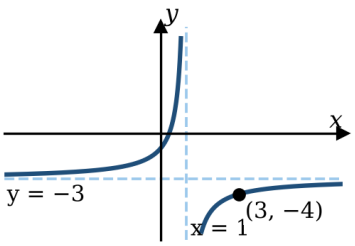
Day 214	A Level Maths: A Tier 10-a-day
1 $y = e^{2x^2 + 4x}$. Find $\frac{dy}{dx}$, and the equation of the tangent to the curve at the point where $x = -2$.	
2 Find the quotient and the remainder when $3x^4 + 5x^3 - 3x^2 - 14x - 8$ is divided by $(x^2 - 2)$.	
3 A lift of mass 500 kg carries a person of mass 80 kg. The cable tension is 5974 N and the lift is accelerating. Find (a) the magnitude and direction of the acceleration, (b) the force of the floor on the person. Take $g = 9.8$.	
4 A and B have position vectors $\begin{pmatrix} 5 \\ -3 \end{pmatrix}$ and $\begin{pmatrix} 5 \\ 1 \end{pmatrix}$. The point P lies on AB with AP : PB = 3 : 1. Find the position vector of P and the exact distance OP.	
5 The random variable X has probability density function $f(x) = kx^2$ for $0 \leq x \leq 4$, and 0 otherwise. (a) Find k. (b) Find E(X). (c) Find P(X > 2).	

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6 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.



7 The line through the origin is a tangent to the curve $y = x^2 + 1$.
Find the gradients of the two possible tangents and the points of contact.

8 A particle is projected up a line of greatest slope of a smooth plane inclined at α. It passes A, 19.6 m from the start, after 2 s and again after 5 s. Find (a) the speed of projection, (b) α to 1 d.p. Take g = 9.8.

9 The curve y = f(x) has a minimum point at (5, 1).
Find the coordinates of the corresponding point on:
(a) y = f(−x)
(b) y = −f(x)
(c) y = f(x + 3)

10 Parts are defective with probability 0.1, independently. A box of 10 parts is rejected if it has at least 3 defective.
From 10 such boxes, find the probability that exactly 2 are rejected (3 s.f.).