Day 242	A Level Maths: B Tier 10-a-day
1 A journey takes X minutes, normal with mean 170, s.d. 0.5. Find, to 3 s.f., the probability a value is (a) less than 171, (b) between 171 and 171.5.	
2 A woman of mass 50 kg stands on weighing scales in a lift. The lift decelerates at 2 m s^{-2} while moving downwards. Take g = 9.8 m s^{-2}. Find the force exerted on the woman by the scales.	
3 Prove that $n^2 + 7n + 2$ is even for all integers n.	
4 P(X = x) = kx for x = 1, 2, ..., 6. (a) Find k. (b) Find E(X) and Var(X).	
5 $f(x) = x^3 + 2x^2 + kx$. Given that $(x - 1)$ is a factor of f(x), (a) find the value of k, (b) factorise f(x) completely.	

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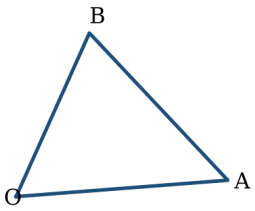
6 A sledge of mass 3 kg is pulled across smooth horizontal ice by a rope with tension 25 N, inclined at α above the horizontal, where $\tan\alpha = \frac{4}{3}$.

Take $g = 9.8\ \text{m s}^{-2}$.

Find (a) the acceleration of the sledge, (b) the normal reaction of the ice.

7 In triangle OAB, OA = a and OB = b. M lies on AB with AM : MB = 1 : 3, and N lies on OB with ON : NB = 3 : 1.

Find OM and NM in terms of a and b.



8 $f(x) = 2x^3 + px^2 + qx - 9$.

When f(x) is divided by $(x - 3)$ the remainder is 3, and when divided by $(x + 1)$ the remainder is -17. Find p and q.

9 Solve $2\cos 2x = 7\cos x$ for $0 \leq x \leq 360°$, giving answers to 1 d.p. where necessary.

10 Use integration by parts to find the exact value of

$$\int_0^2 xe^{-x}\,dx.$$