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**1.** The table below shows corresponding values of $x$ and $y$ for $y = \log_2(2x)$

The values of $y$ are given to 2 decimal places as appropriate.

| $x$ | 2 | 5 | 8 | 11 | 14 |
|---|---|---|---|---|---|
| $y$ | 2 | 3.32 | 4 | 4.46 | 4.81 |

Using the trapezium rule with all the values of $y$ in the given table,

(a) obtain an estimate for $\int_2^{14} \log_2(2x)\,dx$, giving your answer to one decimal place.

**(3)**

Using your answer to part (a) and making your method clear, estimate

(b) (i) $\int_2^{14} \frac{\log_2(4x^2)}{5}\,dx$

(ii) $\int_2^{14} \log_2\left(\frac{2}{x}\right)dx$

**(4)**

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**Question 1 continued**

**Q1**

**(Total 7 marks)**

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**2.** One of the terms in the binomial expansion of $(3 + ax)^6$, where $a$ is a constant, is $540x^4$

(a) Find the possible values of $a$.

**(4)**

(b) Hence find the term independent of $x$ in the expansion of

$$\left(\frac{1}{81} + \frac{1}{x^6}\right)(3 + ax)^6$$

**(3)**

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