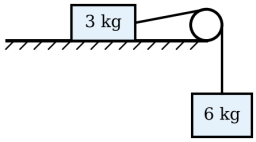
Day 267 **A Level Maths: B Tier 10-a-day**

1 A block of mass 3 kg lies on a rough horizontal table (coefficient of friction 0.2). It is joined by a light string over a smooth pulley to a particle of mass 6 kg hanging freely.
Take $g = 9.8$ m s^{-2}.
The system is released. Find the acceleration and the tension in the string.

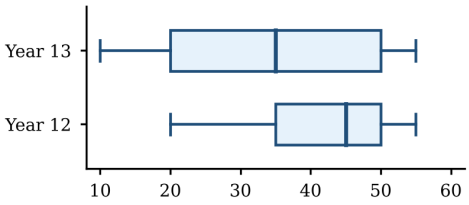


2 Prove that $n^2 + 3n + 5$ is odd for all integers n.

3 A stone is projected vertically upwards with speed 19 m s^{-1} from ground level.
Take $g = 9.8$ m s^{-2}. Find, to 3 significant figures,
(a) the greatest height reached, (b) the time of flight.

4 Find the x-coordinate(s) of the stationary point(s) of the curve $y = \frac{x}{x^2 + 3}$.

5 The box plots show the marks in a mock exam for two groups.
(a) Find the interquartile range of each group.
(b) Compare the two distributions.



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6 Line l_1: $\mathbf{r} = \begin{pmatrix} -7 \\ 4 \\ 7 \end{pmatrix} + \lambda \begin{pmatrix} -2 \\ 1 \\ 2 \end{pmatrix}$. Line l_2: $\mathbf{r} = \begin{pmatrix} -6 \\ 2 \\ 5 \end{pmatrix} + \mu \begin{pmatrix} 3 \\ 0 \\ -2 \end{pmatrix}$. Show that l_1 and l_2 intersect and find the point.	
7 The continuous random variable X has pdf f(x) = kx^4 for $0 \leq x \leq 4$, and 0 otherwise. (a) Find the value of k. (b) Find P(X > 2). (c) Find E(X).	
8 Solve $\ln(3x - 1) = 2$, giving your answer to 3 s.f.	
9 Prove by contradiction that there are no integers m and n such that 15m + 10n = 122.	
10 Evaluate $\sum_{r=1}^{7} 4 \times 2^r$.	