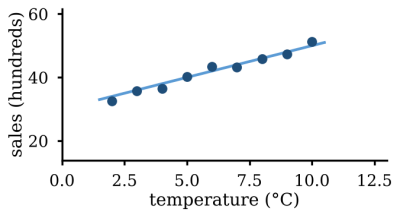
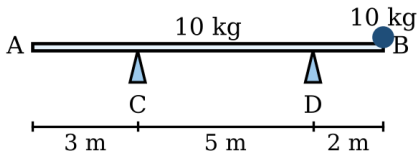
Day 291 **A Level Maths: A Tier 10-a-day**

1 A cyclist passes P with speed 6 m s^{-1} and accelerates uniformly. She travels 64 m in the next 8 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.

2 The diagram shows data and the regression line y = 30 + 2x.
(a) Interpret the gradient.
(b) Estimate y when x = 9 and comment.

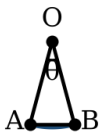


3 A uniform beam AB rests on supports at C and D, with a particle attached at B. Find the reactions at C and D. Take g = 9.8.



4 A and B have position vectors $\begin{pmatrix} 4 \\ -2 \end{pmatrix}$ and $\begin{pmatrix} 0 \\ 6 \end{pmatrix}$.
The point P lies on AB with AP : PB = 1 : 3.
Find the position vector of P and the exact distance OP.

5 Show that $\frac{1}{\sqrt{7}-1} + \frac{4}{\sqrt{7}+1}$ can be written as p + q$\sqrt{7}$, and find p and q.

Day 291	A Level Maths: A Tier 10-a-day
6 The length of a plank is N(52, 8^2). A plank is classed as 'special' if its length is less than 44. 11 planks are chosen at random. Find the probability that exactly 2 are special (3 s.f.).	
7 A salary is £20000 in year 1 and increases by 3% each year. In which year does the salary first exceed £30000?	
8 Solve $\cos 2\theta - \cos \theta = 2$ for $0 \leq \theta \leq 2\pi$.	
9 The circle has centre O and radius 12 cm. Angle AOB = $\frac{\pi}{6}$. Find the exact area of the shaded segment. 	
10 In the expansion of $(1 + kx)^n$, where n is a positive integer, the coefficient of x is -14 and the coefficient of x^2 is 84. Find n and k.	