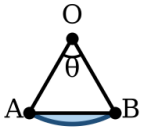
Day 206	A Level Maths: A Tier 10-a-day
1 A circular ripple has area A cm^2 increasing at a constant 8 cm^2s^{-1}. Find the rate at which the circumference is increasing when the radius is 3 cm.	
2 A lift of mass 300 kg carries a person of mass 50 kg. The cable tension is 3535 N and the lift is accelerating. Find (a) the magnitude and direction of the acceleration, (b) the force of the floor on the person. Take g = 9.8.	
3 $y = \sqrt{3x^2 - 11}$. Find $\frac{dy}{dx}$ and the gradient of the curve at x = 2.	
4 P(B) = 0.4, P(A) = 0.3 and P(A | B) = 0.45. (a) Find $P(A \cap B)$ and $P(A \cup B)$. (b) Find P(B | A). (c) Determine whether A and B are independent.	
5 The circle has centre O and radius 18 cm. Angle AOB = $\frac{\pi}{3}$. Find the exact area and the exact perimeter of the shaded segment. 	

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6 The second term of a geometric series is 6 and its sum to infinity is 25. Find the two possible values of the first term.	
7 Bulbs are defective with probability 0.15, independently. A pack of 8 bulbs is rejected if it has at least 3 defective. From 8 such packs, find the probability that exactly 2 are rejected (3 s.f.).	
8 In the expansion of $(1 + kx)^n$, where n is a positive integer, the coefficient of x is 12 and the coefficient of x^2 is 54. Find n and k.	
9 At t = 0, P and Q have position vectors $(17\mathbf{i} + 2\mathbf{j})$ m and $(2\mathbf{i} - \mathbf{j})$ m and velocities $(-2\mathbf{i} + 2\mathbf{j})$ m s^{-1} and $(\mathbf{i} - \mathbf{j})$ m s^{-1}. Find (a) the time when they are closest, (b) the least distance between them. Give answers to 3 s.f. if not exact.	
10 The line $3x - 4y = -21$ meets the circle $(x - 3)^2 + (y - 3)^2 = 25$ at the points A and B. Find the exact length of AB.	