Day 344	A Level Maths: S Tier 10-a-day
1 A binomial random variable X has mean 12 and variance 9. (a) Find n and p. (b) Find P(X = 13), correct to 3 significant figures.	
2 A(−3, 5) and B(0, −4). The point C lies on the x-axis and CA = CB. Find the coordinates of C and the area of triangle ABC.	
3 A particle P moves with constant acceleration. At t = 0 seconds P is at $(4\mathbf{i} + 3\mathbf{j})$ m with velocity $(11\mathbf{i} + 5\mathbf{j})$ m s^{-1}. At t = 6, P has velocity $(-13\mathbf{i} - 19\mathbf{j})$ m s^{-1}. Find (a) the acceleration of P, (b) the time at which P moves parallel to $(\mathbf{i} - \mathbf{j})$, (c) the position vector of P at that time.	
4 Solve $\sec^2\theta + 5\tan\theta + 5 = 0$ for $0 \leq \theta < 360°$, giving answers to 1 d.p.	
5 Find the set of values of x for which both $x^2 - 3x - 28 \geq 0$ and $2x - 1 \geq 1$.	

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6 A curve has parametric equations $x = 2\cos t$, $y = 6\sin t$.
Find a cartesian equation of the curve, with no fractions.

7 $g(x) = \sqrt{-x^2 - x + 6}$.
Find the largest possible domain of g, and the corresponding range.

8 The points A, B, C have coordinates $(4, 4, -2)$, $(1, -2, -2)$, $(2, -3, -2)$.
Find angle ABC to 1 d.p., and the exact area of triangle ABC.

9 A test of H_0: $p = 0.5$ against H_1: $p < 0.5$ uses a sample of 30 at the 1% level.
(a) Find the critical region for X, the number of successes.
(b) Find the actual significance level.
(c) Find P(Type II error) when in fact $p = 0.35$.

10 A uniform rod AB (4 m, 80 N) is hinged at A to a vertical wall and held horizontal by a string BC, C on the wall above A, with $\tan\alpha = \frac{5}{12}$, where α is the angle between string and rod. A 20 N particle hangs at P, AP = 3 m.
Find (a) the tension, (b) the magnitude and direction of the hinge force (3 s.f. and 1 d.p.).

