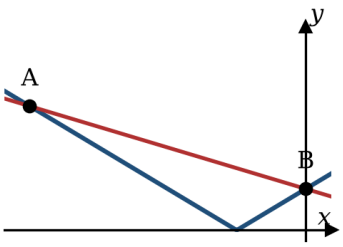
Day 226 **A Level Maths: A Tier 10-a-day**

1 The diagram shows the graphs of $y = |x + 6|$ and $y = -\frac{1}{2}x + 6$.

The graphs meet at A and B.
Find the coordinates of A and B.



2 A sector of a circle of radius 12 cm has angle 30°.
Find, in terms of π, the arc length, the area and the perimeter of the sector.

3 A geometric sequence has first term 200 and common ratio $\frac{1}{2}$.

Find the first term of the sequence that is less than 5.

4 Calls reach a switchboard at a mean rate of 3.5 per day, as a Poisson process.
Find the probability that in one such period there are
(a) exactly 2 (b) at least 2 (c) fewer than 2 (3 s.f.).

5 Given that $\sum_{r=1}^{n}(2r + 3) = 165$, find the value of n.

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6 Solve $4\sec^2\theta - 10\tan\theta - 28 = 0$ for $-180° \leq \theta \leq 180°$. Give answers to 1 d.p.	
7 Forces $F_1 = (-7\mathbf{i} - \mathbf{j})$ N, $F_2 = (15\mathbf{i} - 8\mathbf{j})$ N and $F_3 = (a\mathbf{i} + b\mathbf{j})$ N keep a 5 kg particle in equilibrium. Find (a) a and b. F_2 is then removed; (b) find the magnitude of the acceleration.	
8 A data set has mean 77 and standard deviation 9. A value is treated as an outlier if it is more than 3 standard deviations from the mean. Which of 53, 85, 102, 113 are outliers?	
9 Solve $2\operatorname{cosec}^2\theta + 10\cot\theta + 6 = 0$ for $0° < \theta < 180°$. Give answers to 1 d.p.	
10 At 12:00 ship P has position $(12\mathbf{i} + 24\mathbf{j})$ km and velocity $(-\mathbf{i} - 4\mathbf{j})$ km h^{-1}; ship Q has position $(2\mathbf{i} - 6\mathbf{j})$ km and velocity $(\mathbf{i} + 2\mathbf{j})$ km h^{-1}. Show that the ships collide and find the time and position vector of the collision.	