Improper Integrals Exam Questions (From OCR 4722)

Note that in all of these questions, showing the limiting process for each improper integral is required to gain full credit.

Q1, (Jan 2006, Q6b)

(i) Find the value, in terms of a, of $\int_1^a 4x^{-2}\,\mathrm{d}x$, where a is a constant greater than 1. **[3]**

(ii) Deduce the value of $\int_1^\infty 4x^{-2}\,\mathrm{d}x$. **[1]**

Q2, (Jun 2008, Q7b)

(i) Find $\int 18x^{-4}\,\mathrm{d}x$. [2]

(ii) Hence evaluate $\int_2^\infty 18x^{-4}\,\mathrm{d}x$. [2]

Q3, (Jun 2010, Q6c)

Evaluate $\int_1^\infty \frac{8}{x^3}\,\mathrm{d}x$. **[4]**

Q4, (Jan 2011, Q6b)

(i) Find, in terms of a, the value of $\int_2^a 6x^{-4}\,\mathrm{d}x$, where a is a constant greater than 2. **[3]**

(ii) Deduce the value of $\int_2^\infty 6x^{-4}\,\mathrm{d}x$. **[1]**

Q5, (Jun 2013, Q4b)

(i) Find $\int 24x^{-3}\mathrm{d}x$. **[2]**

(ii) Given that $\int_a^\infty 24x^{-3}\mathrm{d}x = 3$, find the value of the positive constant a. **[3]**

Q6, (Jun 2016, Q5b)

(i) Find, in terms of a, the value of $\int_1^a (6x^{-2} - 4x^{-3})\mathrm{d}x$, where a is a constant greater than 1. **[4]**

(ii) Deduce the value of $\int_1^\infty (6x^{-2} - 4x^{-3})\mathrm{d}x$. **[1]**
