NCERT Mathematics Ex 9.4 Q6

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1) Find the sum to n terms of

$3 \times 8 + 6 \times 11 + 9 \times 14 + \dots$

SOLUTION:

Writing the series in terms of summation:

$$\sum_{r=0}^{n} 3r \times (5 + 3r)$$

$$\sum_{r=0}^{n} 15r + 9r^2 \qquad (1)$$

Using formulas for the sum of n terms (i) and sum of the squares of the n terms (ii)

$$\sum_{r=0}^{n} r = \frac{n(n + 1)}{2} \qquad (i)$$

$$\sum_{r=0}^{n} r^2 = \frac{n(n + 1)(2n + 1)}{6} \qquad (ii)$$

Equation (1) evaluates to

$$\frac{15n(n + 1)}{2} + \frac{9n(n + 1)(2n + 1)}{6}$$

$$\boxed{\frac{3n(n + 1)(2n + 6)}{2}}$$