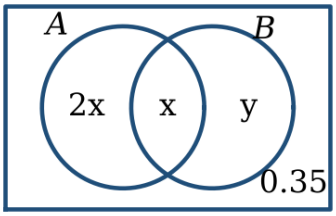
Day 342	A Level Maths: S Tier 10-a-day
1 The roots of $x^2 + kx + 60 = 0$ differ by 4. Find the possible values of k.	
2 Ball A is projected vertically upwards from ground level with speed 27 m s^{-1}. At the same instant, ball B is released from rest 108 m directly above A. The balls collide. Find (a) the height above the ground at which they collide, (b) the velocity of A just before the collision. Take g = 9.8 m s^{-2}.	
3 The first row of a theatre has 11 seats. Each row has 2 more seats than the row in front. Find (a) the number of seats in row 30, (b) the least number of rows for at least 1295 seats.	
4 A drink cools according to $\theta = 18 + Ae^{-kt}$, where θ °C is the temperature after t minutes. Initially $\theta = 90$, and after 8 minutes $\theta = 54$. Find A and k, then find when $\theta = 29$ (3 s.f.).	
5 12 recorded lengths (cm) have mean 60 and standard deviation 5. One value was recorded as 52 but should have been 46. Find the correct mean and the correct standard deviation.	

Day 342 **A Level Maths: S Tier 10-a-day**

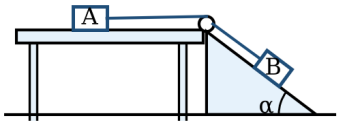
6 The curve C has equation $x e^y + y = 4$.
Find the equation of the tangent to C at the point (4, 0),
in the form $ax + by + c = 0$ with integers a, b, c.

7 The Venn diagram shows probabilities; A and B are independent.
Find x and y.



8 Particle A (4 kg) lies on a rough table with $\mu = 0.1$, and is joined by a light string over a smooth pulley (see diagram) to particle B (4 kg) on a smooth slope, $\sin\alpha = \frac{3}{5}$.

Released from rest, the string is cut when B has moved 0.5 m. Find the further distance A slides before stopping.



9 Find the remainder when x^7 is divided by $(x - 2)(x + 2)$.

10 θ is small and measured in radians. Use small angle approximations to find the value that $\frac{\cos 4\theta - \cos 5\theta}{\theta^2}$ approaches as $\theta \to 0$.