Day 191	A Level Maths: S Tier 10-a-day
1 A data set has lower quartile 12 and upper quartile 21. An outlier is a value more than 2 × IQR beyond the nearest quartile. (a) Find the range of values that are not outliers. (b) 8 observations have mean 20. The largest is 49, an outlier, and it is removed. Find the new mean.	
2 A(12, 8) and B(6, 10). The point C lies on the x-axis and CA = CB. Find the coordinates of C and the area of triangle ABC.	
3 Solve $\log_2(x + 3) + \log_2(x - 1) = 5$, justifying clearly any root that you reject.	
4 The mass of a apple is N(88, 5^2) g. A apple is 'heavy' if it exceeds 91. (a) Find the probability that a apple is heavy. (b) 18 apples are chosen at random. Find the probability that at least 3 are heavy.	
5 A ball is projected from a point O on horizontal ground at 35 m s^{-1}, at angle θ above the horizontal. It passes through the point P, 93 m horizontally and 6 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}.	

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6 A chord AB of a circle, centre O and radius 12 cm, subtends an angle of $\frac{\pi}{3}$ at O. Find the exact area and the exact perimeter of the minor segment cut off by AB.	
7 The first row of a theatre has 14 seats. Each row has 3 more seats than the row in front. Find (a) the number of seats in row 52, (b) the least number of rows for at least 1789 seats.	
8 A non-uniform rod AB of length 5 m and mass 4 kg rests on supports at C and D, where AC = 2 m and AD = 4 m, with R_C = $\frac{2}{3}$ R_D. Find (a) the distance of the centre of mass from A. A particle of mass m kg at B puts the rod on the point of tilting about D. (b) Find m.	
9 The curve C has equation $x^2 - 2xy + 2y^2 = 72$. Find the coordinates of the points on C where the tangent is parallel to the y-axis.	
10 A circle passes through A(−6, −7), B(−8, −5) and C(10, 1). Find its equation.	