Day 299	A Level Maths: B Tier 10-a-day
1 The vector $\mathbf{a} = \begin{pmatrix} 4 \\ 12 \\ 3 \end{pmatrix}$. Find $\lvert\mathbf{a}\rvert$ and a unit vector in the direction of a.	
2 A bag has 5 red and 7 blue counters; two are taken without replacement. (a) Find P(exactly one red). (b) Find P(at least one red).	
3 Use the trapezium rule with 5 strips to estimate $\int_0^1 \frac{1}{\sqrt{1+x^3}}\,dx$, giving your answer to 3 significant figures.	
4 The points A, B and C are $(-4, -5)$, $(-3, -1)$ and $(-7, 0)$. (a) Show that angle ABC = 90°. (b) Find the area of triangle ABC.	
5 A ball is projected horizontally at 156.8 m s^{-1} from a point high above the ground. Take g = 9.8 m s^{-2}. Find the speed and the direction of motion 12 s later, to 1 d.p. below the horizontal.	

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6 A geometric series has second term 128 and fifth term 2. Find (a) the common ratio, (b) the first term, (c) the sum to infinity.	
7 A class of width 10, frequency 12, is a bar 5 cm wide, 4.8 cm tall. (a) Find the bar height for width 30, frequency 12. (b) Find the frequency of a 3 cm by 2 cm bar.	
8 The line $y = 7x - 11$ meets the circle $(x + 2)^2 + y^2 = 25$ at the points A and B. Find the coordinates of A and B, and the exact length of the chord AB.	
9 Solve $3\sin^2 x - 2\cos x - 2 = 0$ for $0 \leq x \leq 360°$, giving answers to 1 d.p. where necessary.	
10 A block of mass 4 kg is released from rest on a rough plane inclined at angle α to the horizontal, where $\tan\alpha = \frac{3}{4}$. The coefficient of friction is 0.125. Take $g = 9.8$ m s^{-2}. Find the acceleration down the plane, and the distance moved in 4 s.	