Day 335	A Level Maths: S Tier 10-a-day
1 A circle has its centre in the first quadrant and touches both the x-axis and the y-axis. It passes through the point (4, 8). Find the two possible equations of the circle.	
2 A seed supplier says that 50% of its seeds germinate. 25 seeds are planted, and 10 germinate. Test, at the 5% significance level, the claim that the proportion is lower. Give your conclusion in context.	
3 Find the exact value of $\int_0^2 \frac{10x - 10}{x^2 - 2x + 3}\,dx$	
4 Solve $\lvert x + 1\rvert < 3x + 5$.	
5 A particle is projected at 7 m s^{-1} up a line of greatest slope of a rough plane inclined at α to the horizontal, where $\sin\alpha = \frac{3}{5}$ and $\mu = 0.4$. Find (a) the distance it travels up the plane, to 3 s.f., (b) its speed on returning to its starting point. Take g = 9.8 m s^{-2}.	

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6 Find the set of values of x for which both $x^2 + x - 12 \geq 0$ and $3x - 2 > 4$.

7 (a) Show that $\frac{x^2 + 4x - 1}{(x + 5)(x + 4)} \equiv 1 + \frac{A}{x + 5} + \frac{B}{x + 4}$.

(b) Hence find the exact value of $\int_0^3 \frac{x^2 + 4x - 1}{(x + 5)(x + 4)}\,dx$.

8 $X \sim B(18, \frac{2}{5})$.

(a) Show that $P(X = r + 1) \div P(X = r) = \frac{18 - r}{r + 1} \times \frac{2}{3}$.

(b) Find the most likely value of X and its probability (3 s.f.).

9 The curve C has equation $x^2 + 2xy + 3y^2 = 96$. Find the coordinates of the points on C where the tangent is parallel to the y-axis.

10 Particles A (1 kg) and B (2 kg) are joined by a light string over a smooth pulley (see diagram). A lies on a smooth slope, $\sin \alpha = \frac{4}{5}$, and B is 4 m above the ground.
Released from rest, find the further distance A moves up the slope after B lands (A does not reach the pulley).

