Summations (Proof By Induction) (From OCR 4725)

Q1, (Jun 2007, Q2)

Prove by induction that, for $n \geqslant 1$, $\sum_{r=1}^{n} r^3 = \frac{1}{4}n^2(n+1)^2$. [5]

Q2, (Jun 2010, Q1)

Prove by induction that, for $n \geqslant 1$, $\sum_{r=1}^{n} r(r+1) = \frac{1}{3}n(n+1)(n+2)$. **[5]**

Q3, (Jun 2011, Q2)

Prove by induction that, for $n \geqslant 1$, $\sum_{r=1}^{n} \frac{1}{r(r+1)} = \frac{n}{n+1}$. **[5]**

Q4, (Jun 2012, Q5)

Prove by induction that, for $n \geqslant 1$, $\sum_{r=1}^{n} 4\times 3^r = 6(3^n - 1)$. **[5]**

Q5, (Jun 2017, Q4)

Prove by induction that, for $n \geqslant 1$, $\sum_{r=1}^{n} \frac{1}{(2r-1)(2r+1)} = \frac{n}{2n+1}$. **[5]**
