Day 301	A Level Maths: B Tier 10-a-day
1 Find (a) $\int 6 \sin 5x \, dx$, (b) the exact value of $\int_0^{\frac{\pi}{10}} 6 \sin 5x \, dx$.	
2 A is the point $(3, -5)$ and B is the point $(6, 4)$. Find the perpendicular bisector of AB as $ax + by + c = 0$, with integer a, b, c.	
3 The length X cm of a metal rod is normal with mean 100, s.d. 3. Find, to 3 s.f., the probability a value is (a) less than 104.5, (b) between 104.5 and 106.	
4 A sequence is defined by $u_{n+1} = k u_n + 2$, $u_1 = 2$. Given that $u_3 = 2$, find the possible values of k.	
5 Particles A (6 kg) and B (10 kg) are joined by a light string over a smooth pulley. Both are held with the string taut, B is 2.5 m above the ground, then released. Take $g = 9.8$ m s^{-2}. Find the speed with which B hits the ground.	

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6 Given that $24\cos\theta + 7\sin\theta \equiv 25\cos(\theta - 16.3°)$,
find the greatest value of
$\frac{1}{(28 + 24\cos\theta + 7\sin\theta)}$.

7 Bottle volumes are normal, s.d. 8 ml. Set mean 250 ml; 36 bottles have mean 252.7 ml.
Test at the 5% level whether the true mean is greater than 250.

8 A curve has equation $2x^2y + 2xy + 3y^3 = -81$.
Find $\frac{dy}{dx}$ in terms of x and y, and the gradient at $(0, -3)$.

9 A circle passes through A(7, 2) and B(5, 8), and its centre lies on the y-axis. Find the centre and the equation of the circle.

10 The diagram shows the speed-time graph of a train between two stations.
Find (a) the acceleration in the first 10 s, (b) the distance between the stations.

