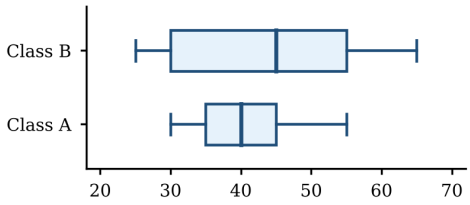
Day 361 **A Level Maths: B Tier 10-a-day**

1 The function $f(x) = x^3 - 1x - 12$.
Show that $f(x) = 0$ has a root between $x = 2$ and $x = 2.5$.

2 The points A, B and C are $(-7, 0)$, $(-3, -2)$ and $(-1, 2)$.
(a) Show that angle ABC = 90°.
(b) Find the area of triangle ABC.

3 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.



4 Two forces $(-3\mathbf{i} - 5\mathbf{j})$ N and $(7\mathbf{i} + 2\mathbf{j})$ N act on a particle of mass 5 kg.
Find the magnitude of the acceleration of the particle.

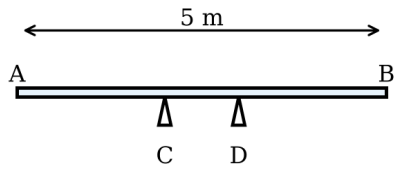
5 A fair die is rolled 7 times and the number of sixes is X.
This is done 100 times. Estimate the number of times that X = 1.

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6 Solve the simultaneous equations
$2x + y = 10$
$x^2 + y^2 = 25$

7 For small θ (in radians), use $\sin\theta \approx \theta$ and $\cos\theta \approx 1 - \frac{\theta^2}{2}$
to find the value of $\lim_{\theta \to 0} \frac{1 - \cos 4\theta}{\theta \sin \theta}$.

8 A uniform plank AB of length 5 m and mass 80 kg rests horizontally on supports at C and D, where AC = 2 m and DB = 2 m.
A girl of mass 20 kg walks from D towards B.
Find how far she is from D when the plank is about to tilt.



9 Line l_1: $\mathbf{r} = \begin{pmatrix} -1 \\ -1 \\ 0 \end{pmatrix} + \lambda \begin{pmatrix} 2 \\ 3 \\ -1 \end{pmatrix}$.
Line l_2: $\mathbf{r} = \begin{pmatrix} 1 \\ 2 \\ -1 \end{pmatrix} + \mu \begin{pmatrix} 1 \\ -2 \\ 3 \end{pmatrix}$.
Show that l_1 and l_2 intersect and find the point.

10 Solve the equation $2^{2x} - 5\times 2^x + 4 = 0$.