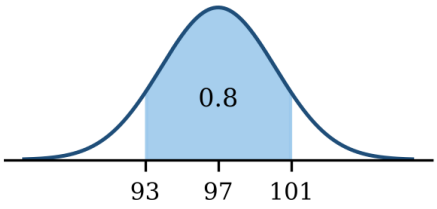
Day 123	A Level Maths: S Tier 10-a-day
1 $u_{n+1} = -\frac{1}{2}u_n + 24$, $u_1 = 10$. (a) Find the limit L of the sequence. (b) Find the least n such that $\lvert u_n - L \rvert < 0.001$.	
2 A ball is projected from a point O on horizontal ground at 21 m s^{-1}, at angle θ above the horizontal. It passes through the point P, 21 m horizontally and 16 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}.	
3 $g(x) = x^2 + 1$. Also $fg(x) = -3x^2 + 6$, where f is a linear function. (a) Find f(x). (b) Solve gf(x) = 10.	
4 Solve $e^x + 10\,e^{-x} = 7$, giving your answers exactly in terms of natural logarithms.	
5 A binomial random variable X has mean 3 and variance 2.7. (a) Find n and p. (b) Find P(X = 3), correct to 3 significant figures.	

Day 123 **A Level Maths: S Tier 10-a-day**

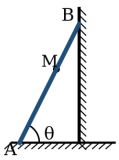
6 A curve has parametric equations $x = t^2$, $y = 2t^3 - 24t$.
Find the coordinates of the points on the curve where
the gradient is 9.

7 $f(x) = \frac{24}{2x^2 - 16x + 34}$ for all real x.
Find the greatest value of f(x), the value of x at which it occurs, and the range of f.

8 The pdf of $X \sim N(97, \sigma^2)$ is shown; the shaded area is symmetrical.
(a) Find σ. (b) Find P(X > 105).



9 A uniform ladder AB of length 6 m and weight 200 N has A on rough ground (μ = 0.6) and B against a smooth vertical wall. It makes angle θ with the ground, $\tan\theta = \frac{4}{3}$.
A man of weight 500 N climbs the ladder. How far along the ladder can he go before it slips?



10 A rectangle has its base on the x-axis and its upper vertices on
the curve $y = 12 - x^2$, symmetric about the y-axis.
Find the maximum area of the rectangle, with justification.