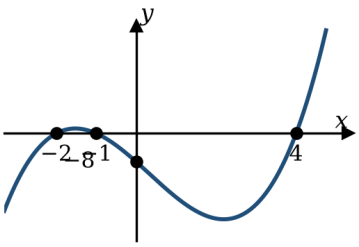
Day 357	A Level Maths: B Tier 10-a-day
1 Items numbered 1 to 168; systematic sample of size 21. (a) Find the sampling interval. (b) The first item is number 1. Find the 3-th item.	
2 A woman of mass 50 kg stands on weighing scales in a lift. The lift decelerates at 0.75 m s^{-2} while moving downwards. Take g = 9.8 m s^{-2}. Find the force exerted on the woman by the scales.	
3 Use integration by parts to find the exact value of $\int_0^1 xe^{-x}\,dx$.	
4 Faults occur at random in a cable at an average rate of 2 per hour of operation. Find the probability that in 30 minutes there are exactly 0 (3 s.f.).	
5 A particle of mass 4 kg is acted on by forces $(7\mathbf{i} + 3\mathbf{j})$ N and $\mathbf{P}$ N only. Its acceleration is $(-\mathbf{j})$ m s^{-2}. Find $\mathbf{P}$, and its magnitude to 3 significant figures.	

Day 357 **A Level Maths: B Tier 10-a-day**

6 A has position vector $\begin{pmatrix}5\\4\\5\end{pmatrix}$ and B has position vector $\begin{pmatrix}0\\-6\\0\end{pmatrix}$.

The point P lies on AB with AP : PB = 2 : 3.
Find the position vector of P.

7 The diagram shows a sketch of the curve y = f(x), where f is a cubic. The curve meets the axes at the labelled points. Find f(x) in factorised form.



8 (a) Write $\frac{2x+4}{(x+3)(x+5)}$ in partial fractions.

(b) Hence evaluate $\int_0^1 \frac{2x+4}{(x+3)(x+5)}\,dx$, giving the answer as a single logarithm.

9 The circle C has equation $(x-2)^2 + (y-4)^2 = 20$.
The point P(−2, 2) lies on C.
Find an equation of the tangent to C at P, in the form ax + by + c = 0 with integer a, b, c.

10 Prove by contradiction that there are no integers
m and n such that 4m + 6n = 147.