Day 144 **A Level Maths: B Tier 10-a-day**

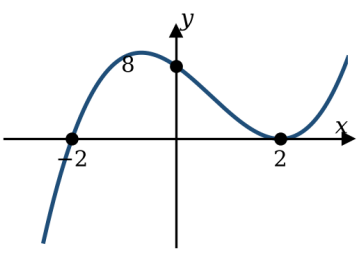
1 A survey covers 28 urban, 60 suburban and 64 rural households.
A stratified sample of size 38 is taken. Find the number selected from each group.

2 Given that $y = \sin 2x$,
find $\frac{dy}{dx}$, and the gradient of the curve when $x = \frac{\pi}{4}$.

3 A curve has equation $y = \frac{4}{x - 3} - 1$.
(a) Write down the asymptotes.
(b) Find where the curve crosses the axes.

4 R: made by machine A; L: item is faulty.
P(R) = 0.2, P(L | R) = 0.4, P(L | R') = 0.25.
(a) Find P(L).
(b) Find P(R | L).

5 The diagram shows a sketch of the curve y = f(x), where f is a cubic. The curve meets the axes at the labelled points. Find f(x) in factorised form.



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6 A ball is projected horizontally at 98 m s^{-1} from a point high above the ground.
Take g = 9.8 m s^{-2}.
Find the speed and the direction of motion 24 s later, to 1 d.p. below the horizontal.

7 Given that $\cos\theta + \sin\theta \equiv \sqrt{2}\cos(\theta - 45.0°)$, solve $\cos\theta + \sin\theta = -0.5$ for $0 \leq \theta \leq 360°$. (1 d.p.)

8 The line $3x - 4y = k$ is a tangent to the circle $(x - 1)^2 + (y + 4)^2 = 100$.
Find the two possible values of k.

9 Solve $3\cos^2 x + 2\cos x - 1 = 0$ for $0 \leq x \leq 360°$,
giving answers to 1 d.p. where necessary.

10 The diagram shows the speed-time graph of a train between two stations.
Find (a) the acceleration in the first 4 s, (b) the distance between the stations.

