Day 252	A Level Maths: A Tier 10-a-day
1 A curve has parametric equations $x = 3 + 5\cos\theta$, $y = -4 + 5\sin\theta$. Find its Cartesian equation and describe the curve.	
2 A is acute and B is obtuse, with $\sin A = \frac{5}{13}$ and $\cos B = -\frac{24}{25}$. Find the exact values of $\sin(A+B)$ and $\tan(A-B)$.	
3 For 25 values of x, $\Sigma(x - 20) = 100$ and $\Sigma(x - 20)^2 = 500$. Find the mean and standard deviation of x.	
4 For small θ (in radians), use the small angle approximations to find the value that $\frac{\sin 3\theta \tan 4\theta}{1 - \cos 4\theta}$ approaches as $\theta \to 0$.	
5 The line $5x + 12y = k$ is a tangent to the circle $(x - 1)^2 + (y - 2)^2 = 4$. Find the two possible values of k.	

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6 X ~ B(24, 0.25). Find the largest value of c such that P(X ≤ c) < 0.01.	
7 A circle touches both coordinate axes and passes through the point (12, −6). Its centre lies in the fourth quadrant. Find the equations of the two possible circles.	
8 A 15 kg box is pulled from rest along rough horizontal ground by a horizontal force of 44.25 N and moves 25 m in 10 s. Find (a) the coefficient of friction. The force is then removed; (b) find the further distance moved. Take g = 9.8. Give answers to 3 s.f. if not exact.	
9 Solve $4\sec^2\theta + 6\tan\theta - 8 = 0$ for $0° \leq \theta \leq 360°$. Give answers to 1 d.p.	
10 A uniform rod AB (12 kg, 4 m) is smoothly hinged at A to a vertical wall, with a 2 kg particle at B. A light string from B to the wall above A holds the rod horizontal, at angle θ to it, $\tan\theta = \frac{3}{4}$. Find (a) the tension, (b) the magnitude of the hinge force. Take g = 9.8. Give answers to 3 s.f. if not exact.	