Day 131	A Level Maths: A Tier 10-a-day
1 The curve y = f(x) has a maximum point at (−4, −5). Find the coordinates of the corresponding point on: (a) y = f(2x) (b) y = f(x − 3) (c) y = 3f(x)	
2 A is acute and B is obtuse, with sin A = $\frac{12}{13}$ and cos B = $-\frac{5}{13}$. Find the exact values of tan(A+B) and cos(A+B).	
3 For 25 values of x, Σ(x − 20) = 100 and Σ(x − 20)^2 = 625. Find the mean and standard deviation of x.	
4 A circle has equation $x^2 + y^2 - 8x + 8y + 3 = 0$. (a) Find the centre and radius of the circle. (b) Determine whether P(3, 1) lies inside or outside the circle.	
5 A ball is projected horizontally at 15 m s^{-1} from a point 19.6 m above horizontal ground. Find (a) the horizontal distance to the landing point, (b) the speed and direction (angle below the horizontal, 1 d.p.) on landing. Take g = 9.8. Give answers to 3 s.f. if not exact.	

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6 (a) Express $21 \sin x + 20 \cos x$ in the form $R \sin(x + \alpha)$, where $R > 0$ and $0° < \alpha < 90°$. Give α to 1 d.p. (b) Solve $21 \sin x + 20 \cos x = 14$ for $0° \leq x < 360°$, giving answers to 1 d.p.	
7 Solve $x(\sqrt{3} - 3) = -3 - 3\sqrt{3}$, writing x in the form $p + q\sqrt{3}$.	
8 A ball is projected from the ground at 20 m s^{-1} at angle α above the horizontal, $\tan \alpha = \frac{12}{5}$. At time T s, while in flight, it is moving perpendicular to its initial direction. Find (a) T, (b) the height of the ball then. Take $g = 9.8$. Give answers to 3 s.f. if not exact.	
9 $g(\theta) = \frac{1}{36 + 20 \sin \theta + 21 \cos \theta}$ (a) Write $20 \sin \theta + 21 \cos \theta$ in the form $R \sin(\theta + \alpha)$, with α acute. (b) Find the greatest and least values of $g(\theta)$ and the smallest positive θ at which the greatest value occurs (1 d.p.).	
10 $X \sim B(37, p)$. H_0: $p = 0.3$ is tested against H_1: $p < 0.3$ using a 5% significance level. (a) Find the critical region. (b) State the probability of a Type I error. (c) Find the probability of a Type II error when $p = 0.15$ (3 s.f.).	