

Probabilities : first exercises

Exercise n°1

A jar contains one red marble, two blue marbles and three green marbles. Niki draws one marble from the jar, and then Tom draws a marble from those remaining.

Consider the following events:

A: "Niki draws a red marble"

B: "Tom draws a red marble"

C: "Tom draws a blue marble"

- 1- Make a tree diagram to show all the possible outcomes
- 2- Are the event A and B mutually exclusive? Why? Are they independent? Why?
- 3- What is the probability that Niki draws a red marble and Tom draws a blue marble?
Express your answer as a fraction in its lowest terms
- 4- What is the probability that tom draws a blue marble?
- 5- Given that Tom has drawn a blue marble, what is the probability that Niki had drawn a red marble?
- 6- Are the events A and C independent? Why?

Exercise n°2

Give your answers with three significant figures

- a) You draw two cards from a deck containing 52 cards, what is the probability that
 - a. both of them are face cards (king, queen, or jack)?
 - b. At least one of them is a heart?

- b) A man goes to the dentist. Five of his teeth are rotten and the other 27 are in good condition. The dentist removes two teeth at random. What is the probability that they are both rotten?

Exercise n°3

The probability that a man has an argument with his wife over breakfast is $\frac{1}{4}$. If he has an argument with his wife, the probability that he then takes his secretary out to lunch is $\frac{2}{3}$, whereas if he has no argument the probability is $\frac{1}{6}$.

- a) On any particular day, what is the probability that he takes his secretary out to lunch?
- b) Given that he is having lunch with his secretary, what is the probability that he had a peaceful breakfast with his wife?

Exercise n°4

A shampoo company asked 120 people about the type of shampoo (from brand A,B and C) they bought.

Brand A was bought by 40 people, brand b by 30 people and brand C by 25.

Both brands A and B (and possibly C as well) were bought by 8 people, B and C (and may be A) were bought by 10 people and A and C (and may be B) by 7 people.

All three brands were bought by 3 people

- a- Represent the information in a Venn diagram
- b- If a person is selected at random, find the probability that:
 - 1- She buys at least one of the brands
 - 2- She buys at least two of the brands
 - 3- She buys brand B, given that she buys only one type of shampoo

Exercise n°5

At technical controls of cars they've noted that 28% of the cars have brake problems and 12% have headlight problems. Among the cars that have brake problems, one out of seven has also lighting problems. Let's consider a car chosen at random; Draw a tree diagram and determine the probabilities of the following events:

L: "the car has lighting problems"

B: "the car has break problems"

A: "the car has lighting problems knowing that it has break problems"

E: "the car has both break and lighting problems"

F: "the car has break problems knowing that it has lighting problems"

G: "the car has no problem at all"

Exercise n°6

The door to a block of flats is protected by code lock. The code is made of three numbers followed by two letters; The numbers are among the 10 digits and the letters are those of the alphabet (26 in all)

A burglar intends to sneak into the building.

- 1- How many codes can possibly be made?
- 2- The thief tries a code at random. What's the probability that he succeeds?
- 3- The burglar knows the two letters in the right order. Same question
- 4- He knows the two letters and the three digits but he doesn't know their order.
Same question
- 5- He knows that the letters are D and G and the digits are odd ones. Same question.
If the digits are even, what difference does it make?

Exercise n°7

In a class of 30 students, 16 of them like sports, 21 like music and 5 like neither sports nor music. A student is chosen at random and asked what he likes.

- 1- make a diagram or a table showing all the categories and their numbers
- 2- What are the probabilities of the following events:
A: "the student likes both sports and music" B: "He likes sports only"
- 3- Now, three students are interviewed about the same matter. What are the probabilities of:
C: "all of them like music"
D: "neither of them like sports"
E: "One at least of them like both sports and music"
F: "one and only one of them likes music"