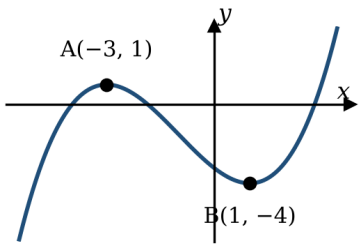
Day 346	A Level Maths: B Tier 10-a-day
1 A box of mass 8 kg rests on a rough horizontal floor, with coefficient of friction 0.5. A horizontal force of 31 N is applied to the box. Take g = 9.8 m s^{-2}. Determine whether the box moves. Find the friction force, or the acceleration if it moves.	
2 $\mathbf{a} = \begin{pmatrix} 3 \\ 0 \\ -2 \end{pmatrix}$ and $\mathbf{b} = \begin{pmatrix} -4 \\ -2 \\ 3 \end{pmatrix}$. Find the angle between a and b, to 1 d.p.	
3 Prove that $n^2 + 7n + 14$ is even for all integers n.	
4 For 11 pairs of data, $S_{xx} = 40$, $S_{yy} = 80$ and $S_{xy} = -48$. Find the PMCC (3 s.f.) and describe the correlation.	
5 A particle of mass 3 kg is acted on by forces $(7\mathbf{i} + 6\mathbf{j})$ N and $\mathbf{P}$ N only. Its acceleration is $(-2\mathbf{i} + 2\mathbf{j})$ m s^{-2}. Find $\mathbf{P}$, and its magnitude to 3 significant figures.	

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6 Find the coordinates of the stationary point of the curve $y = 4x - \ln x$,
and determine its nature.

7 The diagram shows the curve y = f(x). A and B are the turning points. Find the turning points of:
(a) y = 2f(x) (b) y = f(−x)



8 Given that $\tan\theta = \frac{3}{4}$ and θ is acute,
find the exact value of sec θ.

9 X ~ B(200, 0.2). Use a normal approximation to find P(40 ≤ X ≤ 44), to 3 significant figures.

10 A sequence is defined by $u_{n+1} = \frac{1}{1 - u_n}$, $u_1 = 4$.

(a) Show that the sequence is periodic, stating the period.

(b) Find u_{100} and $\sum_{r=1}^{100} u_r$.