Day 133	A Level Maths: B Tier 10-a-day
1 A particle is in equilibrium under three forces: P N at angle θ above the positive x-axis, a force of 16 N in the negative x-direction and a force of Q N in the negative y-direction. $\cos\theta = \frac{4}{5}$. Find P and Q.	
2 y = f(x) has a minimum point at (6, 1). Find the turning point on the curve: (a) $y = f(x) - 2$ (b) $y = f(x + 1)$ (c) $y = f(\frac{x}{3})$	
3 A ship moves with constant velocity $(-2\mathbf{i} + \mathbf{j})$ m s^{-1}. At time t = 0 its position vector relative to a fixed origin O is $(-4\mathbf{i} - 2\mathbf{j})$ m. Find (a) its position vector when t = 3, (b) the value of t when it crosses the line through O in the direction of $\mathbf{i}$.	
4 Given that $y = \frac{\cos x}{x^2}$, find $\frac{dy}{dx}$, and its value when $x = \pi$.	
5 The continuous random variable X has pdf f(x) = kx for $0 \leq x \leq 5$, and 0 otherwise. (a) Find the value of k. (b) Find P(X > 4). (c) Find E(X).	

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6 Solve $10\sin^2 x + 9\sin x - 9 = 0$ for $0 \leq x \leq 360°$,
giving answers to 1 d.p. where necessary.

7 The curve C has equation $y = x^2 + x - 2$.
C is translated by $\begin{pmatrix} 2 \\ -1 \end{pmatrix}$ and then stretched by scale factor 2 parallel to the y-axis.
Find its new equation.

8 X has a binomial distribution with mean 6 and variance 4.2.
(a) Find n and p.
(b) Find P(X = 6) to 3 significant figures.

9 (a) Write $\frac{-2x - 6}{(x + 2)(x + 4)}$ in partial fractions.
(b) Hence evaluate $\int_0^4 \frac{-2x - 6}{(x + 2)(x + 4)}\,dx$,
giving the answer as a single logarithm.

10 The diagram shows the curve y = f(x), a quadratic.
(a) Find the coordinates of the local maximum point of y = |f(x)|.
(b) How many solutions has |f(x)| = 12?

