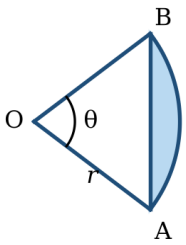
Day 294	A Level Maths: B Tier 10-a-day
1 Expand and simplify $(2 + \sqrt{2})(-2 - 3\sqrt{2})$, giving your answer in the form $a + b\sqrt{2}$.	
2 A person of mass 60 kg stands on the floor of a lift. The lift accelerates upwards at 0.6 m s^{-2}. Take g = 9.8 m s^{-2}. Find the normal reaction between the person and the floor.	
3 (a) Write $3x^2 - 30x + 79$ in the form $a(x + p)^2 + q$. (b) Write down the coordinates of the minimum point of $y = 3x^2 - 30x + 79$.	
4 Find (a) $\int 5 \cos 3x \, dx$, (b) the exact value of $\int_0^{\frac{\pi}{6}} 5 \cos 3x \, dx$.	
5 Evaluate $\sum_{r=4}^{24} (3r - 3)$.	

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6 The shaded region is the segment cut off by the chord AB of a circle with centre O and radius 5 cm. Angle AOB = 1.9 radians.
Find the area of the segment, to 3 s.f.



7 Data are modelled by $y = ax^n$. A plot of $\log_{10} y$ against $\log_{10} x$ is a straight line with intercept 0.477 and gradient 2.5.
Find a (2 s.f.) and n, then estimate y when x = 9 (3 s.f.).

8 The depth of water at a pier is modelled by $D = 9 + 2\sin(\frac{\pi t}{12})$, where t is in hours after noon.
Find (a) the greatest and least values, (b) the values of t with $0 \leq t \leq 24$ when it equals 10 m.

9 X ~ B(100, 0.2). Use a normal approximation to find $P(16 \leq X \leq 24)$, to 3 significant figures.

10 A uniform rod AB of length 3 m and mass 5 kg hangs horizontally from two vertical strings attached 0.5 m from A and 0.5 m from B.
A particle of mass 2 kg is attached 2 m from A.
Take g = 9.8 m s^{-2}. Find the tension in each string.