1. **In this question you must show all stages of your working.**
Solutions relying on calculator technology are not acceptable.

Given that the binomial expansion of $(1 + ax)^n$, in ascending powers of x, is

$$1 - 4x + \frac{24}{5}x^2 + px^3 + \ldots$$

where a, n and p are constants,

(a) find the value of a and the value of n.

(5)

Hence

(b) find the value of p,

(2)

(c) state the set of values of x for which the expansion is valid.

(1)

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Question 1 continued

Question 1 continued

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Question 1 continued

(Total for Question 1 is 8 marks)

2. **In this question you must show all stages of your working.**
Solutions relying on calculator technology are not acceptable.

Using algebraic integration, find the exact value of

$$\int_{2}^{2e^2} x^3 \ln\left(\frac{1}{2}x\right) \mathrm{d}x$$

giving the answer in simplest form.

(5)

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