Day 11 **A Level Maths: B Tier 10-a-day**

1 The vector $\mathbf{a} = \begin{pmatrix} -10 \\ 2 \\ -11 \end{pmatrix}$.

Find $|\mathbf{a}|$ and a unit vector in the direction of $\mathbf{a}$.

2 A sprinter moves in a straight line with constant acceleration. Its initial speed is 16 m s^{-1}, its final speed is 46 m s^{-1} and the motion lasts 10 s.

Find the distance travelled.

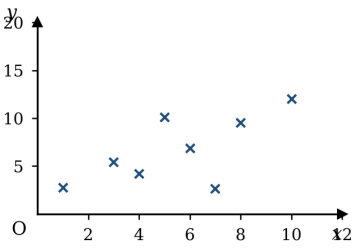
3 Statement: "The sum of two irrational numbers is always irrational."

Use the numbers $6 + \sqrt{5}$ and $4 - \sqrt{5}$ to show this is false.

4 The scatter diagram shows eight pairs of values of x and y.

(a) Describe the correlation.

(b) Why should y = 2 + x not be used for x = 15?

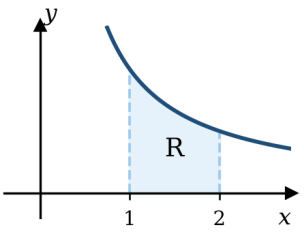


5 The region R is bounded by the curve $y = \frac{1}{x}$,

the x-axis

and the lines x = 1 and x = 2.

R is rotated through 360° about the x-axis. Find the exact volume generated.



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6 $f(x) = x^3 + 2x^2 + kx - 18$. Given that $(x + 3)$ is a factor of $f(x)$, (a) find the value of k, (b) factorise $f(x)$ completely.	
7 $X \sim B(7, 0.4)$ and $Y \sim B(12, 0.1)$ are independent. Find $P(X = 3 \text{ and } Y \leq 1)$, to 3 significant figures.	
8 A geometric series has first term 8 and common ratio 4. Find the smallest value of n for which the sum of the first n terms exceeds 500.	
9 Find (a) $\int (2x + 6)^4 \, dx$, (b) the exact value of $\int_1^2 (2x + 6)^4 \, dx$.	
10 A uniform rod AB of length 3 m and mass 10 kg hangs horizontally from two vertical strings attached 0.5 m from A and 0.5 m from B. A particle of mass 2 kg is attached 1 m from A. Take $g = 9.8 \text{ m s}^{-2}$. Find the tension in each string.	