Among employee of a company taking

vacations last years, 90% took vacations in the summer, 65% in the winter, 10% in the spring, 7% in the autumn, 55% in winter and summer, 8% in the spring and summer, 6% in the autumn and summer, 4% in the winter and spring, 4% in winter and autumn, 3% in the spring and autumn, 3% in the summer, winter and spring, 3% in the summer, winter and autumn, 2% in the summer, autumn and spring, and 2% in the winter, spring and autumn. Percentage of employee that took vacations during every season:

(a) 4   (b) 3
(c) 2   (d) 8

solution:

Suppose that number of employee taking va-

cations is 100.

Su – set of employee taking leave in Summer
W – set of employee taking leave in Winter
Sp – set of employee taking leave in Spring
A – set of employee taking leave in Autumn

$n(Su) = 90, n(W) = 65, n(Sp) = 10, n(A) = 7$

$n(W \cap Su) = 55, n(Sp \cap Su) = 8, n(A \cap Su) = 6$

$n(W \cap Sp) = 4, n(W \cap Au) = 4, n(Sp \cap A) = 3$

$n(Su \cap A) = 3, n(Su \cap W \cap A) = 3$

$n(Su \cap W \cap Sp) = 3, n(Su \cap A \cap Sp) = 2$

$n(W \cap Sp \cap A) = 2$

$n(Su \cap Sp \cap W \cap A)$

$$= n(Su) + n(Sp) + n(W) + n(A) - n(Su \cap Sp)$$
$$- n(Sp \cap W) - n(W \cap A) - n(Su \cap A) - n(Su \cap W)$$
$$- n(Sp \cap A) + n(Su \cap Sp \cap W) + n(Su \cap W \cap A)$$
$$+ n(W \cap A \cap Su) + n(Su \cap Sp \cap A)$$
$$- n(Sp \cup Su \cup A \cup W)$$
$$= 90 + 65 + 10 + 7 - 55 - 8 - 6 - 4 - 4 - 3$$
$$+ 3 + 3 + 2 + 2 - 100 = 2$$