Day 105	A Level Maths: A Tier 10-a-day
1 A cyclist passes P with speed 7 m s^{-1} and accelerates uniformly. She travels 300 m in the next 20 s, reaching Q. Find (a) her acceleration, (b) her speed at Q, (c) her speed at the midpoint of PQ.	
2 Solve $5^{x+2} = 25^{2x-3}$.	
3 P(A) = 0.6, P(B) = 0.2 and P(A ∩ B) = 0.05. Find (a) P(A ∪ B) (b) P(B′ | A′) (c) P(A | B)	
4 The line $y = -2x + 1$ meets the curve $y = x^2 - 4x - 14$ at A and B. (a) Find the coordinates of A and B. (b) Find the exact length AB.	
5 Solve $\log_2(x + 7) + \log_2(x - 8) = 4$.	

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6 Ball A is dropped from rest 49 m above the ground. At the same instant ball B is projected upwards at 24.5 m s^{-1} from the ground directly below A. Find (a) the time when they collide, (b) the height of the collision. Take g = 9.8.	
7 A car costs £18000 new. Its value falls by 10% each year, so after t years its value is £V. (a) Write down V in terms of t. (b) Find, to 3 s.f., the time when the value is £6000.	
8 Eggs are defective with probability 0.1, independently. A tray of 9 eggs is rejected if it has at least 3 defective. From 12 such trays, find the probability that exactly 3 are rejected (3 s.f.).	
9 A curve has equation $x^2 - xy + 3y^2 = 11$. Find the coordinates of the points where the tangent is parallel to the x-axis.	
10 (a) Expand $(1 - 2x)^{\frac{1}{2}}$ in ascending powers of x up to x^2. (b) Use x = 0.01 to estimate $\sqrt{98}$ to 4 decimal places.	