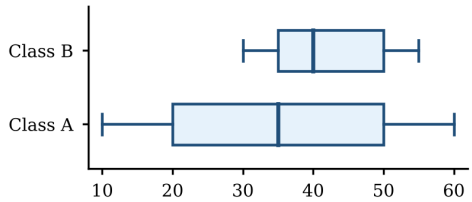
Day 310 **A Level Maths: B Tier 10-a-day**

1 A curve has parametric equations $x = -t + 3$, $y = 3t^2 + 2t + 4$, $t \in \mathbb{R}$.
Find a Cartesian equation of the curve in the form $y = f(x)$.

2 A particle moves on a straight line. Its displacement from O at time t seconds is $s = t^3 - 4t^2$ metres.
Find its velocity and acceleration when $t = 3$.

3 A has position vector $\begin{pmatrix} -4 \\ 1 \\ 5 \end{pmatrix}$ and B has position vector $\begin{pmatrix} 1 \\ -4 \\ 10 \end{pmatrix}$.
The point P lies on AB with AP : PB = 3 : 2.
Find the position vector of P.

4 The box plots show the times taken (minutes) to complete a puzzle for two groups.
(a) Find the interquartile range of each group.
(b) Compare the two distributions.



5 Solve $2^{-2x+3} = 4^{-3x+1}$.

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6 P(A) = 0.4, P(B) = 0.3, P(A ∩ B) = 0.07. Find (a) P(A ∪ B), (b) P(A | B). (c) Are A and B independent?	
7 $\mathbf{a} = \begin{pmatrix} -2 \\ 0 \\ 3 \end{pmatrix}$ and $\mathbf{b} = \begin{pmatrix} -1 \\ 3 \\ 5 \end{pmatrix}$. Find the angle between a and b, to 1 d.p.	
8 The equation $4x^2 + kx + 4 = 0$ has equal roots. Find the possible values of k.	
9 A trunk of mass 15 kg is dragged at constant speed along rough horizontal ground by a rope inclined at angle α above the horizontal, where $\cos \alpha = \frac{12}{13}$. The coefficient of friction is 0.2. Take g = 9.8 m s^{-2}. Find the tension in the rope.	
10 Solve $4 \sin^2 x - \cos x - 1 = 0$ for $0 \leq x \leq 360°$, giving answers to 1 d.p. where necessary.	