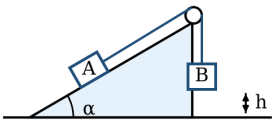
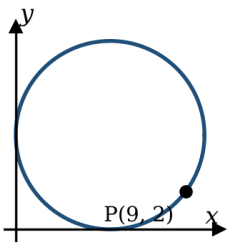
Day 2	A Level Maths: S Tier 10-a-day
1 A van costs £24000 and loses 15% of its value each year. Find the least whole number of years after which its value is below £3000.	
2 For 20 observations x, $\Sigma(x - 40) = 10$ and $\Sigma(x - 40)^2 = 425$. (a) Find the mean of x. (b) Find the standard deviation of x. (c) Find the value of Σx^2.	
3 Particles A (9 kg) and B (9 kg) are joined by a light string over a smooth pulley (see diagram). A lies on a smooth slope, $\alpha = 30°$, and B is 1.5 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). 	
4 $f(x) = x^3 + 6x^2 + 15x + 14$. Show that $(x + 2)$ is a factor of f(x), and that the equation $f(x) = 0$ has exactly one real root.	
5 A particle P moves with constant acceleration. At t = 0 seconds P is at $(-\mathbf{i})$ m with velocity $(2\mathbf{i} + 9\mathbf{j})$ m s^{-1}. At t = 8, P has velocity $(-6\mathbf{i} - 15\mathbf{j})$ m s^{-1}. Find (a) the acceleration of P, (b) the time at which P moves parallel to $(\mathbf{j})$, (c) the position vector of P at that time.	

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6 The circle in the diagram touches both axes and passes through P. Find the equation of the circle, giving it in the form $x^2 + y^2 + ax + by + c = 0$.



7 A curve is given by $x = \ln y + 2y^2$.
Find dy/dx and d^2y/dx^2 when $y = 1$.

8 A test of H_0: $p = 0.3$ against H_1: $p > 0.3$ uses a sample of 30 at the 5% level.
(a) Find the critical region for X, the number of successes.
(b) Find the actual significance level.
(c) Find P(Type II error) when in fact $p = 0.4$.

9 The points A, B, C have coordinates (0, 2, 0), (1, −2, −3), (0, 5, 2).
Find angle ABC to 1 d.p., and the exact area of triangle ABC.

10 The curve C has parametric equations $x = 2t$, $y = 3t^2$. The line $y = -\frac{9}{2}x - 6$ meets C at A and B. Find the exact length AB.