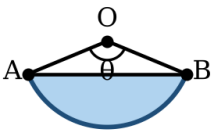
Day 310	A Level Maths: A Tier 10-a-day
1 A 3 kg particle rests on a rough plane inclined at α, $\tan\alpha = \frac{15}{8}$, $\mu = 0.25$. A force of P N acts up a line of greatest slope and the particle stays at rest. Find the range of values of P. Take g = 9.8. Give answers to 3 s.f. if not exact.	
2 Find the exact value of $\int_0^2 (4x + 3)^4 \, dx$.	
3 12 values have $\Sigma x = 480$ and $\Sigma x^2 = 19968$. One value was recorded as 25 but should have been 46. Find the correct mean and standard deviation (3 s.f.).	
4 The line $3x - 4y = k$ is a tangent to the circle $(x - 2)^2 + (y + 4)^2 = 25$. Find the two possible values of k.	
5 X, the length (mm), is $N(81, 2^2)$. Find the symmetric limits about the mean between which the central 90% of values lie (3 s.f.).	

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6 The circle has centre O and radius 20 cm. Angle AOB = $\frac{3\pi}{4}$. Find the exact area of the shaded segment. 	
7 Express $\frac{2x^2 - x - 8}{(x + 1)(x - 4)}$ in the form $2 + \frac{A}{(x + 1)} + \frac{B}{(x - 4)}$, where A and B are constants to be found.	
8 A 2 kg particle is in equilibrium on a rough plane inclined at α, $\tan \alpha = \frac{4}{3}$, μ = 0.2. A horizontal force of P N, in the vertical plane through a line of greatest slope, pushes it towards the plane. Find the least and greatest values of P. Take g = 9.8. Give answers to 3 s.f. if not exact.	
9 The points A, B and C have coordinates (0, −1, 3), (2, 3, 4) and (3, −1, 0). Find angle ABC, in degrees to 1 d.p.	
10 In the expansion of $(1 + kx)^n$, where n is a positive integer, the coefficient of x is 33 and the coefficient of x^2 is 495. Find n and k.	