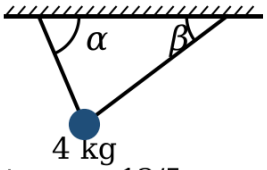
Day 246	A Level Maths: A Tier 10-a-day
1 $y = 3x - 6\sin x$ for $0 \leq x \leq 2\pi$. Find the exact coordinates of the stationary points and determine their nature.	
2 Find the quotient and the remainder when $2x^3 + 10x^2 + 8x - 15$ is divided by $(x + 3)$.	
3 A curve has equation $2x^2 + 2xy + 3y^2 = 40$. Find the coordinates of the points where the tangent is parallel to the x-axis.	
4 $P(A) = 0.7$ and $P(A \cup B) = 0.79$. (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 $P(A' \cap B)$.	
5 Solve $\|x + 7\| = 4x - 7$.	

Day 246 **A Level Maths: A Tier 10-a-day**

6 A 1500 kg car tows a 250 kg trailer by a light tow-bar on a horizontal road. Driving force 1075 N; resistances 400 N (car), 150 N (trailer). Find (a) the acceleration and the tow-bar tension. At 15 m s^{-1} the tow-bar breaks. (b) How far does the trailer then travel?

7 The probability that a biased coin lands heads is 0.08 on each independent trial.
Find the least number of trials needed so that the probability of this happening at least once is greater than 0.95.

8 A 4 kg particle hangs in equilibrium from two light strings, as shown. Find the tension in each string (T_1 in the string at angle α). Take g = 9.8. Give answers to 3 s.f. if not exact.



$\tan\alpha = 12/5$
$\tan\beta = 3/4$

9 The line l has equation $\mathbf{r} = \begin{pmatrix} -3 \\ -3 \\ -2 \end{pmatrix} + t\begin{pmatrix} 0 \\ -3 \\ 1 \end{pmatrix}$.
Find the coordinates of the foot of the perpendicular from P(−5, 0, −3) to l, and the exact distance from P to l.

10 The diagram shows the curve $y = \frac{k}{x - a} + b$ with asymptotes as shown. Find the values of k, a and b, and the coordinates where the curve crosses the axes.

