up a hill where $\sin\alpha = \frac{1}{20}$. Take g = 10. Give answers to 3 s.f. if not exact.	
7 Find the coefficient of x^3 in the expansion of $(2x^3 - \frac{3}{x^2})^6$.	
8 The random variable X has pdf $f(x) = \frac{3}{216}x^2$ for $0 \leq x \leq 6$, and 0 otherwise. (a) Find the cumulative distribution function F(x) for $0 \leq x \leq 6$. (b) Find P(X > 3). (c) Find the median of X to 3 s.f.	
9 A 3 kg particle is in equilibrium on a rough plane inclined at α, $\tan\alpha = \frac{8}{15}$, $\mu = \frac{1}{3}$. A horizontal force of P N, in the vertical plane through a line of greatest slope, pushes it towards the plane. Find the least and greatest values of P. Take g = 9.8. Give answers to 3 s.f. if not exact.	
10 X ~ Po(16). Use a suitable approximation to find $P(X \geq 12)$, to 3 significant figures.	