Day 79 **A Level Maths: B Tier 10-a-day**

1 The vector $\mathbf{a} = \begin{pmatrix} -2 \\ -6 \\ 9 \end{pmatrix}$.

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

2 Evaluate $\left(\frac{81}{16}\right)^{-\frac{1}{2}}$.

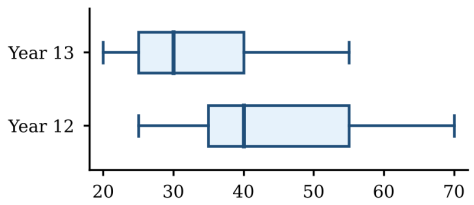
3 (a) Show that $x^2 - 3x - 4 = 0$ can be written as $x = \sqrt{3x + 4}$.

(b) Use $x_{n+1} = \sqrt{3x_n + 4}$ with $x_0 = 3$ to find x_1, x_2, x_3 to 4 d.p.

4 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.



5 Solve $|3x + 4| = |-x - 2|$.

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6 A particle moves so that at time t s its velocity is $\mathbf{v} = (3t^2 + 5)\mathbf{i} + (5t - 20)\mathbf{j}$ m s^{-1}.
Find the time when the particle is moving in the direction of $\mathbf{i}$, and its speed then.

7 (a) Write $\frac{-5x - 17}{(x + 3)(x + 4)}$ in partial fractions.

(b) Hence evaluate $\int_0^1 \frac{-5x - 17}{(x + 3)(x + 4)}\,dx$, giving the answer as a single logarithm.

8 Find the set of values of x for which
$4x + 4 \leq -3$ and $x^2 - 2x - 15 \geq 0$.

9 The random variable X is normally distributed.
P(X < 34) = 0.0228 and P(X > 58) = 0.1587.
Find the mean and standard deviation (3 s.f.).

10 A uniform beam AB of length 5 m and mass 50 kg rests horizontally on supports at C and D, where AC = 1 m and BD = 1.5 m.
A particle of mass 10 kg is placed on the beam 1.5 m from B. Take g = 9.8 m s^{-2}.
Find the reactions at C and D.

