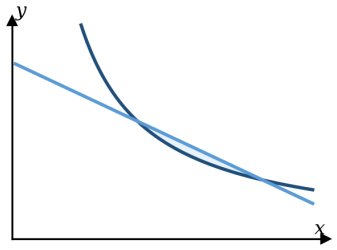
Day 62	A Level Maths: S Tier 10-a-day

1 Express $\sqrt{94 - 42\sqrt{5}}$ in the form $a - b\sqrt{5}$, where a and b are positive integers.

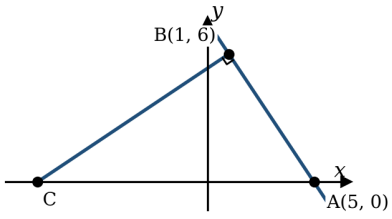
2 Each component is faulty with probability 0.02, independently.
Find the least number n of components that must be tested so that the probability of finding at least one faulty is greater than 0.999.

3 A geometric series has first term 4 and common ratio $\frac{2}{3}$.
Find the least n for which S_n exceeds 95% of the sum to infinity.

4 The diagram shows the curve $y = \frac{8}{x}$ and the line $y = 6 - x$.
Find the exact area of the shaded region enclosed by
the curve and the line.



5 In the diagram, line l_1 passes through A and B. Line l_2 is perpendicular to l_1 at B and meets the x-axis at C. Find the coordinates of C and the area of triangle ABC.



Day 62	A Level Maths: S Tier 10-a-day
6 A river is 100 m wide and flows at 30 m s^{-1}. A boatman can row at 34 m s^{-1} in still water and wants to reach the point directly opposite his starting point. Find (a) the angle to the bank at which he should head, to 1 d.p., (b) the time taken, to 3 s.f.	
7 Solve $e^x + 18\,e^{-x} = 9$, giving your answers exactly in terms of natural logarithms.	
8 Use a suitable trigonometric identity to find the exact value of $\int_0^{\pi/12} \tan^2 3x \, dx$	
9 A binomial random variable X has mean 15 and variance 10.5. (a) Find n and p. (b) Find P(X = 17), correct to 3 significant figures.	
10 A box of weight 51 N is pulled at constant speed along rough horizontal ground ($\mu = \frac{8}{15}$) by a force P N at angle θ above the horizontal. (a) Find P when $\tan\theta = \frac{15}{8}$. (b) Find the least possible value of P as θ varies, and the corresponding θ to 1 d.p.	