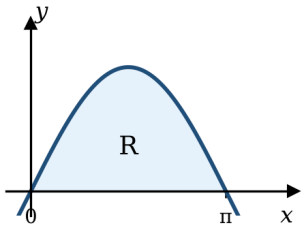
Day 4	A Level Maths: B Tier 10-a-day
1 (a) Write $\frac{-2x-4}{(x+1)(x+3)}$ in partial fractions. (b) Hence evaluate $\int_0^4 \frac{-2x-4}{(x+1)(x+3)}\,dx$, giving the answer as a single logarithm.	
2 A particle of mass 0.5 kg slides from rest down a smooth curved slope, starting 40 m above the bottom. Take $g = 9.8$ m s^{-2}. Use energy to find its speed at the bottom of the slope.	
3 P(A) = 0.25, P(B) = 0.35, P(A ∩ B) = 0.25. Find (a) P(A ∪ B), (b) P(A | B). (c) Are A and B independent?	
4 A marble is projected vertically upwards from ground level with speed 29.4 m s^{-1}. Take $g = 9.8$ m s^{-2}. Find (a) the greatest height reached, (b) the total time before it returns to the ground.	
5 Prove that $-2x^2 + 4x - 11 < 0$ for all real values of x.	

Day 4 **A Level Maths: B Tier 10-a-day**

6 The region R is bounded by the curve y = sin x, the x-axis
and the lines x = 0 and x = π.
R is rotated through 360° about the x-axis. Find the exact volume generated.



7 The time, X minutes, to complete a task is normally distributed with mean 40 and s.d. 10.
A random sample of 16 is taken. Find the probability that the mean time is more than 45 (3 s.f.).

8 Line l_1: $\mathbf{r} = \begin{pmatrix} -10 \\ -12 \\ 10 \end{pmatrix} + \lambda \begin{pmatrix} 3 \\ 3 \\ -2 \end{pmatrix}$.
Line l_2: $\mathbf{r} = \begin{pmatrix} -1 \\ -9 \\ 7 \end{pmatrix} + \mu \begin{pmatrix} 0 \\ 2 \\ -1 \end{pmatrix}$.
Show that l_1 and l_2 intersect and find the point.

9 Express $\frac{15 + 2\sqrt{5}}{\sqrt{5}}$ in the form $p + q\sqrt{5}$, where p and q are integers.

10 A geometric sequence has first term 100 and common ratio 0.5.
Find the smallest n for which the nth term is less than 1.