Day 217	A Level Maths: B Tier 10-a-day
1 Given that $\sin\theta = \frac{24}{25}$ and $90° < \theta < 180°$, find the exact value of $\tan 2\theta$.	
2 Expand and simplify $(-2 - 3\sqrt{7})(-3 + 3\sqrt{7})$, giving your answer in the form $a + b\sqrt{7}$.	
3 Marks are normal: Maths $N(55, 10^2)$, Physics $N(40, 8^2)$. Anna scores 75 in Maths and 46 in Physics. Which is her better performance, relatively?	
4 A car of mass 1000 kg moves along a horizontal road. The engine works at a constant rate of 30 kW. The resistance to motion is constant at 1000 N. Find the acceleration when the speed is 12 m s^{-1}.	
5 Given that $3\cos\theta + 4\sin\theta \equiv 5\cos(\theta - 53.1°)$, solve $3\cos\theta + 4\sin\theta = 2.5$ for $0 \leq \theta \leq 360°$. (1 d.p.)	

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6 Prove, by exhaustion, that a square number cannot be written in the form $7k + 3$, where k is an integer.	
7 A cup of tea cools in a room at 20°C: $\frac{dT}{dt} = -k(T - 20)$. Initially $T = 80$ and after 8 minutes $T = 45$. Find k to 3 s.f. and the time to cool to 30°C, to 3 s.f.	
8 Given that each trap catches a rabbit independently with probability 0.05, find the least number of traps needed for the probability of at least one success to exceed 0.999.	
9 Solve $\|2x + 3\| > 1$.	
10 Particles A (1 kg) and B (3 kg) are joined by a light string over a smooth pulley. Both are held with the string taut, B is 1.25 m above the ground, then released. Take $g = 9.8$ m s^{-2}. Find the speed with which B hits the ground.	