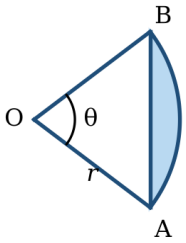
Day 122	A Level Maths: B Tier 10-a-day
1 A drone moves with constant velocity $(-7\mathbf{i} + 24\mathbf{j})$ m s^{-1}, where $\mathbf{i}$ and $\mathbf{j}$ are unit vectors east and north. Find its speed and the acute angle its direction makes with $\mathbf{i}$, to 1 d.p.	
2 Evaluate $4^{\frac{1}{2}}$.	
3 Solve $2^x = 48$, giving your answer to 3 s.f.	
4 A journey takes X minutes, normal with mean 100, s.d. 10. Find k (3 s.f.): (a) P(X < k) = 0.05, (b) P(X > k) = 0.01.	
5 $f(x) = x^3 - 2x^2 - x + k$. Given that $(x - 2)$ is a factor of f(x), (a) find the value of k, (b) factorise f(x) completely.	

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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 8 cm. Angle AOB = 0.9 radians.
Find the area of the segment, to 3 s.f.



7 Find the coefficient of x^2 in the expansion of $(1 + 4x)(1 - 3x)^7$.

8 Points A and B have position vectors $\begin{pmatrix} 3 \\ 0 \\ 3 \end{pmatrix}$ and $\begin{pmatrix} 5 \\ 10 \\ 14 \end{pmatrix}$.
Find AB and the distance AB.

9 A particle moves so that at time t s its velocity is $\mathbf{v} = (3t^2 + 2)\mathbf{i} + (2t - 2)\mathbf{j}$ m s^{-1}.
Find the time when the particle is moving in the direction of $\mathbf{i}$, and its speed then.

10 X ~ B(150, 0.5). Use a normal approximation to find P(X ≤ 76), to 3 significant figures.