Exercises: Probability and Counting

1

One environmental hazard is overexposure to airborne asbestos. In a sample of 10 public buildings over 20 years old, three were found to be insulated with materials that produce an excess of asbestos particles. What is the approximate probability that another building of this type will have this problem? What method are you using to assign this probability? Write down the mathematical formula that expresses the method.

2

When a woman is a carrier of classical hemophilia, there is a 50% chance that a male child will inherit the disease. If a carrier gives birth to two sons, what is the probability that both boys will have the disease? What approach to probability are you using to answer the question?

3

Evaluate each of the following expressions:

$9!$, $6!$, $_7P_3$, $_6P_2$, $_5P_5$, $_6P_6$

$_9C_4$, $_8C_3$

$\binom{8}{5}$, $\binom{8}{0}$, $\binom{8}{7}$

4

A firm employs 10 programmers, 8 systems analysts, 4 computer engineers and 3 statisticians. A team will consist of 3 programmers, 2 systems analysts, 2 computer engineers and 1 statistician.

(a) In how many ways can a team be chosen?

(b) If a customer insists that one particular computer engineer is assigned, in how many ways can a team be chosen?

5

A computer system uses passwords that consist of five letters followed by a single digit.

(a) How many passwords are possible? Assume English-Latin letters with no diacritics.

(b) How many passwords consists of three A's and two B's (in any order) followed by an even digit?

(c) If you forgot your password, but remember that it has the above characteristic, what is the probability that you would guess the right password on your first try?