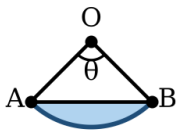
Day 171	A Level Maths: A Tier 10-a-day
1 A particle is projected up a line of greatest slope of a smooth plane inclined at α. It passes A, 19.6 m from the start, after 2 s and again after 8 s. Find (a) the speed of projection, (b) α to 1 d.p. Take g = 9.8.	
2 A circle has equation $x^2 + y^2 + 6x - 4y + 3 = 0$. (a) Find the centre and radius of the circle. (b) Determine whether P(−1, 3) lies inside or outside the circle.	
3 Water pours into a cone, vertex down, at 10 cm^3s^{-1}. The surface radius is always $\frac{h}{2}$. Find the rate at which the depth is rising when h = 2 cm.	
4 Given that $\sum_{r=1}^{n}(4r - 3) = 780$, find the value of n.	
5 0.5% of people have a fault. The inspection test is positive for 80% of those who have it and for 2% of those who do not. (a) Find the probability that a person tests positive. (b) Given a positive test, find the probability that the person has the fault (3 s.f.).	

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6 The circle has centre O and radius 10 cm.

Angle AOB = $\frac{\pi}{2}$.

Find the exact area of the shaded segment.



7 Particle A (3 kg) rests on a smooth table, joined by a light string over a smooth pulley at the edge to particle B (1 kg), hanging 1.2 m above the floor. Released from rest. Find (a) the tension, (b) the speed of B as it hits the floor. Take g = 9.8. Give answers to 3 s.f. if not exact.

8 (a) Express $\frac{-3x - 13}{(x + 1)(x + 6)}$ in partial fractions.

(b) Hence find $\int_0^1 \frac{-3x - 13}{(x + 1)(x + 6)}\,dx$, giving the answer in the form ln k.

9 The line $y = k - 4x$ is a tangent to the curve $y = \frac{1}{x}$.

Find the possible values of k.

10 Eggs are defective with probability 0.3, independently. A tray of 7 eggs is rejected if it has at least 2 defective.

From 10 such trays, find the probability that exactly 3 are rejected (3 s.f.).