Day 52	A Level Maths: A Tier 10-a-day
1 A stratified sample of 40 members is taken from three groups. 6 of the sample are from Bronze, which has 48 members. (a) Find the total number of members. (b) Silver has 112 members. How many are sampled?	
2 Solve $\log_2(x + 7) + \log_2(x - 7) = 5$.	
3 X ~ B(17, 0.25). Find, to 3 significant figures: (a) P(X = 7) (b) P(X ≥ 7) (c) P(X ≤ 6)	
4 A sector of a circle has arc length 4.2 cm and area 14.7 cm^2. Find the radius of the circle and the angle of the sector, in radians.	
5 A curve has parametric equations $x = 3t^2 - 5$, $y = 2t(t^2 - 1)$. Find the coordinates of the points where the curve meets the x-axis.	

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6 A 5 kg particle moves on a smooth horizontal line. At time t s a single force of $(15 - 3t)$ N acts along the line. When t = 0 its speed is 1 m s^{-1}. Find (a) its speed when t = 8, (b) its greatest speed.	
7 A curve has parametric equations $x = t + \frac{1}{t}$, $y = t - \frac{1}{t}$. Find $\frac{dy}{dx}$ in terms of t, and the equation of the normal at the point where t = 3, in the form ax + by + c = 0 (integers).	
8 $f(x) = x^3 + ax^2 + bx + 48$, where a and b are constants. $(x - 4)$ is a factor of f(x). The remainder when f(x) is divided by $(x + 1)$ is 60. (a) Find a and b. (b) Solve f(x) = 0.	
9 Given that $\sum_{r=1}^{n} (r - 2) = 119$, find the value of n.	
10 A 1000 kg car tows a 300 kg trailer by a light tow-bar on a horizontal road. Driving force 610 N; resistances 200 N (car), 150 N (trailer). Find (a) the acceleration and the tow-bar tension. At 15 m s^{-1} the tow-bar breaks. (b) How far does the trailer then travel?	