

Answer Key

1a. 1x B, 3x A, 2x N.

1b. There are $C(6, 1) = 6$ ways to place the B.

1c. There are $C(5, 3) = 10$ ways to place the A's.

1d. There are $C(2, 2) = 1$ ways to place the N's.

1e. Use the Rule of Products: $6 \cdot 10 \cdot 1 = 60$.

2. P: $C(12, 1)$, E: $C(11, 1)$, N: $C(10, 3)$, S: $C(7, 1)$, Y: $C(6, 1)$, L: $C(5, 1)$,
 V: $C(4, 1)$, I: $C(3, 1)$, A: $C(2, 2)$
 $= 12 \cdot 11 \cdot 120 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 1$
 $= 39,916,800$

3a. $r = 3$

3b. $n - r = 2$

3c. $n - 3 = 2 \quad n = 2 + 3 \quad n = 5$

3d. $C(n, r) = C(5, 3) = 10$

4. Length 5 means 1x, 3x, or 5x ones.

one 1, four 0: $r = 1, n - r = 4, n - 1 = 4, n = 5, C(5, 1) = 5$
 three 1, two 0: $r = 3, n - r = 2, n - 3 = 2, n = 5, C(5, 3) = 10$
 five 1, zero 0: $r = 5, n - r = 0, n - 5 = 0, n = 5, C(5, 5) = 1$
 $5 + 10 + 1 = 16$

5a. 0100010000

5b. 0000100001

5c. 0000000011

6a. $n = 5$

6b. $r = 12$

6c. 4 separators

6d. 12 donuts + 4 separators = 16

6e. $r + n - 1 = 12 + 5 - 1 = 16$

6f. $C(16, 12)$ or $C(16, 4)$.

6g. $C(16, 12) = 1,820$

7. 20 pieces of fruit, 2 separators: $C(22, 20)$.
 $C(22, 20) = 231$