Day 176	A Level Maths: S Tier 10-a-day

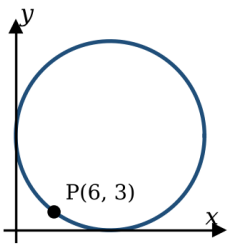
1 A particle P moves with constant acceleration. At t = 0 seconds P is at $(5\mathbf{i} - 5\mathbf{j})$ m with velocity $(-10\mathbf{i} + 6\mathbf{j})$ m s^{-1}. At t = 6, P has velocity $(8\mathbf{i} - 6\mathbf{j})$ m s^{-1}.
Find (a) the acceleration of P, (b) the time at which P moves parallel to $(\mathbf{i} - \mathbf{j})$, (c) the position vector of P at that time.

2 A sector of a circle has radius r cm and angle θ radians, where $\theta < 2\pi$.
Its perimeter is 42 cm and its area is 98 cm^2.
Find the two possible pairs of values of r and θ.

3 A(−3, 5) and B(−6, −4). The point C lies on the x-axis and CA = CB. Find the coordinates of C and the area of triangle ABC.

4 Given that $\cos 3\theta \equiv 4\cos^3\theta - 3\cos\theta$, solve $\cos 3\theta = 0$ for $0 < \theta < 180°$.

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



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6 Find the exact coordinates of the stationary point of $y = x^2e^{-2x}$ for $x > 0$, and determine its nature.	
7 A particle P moves on a straight line. At time t seconds, where $t \geq 0$, its velocity is v m s^{-1}, where $v = 15\sqrt{t} - 3t$. Find (a) the greatest speed of P, (b) the greatest displacement of P from its starting point.	
8 For events A and B, P(A) = 0.2, P(B) = 0.15 and P(A | B) = 0.95. (a) Find $P(A \cap B)$. (b) Find $P(A \mid B')$.	
9 Solve $\frac{2}{(x+3)} > \frac{3}{(x+1)}$.	
10 A battery's life, in hours, is $N(69, 8^2)$. Given that it exceeds 77, find the probability that it exceeds 86.	