Day 287	A Level Maths: B Tier 10-a-day
1 Given that $y = (2x + 6)^3$, find $\frac{dy}{dx}$, and the gradient of the curve when $x = -1$.	
2 A summary of the times, t minutes, taken by 7 people to complete a puzzle gives $\Sigma t = 193$ and $\Sigma t^2 = 6583$. Find the mean and the standard deviation (3 s.f.).	
3 A sector of a circle has radius 15 cm and angle 72°. Find the perimeter of the sector, in terms of π.	
4 The points A, B and C are (1, 3), (−2, 4) and (−1, 7). (a) Show that angle ABC = 90°. (b) Find the area of triangle ABC.	
5 A uniform rod AB of length 3 m and mass 18 kg is hinged at A and held horizontal by a light string attached at B. The string makes an angle θ with the rod, where $\sin\theta = \frac{4}{5}$. Take $g = 9.8$ m s^{-2}. Find the tension in the string.	

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6 The continuous random variable X has pdf f(x) = $\frac{2x}{100}$ for $0 \leq x \leq 10$, and 0 otherwise. (a) Find P(X > 6). (b) Find the median of X, to 3 significant figures.	
7 A particle moves in a straight line. At time t s its velocity is $v = 8t - 2t^2$ m s^{-1}, for $t \geq 0$. Find the maximum speed of the particle and the time at which it occurs.	
8 Given that $y = \frac{3x^2 + 5}{x + 5}$, find $\frac{dy}{dx}$, and its value when x = 0.	
9 The line $y = -x - 10$ meets the circle $(x + 1)^2 + y^2 = 65$ at the points A and B. Find the coordinates of A and B, and the exact length of the chord AB.	
10 Statement: "$n^2 + n$ is a multiple of 9 for every positive integer n." Find a counter-example.	