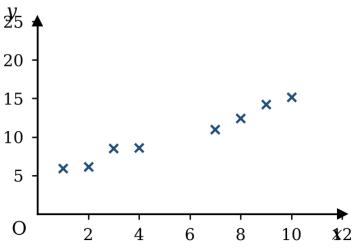
Day 343 **A Level Maths: B Tier 10-a-day**

1 A car moves in a straight line with constant acceleration. Its final speed is 47 m s^{-1}, its acceleration is 5 m s^{-2} and the motion lasts 9 s.
Find the initial speed.

2 Points A, B and C have position vectors $\begin{pmatrix} 3 \\ 2 \\ -1 \end{pmatrix}$, $\begin{pmatrix} 2 \\ 1 \\ -3 \end{pmatrix}$ and $\begin{pmatrix} 0 \\ q \\ -7 \end{pmatrix}$ respectively.
Given that A, B, C are collinear, find q.

3 The scatter diagram shows eight pairs of values of x and y.
(a) Describe the correlation.
(b) Why should y = 5 + x not be used for x = 14?

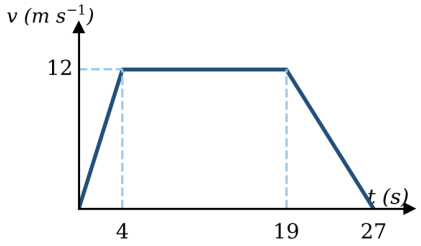


4 Solve cos 2x + 5 cos x + 3 = 0 for $0 \leq x \leq 360°$,
giving answers to 1 d.p. where necessary.

5 A circle passes through A(−3, 1) and B(0, 2), and its centre lies on the y-axis. Find the centre and the equation of the circle.

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6 The diagram shows the speed-time graph of a train between two stations.
Find (a) the acceleration in the first 4 s, (b) the distance between the stations.



7 For small θ (in radians), find an approximation of the
form $1 + p\theta + q\theta^2$ for
$\sin 4\theta + \cos 2\theta + 2\tan\theta$.

8 $X \sim B(25, p)$. H_0: $p = 0.25$ is to be tested against H_1: $p > 0.25$ at the 5% significance level.
Find the critical region and the actual significance level.

9 The line $4x - 3y = k$ is a tangent to the circle $(x + 2)^2 + (y - 1)^2 = 100$.
Find the two possible values of k.

10 Express $\frac{-6x^2 + 37x - 54}{(x - 2)(x - 4)^2}$ in partial fractions.