Day 346	A Level Maths: A Tier 10-a-day
1 Given that $\log_a 2 = p$ and $\log_a 3 = q$, express $\log_a\left(\frac{9\sqrt{2}}{4}\right)$ in terms of p and q.	
2 The curve y = f(x) has a minimum point at (3, 4). Find the coordinates of the corresponding point on: (a) y = f(−x) (b) y = 2f(x) (c) y = f(2x)	
3 X, the length (mm), is normally distributed with mean 83 and standard deviation 2. Find (a) P(X > 81.2) (b) P(81.2 < X < 83), each to 3 s.f.	
4 A particle P has position vector $\mathbf{r} = (2t^3 - 2t)\mathbf{i} + (t^2 - 2t)\mathbf{j}$ metres at time t s. Find (a) the speed of P when t = 4, (b) the value of t when P is moving parallel to **i**. Give answers to 3 s.f. if not exact.	
5 |a| = 4, |b| = 3 and the angle between a and b is 150°. Find the exact values of a·b and |a + b|.	

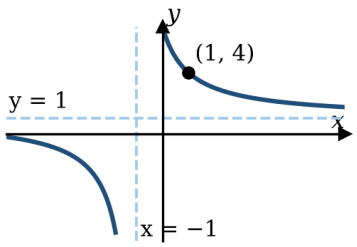
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6 Find the coefficient of x^{-2} in the expansion of $(3x^2 - \frac{2}{x})^5$.

7 Solve $\sin 2x = -\cos x$ for $0 \leq x \leq 2\pi$.

8 X ~ Po(25). Use a suitable approximation to find P(X ≥ 25), to 3 significant figures.

9 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.



10 A ball is projected from the ground at 35 m s^{-1} at angle α above the horizontal, $\tan \alpha = \frac{12}{5}$. At time T s, while in flight, it is moving perpendicular to its initial direction. Find (a) T, (b) the height of the ball then. Take g = 9.8. Give answers to 3 s.f. if not exact.