# Induction – Q6 [Practice/E] (18/6/23)

$\sum_{r=1}^{n} r(r+2) = \frac{1}{6}n(n+1)(2n+7)$

**Solution**

[Show that the result is true for $n = 1$]

Now assume that the result is true for $n = k$, so that

$\sum_{r=1}^{k} r(r+2) = \frac{1}{6}k(k+1)(2k+7)$

Then $\sum_{r=1}^{k+1} k(k+2) = \frac{1}{6}k(k+1)(2k+7) + (k+1)(k+3)$

$= \frac{1}{6}(k+1)\{k(2k+7) + 6(k+3)\}$

$= \frac{1}{6}(k+1)(2k^2 + 13k + 18)$

$= \frac{1}{6}(k+1)(2k+9)(k+2)$

$= \frac{1}{6}(k+1)([k+1]+1)(2[k+1]+7)$

[Standard wording]