

## **STEP II, 2012 Q1**

1 Write down the general term in the expansion in powers of  $x$  of  $(1 - x^6)^{-2}$ .

(i) Find the coefficient of  $x^{24}$  in the expansion in powers of  $x$  of

$$(1 - x^6)^{-2}(1 - x^3)^{-1}.$$

Obtain also, and simplify, formulae for the coefficient of  $x^n$  in the different cases that arise.

(ii) Show that the coefficient of  $x^{24}$  in the expansion in powers of  $x$  of

$$(1 - x^6)^{-2}(1 - x^3)^{-1}(1 - x)^{-1}$$

is 55, and find the coefficients of  $x^{25}$  and  $x^{66}$ .



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