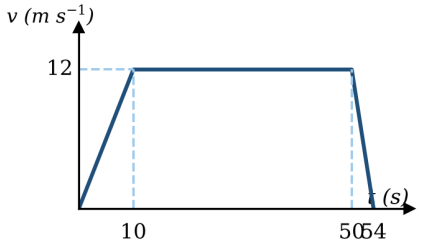
Day 151 **A Level Maths: B Tier 10-a-day**

1 The table shows the number of siblings, x, of 33 students.
Calculate the mean and standard deviation (3 s.f.).

x	2	3	4	5	6
Frequency	3	4	11	6	9

2 The diagram shows the speed-time graph of a train between two stations.
Find (a) the acceleration in the first 10 s, (b) the distance between the stations.



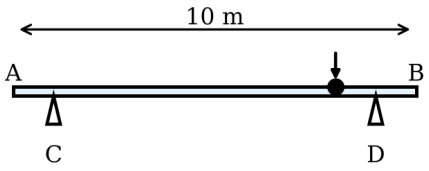
3 Statement: "If a > b then $\frac{1}{a} < \frac{1}{b}$."
Find values of a and b to show this is false.

4 The function $f(x) = x^3 - 4x - 9$.
Show that f(x) = 0 has a root between x = 2.5 and x = 3.

5 X ~ Po(6), modelling the number of calls to a helpline per minute.
Find, to 3 significant figures,
(a) $P(X \geq 7)$
(b) $P(X = 7)$

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6 A uniform beam AB of length 10 m and mass 50 kg rests horizontally on supports at C and D, where AC = 1 m and BD = 1 m.
A particle of mass 20 kg is placed on the beam 2 m from B. Take g = 9.8 m s^{-2}.
Find the reactions at C and D.



7 Given that $\cos\theta = \frac{20}{29}$ and $0 < \theta < 90°$,
find the exact value of $\sin 2\theta$.

8 A curve has parametric equations $x = -t - 3$, $y = t^2 - 3t - 2$.
The line $y = 2x + 10$ meets the curve at two points.
Find the coordinates of these points.

9 For small θ (in radians), use the small angle approximations
to find the value of $\lim_{\theta \to 0} \frac{\tan 2\theta \sin 3\theta}{1 - \cos 4\theta}$.

10 In the binomial expansion of $(1 + kx)^n$, where n is a positive integer, the coefficient of x is -4 and the coefficient of x^2 is 6.
Find the values of n and k.