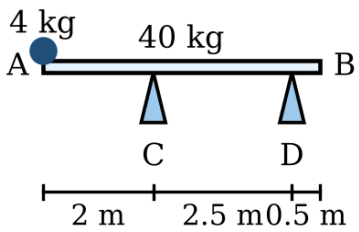
Day 222	A Level Maths: A Tier 10-a-day
1 (a) Solve $4x - 8 \leq 5$. (b) Solve $x^2 - 36 > 0$. (c) Hence find the values of x satisfying both inequalities.	
2 A cyclist passes P with speed 4 m s^{-1} and accelerates uniformly. She travels 127.5 m in the next 15 s, reaching Q. Find (a) her acceleration, (b) her speed at Q, (c) her speed at the midpoint of PQ. Give answers to 3 s.f. if not exact.	
3 $y = (\ln x)^3$ for $x > 0$. Find $\frac{dy}{dx}$ and its exact value at $x = e^2$.	
4 Expand $(2 - 3x)^{-2}$ in ascending powers of x, up to and including x^2. State the range of x for which the expansion is valid.	
5 A uniform beam AB rests on supports at C and D, with a particle attached at A. Find the reactions at C and D. Take g = 9.8. Give answers to 3 s.f. if not exact. 	

Day 222	A Level Maths: A Tier 10-a-day
6 The curve y = f(x), where $f(x) = \frac{3}{x-3} + 2$, is translated by $\begin{pmatrix} -3 \\ 1 \end{pmatrix}$. Write down the equations of the asymptotes of the new curve, and find where it crosses the x-axis.	
7 P(A) = 0.4 and P(A ∪ B) = 0.76. (a) Given that A and B are independent, find P(B). (b) Given instead that A and B are mutually exclusive, find P(B). (c) In the case in (a), find P(A′ ∩ B).	
8 A drink at 88°C is left in a room at 18°C. Its temperature θ °C satisfies $\frac{d\theta}{dt} = -k(\theta - 18)$. After 15 minutes the temperature is 58°C. Find k, then the time for it to reach 33°C, to 3 s.f.	
9 X ~ B(26, p). H_0: p = 0.5 is tested against H_1: p > 0.5 using a 5% significance level. (a) Find the critical region. (b) State the probability of a Type I error. (c) Find the probability of a Type II error when p = 0.7 (3 s.f.).	
10 θ is obtuse and $\sin\theta = \frac{8}{17}$. Find the exact values of sin 2θ, cos 2θ and tan 2θ.	