Day 91	A Level Maths: B Tier 10-a-day

1 The vector $\mathbf{a} = \begin{pmatrix} -7 \\ -4 \\ 4 \end{pmatrix}$.

Find $|\mathbf{a}|$ and a unit vector in the direction of $\mathbf{a}$.

2 Solve $|-x - 5| > -3x - 1$.

3 A sector of a circle has area 44.1 cm^2 and angle 1.8 radians.

Find (a) the radius, (b) the perimeter of the sector.

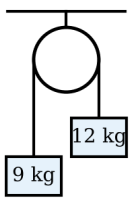
4 $f(x) = 2x + 1$ and $g(x) = x^2 + 2$ for $x \in \mathbb{R}$.

(a) Find $fg(x)$.

(b) Solve $gf(x) = 11$.

5 Particles of mass 9 kg and 12 kg hang on a light string over a smooth fixed pulley, as shown, and are released from rest. Take $g = 9.8$ m s^{-2}.

Find the acceleration and the tension in the string.



Day 91	A Level Maths: B Tier 10-a-day
6 The continuous random variable X has pdf f(x) = kx^2 for $0 \leq x \leq 6$, and 0 otherwise. (a) Find the value of k. (b) Find P(X > 2). (c) Find E(X).	
7 Given that $21\cos\theta + 20\sin\theta \equiv 29\cos(\theta - 43.6°)$, solve $21\cos\theta + 20\sin\theta = -4$ for $0 \leq \theta \leq 360°$. (1 d.p.)	
8 The line $3x - 4y = k$ is a tangent to the circle $(x - 4)^2 + (y + 1)^2 = 100$. Find the two possible values of k.	
9 The length X cm of a metal rod is normal with s.d. 10. Given P(X < 68.4) = 0.8, find the mean (3 s.f.).	
10 A particle of mass 6 kg is suspended in equilibrium by two light strings attached to a horizontal ceiling. The strings make angles α and β with the ceiling, where $\tan\alpha = \frac{4}{3}$ and $\tan\beta = \frac{5}{12}$. Take g = 9.8 m s^{-2}. Find the tension in each string.	