



**Question (1):** Compute each of these

$$\begin{aligned}
 1) \sum_{i=1}^2 \sum_{j=1}^3 (i+3j) &= \sum_{i=1}^2 [i+3 + i+6 + i+9] \\
 &= \sum_{i=1}^2 (3i+18) \\
 &= (3+18) + (6+18) + 9 \\
 &= 21 + 24 = 45.
 \end{aligned}$$

$$\begin{aligned}
 2) \sum_{k=5}^{10} k^2 &= \sum_{j=1}^{10} k^2 - \sum_{j=1}^4 k^2 & \text{note: } \sum_{k=1}^n k^2 &= \frac{n(n+1)(2n+1)}{6} \\
 &= \frac{10(11)(21)}{6} - \frac{4(5)(9)}{6} \\
 &= \frac{2310}{6} - \frac{180}{6} = \frac{2130}{6} \\
 &= 355
 \end{aligned}$$

**Question (2):** Let  $p$  and  $q$  be the propositions

$P$  = "Swimming at the New Jersey shore is allowed" and

$q$  = "Sharks have been spotted near the shore,"

Express each of these compound propositions as an English sentence.

$$1) \neg p \rightarrow \neg q$$

If the swimming at the new jersey shore is not allowed then shark have not been spotted.

$$2) \neg p \wedge (p \vee \neg q)$$

Swimming is not allowed, and either swimming is allowed or sharks have not been spotted.