| Day 219 | A Level Maths: B Tier 10-a-day |
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| **1** A school has 32 students in Year 7, 60 in Year 8 and 32 in Year 9.<br>A stratified sample of size 31 is taken. Find the number selected from each group. | |
| **2** Prove, by exhaustion, that a cube number cannot be written in the form 9k + 2, where k is an integer. | |
| **3** Solve $\sin 2x + \cos x = 0$ for $0 \leq x \leq 360°$, giving answers to 1 d.p. where necessary. | |
| **4** Simplify $\frac{(3x^2)^3 \times 3x^2}{x^2}$. | |
| **5** A trolley of mass 8 kg is moving on a smooth horizontal surface at 7 m $s^{-1}$ when a constant horizontal force of 12 N, in the direction of motion, acts for 3 s.<br>Find the speed of the trolley at the end of this time and the distance it moves. | |

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| **6** Find the set of values of x for which $4x - 1 \leq 3$ and $x^2 + 8x + 12 \geq 0$. | |
| **7** A model boat moves so that its position vector relative to O at time t s is $\mathbf{r} = (3t^2)\mathbf{i} + (t^3 - 3t)\mathbf{j}$ metres.<br>Find the velocity when t = 2, and the speed at that time. | |
| **8** The random variable X is normally distributed. P(X < 45) = 0.1587 and P(X > 57.5) = 0.0668.<br>Find the mean and standard deviation (3 s.f.). | |
| **9** For small $\theta$ (in radians), find an approximation of the<br>form $1 + p\theta + q\theta^2$ for<br>$\sin 5\theta + \cos 3\theta + 3\tan\theta$. | |
| **10** Given that $\sin A = \frac{3}{5}$ and $\cos B = \frac{8}{17}$, where A and B are acute,<br>find the exact value of sin(A + B). | |