**Question 1:** Using the principle of mathematical induction, prove that

$$1^2 + 2^2 + 3^2 + ..... + n^2 = (1/6)\{n(n + 1)(2n + 1\} \text{ for all } n \in N.$$

**Question 2:** By using mathematical induction prove that the given equation is true for all positive integers. $1 \times 2 + 3 \times 4 + 5 \times 6 + .... + (2n - 1) \times 2n = (n(n+1)(4n-1))/3$

**Question 3:** Using the principle of mathematical induction, prove that

$$1 \cdot 2 + 2 \cdot 3 + 3 \cdot 4 + ..... + n(n + 1) = (1/3)\{n(n + 1)(n + 2)\}$$

**Question 4:** By using mathematical induction prove that the given equation is true for all positive integers. $2 + 4 + 6 + .... + 2n = n(n+1)$

**Question 5:** By using mathematical induction prove that the given equation is true for all positive integers. $2 + 6 + 10 + ..... + (4n - 2) = 2n^2$

**Question 6:** Using the principle of mathematical induction, prove that

$$1/(1 \cdot 2) + 1/(2 \cdot 3) + 1/(3 \cdot 4) + ..... + 1/\{n(n + 1)\} = n/(n + 1)$$

**Question 7:** Using the principle of mathematical induction, prove that

$$\{1/(3 \cdot 5)\} + \{1/(5 \cdot 7)\} + \{1/(7 \cdot 9)\} + ....... + 1/\{(2n + 1)(2n + 3)\} = n/\{3(2n + 3)\}.$$

**Question 8:** By induction prove that $3n - 1$ is divisible by 2 is true for all positive integers.

**Question 9:** Using the principle of mathematical induction, prove that

$1/(1 \cdot 2 \cdot 3) + 1/(2 \cdot 3 \cdot 4) + ........ + 1/\{n(n + 1)(n + 2)\} = \{n(n + 3)\}/\{4(n + 1)(n + 2)\}$ for all $n \in N$.

**Question 10:** By induction prove that $n^2 - 3n + 4$ is even and it is true for all positive integers.