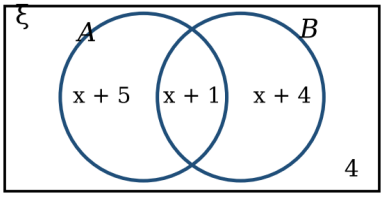
Day 102	A Level Maths: A Tier 10-a-day
1 Solve $5^{x-2} = 3^{x+3}$. Give your answer to 3 significant figures.	
2 The probability that a ticket wins a prize is 0.3. In 18 independent trials, find the probability that this happens (a) exactly 4 times (b) fewer than 4 times (c) at least 4 times.	
3 A(1, 11) and B(1, −15) are the ends of a diameter of a circle. (a) Find the equation of the circle, in the form $x^2 + y^2 + ax + by + c = 0$. (b) Show that C(13, 3) lies on the circle.	
4 A ball is projected from a point O on horizontal ground at 27 m s^{-1} at angle α above the horizontal, $\tan\alpha = \frac{5}{12}$, and lands at A. Find (a) the time of flight, (b) the greatest height, (c) OA. Take g = 9.8. Give answers to 3 s.f. if not exact.	
5 θ is small and measured in radians. Use small angle approximations to show that $2\sin 3\theta + 2\cos\theta = 5.5$ can be written as $a\theta^2 + b\theta + c = 0$ with integers a, b, c. Hence find the approximate solution with $0 < \theta < 0.8$, to 3 s.f.	

Day 102 **A Level Maths: A Tier 10-a-day**

6 A particle is projected at 9.8 m s^{-1} up a line of greatest slope of a rough plane inclined at α, where $\tan\alpha = \frac{4}{3}$. The coefficient of friction is 0.3. Find (a) the greatest distance it moves up the plane, (b) its speed on returning to the start. Take g = 9.8. Give answers to 3 s.f. if not exact.

7 The Venn diagram shows the numbers of 32 students in sets A and B.
(a) Find the value of x.
(b) A student is chosen at random. Find P(A | B′).



8 A curve has parametric equations $x = 4 + 2\cos\theta$, $y = -2 + 2\sin\theta$.
Find its Cartesian equation and describe the curve.

9 θ is obtuse and $\sin\theta = \frac{7}{25}$.
Find the exact values of $\sin 2\theta$, $\cos 2\theta$ and $\tan 2\theta$.

10 The line $12x + 5y = k$ is a tangent to the circle $(x-3)^2 + (y+4)^2 = 9$.
Find the two possible values of k.