

Workshop 8: Counting

Use the following to answer questions 1-12:

In the questions below suppose that a “word” is any string of seven letters of the alphabet, with repeated letters allowed.

1. How many words are there?
2. How many words end with the letter T?
3. How many words begin with R and end with T?
4. How many words begin with A or B?
5. How many words begin with A or end with B?
6. How many words begin with A or B and end with A or B?
7. How many words begin with A or B or end with A or B?
8. How many words begin with a vowel and end with a vowel?
9. How many words begin with a vowel or end with a vowel?
10. How many words begin with AAB in some order?
11. How many words have no vowels?
12. How many words have exactly one vowel?
13. Find the number of words of length eight of distinct letters of the alphabet so that the words do not have both A and B in them.

Use the following to answer questions 14-18:

In the questions below consider all bit strings of length 12.

14. How many begin with 110?
15. How many begin with 11 and end with 10?
16. How many begin with 11 or end with 10?
17. How many have exactly four 1s?
18. How many have exactly four 1s and none of these 1s are adjacent to each other?
19. How many permutations of the seven letters A, B, C, D, E, F, G are there?
20. How many permutations of the seven letters A, B, C, D, E, F, G have E in the first position?

21. How many permutations of the seven letters A, B, C, D, E, F, G have E in one of the first two positions?
22. How many permutations of the seven letters A, B, C, D, E, F, G do not have vowels on the ends?
23. How many permutations of the seven letters A, B, C, D, E, F, G have the two vowels before the five consonants?
24. How many permutations of the seven letters A, B, C, D, E, F, G have A immediately to the left of E ?
25. How many permutations of the seven letters A, B, C, D, E, F, G neither begin nor end with A ?
26. How many permutations of the seven letters A, B, C, D, E, F, G do not have the vowels next to each other?

Use the following to answer questions 36-40:

In the questions below let A be the set of all bit strings of length 10.

36. How many bit strings of length 10 are there?
37. How many bit strings of length 10 begin with 1101?
38. How many bit strings of length 10 have exactly six 0s?
39. How many bit strings of length 10 have equal numbers of 0s and 1s?
40. How many bit strings of length 10 have more 0s than 1s?

Use the following to answer questions 41-44:

In the questions below suppose you have 30 books (15 novels, 10 history books, and 5 math books). Assume that all 30 books are different. In how many ways can you

41. In how many ways can you put the 30 books in a row on a shelf?
42. In how many ways can you get a bunch of four books to give to a friend?
43. In how many ways can you get a bunch of three history books and seven novels to give to a friend?
44. In how many ways can you put the 30 books in a row on a shelf if the novels are on the left, the math books are in the middle, and the history books are on the right?
45. A class consists of 20 sophomores and 15 freshmen. The class needs to form a committee of size five.
 - (a) How many committees are possible?
 - (b) How many committees are possible if the committee must have three sophomores and two freshmen?

Use the following to answer questions 64-67:

In the questions below suppose you have a class with 30 students — 10 freshmen, 12 sophomores, and 8 juniors.

64. In how many ways can you put all 30 in a line?
65. In how many ways can you put all students in a line so that the freshmen are first, the sophomores are in the middle, and the juniors are at the end?
66. In how many ways can you get a committee of 7?
67. In how many ways can you get a committee of 4 freshmen and 3 sophomores?
68. Using the ordinary alphabet and allowing repeated letters, find the number of words of length 8.
69. Using the ordinary alphabet and allowing repeated letters, find the number of words of length 8 that begin and end with T.
70. Using the ordinary alphabet and allowing repeated letters, find the number of words of length 8 that begin and end with the same letter.
71. Using the ordinary alphabet and allowing repeated letters, find the number of words of length 8 that have exactly one B.
72. Using the ordinary alphabet and allowing repeated letters, find the number of words of length 8 that have at least one C.
73. Using the ordinary alphabet and allowing repeated letters, find the number of words of length 8 that begin with L or end with R.
74. How many ways are there to select 6 students from a class of 25 to serve on a committee?
75. How many ways are there to select 6 students from a class of 25 to hold six different executive positions on a committee?