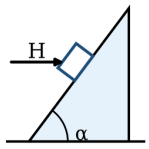
Day 37	A Level Maths: S Tier 10-a-day
1 Evaluate $\sum_{r=4}^{10}(4 \times 3^r + 2r)$.	
2 A manufacturer says that 40% of its screens have no flaws. A sample of 25 screens is checked, and 16 have no flaws. Test, at the 5% significance level, the claim that the proportion is higher. Give your conclusion in context.	
3 Solve $\log_2(x + 3) + \log_2(x - 4) = 3$, justifying clearly any root that you reject.	
4 A data set has lower quartile 33 and upper quartile 51. An outlier is a value more than 1.5 × IQR beyond the nearest quartile. (a) Find the range of values that are not outliers. (b) 8 observations have mean 38. The largest is 88, an outlier, and it is removed. Find the new mean.	
5 A stone is thrown vertically upwards with speed 7 m s^{-1} from the top of a cliff. The top of the cliff is 23.1 m above the sea. Find (a) the time taken for the stone to reach the sea, (b) the total distance travelled by the stone, to 3 s.f. Take g = 9.8 m s^{-2}.	

Day 37	A Level Maths: S Tier 10-a-day

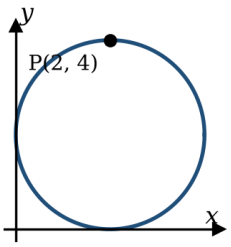
6 A is acute and B is acute. $\cos A = \frac{15}{17}$ and $\cos B = \frac{24}{25}$.
Find the exact values of $\cos(A - B)$ and $\tan(A - B)$.

7 $u_{n+1} = \frac{3}{4}u_n + \frac{3}{2}$, $u_1 = 26$.
(a) Find the limit L of the sequence.
(b) Find the least n such that $|u_n - L| < 0.01$.

8 A particle of weight 85 N rests on a rough plane inclined at α to the horizontal, where $\tan \alpha = \frac{4}{3}$ and $\mu = 0.5$.
A horizontal force H N, in the vertical plane through a line of greatest slope, holds it in equilibrium. Find the range of possible values of H.



9 The circle in the diagram touches both axes and passes through P. Find the equation of the circle, giving it in the form $x^2 + y^2 + ax + by + c = 0$.



10 Squares of side x cm are cut from the corners of a square sheet of
side 24 cm and the sides folded up to make an open box.
Find the value of x that maximises the volume, and that maximum volume.