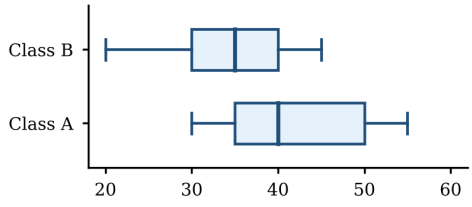
Day 20 **A Level Maths: B Tier 10-a-day**

1 The points A and B have coordinates $(-2, -6)$ and $(-4, 3)$.
(a) Find the midpoint of AB.
(b) Find the line AB as $ax + by + c = 0$, with integer a, b, c.

2 $P(A) = 0.4$, $P(B) = 0.3$, $P(A \cap B) = 0.12$.
Find (a) $P(A \cup B)$, (b) $P(A \mid B)$.
(c) Are A and B independent?

3 A car of mass 1000 kg moves along a horizontal road. The engine works at a constant rate of 48 kW. The resistance to motion is constant at 1000 N.
Find the acceleration when the speed is 15 m s^{-1}.

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 Points A, B and C have position vectors $\begin{pmatrix} 1 \\ -2 \\ -3 \end{pmatrix}$, $\begin{pmatrix} 2 \\ 0 \\ -5 \end{pmatrix}$ and $\begin{pmatrix} p \\ 2 \\ -7 \end{pmatrix}$ respectively.
Given that A, B, C are collinear, find p.

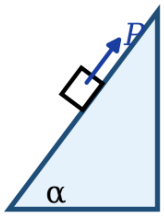
Day 20 **A Level Maths: B Tier 10-a-day**

6 Find the set of values of x for which $5x + 4 > -3$ and $x^2 - x \geq 0$.

7 (a) Show that $x^3 - 3x - 7 = 0$ can be written as $x = \sqrt[3]{3x + 7}$.
(b) Use $x_{n+1} = \sqrt[3]{3x_n + 7}$ with $x_0 = 2$ to find x_1, x_2, x_3 to 4 d.p.

8 (a) Expand $(8 - 4x)^{\frac{1}{3}}$ in ascending powers of x up to and including the term in x^3.
(b) State the range of values of x for which the expansion is valid.

9 A block of mass 5 kg is held on a rough plane ($\tan\alpha = \frac{4}{3}$, $\mu = 0.5$) by a force P N up the plane, as shown.
Take $g = 9.8$ m s^{-2}. The block is about to move down the plane. Find P.



10 A has position vector $\begin{pmatrix} 1 \\ -1 \\ -1 \end{pmatrix}$ and B has position vector $\begin{pmatrix} 1 \\ 7 \\ -1 \end{pmatrix}$.
The point P lies on AB with AP : PB = 3 : 1.
Find the position vector of P.