Day 140	A Level Maths: B Tier 10-a-day
1 X ~ B(25, p). H_0: p = 0.1 is to be tested against H_1: p > 0.1 at the 10% significance level. Find the critical region and the actual significance level.	
2 Simplify $\frac{(4x^3)^3 \times 4x}{4x^8}$.	
3 A sector of a circle has radius 7 cm and arc length 4.9 cm. Find (a) the angle of the sector in radians, (b) the area of the sector.	
4 A circle passes through A(7, 11) and B(2, 14), and its centre lies on the y-axis. Find the centre and the equation of the circle.	
5 A cup of tea cools in a room at 15°C: $\frac{dT}{dt} = -k(T - 15)$. Initially T = 95 and after 8 minutes T = 45. Find k to 3 s.f. and the time to cool to 25°C, to 3 s.f.	

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6 The curve $y = 3x^2 + 6x - 2$ and the line $y = -6x - 2$ meet at the points A and B. Find the coordinates of A and B.	
7 A stone is projected horizontally at 196 m s^{-1} from a point high above the ground. Take g = 9.8 m s^{-2}. Find the speed and the direction of motion 48 s later, to 1 d.p. below the horizontal.	
8 The continuous random variable X has pdf f(x) = $\frac{2x}{64}$ for $0 \leq x \leq 8$, and 0 otherwise. (a) Find P(X > 2). (b) Find the median of X, to 3 significant figures.	
9 A model car moves in a straight line. At time t seconds its acceleration is 4t + 1 m s^{-2}. When t = 0 the velocity is -2 m s^{-1}. Find the velocity when t = 5.	
10 For small θ (in radians), use $\sin\theta \approx \theta$ and $\cos\theta \approx 1 - \frac{\theta^2}{2}$ to find the value of $\lim_{\theta \to 0} \frac{1 - \cos 3\theta}{\theta \sin 4\theta}$.	