



1. Counts

E.11039 Anne and Jean bought 630 pink sugared almonds and 810 white sugared almonds, which they put in a bag. We assume that the sugared almonds are indistinguishable to the touch.

- How many candies did Anne and Jean buy in total?
- Anne randomly picks a candy from the bag. What is the probability that she will get a white candy? Give the probability as an irreducible fraction.

E.11041 Students organize a game for their class in which prizes can be won. To do this, they place in an urn three black balls numbered from 1 to 3, and four red balls numbered from 1 to 4, all indistinguishable by touch.

One ball is drawn at random from the urn.

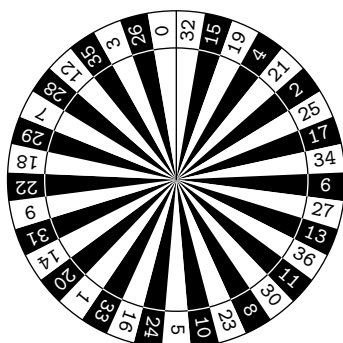
- What is the probability of drawing a red ball?
- What is the probability of drawing a ball whose number is an even number?

E.11038

In the casino, roulette is a game of chance in which each player bets at will on one or more numbers.

A ball is thrown onto a spinning wheel, numbered from 0 to 36.

The ball has the same probability of stopping on each number.



- Explain why the probability of the ball stopping on number 7 is $\frac{1}{37}$.
- Determine the probability that the marble stops on a square that is both black and even.
- Determine the probability that the marble stops on a number less than or equal to 6.
 - Deduct the probability that the marble stops on a number greater than or equal to 7.
 - A player claims that there are more than 3 chances in

4 of getting a number greater than or equal to 7. Is he right?

E.11040

Recall that a deck of 32 cards consists of four families (*clubs, diamonds, hearts, spades*). Each family consists of eight cards: 7, 8, 9, 10, jack, queen, king and ace.

The random experiment consists of drawing a card at random from this deck 32 cards.

♥	♦	♠	♣
As	As	As	As
R	R	R	R
D	D	D	D
V	V	V	V
10	10	10	10
9	9	9	9
8	8	8	8
7	7	7	7

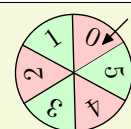
- What is the probability of getting the 8 of spades? Justify your answer.
- What is the probability of getting a king or a heart? Justify your answer.

E.11213

Game 1: A bag contains five balls that are indistinguishable to the touch, one of which bears the letter *N*, two bear the letter *G*, and two bear the letter *P*.



Game 2: A wheel with six identical angular sectors numbered from one to six.



- We consider game 1.
We pick a ball at random from this wheel and note the letter written on the chosen ball.
We consider that we have won if we pick the letter *G*.
Show that the probability of winning with this game is $\frac{2}{5}$.
- Consider game 2.
Spin the wheel and note the number written on the sector pointed to by the arrow.
You win if you land on a prime number.
What is the probability of winning this game?
- Which game has the lowest probability of winning?
 - Propose a list of balls to add so that the probability of winning with game 1 is $\frac{1}{4}$.

2. Probability and double entry table

E.11215 Here is a double-entry table showing the optional language chosen in a class of 34 students:

- Complete the following table:

	German	Spanish	Total
Boys		10	17
Girls			
Total	19		

- 2 a What is the probability of randomly selecting a student who has chosen German as a foreign language?
- b What is the probability of selecting a girl who has chosen Spanish as a foreign language?

E.9245     In the window of a store A are presented a total of 45 models of shoes. Some are designed for the city, others for sports and come in three different colors: black, white or brown.

- 1 Complete the following table:

Model	For the city	For the sport	Total
Noir		5	20
Blanc	7		
Marron		3	
Total	27		45

- 2 A random shoe model is chosen from this display case.
- a What is the probability of choosing a black model?
- b What is the probability of choosing a sports model?
- c What is the probability of choosing a brown colored city model?
- 3 In the store window B , there are 54 models of shoes, of

which 30 are black.

A shoe model is randomly selected from the A store window and then from the B store window.

In which of the two windows is there a greater chance of getting a black model? Justify.

E.11150    The school administration reviews the number of students enrolled in the half-board program:

- The school has 852 students;
- In total, there are 213 students enrolled in the “day student”;
- For girls, 123 girls are enrolled in the “day student” program and 312 are enrolled in the half-board program

- 1 Copy and complete the table below:

	Boys	Filles	Total
External			
Half-board			
Total			

Note: probabilities will be rounded to the nearest thousandth.

- 2 A student is chosen at random from this school:
- a What is the probability of choosing a boy enrolled as an external student?
- b What is the probability of choosing a boy?
- 3 When choosing a girl at random, what is the probability that this girl is enrolled as a “half-boarder”?

3. To conditional probability

E.9243     We are interested in a race held at the beginning of 2018. There are 80 participants, including 32 women and 48 men. The women wear red bibs numbered from 1 to 32. The men wear green bibs numbered from 1 to 48. There is therefore a red bib number o1 for a woman, and a green bib number o1 for a man, and so on...

- 1 What is the percentage of women participating in the race?
- 2 A host randomly draws a participant's bib number to award a consolation prize.
- a Consider event V : “The bib number is green”. What is the probability of event V ?
- b Consider event M : “The bib number is a multiple of 10”. What is the probability of event M ?
- 3 The host announces that the bib number is a multiple of 10. What is the probability that it belongs to a woman?

E.3767     A class of 3^{ème} consists of 25 students.

Some are day students, others are half-boarders.

The table below shows the composition of the class.

	Boys	Girls	Total
Day students		3	
Demi-pensionnaire	9	11	
Total			25

- 1 Copy and complete the table.
- 2 A student is chosen at random from this class.
- a What is the probability that this student is a girl?
- b What is the probability that this student is a day student?
- 3 If this student is a half-boarder, what is the probability that they are a boy?

E.5086    A jeweler buys a batch of 220 Tahitian pearls. A quality controller is interested in their shapes (*round or baroque*) and colors (*gray or green*).

- 77 beads are green in color, and of these 13 are round in shape;
- There are 176 baroque-shaped beads.

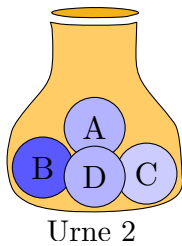
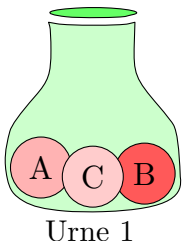
1 Copy and complete the table below:

	Rondes	Baroques	Total
Grises			
Vertes			
Total			

- Controller randomly draws a bead from the purchased bead lot
 - What is the probability that this bead is baroque in shape?
 - What is the probability of drawing a green baroque bead?
- Of the round beads, what is the probability that the controller will choose a green colored bead?

4. Experiments consisting of two trials without a choice tree

E.11571    There are two urns containing balls that are indistinguishable to the touch and marked with letters. Here is the contents of each urn:



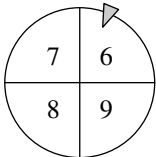
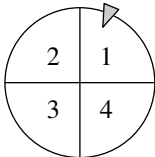
A ball is drawn at random from each urn and the word is formed using the two letters marked on these balls.

1 Complete the table below to obtain all the "words" possible in this game.

Urne 1 \ Urne 2	A	B	C	D
A				
B				
C				

2 What is the probability of obtaining a word whose letters are in alphabetical order?

E.9135     Mathilde spins two lottery wheels *A* and *B* each with four numbered sectors as in the diagram below:



The probability of obtaining each of the sectors of a wheel is the same. The arrows indicate the two sectors obtained.

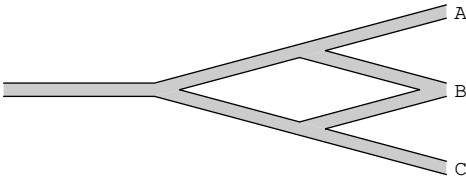
Mathilde's experiment is as follows: she spins the two wheels to obtain a two-digit number. The number obtained with the *A* wheel is the tens digit and the one with the *B* wheel is the units digit.

In the example below, it gets the number 27 (Wheel *A*: 2 and wheel *B*: 7)

- Write all the possible numbers from this experiment.
- Prove that the probability of getting a number greater than 40 is 0.25.
- What is the probability that Mathilde gets a number divisible by 3?

E.7915    Tell whether the statement below is true or false, carefully justifying the answer:

Scratch wants to meet up with a friend, but he has forgotten the end of the journey. He decides to finish his journey by taking, at intersections, a random right or left.



Assertion: the probability that he arrives at *A*, *B* or *C* is the same.

E.3771     Mr. Dubois is building a house and today he visits the construction site. He observes an electrician. He notices that this one has, beside him, 2 boxes.

- In the first, there are 40 round-ended screws and 60 flat-ended screws.
- In the second, there are 38 round-ended screws and 12 flat-ended screws.

- 1 The electrician randomly takes a screw from the first box. What is the probability that this screw has a round tip?
- 2 The electrician put this screw back in the first box. Therefore, the two boxes are unchanged.

He now takes, again at random, a screw from the first box and then a screw from the second box.

- a What are the different possible draws?
- b Show that he has more than a 50/50 chance of getting two different screws.

E.2638    The following random experiment is studied: two six-sided dice are thrown and the value of each dice is summed.

- 1 Complete the following table :

D0vert D0rouge	1	2	3	4	5	6
1						
2						
3						
4						
5						
6						

- 2 Determine the probabilities of the following events :
 - a Event A : “we get 8”.
 - b Event B : “a value greater than or equal to 6” is obtained.
 - c Event C : “One of the dice has the value 4 and the sum is greater than or equal to 7”.

E.9244     Two well-balanced six-sided dice are rolled simultaneously, one red and one green. We call “score” the sum of the numbers rolled on each die.

- 1 What is the probability of the event C : “the score is 13”? What is such an event called?
- 2 In the two-way table given below, fill in each box with the sum of the numbers rolled on each die.

D0vert D0rouge	1	2	3	4	5	6
1						
2						
3				7		
4		6				
5						
6						

- a Complete, without justification, the table given above.
 - b Give the list of possible scores.
- 3
 - a Determine the probability of the event D : “the score is 10”.
 - b Determine the probability of the event E : “the score is a multiple of 4”.
 - c Demonstrate that the score obtained has as much chance of being a prime as a number strictly greater than 7.

E.9242    We study the following random experiment : we throw two six-sided dice and note the value of each of the two dice.

- 1 Complete the following table :

D0vert D0rouge	1	2	3	4	5	6
1						
2						
3						
4						
5						
6						

- 2
 - a Event D : “both dice have the same value”.
 - b Event E : “we get 6 and 4”.
 - c Event F : “one of the dice has the value 3 and the other has an even value”.

E.6277



During the filling of a lock, Jules and Paul, on board their barge, wait while playing dice. These dice are balanced.

- When rolling a die, is the probability of getting a "1" the same as getting a "5"? Explain.
- Jules rolls a red die and a yellow die at the same time. For example, he can get 3 on the red die and 4 on the yellow die, this is one of the possible outcomes. Explain why the number of possible outcomes when he rolls his two dice is 36.

Jules suggests that Paul play with these two dice (*one yellow and one red*). He explains the rule to her :

- The winner is the first to earn a total of 1 000 points.
- If, on a throw, a player makes two "1", that is, a pair* of "1", he wins 1 000 points (*and donates the game*).
- If a player gets a pair of 2? he gets 100 times the value of the 2, or :
 $2 \times 100 = 200$ points
- Similarly, if a player gets a pair of 3 or 4 or 5 or 6, he gets 100 times the value of the die or $3 \times 100 = 300$, or ...
- If a player gets a result other than a pair (*example 3 on the yellow die and 5 on the red die*), he gets 50 points.

* On appelle une paire de 1 quand on obtient deux "1", une paire de 2 quand on obtient deux "2"...

- Paul already has 2 throws and has earned 650 points. What is the probability that he wins the game on his third throw?

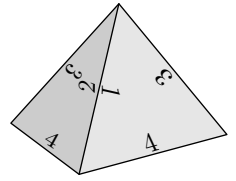
In this question, if the work is not completed, still leave a record of the search on the copy. It will be taken into account in scoring.

E.11570



Two tetrahedral dice have their bases numbered from 1 to 4.

By rolling the two dice and adding the two bases obtained, determine the probability of obtaining 6.

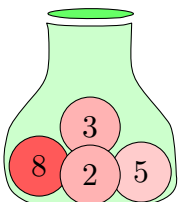


5. Experiments consisting of two tests and tree of possibilities

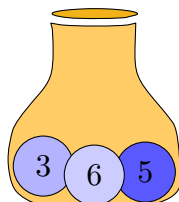
E.10619



Consider the two urns below containing balls with numbers written on them :



Urne A



Urne B

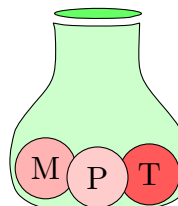
The random experiment consists of drawing a ball at random from urn A and a ball at random from urn B and adding the two numbers written on these two balls.

- Construct the tree of possibilities for this random experiment.
- What is the probability of obtaining an odd number?

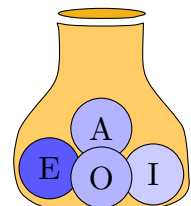
E.10618



Consider the two urns below containing balls inscribed with a letter :



Urne A



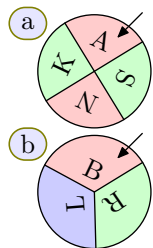
Urne B

The random experiment consists of drawing a random ball from the A urn and a random ball from the B urn. What is the probability of forming a feminine possessive determiner with the two letters on these balls?

E.11214



Consider the two wheels shown opposite, where a letter is written on each of its parts. By rotating these wheels, we randomly write "not random 2 letters: first the letter chosen by the (a) wheel, then the letter chosen by the (b) wheel.



- 1 Using a probability tree, write the set of words that can be obtained by this game.
- 2 The rule defines that a move is winning if the two letters of the word obtained are ranked in ascending order.

Determine the probability of winning.

E.7925



Thomas has a watch that he composes by assembling dials and bracelets of several colours. For this, he has:

- two dials: one red and one yellow
- four bracelets: one red, one yellow, one green and one black.

- 1 How many possible assemblies are there?

He randomly chooses a dial and a strap to compose his watch.

- 2 Determine the probability of getting an all-red watch.
- 3 Determine the probability of getting a watch of only one color.
- 4 Determine the probability of getting a watch of two colors.

E.6285



In the game *rock-leaf-scissors* two players choose one of the following three "coups" at the same time:

- **stone** closing hand;
- **leaf** reaching out;
- **scissors** by spreading two fingers.

Here are the rules of the game:

- The **stone** beats the **scissors** (*breaking them*);
- The **scissors** beats the **leaf** (*cutting it*);
- The **leaf** beats the **stone** (*by wrapping it*);
- It is a draw if both players choose the same move (*e.g. if each player chooses "feuille"*).

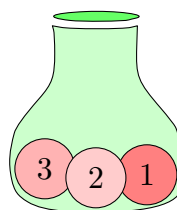
I play a game against an opponent who plays randomly and I choose to play "stone".

- 1 a What is the probability that I will lose the game?
b What is the probability that I will not lose the game?
- From now on, I play two games in a row and choose to play "stone" each game. My opponent plays randomly.
- 2 Construct the opponent's possibility tree for these two games. Note P , F , C for stone, leaf, scissors.
 - 3 Infer:
 - a The probability that I win both games.
 - b The probability that I will not lose either game.

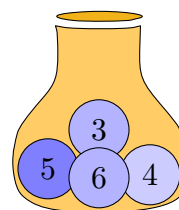
E.10620



Consider the two urns below containing balls inscribed with a number:



Urne A



Urne B

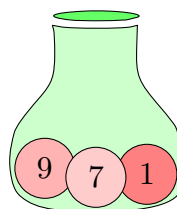
The random experiment consists of drawing a ball at random from the A urn and a ball at random from the B urn, and summing the two numbers on these two balls. We'll look at the number of divisors in this sum.

- 1 Construct the possibility tree for this random experiment.
- 2 What is the probability of obtaining a number with exactly 4 divisors?

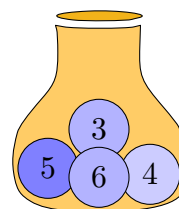
E.11151



Consider the two urns below containing balls inscribed with a number:



Urne A



Urne B

The random experiment consists of drawing a ball at random from the A urn and a ball at random from the B urn, and summing S the two numbers on these two balls.

- 1 Construct the possibility tree for this random experiment, indicating the sum obtained for each elementary event.
- 2 What is the probability that the sum S is an even integer?

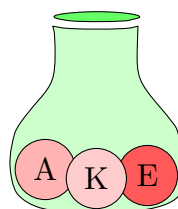
6. Experiments consisting of three tests

E.11572

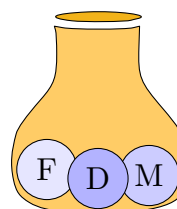


There are two urns containing balls that are indistinguishable to the touch and marked with letters.

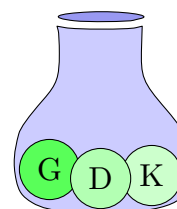
Here is the contents of each of these urns:



Urne 1



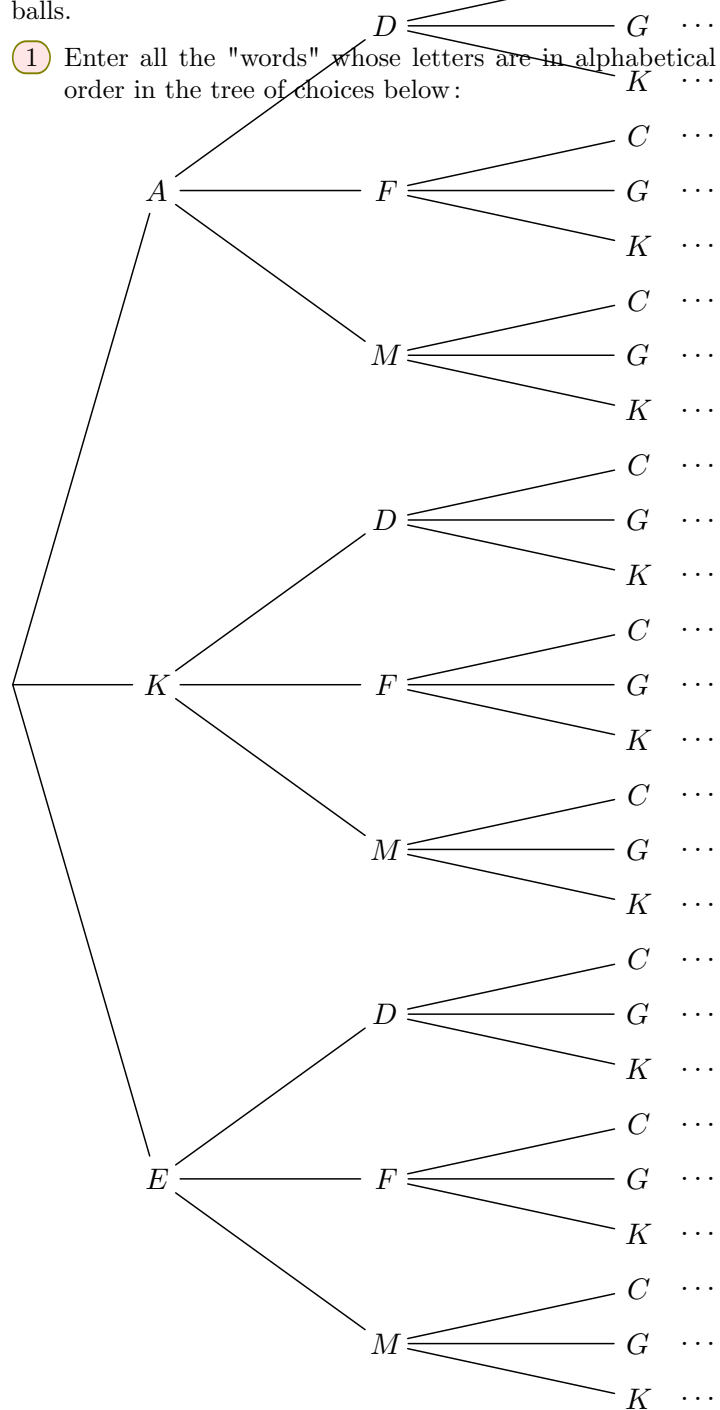
Urne 2



Urne 2

We draw a ball from urn 1, then from urn 2, then from urn 3. We compose the word with the three letters written on these balls.

- ① Enter all the "words" whose letters are in alphabetical order in the tree of choices below:

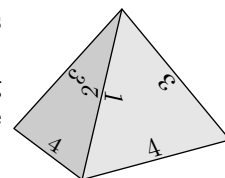


- ② What is the probability of obtaining a word whose letters are in alphabetical order?

E.11573 🔑 🍬 🎒

Three tetrahedral dice have their bases numbered from 1 to 4.

By rolling the three dice and multiplying the three bases obtained, determine the probability of obtaining an odd product.

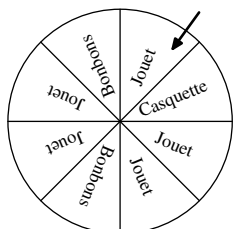


7. Event meeting

E.9138 🔑 🍬 ⚠️

A stand at a fair, a wheel is spun to win a prize (*a toy, cap or candy*). An arrow points to the winning sector on the wheel.

It is assumed that each sector has the same chance of being designated.



- ① a What is the probability of the event "we win sweets"?
b Define with a sentence the opposite event of the event "wins candy".

- c What is the probability of the event defined at ① b)?
② Let be the event "we win a cap or bonbons". What is the probability of this event?

E.3769     On the carousel “Carroussel”, there are four horses, two donkeys, a rooster, two lions and a cow.

On each animal there is a seat. Vaite sits down randomly on the carousel.

- 1 What is the probability that she is riding a horse? Express the result as an irreducible fraction.

- 2 Consider the following events:

- A : “Vaite rides a âne”;
- C : “Vaite rides a coq”;
- L : “Vaite rides a lion”.

- a Define with a sentence the event *not* L and then calculate its probability.
- b What is the probability of the event: “ A or C ”.

8. Equiprobability: determining the number of employees

E.9250    A bag contains tokens each bearing a consonant or vowel of the alphabet. These tokens are indistinguishable by touch. The random experiment consists of choosing a token at random from the bag and noting the letter on the token.

We know that the bag contains 12 vowels and that the event “draw a vowel” has probability $\frac{1}{5}$.

We note n the number of tokens with a consonant.

- 1 Justify that the integer n is a solution of the equation:
$$\frac{12}{12+n} = \frac{1}{5}$$
- 2 Determine the number of tokens in the bag with a consonant.

E.5045     A bag contains 6 red chips and 2 yellow chips. A random draw is made, with each of the tokens having the same probability of being drawn.

- 1 Compute the probability of drawing a red token.
- 2 Calculate the probability of drawing a yellow token.
- 3 Green tokens are added to this bag. The bag then contains 6 red tokens, 2 yellow tokens, and the green tokens. We randomly draw a token at random.

Knowing that the probability of drawing a green chip is equal to $\frac{1}{2}$, calculate the number of green chips.

E.9248     In an urn containing green

and blue balls, we randomly draw a ball and look at its color. The ball is then returned to the urn and the balls are mixed. The probability of getting a green ball is $\frac{2}{5}$.

- 1 Explain why the probability of getting a blue ball is equal to $\frac{3}{5}$.
- 2 Paul made 6 draws and got a green ball each time. On the 7^e draw, will he be more likely to get a blue ball than a green ball?
- 3 Determine the number of blue balls in this urn knowing that there are 8 green balls.

E.3277     A bag contains 10 red balls, 6 black balls and 4 yellow balls. Each of these balls has the same probability of being drawn. One ball is drawn at random.

- 1 Calculate the probability that this ball is red.
- 2 Calculate the probability that this ball is black or yellow.
- 3 Calculate the sum of the two probabilities found in the previous two questions. Was the outcome predictable? Why?
- 4 Blue balls are added to this bag. The bag then contains 10 red balls, 6 black balls, 4 yellow balls, and the blue balls.

One ball is drawn at random. Knowing that the probability of drawing a blue ball is equal to $\frac{1}{5}$, calculate the number of blue balls.

9. Modification of the outcomes of the experiment

E.9249    An urn contains 8 red balls and 12 green balls indistinguishable by touch. Consider the random experiment of drawing a ball at random from this urn.

- 1 Determine the probability of the event “the ball drawn is red”.
- 2 We add n green balls to the urn.
 - a Express the number of balls in the urn as a function of n .
 - b Determine the value of n so that the event “the ball drawn is rouge” has a probability of 1 chance in 6 of occurring.

E.4021     Three people, Aline, Bernard and Claude, each have a bag of marbles. Each person draws a marble at random from their bag.

- 1 Bag contents are as follows:

Aline's bag:	Bernard's bag:	Claude's bag:
5 marbles rouges	10 billes rouges et 30 billes noires	100 billes rouges et 3 billes noires

Which of these people has the highest probability of drawing a red marble?

- 2 We want Aline to have the same probability as Bernard of drawing a red marble. Before the draw, how many

black marbles must be added to Aline's bag to do this?

E.5087    A farmer owns two pens.

- the first pen contains 28 hens and 21 geese;
- the second pen contains 20 hens and 3 geese.

10. Probability and frequency

E.5916     Tom rolls two perfectly balanced six-sided dice fifty times. He notes in a spreadsheet the sums obtained at each throw. He obtains the following table:

B 3		f _x = B 2 = M 2												
	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	somme obten ue	2	3	4	5	6	7	8	9	10	11	12	Total	
2	nombre d'apparitions	3	1	4	6	9	9	7	3	5	3	0	50	
3	fréquence d'apparition	0,06												

- 1 What formula did he enter in cell M2 to verify that he had taken 50 results?
- 2 Tom entered the formula =B2/M2 in cell B3. He gets an error message when he pulls it into cell C3. Why?
- 3 Tom deduces from reading this table that if he rolls these two dice, he has no chance of getting the sum 12. Is he right or wrong?

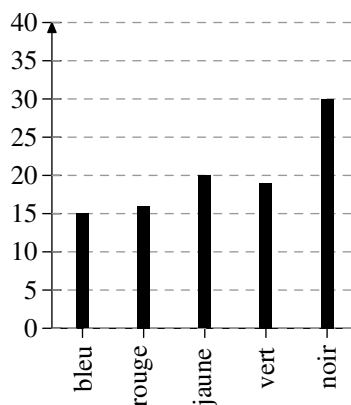
E.9141     An opaque bag contains 120 balls all indistinguishable by touch, of which 30 are blue. The remaining balls are red or green.

Consider the following random experiment: draw a ball at random, look at its color, put the ball back in the bag, and mix.

- 1 What is the probability of drawing a blue ball? Write the result as an irreducible fraction.
- 2 Cecile performed 20 times this random experiment and got 8 times a green ball. Choose the number of green balls in the bag (*no justification is required*) from the following answers:
 - a 48
 - b 70
 - c On can't know
 - d 25
- 3 The probability of drawing a red ball is equal to 0.4.
 - a What is the number of red balls in the bag?
 - b What is the probability of drawing a green ball?

- 1 Determine the probability of choosing a hen from the first pen.
- 2 How many geese must be added to the second pen so that the probability of choosing a hen in that pen is the same as the probability of getting a hen in the first pen?

E.4334   



A cubic die has 6 painted sides: one blue, one red, one yellow, one green and two black.

- 1 This die is rolled a hundred times, and the color of the face obtained is noted each time. The diagram opposite shows the distribution of colors obtained in these hundred throws.
 - a Determine the frequency of appearance of the color yellow.
 - b Determine the frequency of appearance of the color black.
- 2 The die is assumed to be balanced.
 - a What is the probability of obtaining the color yellow?
 - b What is the probability of obtaining the color black?
- 3 Explain the discrepancy between the frequencies obtained in question 1 and the probabilities found in question 2.

E.3378     Consider the two urns below :



and the following randomized experiment :

- randomly draw a black ball, note its number ;
- draw a white ball, note its number ;
- then calculate the sum of 2 numbers drawn.

- 1 The experiment was simulated with a spreadsheet, using the function `ALEA()` to obtain the numbers of the balls drawn at random.

Here are the results of the first experiments :

	A	B	C	D
1	Exp Ørience	NumØro de la boule noire	NumØro de la boule blanche	Somme
2	n°1	4	2	6
3	n°2	1	2	3
4	n°3	1	2	3
5	n°4	3	3	6
6	n°5	3	5	8
7	n°6	4	3	7

- a Describe the experiment $n^{\circ}3$.

- b Of the following 4 formulas, copy the one written in the box D5 :

• `=2*A` • `=B4+C4` • `=B5+C5` • `=SUM(D5)`

- c Can we get the sum 2? Justify.

- d What are the possible draws that yield the sum 4? What is the largest possible sum? Justify.

- 2 On a second spreadsheet, we copied the results obtained with 50 experiments, with 1 000 experiments, with 5 000 experiments and calculated the frequencies of the different sums.

	A	B	C	D	E	F	G	H	I
1	Somme	3	4	5	6	7	8	9	E ctif total
2	E ctif	5	10	9	8	8	8	2	50
3	FrØq	0,1	0,2	0,18	0,16	0,16	0,16	0,04	
4									
5	Somme	3	4	5	6	7	8	9	E ctif total
6	E ctif	79	161	167	261	166	72	94	1000
7	FrØq	0,079	0,161	0,167	0,261	0,166	0,072	0,094	
8									
9	Somme	3	4	5	6	7	8	9	E ctif total
10	E ctif	405	844	851	1221	871	410	398	5000
11	FrØq	0,081	0,1688	0,1702	0,2442	0,1742	0,082	0,0796	

- a What is the frequency of the sum 9 during the first 50 experiments? Justify.

- b What formula was written in the box B7 to obtain the frequency of the sum 3?

- c Give an estimate of the probability of obtaining the sum 3.

11. Frequency stabilization

E.9132     Two ballot boxes are available :

- a blue urn containing three blue balls numbered: 2, 3, and 4.
- a red urn containing four red balls numbered: 2, 3, 4, and 5.

In each urn, the balls are indistinguishable by touch and have the same probability of being drawn.

We are interested in the following random experiment :

“A blue ball is drawn at random and its number noted, then a red ball is drawn at random and its number noted.”

Example: if we draw the blue ball numbered 3, then the red ball numbered 4, the resulting draw will be noted (3;4).

We specify that the draw (3;4) is different from the draw (4;3).

- 1 We define the following two events :
“We get two prime numbers” and “The sum of the two numbers is equal to 12”.

- a For each of the previous two events, say whether it is possible or impossible when performing the random experiment.

- b Determine the probability of the event “We get two prime numbers”.

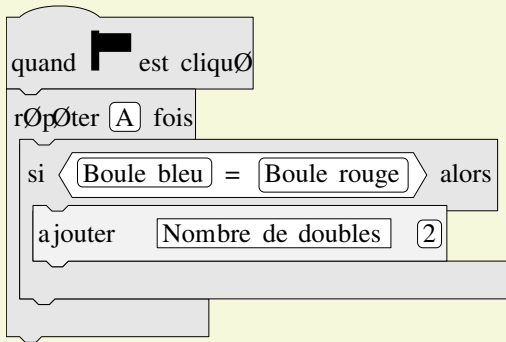
- 2 We get a “double” when both balls drawn have the same

number.

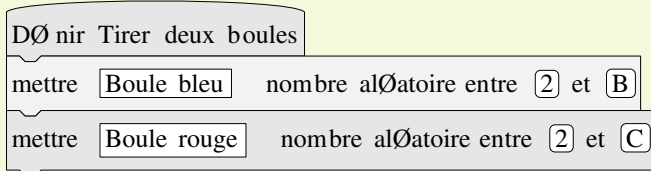
Justify that the probability of getting a “double” in this experiment, $\frac{1}{4}$.

- 3 In this question, no justification is expected.
We wish to simulate this experiment 1 000 times.
To do this, we started writing a program, at this point, still incomplete. Here are some screen shots :

Main script :



Block "Shoot two boules":



Blue ball, red ball and Number of doubles are variables.

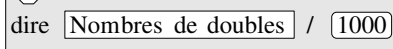
The block is to be inserted into the main script.

- With what numbers should the letters A , B and C be replaced?
- In the main script, indicate where to place the block :
- In the main script, indicate where to place the block :
- We want to get the frequency of occurrence of the number of "doubles" obtained. Which of the statements below should be placed at the end of the main script after the loop "repeat"?

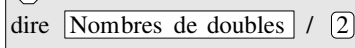
Proposition 1:



Proposition 2:



Proposition 3:



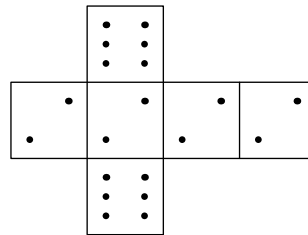
E.9136



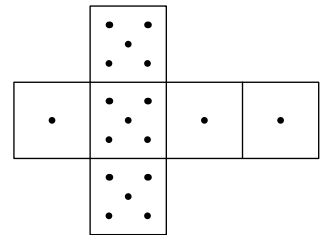
Two friends Armelle and Basile are playing dice using dice that are well balanced but have had their faces changed. Armelle plays with the A die and Basile plays with the B die.

During a game, each player rolls his or her die and whoever gets the highest number wins a point.

Here are the patterns of the two dice :



Patron du $d6A$

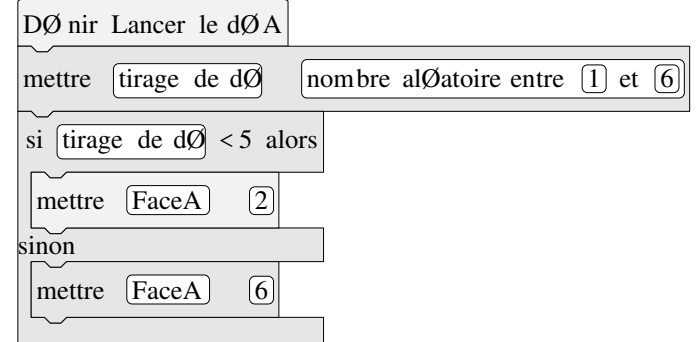
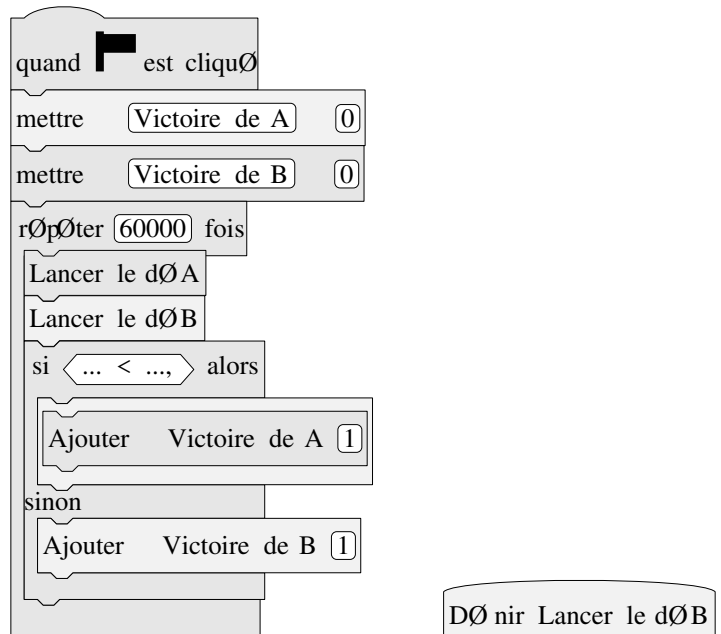


Patron du $d6B$

- Can a game end in a draw?
- If the result obtained with the die A is 2, what is the probability that Basile wins a point?
 - If the result obtained with the die B is 1, what is the probability that Armelle wins a point?

The players want to compare their chances of winning. They decide to simulate a match of sixty thousand duels using a computer program.

Here is part of the program they made.



We specify that the expression (*random number between 1 and 5*) equiprobably returns a number that can be 1;2;3;4;5 or 6.

The variables FaceA and FaceB store the results of the dice

A and B . For example, the variable FaceA can take either the value 2 or the value 6, since these are the only numbers present on the die A .

The variables *Victory of A* and *Victory of B* count player wins.

- 3
 - a When running the subroutine “Roll the die A ”, what is the probability that the variable FaceA takes the value 2?
 - b Copy the line 7 from the main program, completing it.
 - c Write a subroutine “Roll the die B ” that simulates the

roll of the die B and stores the resulting number in the variable FaceB .

- 4 After running the main program, we get the following results:
 $\text{Victory of A} = 39\,901$ $\text{Victory of B} = 20\,099$
 - a Calculate the player’s winning frequency A , expressed as a percentage. A value approximated to the nearest 1 % will be given.
 - b Conjecture the probability that A wins against B .

12. Probability and arithmetic

E.9246     A bag contains 20 balls each with the same probability of being drawn. These 20 balls are numbered from 1 to 20. One ball is drawn at random from the bag.

All results will be given as irreducible fractions.

- 1 What is the probability of drawing the numbered ball 13?
- 2 What is the probability of drawing an even numbered ball?
- 3 Is it more likely to get a ball with a number that is a multiple of 4 than to get a ball with a number that is a factor of 4?
- 4 What is the probability of drawing a ball with a number that is a prime?

E.9247     There are in an urn 12 balls indistinguishable by touch, numbered from 1 to 12. We want to draw a ball at random.

- 1 Is it more likely to get an even number or else a multiple of 3?
- 2 What is the probability of getting a number less than 20?
- 3 We remove from the urn all balls whose number is a factor of 6. We again want to draw a ball at random. Explain why the probability of getting a number that is a prime number is then 0.375.

E.9241     Damien has made three perfectly balanced, but somewhat peculiar six-sided dice.

On the faces of the first die are written the six smallest strictly positive even numbers:

2 ; 4 ; 6 ; 8 ; 10 ; 12

On the faces of the second die are written the six smallest positive odd numbers.

On the faces of the third die are written the six smallest prime numbers.

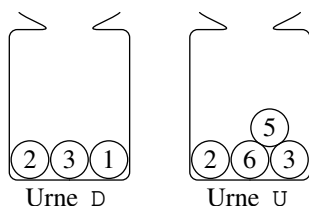
After rolling a die, the number obtained is written on the top face.

- 1 What are the six numbers on the second die?
What are the six numbers shown on the third die?
- 2 Zoe chooses the third die and rolls it. She squares the number she gets. Leo chooses the first die and rolls it. He squares the number he gets.
 - a Zoe got a square equal to 25. What was the number read on the die she rolled?
 - b What is the probability that Leo will get a greater square than the one Zoe got?
- 3 Mohamed chooses one of the three dice and rolls four times in a row. He multiplies the four numbers he gets and gets 525.
 - a Can we determine the numbers obtained in the four throws? Justify.
 - b Can we determine which die Mohamed chose? Justify.

13. Share

E.7966   

Two urns contain numbered balls that are indistinguishable to the touch. The diagram below shows the contents of each of the urns.



A two-digit integer is formed by randomly drawing a ball from each urn:

- the tens digit is the number of the ball from the urn D ;
- the units digit is the number of the ball from the urn U .

Example: by drawing the ball ① de l’urne D et ensuite la boule ⑤ from the urn U , we form the number 15.

- 1 Are we more likely to form an even number than an odd one?
- 2
 - a Without justification, indicate the prime numbers that can be formed in this experiment.
 - b Show that the probability of forming a prime is equal to $\frac{1}{6}$.
- 3 Define an event whose probability of occurrence is equal to $\frac{1}{3}$.