Day 287	A Level Maths: A Tier 10-a-day
1 A company employs 440 people: 160 Sales, 220 Admin and 60 Production. A stratified sample of size 22 is taken. Find the number of people sampled from each group.	
2 Solve $\log_3(x + 4) + \log_3(x - 2) = 3$.	
3 Find the value of $\sum_{r=1}^{6} 6 \times 3^r$.	
4 A cyclist passes P with speed 6 m s^{-1} and accelerates uniformly. She travels 100 m in the next 10 s, reaching Q. Find (a) her acceleration, (b) her speed at Q, (c) her speed at the midpoint of PQ. Give answers to 3 s.f. if not exact.	
5 A bag has 5 red and 7 blue counters. Two are taken at random without replacement. Given that the counters are the same colour, find the probability they are both red.	

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6 A particle moves on the x-axis. At time t s its acceleration is $(12t - 36)$ m s^{-2}. When t = 0 it is at O with velocity -7 m s^{-1}. Find (a) its velocity when the acceleration is zero, (b) its displacement from O then.	
7 Solve the differential equation $x\frac{dy}{dx} = 3y$, given that y = 5 when x = 1 (x > 0, y > 0). Give y in terms of x.	
8 Expand $(2 + x)^{-2}$ in ascending powers of x, up to and including x^2. State the range of x for which the expansion is valid.	
9 Find the coefficient of x^4 in the expansion of $(1 - 3x)(2 - 2x)^6$.	
10 Water pours into a cone, vertex down, at 30 $cm^3 s^{-1}$. The surface radius is always $\frac{h}{3}$. Find the rate at which the depth is rising when h = 10 cm.	