Day 256	A Level Maths: S Tier 10-a-day
1 Solve $\sin(3\theta - 45°) = \frac{1}{2}$ for $-180° \leq \theta \leq 180°$.	
2 A binomial random variable X has mean 21 and variance 8.4. (a) Find n and p. (b) Find P(X = 21), correct to 3 significant figures.	
3 Solve $\sec^2\theta - \tan\theta - 3 = 0$ for $0 \leq \theta < 360°$, giving answers to 1 d.p.	
4 A ball is projected horizontally at 39.2 m s^{-1} from the top of a vertical cliff of height 44.1 m, and lands on horizontal ground. Find (a) the time of flight and the distance from the cliff, (b) the speed and direction on landing. Take g = 9.8 m s^{-2}.	
5 For 50 observations x, $\Sigma(x - 40) = 100$ and $\Sigma(x - 40)^2 = 1200$. (a) Find the mean of x. (b) Find the standard deviation of x. (c) Find the value of Σx^2.	

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6 A particle P moves in a plane. At time t seconds its position vector relative to a fixed origin O is r metres, where $\mathbf{r} = (0.5t^2 - 2t)\mathbf{i} + (t^2 - 9t)\mathbf{j}$. Find (a) the value of t at which P is moving parallel to $(2\mathbf{i} - \mathbf{j})$, (b) the speed of P at this time (3 s.f. if not exact).	
7 Solve $\lvert 4x + 6\rvert < -x + 6$.	
8 Find the binomial expansion of $(8 - 2x)^{\frac{1}{3}}$ in ascending powers of x up to and including the term in x^3. State the values of x for which it is valid.	
9 The curve C has equation $x^2 - xy + 3y^2 = 44$. Find the coordinates of the points on C where the tangent is parallel to the x-axis.	
10 Solve $\frac{-4x + 1}{x - 6} < -3$.	