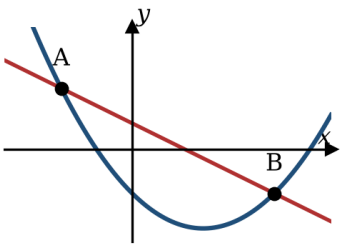
Day 338 **A Level Maths: A Tier 10-a-day**

1 A cyclist passes P with speed 4 m s^{-1} and accelerates uniformly. She travels 140 m in the next 20 s, reaching Q. Find (a) her acceleration, (b) her speed at Q, (c) her speed at the midpoint of PQ. Give answers to 3 s.f. if not exact.

2 P(A) = 0.7, P(B) = 0.6 and P(A ∩ B) = 0.35.
Find
(a) P(A ∪ B)
(b) P(B | A)
(c) P(B′ | A′)

3 Solve $2^{3x+3} = 3^{3x-3}$.
Give your answer to 3 significant figures.

4 The diagram shows the curve $y = x^2 - 4x - 5$ and the line $y = -2x + 3$, meeting at A and B.
(a) Find the coordinates of A and B.
(b) Find the coordinates of the midpoint of AB.



5 $f(x) = x^3 + 2x - 2$.
Use the Newton-Raphson method with $x_0 = 1$ to find x_1 and x_2, giving your answers to 4 d.p.

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6 Buses arrive at a stop at random at an average of 6 per hour. Find the probability that in a 45-minute period there are (a) zero events (b) at least 2. (c) Find the probability that at least one occurs in each of two separate 45-minute periods.	
7 A circle passes through A(11, 9) and B(11, −3). Its centre lies on the line $y = 2x - 3$. Find the equation of the circle.	
8 A particle P has constant acceleration $(-2\mathbf{i} - 3\mathbf{j})$ m s^{-2}. When t = 0, P is at $(2\mathbf{i} - 4\mathbf{j})$ m moving with velocity $(4\mathbf{i} - \mathbf{j})$ m s^{-1}. Find (a) when P moves parallel to $\mathbf{j}$, (b) its position vector then.	
9 Prove by contradiction that there are no integers m and n such that 6m + 15n = 97.	
10 $g(x) = \frac{1}{15 + 12 \sin x + 5 \cos x}$ (a) Write 12 sin x + 5 cos x in the form R sin(x + α), with α acute. (b) Find the greatest and least values of g(x) and the smallest positive x at which the greatest value occurs (1 d.p.).	