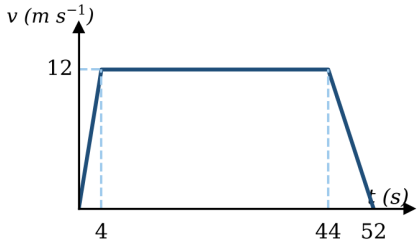
| Day 154 | A Level Maths: B Tier 10-a-day |
|---|---|
| **1** Find the exact value of $\int_1^2 (3x^3 + 1 - \frac{2}{x^2})\,dx$. | |
| **2** Prove that $n^2 + n + 11$ is odd for all integers n. | |
| **3** The diagram shows the speed-time graph of a train between two stations. Find (a) the acceleration in the first 4 s, (b) the distance between the stations.   | |
| **4** (a) Write $3x^2 - 6x + 1$ in the form $a(x + p)^2 + q$. (b) Write down the coordinates of the minimum point of $y = 3x^2 - 6x + 1$. | |
| **5** Use integration by parts to find the exact value of $\int_0^{\frac{\pi}{6}} x \cos 3x\,dx$. | |

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|---|---|
| **6** A sequence is defined by $u_{n+1} = \frac{1}{1 - u_n}$, $u_1 = 3$.<br>(a) Show that the sequence is periodic, stating the period.<br>(b) Find $u_{40}$ and $\sum_{r=1}^{40} u_r$. | |
| **7** Packet masses are normal, s.d. 8 g. Claimed mean 50 g; 25 packets have mean 53.4 g. Test at the 5% level whether the true mean is greater than 50. | |
| **8** Solve $5\cos^2 x - \sin x - 5 = 0$ for $0 \leq x \leq 360°$, giving answers to 1 d.p. where necessary. | |
| **9** A battery lasts X hours, normal with mean 60, s.d. 4.<br>Find k (3 s.f.): (a) $P(X < k) = 0.05$,<br>(b) $P(X > k) = 0.1$. | |
| **10** Two forces $(4\mathbf{i} + 5\mathbf{j})$ N and $(8\mathbf{i})$ N act on a particle of mass 2 kg.<br>Find the magnitude of the acceleration of the particle. | |