Day 163 **A Level Maths: A Tier 10-a-day**

1 A sector of a circle has arc length 20 cm and area 80 cm^2.
Find the radius of the circle and the angle of the sector, in radians.

2 X ~ Po(25). Use a suitable approximation to find P(X ≥ 26), to 3 significant figures.

3 Show that $\frac{2}{\sqrt{2}-1} + \frac{5}{\sqrt{2}+1}$ can be written as p + q$\sqrt{2}$, and find p and q.

4 Solve $\cos 2x - 4\sin x = -5$
for $-180° \leq x \leq 180°$.

5 The table summarises the mass, m kg, of parcels of 61 items.
Use linear interpolation to estimate the lower quartile.

Class	Frequency
$10 \leq m < 20$	14
$20 \leq m < 30$	14
$30 \leq m < 40$	4
$40 \leq m < 50$	12
$50 \leq m < 60$	14
$60 \leq m < 70$	3

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6 The curve with equation $y = x^2 + 2x + 5$ is transformed by a stretch, scale factor 3, parallel to the y-axis, followed by a reflection in the y-axis. Find the equation of the image curve.	
7 A 6 kg particle moves on a smooth horizontal line. At time t s a single force of $(24 - 4t)$ N acts along the line. When t = 0 its speed is 4 m s^{-1}. Find (a) its speed when t = 3, (b) its greatest speed.	
8 Use integration by parts to find the exact value of $\int_1^e x^3 \ln x \, dx$.	
9 The line $y = k - 4x$ is a tangent to the curve $y = \frac{4}{x}$. Find the possible values of k.	
10 A 3 kg particle is in equilibrium on a rough plane inclined at α, $\tan\alpha = \frac{15}{8}$, $\mu = 0.5$. 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.	