Day 345	A Level Maths: B Tier 10-a-day
1 Solve $x - 5 < -5x + 2$.	
2 X ~ Po(0.8), modelling the number of emails received per hour. Find, to 3 significant figures, (a) $P(X \geq 3)$ (b) $P(X \leq 3)$	
3 $f(x) = x^3 + 2x - 3$. Use the Newton-Raphson method with $x_0 = 1$ to find x_1 and x_2, to 4 d.p.	
4 The points A, B and C are (2, 0), (0, 1) and (−1, −1). (a) Show that angle ABC = 90°. (b) Find the area of triangle ABC.	
5 Given that $\sin A = \frac{40}{41}$ and $\sin B = \frac{7}{25}$, where A and B are acute, find the exact value of $\cos(A - B)$.	

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6 A ball is kicked from horizontal ground with speed 24.5 m s^{-1} at an angle θ above the horizontal, where $\tan\theta = \frac{3}{4}$.

Take g = 9.8 m s^{-2}.
Find (a) the time of flight, (b) the horizontal range.

7 (a) Write $12\cos\theta + 5\sin\theta$ in the form $R\cos(\theta - \alpha)$, with $R > 0$ and $0 < \alpha < 90°$.
(b) Hence find its maximum value and the smallest $\theta \geq 0$ at which it occurs. Give α to 1 d.p.

8 Data are modelled by $y = ax^n$. A plot of $\log_{10} y$ against $\log_{10} x$ is a straight line with intercept 1.00 and gradient 0.5.
Find a (2 s.f.) and n, then estimate y when x = 4 (3 s.f.).

9 A sequence is defined by $u_{n+1} = \frac{1}{1 - u_n}$, $u_1 = 3$.

(a) Show that the sequence is periodic, stating the period.

(b) Find u_{25} and $\sum_{r=1}^{25} u_r$.

10 A block of mass 10 kg is held on a rough plane ($\tan\alpha = \frac{4}{3}$, $\mu = 0.25$) by a force P N up the plane, as shown.
Take g = 9.8 m s^{-2}. The block is about to move down the plane. Find P.

