| Day 291 | A Level Maths: B Tier 10-a-day |
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| **1** Evaluate $\sum_{r=1}^{10}(6r + 5)$. | |
| **2** A boat moves with constant velocity $(-24\mathbf{i} - 32\mathbf{j})$ m s$^{-1}$, where $\mathbf{i}$ and $\mathbf{j}$ are unit vectors east and north.<br>Find its speed and the acute angle its direction makes with $\mathbf{i}$, to 1 d.p. | |
| **3** Faults occur at random in a cable at an average rate of 0.5 per hour of operation.<br>Find the probability that in 45 minutes there are at least 1 (3 s.f.). | |
| **4** A particle moves in a straight line. At time t seconds its velocity is $v = 4t^2 - 4t + 6$ m s$^{-1}$.<br>Find the distance moved between t = 1 and t = 4. (The particle does not change direction.) | |
| **5** Solve $\frac{dy}{dx} = 2xy$, given that y = 2 when x = 0.<br>Give y in terms of x. | |

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| **6** $f(x) = \frac{-4x + 3}{x + 5}$ for $x \in \mathbb{R}$, $x \neq -5$.<br>(a) Find $f^{-1}(x)$.<br>(b) State the domain of $f^{-1}$. | |
| **7** A bag has 9 white and 6 black sweets; two are taken without replacement.<br>(a) Find P(same colour).<br>(b) Given they are the same colour, find P(both white). | |
| **8** Solve $(x + 5)(x + 2)(x + 1) > 0$. | |
| **9** Given that $24 \cos \theta + 7 \sin \theta \equiv 25 \cos(\theta - 16.3°)$,<br>solve $24 \cos \theta + 7 \sin \theta = 1$ for $0 \leq \theta \leq 360°$.<br>(1 d.p.) | |
| **10** (a) Write $\frac{-1}{(x + 2)(x + 3)}$ in partial fractions.<br>(b) Hence evaluate $\int_0^1 \frac{-1}{(x + 2)(x + 3)}\,dx$,<br>giving the answer as a single logarithm. | |