Day 133	A Level Maths: A Tier 10-a-day

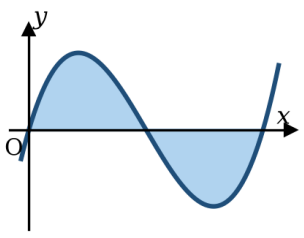
1 Find the quotient and the remainder when $4x^3 - 18x^2 + 16x + 15$ is divided by $(2x - 5)$.

2 A crate of mass 5 kg is pushed at constant speed along rough horizontal ground, $\mu = 0.5$, by a force of P N at angle θ below the horizontal, $\tan\theta = \frac{5}{12}$. Find P and the normal reaction. Take g = 9.8. Give answers to 3 s.f. if not exact.

3 (a) Express $6\cos\theta - 8\sin\theta$ in the form $R\cos(\theta + \alpha)$, where $R > 0$ and $0° < \alpha < 90°$. Give α to 1 d.p.
(b) Solve $6\cos\theta - 8\sin\theta = 5$ for $0° \leq \theta < 360°$, giving answers to 1 d.p.

4 X, the journey time (minutes), is $N(39, 6^2)$. The highest 15% of values exceed k.
Find k to 3 significant figures.

5 The diagram shows the curve $y = x(x - 3)(x - 6)$.
Find the total area of the two shaded regions.



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6 Find the coefficient of x^4 in the expansion of $(3 + 3x)(1 + x)^5$.	
7 A regression line of v on w is $v = 1003.5 + 5w$, where $w = \frac{t - 2000}{10}$. (a) Find the regression line of v on t in the form $v = p + qt$. (b) Estimate v when $t = 2060$.	
8 Solve the differential equation $x\frac{dy}{dx} = 4y$, given that $y = 3$ when $x = 1$ ($x > 0$, $y > 0$). Give y in terms of x.	
9 Solve $\|4x - 6\| > \|-2x - 3\|$.	
10 At t = 0, P and Q have position vectors $(2\mathbf{i} + 11\mathbf{j})$ m and $(\mathbf{i} + 3\mathbf{j})$ m and velocities $(-4\mathbf{i} - 4\mathbf{j})$ m s^{-1} and $(-2\mathbf{i} - 3\mathbf{j})$ m s^{-1}. Find (a) the time when they are closest, (b) the least distance between them. Give answers to 3 s.f. if not exact.	