11 The tangent to the curve $y = (3x-1)^{\frac{1}{3}}$ at the point where $x = 3$ meets the coordinate axes at the points A and B. The point with coordinates (a, a) lies on the perpendicular bisector of the line AB. Find the exact value of a. [10]

Continuation of working space for Question 11.

Question 12 is printed on the next page.

12 **(a)** It is given that $y = \frac{\ln 3x}{x^2}$ for $x > 0$.

Find $\frac{\mathrm{d}y}{\mathrm{d}x}$. Give your answer in the form $\frac{A + B\ln 3x}{x^3}$, where A and B are integers. [4]

(b) Hence find $\int \frac{\ln 3x}{x^3}\,\mathrm{d}x$. [4]

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