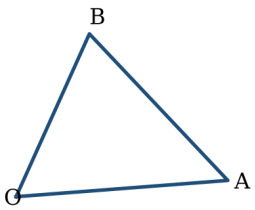
Day 69 **A Level Maths: B Tier 10-a-day**

1 Prove that $n^2 + 5n + 11$ is odd for all integers n.

2 In triangle OAB, OA = a and OB = b. M lies on AB with AM : MB = 2 : 3, and N lies on OB with ON : NB = 2 : 1.
Find OM and NM in terms of a and b.



3 A ship moves with constant velocity $(2\mathbf{i} - \mathbf{j})$ m s^{-1}. At time t = 0 its position vector relative to a fixed origin O is $(-5\mathbf{i} + 5\mathbf{j})$ m.
Find (a) its position vector when t = 2, (b) the value of t when it crosses the line through O in the direction of $\mathbf{i}$.

4 A geometric series has first term 2 and common ratio 4.
Find the smallest value of n for which the sum of the first n terms exceeds 50000.

5 A sledge of mass 4 kg is pulled across smooth horizontal ice by a rope with tension 39 N, inclined at α above the horizontal, where $\tan\alpha = \frac{4}{3}$.
Take g = 9.8 m s^{-2}.
Find (a) the acceleration of the sledge, (b) the normal reaction of the ice.

Day 69	A Level Maths: B Tier 10-a-day
6 P(B) = 0.25, P(A | B) = 0.25 and P(A) = 0.7. (a) Find $P(A \cap B)$. (b) Find P(B | A). (c) Find $P(A \cup B)$.	
7 A circle passes through A(5, −2) and B(0, 3), and its centre lies on the y-axis. Find the centre and the equation of the circle.	
8 X ~ B(120, 0.5). Use a normal approximation to find $P(57 \leq X \leq 63)$, to 3 significant figures.	
9 A closed cylinder has radius r cm and volume 432π cm^3. Show that its surface area is $S = 2\pi r^2 + \frac{864\pi}{r}$, and find the minimum S.	
10 The function $f(x) = \ln x + x - 6$. Show that f(x) = 0 has a root between x = 4 and x = 4.5.	