Day 133	A Level Maths: S Tier 10-a-day
1 A particle P moves on a straight line. At time t = 0, P passes through the fixed point O with velocity -96 m s^{-1}. At time t seconds, P has acceleration $(-6t + 44)$ m s^{-2}. Find (a) the times at which P is at O again, (b) the greatest distance of P from O before it first returns to O.	
2 Solve $\cos 2\theta - 3\cos\theta + 2 = 0$ for $0 \leq \theta < 360°$.	
3 The fill volume of a bottle is N(μ, 36) with known variance 36. The mean was claimed to be 54 ml. A random sample of 49 has mean 56.5. Test at the 5% level whether the mean is less than 54.	
4 Find the exact value of $\sin(\sin^{-1}(\frac{24}{25}) + \cos^{-1}(\frac{21}{29}))$.	
5 Prove by contradiction that $\sqrt{17}$ is irrational.	

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6 $X \sim B(12, p)$. It is given that $P(X = 2) = \frac{11}{3} \times P(X = 1)$. (a) Find the value of p. (b) Find $P(X = 0)$, correct to 3 significant figures.	
7 Use the trapezium rule with 8 strips to estimate $\int_1^3 \frac{1}{1 + x^2}\, dx$, to 4 s.f. Is it an overestimate or an underestimate? Explain.	
8 Given that $\sum_{r=1}^{n}(5r - 1) = 1030$, find n.	
9 A ball is projected from a point O on horizontal ground at 22 m s^{-1}, at angle θ above the horizontal. It passes through the point P, 22 m horizontally and 17 m vertically from O. Find the two possible values of $\tan\theta$, and the two possible values of θ to 1 d.p. Take g = 9.8 m s^{-2}.	
10 Find the sum of all the integers from 1 to 773 inclusive that are divisible by 2 or by 9, but not by both.	