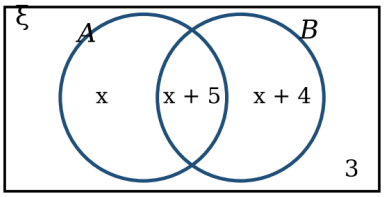
Day 298 **A Level Maths: A Tier 10-a-day**

1 A stratified sample of 60 members is taken from three groups.
7 of the sample are from Bronze, which has 105 members.
(a) Find the total number of members.
(b) Silver has 135 members. How many are sampled?

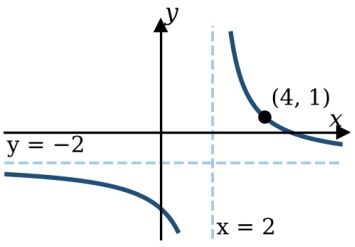
2 The curve y = f(x) has a minimum point at (−1, −5).
Find the coordinates of the corresponding point on:
(a) y = f(−x)
(b) y = −f(x)
(c) y = f(2x)

3 The Venn diagram shows the numbers of 33 students in sets A and B.
(a) Find the value of x.
(b) A student is chosen at random. Find P(A′ | B′).



4 Solve $\cos 2\theta - \sin\theta = -2$
for $0° \leq \theta \leq 360°$.

5 The diagram shows the curve $y = \frac{k}{x - a} + b$
with asymptotes as shown. Find the values of k, a and b, and the coordinates where the curve crosses the axes.



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6 The line l has equation $\mathbf{r} = \begin{pmatrix} 3 \\ 0 \\ 1 \end{pmatrix} + t\begin{pmatrix} 0 \\ -2 \\ 1 \end{pmatrix}$.

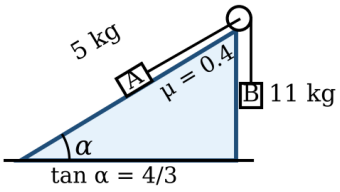
Find the coordinates of the foot of the perpendicular from P(1, 3, −3) to l, and the exact distance from P to l.

7 Car A passes P at constant speed 6 m s^{-1}. 8 s later car B leaves P from rest, in the same direction, with acceleration 3 m s^{-2}. B overtakes A at Q. Find (a) the time B takes to reach Q, (b) PQ, (c) the speed of B at Q.

8 The vectors $\begin{pmatrix} k \\ k \\ 2 \end{pmatrix}$ and $\begin{pmatrix} k \\ -3 \\ -5 \end{pmatrix}$ are perpendicular.

Find the possible values of k and, for the larger value, the exact length of the first vector.

9 The system is released from rest and A moves up the rough plane. Find (a) the acceleration, (b) the tension in the light string. Take g = 9.8. Give answers to 3 s.f. if not exact.



10 $f(x) = x^2 + 6x + 15$, $x \in \mathbb{R}$, and $g(x) = \frac{1}{x+1}$, $x > -1$.

(a) Find the range of f.

(b) Show that gf is defined and find its range.