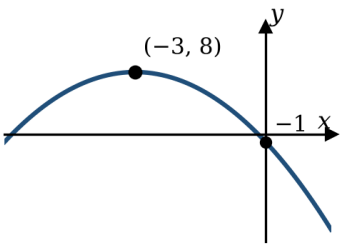
Day 265	A Level Maths: A Tier 10-a-day

1 A is acute and B is obtuse, with $\sin A = \frac{15}{17}$ and $\cos B = -\frac{4}{5}$.
Find the exact values of sin(A+B) and tan(A+B).

2 Find the coefficient of x^4 in the expansion of $(-3 - x)^8$.

3 Find the smallest positive integer n such that $(\frac{4}{5})^n < 0.01$.

4 The diagram shows the curve with equation y = f(x), where f is a quadratic.
The turning point is marked, and the curve crosses the y-axis as shown.
Find f(x), giving it in the form $ax^2 + bx + c$.



5 For small θ (in radians), use the small angle approximations to find the value that
$\frac{\cos 4\theta - \cos 3\theta}{\theta^2}$
approaches as $\theta \to 0$.

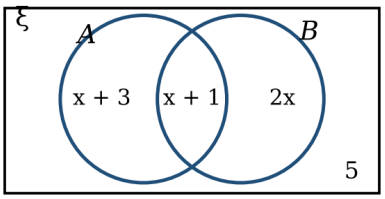
Day 265 **A Level Maths: A Tier 10-a-day**

6 A(1, −11) and B(1, 9) are the ends of a diameter of a circle.
(a) Find the equation of the circle, in the form $x^2 + y^2 + ax + by + c = 0$.
(b) Show that C(7, 7) lies on the circle.

7 Of 44 students, 12 study Maths (M), 22 Physics (P) and 19 Chemistry (C).
8 study M and P, 5 study M and C, 7 study P and C, and 3 study all three.
One student is chosen at random. Given that a student does not study Maths, find the probability that they study Physics.

8 A uniform rod AB (8 kg, 2.5 m) is smoothly hinged at A to a vertical wall, with a 6 kg particle at B. A light string from B to the wall above A holds the rod horizontal, at angle θ to it, $\tan\theta = \frac{12}{5}$. Find (a) the tension, (b) the magnitude of the hinge force. Take g = 9.8. Give answers to 3 s.f. if not exact.

9 The Venn diagram shows the numbers of 37 students in sets A and B.
(a) Find the value of x.
(b) A student in B is chosen at random. Find P(A).



10 A uniform ladder AB (13 m, 10 kg) rests with A on rough ground, $\mu = 0.3$, and B against a smooth wall, B being 5 m above the ground. A man of mass 50 kg climbs the ladder. How far along the ladder from A can he climb before it slips?