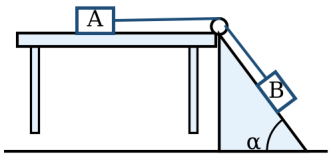
Day 308 **A Level Maths: S Tier 10-a-day**

1 Solve $\cos(2\theta - 30°) = -\frac{1}{2}$ for $0° \leq \theta \leq 180°$.

2 Evaluate $\sum_{r=5}^{10}(2 \times 2^r + 4r)$.

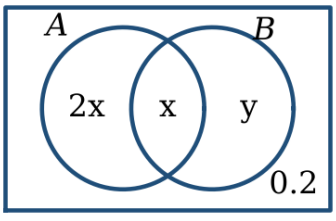
3 Particle A (1 kg) lies on a rough table with $\mu = 0.3$, and is joined by a light string over a smooth pulley (see diagram) to particle B (10 kg) on a smooth slope, $\sin\alpha = \frac{4}{5}$.

Released from rest, the string is cut when B has moved 3.75 m. Find the further distance A slides before stopping.



4 The first term of an arithmetic sequence is 2 and its common difference d is non-zero. The 4th, 6th and 9th terms are the first three terms of a geometric sequence. Find d and the common ratio.

5 Three forces $(-8\mathbf{i} - 7\mathbf{j})$ N, $(-1\mathbf{i} + k\mathbf{j})$ N and $(-8\mathbf{i} - 4\mathbf{j})$ N act on a particle of mass 2 kg. The resultant is parallel to $(-17\mathbf{i} - 14\mathbf{j})$. Find (a) the value of k, (b) the magnitude of the acceleration of the particle, to 3 s.f.

Day 308	A Level Maths: S Tier 10-a-day
6 Use the substitution u = x + 1 to find the exact value of $\int_0^{35} \frac{x}{\sqrt{x+1}}\,dx$	
7 The pdf of X is $f(x) = \frac{k}{x^2}$ for $1 \leq x \leq 7$, and 0 otherwise. (a) Find k. (b) Find the median of X. (c) Find E(X), to 3 significant figures.	
8 The curve C has equation $x^2 - xy + 3y^2 = 99$. Find the coordinates of the points on C where the tangent is parallel to the x-axis.	
9 The Venn diagram shows probabilities; A and B are independent. Find x and y. 	
10 The curve C has parametric equations $x = 3t$, $y = 2t^2$. The line $y = -\frac{4}{3}x + 6$ meets C at A and B. Find the exact length AB.	