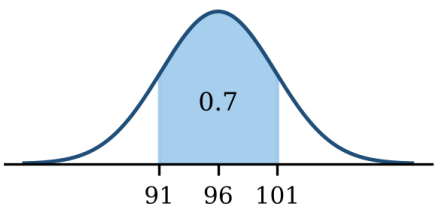
Day 93	A Level Maths: S Tier 10-a-day
1 Use integration by parts to find the exact value of $\int_0^1 xe^{3x}\,dx$	
2 Find the set of values of x for which both $x^2 - 11x + 30 \geq 0$ and $-2x - 2 \leq 2$.	
3 A school says that 30% of its pupils walk to school. 15 pupils are surveyed, and 5 walk. Test, at the 10% significance level, the claim that the proportion is higher. Give your conclusion in context.	
4 Sam claims that $n^2 + 3n + 13$ is prime for every positive integer n. Show that Sam is wrong by finding the smallest value of n that is a counter-example.	
5 The pdf of $X \sim N(96, \sigma^2)$ is shown; the shaded area is symmetrical. (a) Find σ. (b) Find $P(X > 112)$. 	

Day 93	A Level Maths: S Tier 10-a-day
6 Use the substitution $u = x^2 + 2$ to find the exact value of $\int_0^1 x(x^2 + 2)^2 \, dx$	
7 A ball is projected from a point O on horizontal ground at 45° to the horizontal. The ball just passes over the top of a vertical wall of height 15.2 m, at a horizontal distance of 25 m from O. Find (a) the speed of projection, (b) the greatest height of the ball above the ground, to 3 s.f. Take $g = 9.8$ m s^{-2}.	
8 $f(\theta) = \frac{4}{6 + 3\sin\theta + 4\cos\theta}$ (a) Write $3\sin\theta + 4\cos\theta$ as $R\sin(\theta + \alpha)$, $R > 0$, $0 < \alpha < 90°$. (b) Find the greatest and least values of $f(\theta)$, and the smallest positive θ at which the greatest value occurs, to 1 d.p.	
9 The curve C has parametric equations $x = 3t$, $y = t^2$. The line $y = -\frac{1}{3}x + 12$ meets C at A and B. Find the exact length AB.	
10 At time $t = 0$ hours, ship A is at the point with position vector $(8\mathbf{i} + 28\mathbf{j})$ km relative to a port O, and moves with constant velocity $(6\mathbf{i} - \mathbf{j})$ km h^{-1}. Ship B leaves O at $t = 0$ with constant speed 10 km h^{-1} and intercepts A. Find (a) the time at which B intercepts A, (b) the velocity of B as a vector.	