France Educational Curriculum Alignment

The presentations offered by The Educated Choices Program provide support for teaching and learning of the following standards:

Management & Digital Science- Tech Path, Specialist Courses, High School		Environment and Modern Agriculture	Healthful Eating
Theme 1: -From the Individual to the Actor -How to Set the Different Guys of an Organization -How an Individual Becomes an Actor in an Organization -How to Reconcile Effective Management Human Resources and Work Cost	The individual, who has characteristics, becomes an actor within the general organization hierarchy, by the formal and informal relations that are established in work activity and within the framework of responsibilities. Students will be able to: ● Communicate and interact ● Bring skills to the organization ● Register, through its functions in an organization chart, in collective action Relationships within organizations can be conflicting or consensual, from scenarios, videos, games roles, observation of situations communication, oral simulations, analysis of digital practices, the exploitation of stories, articles or testimonials. Students will be able to: ● Characterize the behaviors individuals within groups ● Identify good practices in digital identity management	✔	

Educated Choices Program

	- Identify what, in relationships, reveals the culture and values of organization - Describe, characterize and analyze the communication situations from their components and relational phenomena that they contribute to development Human resources management involves trade-offs for: - Preserving - Enhancing - Rewarding To make the choice between internalization and the outsourcing of certain human resources based on social data and simplified accounting, curriculum vitae or documentation professionally. Students will be able to: - Distinguish the approach by qualification of the approach by skill - Measure work activity using relevant indicators - Evaluate the overall cost of the work with the charges - Assess labor productivity - Establish a link between the conditions of work and the behavior of organization members		
Theme 2: -Digital and Collective Intelligence -Technology That Transforms	In management activities, information is both the source and the result of the action individual and collective. Systems of information (SI) combine to make it a strategic resource for all organizations, from the use of an environment digital and observation of a system information. Students will be able to: Identify the origin of information and the stages of its transformation	✔	

-Resource Information -How Sharing Information Contributes to the Emergence of Collective Intelligence -Does Digital Create Organizational Agility or Rigidity?	(from given to information, from information to knowledge and its transmission) ● Distinguish character data staff and the constraints of their use ● Manipulate open data to create information Organization-wide as well as of society, digital technologies offer new forms of collaboration and cooperation. Mastery of conditions of development and use of collective information is an issue for organizations. As part of activities within an organization, real or simulated, and from the use of a work environment collaborative. Students will be able to: ● Be in an environment digital (roles, rights, responsibilities) ● Understand the variety of uses and impacts ● Contribute to the digital architecture overall of the organization Through their structuring role, the information systems help to shape the organization. They can determine rigid modes of operation and binding but also be an organizational source of agility and opportunities of development Based on examples and an implementation situation that exploits solutions digital, especially online. Students will be able to: ● Identify the different stages of a management process and to map it the sequence ● Identify the effects of automation traffic management activities information, work organization and the role of the actors ● Situate the role of the actors and information system applications in a given management process ● Imagine a new organization of tasks with intelligence integration		

Theme 3: -Value Creation and Performance -Can we measure each actor's contribution by creation of value? -Does the creation of value drive overall performance?	Many actors (internal and external) contribute to the creation of value for an organization. Staff, shareholders, partners, customers, etc. It is still necessary to be able to measure the value and distinguish its different forms. Based on the comparative study of different organizational situations, the student is able to: ● Identify the role of the different actors involved in the valuable creative process ● Characterize the different types of value and relate them to stakeholder expectations ● Identify, based on the notion of value added, the possible distributions in order to meet the expectations of stakeholders, taking into account the constraints of management ● Use a balance sheet and an income statement ● Identify the financial value produced by an organization (mainly a company) ● Use simple indicators to identify the value produced by organization ● Analyze the relationship between price, cost and the level of quality of a product or of a service The analysis of the performance of the organization must be considered in its different sizes. It is right to measure the different performances using relevant indicators in a comparative and evolutionary perspective. From the observation of situations organization and qualitative information and quantitative data, extracted including a dashboard. Students will be able to: ● Identify the relevant indicators that appreciate the performance of organization ● Make comparisons in the time and in space to situate the	✔	

	performance of an organization ● Identify, in an organization, what the aspirations of the different actors may constitute constraints and/or opportunities in the search for performance ● Perceive the character potentially contradictory of the different types of performance		
Theme 4: -Time and risk -What account of time is in the management of the organization? -Improvement of the performance is she without risk?	The horizon of the organization is ordered in terms staggered; short, medium and long term, with varying degrees of information value available. Moreover, the division of time into periods within an organization is linked to different constraints: ● institutional (working hours, publication of results, etc.), ● sectoral (seasonal fluctuations, length of the cycle of production, opening of markets, etc.), ● technologies To better cope with time constraints, the organization can use tools and methods assistance in forecasting and standardizing the value over time. Based on the study of organizational situations, variety and simulation tools, results inquiry. Students will be able to: ● Explain how time is a source uncertainty ● Identify, in relation to the proposed context, the characteristic times of the organization ● Explain why, within the organization, there may be retentions and asymmetry information ● Identify the importance of information updated to make relevant decisions ● Use prospective data to identify the impact of a change in the activity	✔	

	of an organization on its results (break-even point) ● Use prospective data to identify the impact of a change in the activity of an organization on its cash flow (approach budgetary) The search for performance improvement may be accompanied by risks, or even generate risks for the organization, society and the environment. Taking them into account requires identifying the origins. Those related to hazards and those related to time and greater or lesser aptitude leaders to take risks and get out of comfort zones. Organizations adapt by putting in place risk management procedures to limit the consequences. Based on factual information (testimonials from organization leaders, stories business, etc.), data and tools for simulation. Students will be able to: ● Identify the external risks to which the organizations face ● Identify the risks induced by a decision in a given organizational context ● Assess the impact of the risk on the organizational performance measure the ecological consequences of the performance research		

Mathematics, High School		Environment and Modern Agriculture	Healthful Eating
Numbers and Calculations	Goals: This part extends the theme "Numbers and calculations" of cycle 4. Students will be able to: ● deepen knowledge of the various types and sets of numbers; ● develop the practice of numerical or algebraic calculation; ● work on inequalities; ● solve problems modeled by equations or inequalities that come down to the first degree Students will be able to: ● Encounter real numbers as abscissas of points on a number line, and more broadly as numbers for measuring magnitudes. They compare them and they learn that there are irrational numbers and frame them with decimal or rational numbers. ● Understand that calculators and software do calculations approaches. In connection with a deepening of the study of multiples and divisors, they consolidate the practice of calculation on fractions. The highlighting of the power of the literal calculation as a tool for solving a problem, already encountered in college, remains an important objective. ● Face situations, internal or external to mathematics, in which a modeling is necessary, involving variables, algebraic expressions, equations or inequalities. Internal situations are an opportunity to reactivate the knowledge of the college, in particular on the themes	✔	✔

	"Space and geometry" and "Sizes and measures" (lengths, areas, volumes, angles, speeds). ● Balance the training, on the one hand by proposing varied applications and of the concepts and techniques studied, on the other hand, by ensuring the acquisition of automatisms, by the frequent practice of routine calculations. In particular, we will r ● Reactivate the exact decimal forms of 4 3 , 4 1 , 2 1 and fractions 5 k for k in {1,2,3,4}, and rounded of 3 1 and 3 2 -The History of Mathematics The seemingly familiar notion of number is not self-evident. Two examples: 1. The crisis caused by the discovery of irrationals among Greek mathematicians, the difference between "real numbers" and "calculator numbers". It is also to highlight the gain in efficiency and generality brought by the literal calculation, by explaining that a large part of mathematics has been able to develop only as the elaboration progresses, over the centuries, effective symbolisms. 2. It is possible to study ancient texts authors such as Diophantus, Euclid, Al-Khwarizmi, Fibonacci, Viète, Fermat, Descartes and highlight their algorithmic aspects. -Manipulate real numbers In Cycle 4, students studied inequalities to compare numerical values. The notion of interval, presented as a set of numbers verifying inequalities, is News. Absolute value notation is introduced to express the distance between two real numbers and characterize the intervals of a given center. Any other use is excluded in the program.		

	-Contents Set $\mathbb{R}$ of real numbers, number line. $\mathbb{R}$ intervals. Ratings. Notation $\|a\|$. Distance between two real numbers. Representation of the interval [a - r , a + r] then characterization by the condition $\|x - a\| \leqslant r$. Set $\mathbb{D}$ of decimal numbers. Decimal bracket from a real number to 10 -n close. Set $\mathbb{Q}$ of rational numbers. Irrational numbers; examples provided by geometry, for example 2 and π. -Expected capacities Students will be able to: ● Associate each point of the number line with a unique real number and reciprocally. ● Represent an interval of the number line. Determine if a real number belongs to a given interval. ● Give a bracket, of given amplitude, of a real number by decimals. ● In the context of problem solving, round up by giving the number of significant figures adapted to the situation studied. Demonstrations: The rational number: 3 1 is not decimal. The real number 2 is irrational. Algorithm Example. Students will be able to: ● Determine by scanning a frame of 2 of amplitude less than or equal to 10 -n Possible insights: unlimited decimal expansion of a real number. Observation, on examples, of the periodicity of the decimal expansion of rational numbers, since a periodic decimal expansion corresponds to a rational.		

	Students will be able to: • Use the notions of multiple, divisor and prime number -Contents ℕ and ℤ notations. Definition of the notions of multiple, divisor, even number, odd number. -Expected capacities Students will be able to: • Model and solve problems mobilizing the notions of multiple, divisor, even number, odd number, prime number. • Present fractional results in irreducible form. -Demonstrations For a numerical value of a, the sum of two multiples of a is a multiple of a. The square of an odd number is odd. Algorithm Examples. Students will be able to: • Determine if a natural number a is a multiple of a natural number b. • For given integers a and b, determine the greatest multiple of a less than or equal to b. • Determine if a natural number is prime. • Use Literal Calculation		

	-Contents Calculation rules on relative integer powers, on square roots. Relationship 2 has |a|. Identities has 2 -b 2 = (a - b)(a + b), (a + b)2 = has 2 + 2ab + b 2 and (a - b)2 = has 2 - 2ab + b 2 Students will be able to: ● Know how to use both ways. ● Provide simple examples of calculation on algebraic expressions, in particular on fractional expressions. ● Produce the sum of inequalities. Product of an inequality by a positive, negative real, in connection with the direction of variation of an affine function. ● Provide a set of solutions of an equation, an inequality. -Expected capacities Students will be able to: ● Perform numerical or literal calculations involving powers, square roots, fractional writings. On simple cases of relations between variables (for example U = RI, d = vt, S = πr 2, V = abc, V = πr 2 h), expressing one variable in terms of the others. Case of a relationship of the first degree ax + by = c. ● Choose the most appropriate form (factored, reduced expansion) of an expression by view to solving a problem. ● Compare two quantities using their difference, or their quotient in the case positive. ● Model a problem by an inequality. ● Solve a first degree inequality.		

	-Demonstrations Whatever the positive real numbers a and b, we have ab a b . If a and b are strictly positive real numbers, a b a b. For a and b positive reals, geometric illustration of the equality (a + b)2 = has 2 + 2ab + b 2. Example Algorithm Students will be able to: ● Determine the first power of a given positive number greater or less than at a given value. Possible insights Expansion of (a + b + c)2. Development of (a + b)3. Inequality between geometric and arithmetic means of two real numbers strictly positive.		
Geometry	Goals Geometry develops capacities of representation. It is important to rely on figures, according to various methods (freehand drawing, diagram, neat figure, use of software). As part of problem solving, the use of software dynamic geometry by students gives them greater autonomy and encourages their initiative. Students will be able to: ● Consolidate the notions of geometric configurations discussed in college and extend their study; ● Introduce the plane vectors as a tool for studying problems arising from mathematics and other disciplines, especially physics; ● Continue the study of identified geometry, which links numbers, algebraic calculations, functions and geometry and is a useful tool for other disciplines. Especially, introduce the notion of a set of points of the plane described by an equation, by explaining the case of straight	✔	✔

	line equations. ● Discover vectors, which are an effective tool for demonstrating in geometry and for modeling in physics. They manipulate them in the plane provided with an orthonormal reference. ● Deepen their knowledge of plan configurations, have access to ● Utilize new tools for analyzing geometric figures, and solving problems. ● Study right-hand equations, make the connection between geometric, algebraic, and functional. The program is placed within the framework of plane geometry. However, the teacher can propose activities mobilizing the notions of geometry in space seen in college (sections, areas, volumes) enriched with those studied in second (vectors). It is appropriate to highlight the intervention of geometry in the other parts of the program, including "Numbers and Calculations" and "Functions". -History of Mathematics The progress made by Descartes' "coordinate method", then by the notion of vectors, make it possible to effectively link geometry, physics and calculation. We can evoke Greek mathematics, highlighting the central role of geometry in the birth of the idea of demonstration as well as the weak development of algebra in Antiquity, partly due to the systematic reliance on geometry.		

-Manipulate Plane Vectors

In cycle 4, the notion of translation is the subject of a first approach, based on
observation of its effect on flat configurations and various manipulations, especially on a grid or using dynamic geometry software. Here we go press second to introduce the notion of vector. The teacher can define vector operations from coordinates, or start with their geometric construction. In any case, the relation $\vec{u} = x \imath + y \jmath$ is highlighting. Chasles' relation is introduced to illustrate the addition of vectors, but is not the subject of a specific work.

-Contents

- Vector M' associated with the translation which transforms M into M'.
- Direction, direction and standard.
- Equality of two vectors. Rating a.
- Null vector.
- Sum of two vectors related to the sequence of translations.
- Relationship of Chales.
- Orthonormal basis.
- Coordinates of a vector.
- Expression of the norm of a vector.
- Expression of the coordinates of AB depending on those of A and B.
- Product of a vector by a real number.
- Collinearity of two vectors.
- Determinant of two vectors in an orthonormal basis, collinearity criterion.
- Application to alignment, parallelism.
- Expected capacities.

	- Represent vectors geometrically. - Geometrically construct the sum of two vectors. Students will be able to: - Represent a vector whose coordinates are known. - Read the contact details of a vector. - Calculate the coordinates of a sum of vectors, of a product of a vector by a real number. - Calculate the distance between two points. Calculate the coordinates of the middle of a segment. - Characterize alignment and parallelism by collinearity of vectors. - Solve problems using the most suitable representation of vectors. -Demonstration - Two vectors are collinear if and only if their determinant is zero. - Possible deepening - Vector definition of homotheties. Students will be able to: - Solve geometry problems -Contents - Orthogonal projection of a point on a line. - Expected capacities Students will be able to: - Solve plane geometry problems on simple or complex figures (triangles, quadrilaterals, circles).		

	● Calculate lengths, angles, areas and volumes. ● Deal with optimization issues. -Demonstrations The orthogonal projection of point M onto a straight line Δ is the furthest point on the straight line Δ close to point M. cos2 trigonometric relationship (α) + sin2 (α) = 1 in a right triangle. -Possible insights Students will be able to: ● Prove that the altitudes of a triangle are concurrent. Expression of the area of a triangle: ab sinC 2 1. Formula of Al-Kashi. The intersection point of the perpendicular bisectors is the center of the circumscribed circle. Represent and characterize the straight lines of the plane In cycle 4, the pupils encountered the equations on the right to represent the functions affines. In second, they extend the study to the general form of right-hand equations. In this section, the plan is equipped with an orthonormal reference. -Contents ● Direction vector of a line. ● Right equation: Cartesian equation, reduced equation. ● Slope (or directing coefficient) of a straight line not parallel to the ordinary axis.		

	-Expected capacities Students will be able to: ● Determine a line equation from two points, a point and a vector director or a point and the slope. ● Determine the slope or a direction vector of a given line by an equation or a graphical representation. ● Draw a line knowing its Cartesian or reduced equation. ● Establish whether three points are aligned or not. ● Determine if two lines are parallel or secant. ● Solve a system of two linear equations with two unknowns, determine the point of intersection of two secant lines. -Demonstration Students will be able to: ● Using the determinant, establish the general form of a straight line equation. Algorithm Examples ● Study the alignment of three points in the plane. ● Determine a straight line equation passing through two given points. Possible insights ● Set of points equidistant from a point and the abscissa axis. ● Represent, on examples, of parts of the plane described by inequalities on the coordinates.		

Functions	Goals In cycle 4, the pupils gradually discovered the notion of function, and manipulated different modes of representation: algebraic expression, table of values, graphical representation, and calculation programs. They know the basic vocabulary: variable, function, antecedent, image and the notation $f(x)$. According to the mode of representation chosen, they determine an image or antecedents of a number by a function. They have studied linear functions, affine functions and their graphical representation. Students will be able to: ● consolidate the notion of function, as expressing the dependence of a variable by relation to another; ● exploit various registers, in particular the algebraic register and the graphic register; ● extend the range of reference functions; ● study the notions related to variations and extrema of functions. The functions defined on an interval of $\mathbb{R}$ make it possible to model phenomena continuously. Students can be confronted with examples of functions defined on $\mathbb{N}$ for model discrete phenomena. The notation u(n) is then used. The modeling of a dependency by a function appears in areas that are very varied: geometry in the plane or in space, biology, economics, physics, and social science. The modeling of time-dependent phenomena, the variable then being noted t is highlighted Digital tools are used: dynamic geometry software, for the representation graphics and use cursors; Python, spreadsheet or calculator, to highlight the program aspect	✔	✔

	-Calculation Initially, students discover, manipulate and verbalize certain properties (parity, monotonicity over an interval, etc.) on the reference functions. These properties generalize little by little to any functions. Their mastery is an objective at the end of the year. Their formalization is an opportunity to work on quantifiers. -History of Mathematics One can evoke the very slow elaboration of the notion of function, from Antiquity until the current codification by Dirichlet, highlighting some important steps: Newton, Leibnitz, Euler. We then underline the importance of algebraic notation. Students will be able to: ● Build up a repertoire of reference functions ● Build up a repertoire of mental images of curves representative of the reference functions, on which to rely when studying the function properties. -Contents Square, inverse, square root, cube functions: definitions and representative curves. Expected capacities:		

	-For two given numbers a and b and a reference function f, compare f(a) and f(b) numerically or graphically. -For affine, square, inverse, square root, and cube functions, solve graphically or algebraically an equation or an inequality of the type $f(x) = k$, $f(x) < k$. -Demonstration Students will be able to: ● Study the relative position of curves with the equation y = x, y = x 2 , y = x 3 , for x ⩾ 0. ● Represent functions algebraically and graphically -Contents Real-valued function defined on an interval or a finite union of intervals of $\mathbb{R}$. Representative curve: the curve with equation $y = f(x)$ is the set of points of the plane whose coordinates (x,y) satisfy $y = f(x)$. Even, odd function. Geometric translation. -Expected capacities Students will be able to: ● Use the equation $y = f(x)$ of a curve: membership, calculation of coordinates. Modeling by functions of situations resulting from mathematics, from other disciplines. ● Solve an equation or an inequality of the type $f(x) = k$, $f(x) < k$, choosing an adapted method: graphic, algebraic, software. ● Solve an equation, a product or quotient inequality, using a table of signs. ● Solve, graphically or using a numerical tool, an equation or inequality		

	of the type $f(x) = g(x)$, $f(x) < g(x)$. Possible deepening ● Study the parity of a function in simple cases. ● Study variations and extrema of a function -Contents Increase, decrease, monotony of a function defined on an interval. Picture variations. Maximum, minimum of a function over an interval. For an affine function, interpretation of the leading coefficient as a rate increase, variations according to its sign. Variations of the functions square, inverse, square root, cube. -Expected capacities Students will be able to: ● Link graphical representation and table of variations. ● Graphically determine the extrema of a function over an interval. ● Use dynamic geometry or computer algebra software, the calculator or Python to describe the variations of a given function by a formula. ● Connect direction of variation, sign and straight line representing an affine function. -Demonstration ● Variations of the square, inverse, square root functions. ● Algorithm Examples ● For a function whose table of variations is given, algorithms numerical approximation of an extremum (sweeping, dichotomy). ● Algorithm for calculating the approximate length of a portion of a curve representative of function.		

	• Possible deepening; connect the representative curves of the square root function and the square function to ℝ+.		
Statistics and Probabilities	Goals In terms of numerical information, the students worked in cycle 4 numbers, frequencies, proportions, percentages, proportionality coefficient, rate of change, coefficient multiplier. The objective is to consolidate and extend this work by studying situations multiplicative: proportion of proportion, successive or reciprocal evolutions. Students will be able to: • Distinguish whether a percentage expresses a proportion or an evolution. In descriptive statistics, students studied mean, median and range. • Introduce the notion of weighted average and two indicators of dispersion: interquartile range and deviation kind. In cycle 4, students worked on the basic notions of probability: experiment random, outcome, event, probability. They have built their intuition on situations with concrete tests based on equiprobability, then by simulating the repetition of identical tests and independently to observe the stabilization of frequencies. Students will be able to: • Calculate probabilities in contexts involving one or two tests. • Formalize the notion of law (or distribution) of probability in the finite case based on the language of sets and we specify the first elements of calculation of probabilities.	✔	✔

	We insist on the fact that a law of probability (for example equiprobability) is an assumption of the chosen model and cannot be demonstrated. The choice of model can result from implicit assumptions of equiprobability (for example, toss of balanced coins or dice, random draw from a population) that it is advisable to explain; it can also result from the application of a popularized version of the law of large numbers, where a model is built from observed frequencies for a real phenomenon (for example: thumbtack throwing, sex of a child at birth). In all cases, a clear distinction is made between the abstract probabilistic model and the real situation. -History of Mathematics The history of probability provides a framework for identifying the elements of mathematization by chance. An example is the problem of parties, also known as the Chevalier de Méré, the exchange of letters between Pascal and Fermat on this point then the work of Pascal, Fermat and Huygens who as a result. The problem of the Duke of Tuscany or the work of Leibniz on the game of dice can also be mentioned. Students will be able to: ● Use quantitative information and descriptive statistics -Contents ● Proportion, percentage of a subpopulation in a population.		

	- Reference sets included in each other: percentage of percentage. - Evolution: absolute variation, relative variation. - Successive evolutions, reciprocal evolution: relation on the coefficient multipliers (product, inverse). - Central tendency indicators of a statistical series: weighted average. - Linearity of the mean. - Dispersion indicators: interquartile range, standard deviation. -Expected capacities Students will be able to: - Exploit the relationship between numbers, proportions and percentages. Dealing with simple situations involving percentages of percentages. - Exploit the relationship between two successive values and their rate of change. - Calculate the overall evolution rate from the successive evolution rates. - Calculate a reciprocal rate of evolution. - Describe verbally the differences between two statistical series, based on indicators or given graphical representations. - For real data or from a simulation, read and understand a function written in Python returning the mean m, the standard deviation s, and the proportion of elements belonging to [m - 2s,m + 2s]. - Model chance, calculating probabilities. The set of issues is finished. -Contents - Set (universe) of outcomes. - Events.		

- Meeting, intersection, complementary.
- Law (distribution) of probability.
- Probability of an event: sum of the probabilities issues.
- Relation P(A ∪ B) + P(A ∩ B) = P(A) + P(B).
- Enumeration using tables and trees.

-Expected capacities

Students will be able to:

- Use theoretical reference models (dice, balanced piece, draw with equiprobability in a population) understanding that probabilities are defined a priori.
- Build a model from observed frequencies, clearly distinguishing model and reality.
- Calculate probabilities in simple cases: random experiment in twos or threes trials.

-Sampling

In connection with the “Algorithms and programming” part, we define the notion of sample. The objective is to make people perceive, in an experimental form, the law of large numbers, sampling fluctuation and the principle of estimating a probability by a frequency observed on a sample.

-Contents

- Random sample of size n for a two-outcome experiment.
- Popularized version of the law of large numbers: "When n is large, except exception, the observed frequency is close to the probability. »
- Principle of estimating a probability, or a proportion in a population,

	by a frequency observed on a sample. -Expected capacities Students will be able to: ● Read and understand a Python function that returns the number or frequency of success in a sample of size n for a two-way randomized experiment. ● Observe the law of large numbers using a Python or spreadsheet simulation. ● Simulate N samples of size n from a random experiment with two outcomes. If p is the probability of an outcome and f its observed frequency in a sample, calculate the proportion of cases where the difference between p and f is less than or equal to not 1		
Algorithmic and Programming	The algorithmic approach has been, since the beginning, an essential component of mathematical activity. In cycle 4, in mathematics and technology, students learned to write, debug and run a simple program. Consolidation of the achievements of cycle 4 is proposed around two essential ideas: the notion of function; programming as the production of a text in a computer language. Students will be able to: ● describe algorithms in natural language or in a programming language; make some of them using a simple program written in a programming language. ● Simulate textual programming; ● Interpret, complete or modify more complex algorithms.	✔	✔

	An easy-to-use programming language is needed for writing computer programs. The chosen language is Python, interpreted language, concise, widespread and able to operate in a variety of environments. Students are trained to switch from natural language to Python and vice versa. Algorithms have a natural place in all fields of mathematics and problems thus treated must be related to the other parts of the program (functions, geometry, statistics and probability, logic) but also with other disciplines or everyday life. On the occasion of the writing of algorithms and small programs, it is advisable to transmit students the requirement of accuracy and rigor, and to train them in practical systematic checks and controls. While programming, students revisit the notions of variables and functions in a different form. -History of Mathematics The texts mentioned in the theme "Numbers and calculations' ' indicate a concern of algorithms throughout history. When a historical text has an algorithmic aim, transforming the methods it presents into an algorithm, or even into a program, or conversely, is an opportunity to work on changes of register that give meaning to mathematical formalism. Students will be able to: ● Use variables and elementary instructions -Contents		

	Integer, Boolean, float, character string computer variables. Assignment (denoted ⟵ in natural language). Instruction sequence. Conditional statement. Bounded loop (for), unbounded loop (while). -Expected Capacities Students will be able to: ● Choose or determine the type of a variable (integer, float or character string). ● Design and write an assignment statement, a sequence of statements, a conditional statement. ● Write a formula allowing a calculation combining variables. ● Program, in simple cases, a bounded loop, an unbounded loop. ● In more complex cases: read, understand, modify or complete an algorithm or a program. -Notion of Function -Contents Functions with one or more arguments. Function returning a random number. Statistical series obtained by repeatedly calling such a function. -Expected capacities Students will be able to: ● Write simple functions; read, understand, modify, complete more complex functions. ● Call a function. ● Read and understand a function that returns an average, a standard deviation. No knowledge of the lists is not required. ● Write functions that return the numerical result of a random		

	experiment, of a repetition of independent random experiments.		
Set and Logic Vocabulary	The learning of mathematical notations and logic is transversal to all program chapters. Also, it is important to work on them first in contexts where they naturally present themselves, then to foresee times when the concepts and types of reasoning are studied, after having been met several times in a situation. Students will be able to: ● Know the notions of element of a set, subset, belonging and inclusion, meeting, intersecting and complementary, and knowing ● Use the corresponding basic symbols: ∈, ⊂, ∩, ∪, as well as the notation of sets of numbers and intervals. ● Meet the notion of a couple. For the complement of a subset A of E, we use the probability notation $\bar{A}$, or E\A notation. Students will be able to: ● Recognize what a mathematical proposition is, to use variables to write mathematical propositions; ● Read and write propositions containing the connectors “and”, “ Where " ; ● Formulate the negation of simple propositions (without implication or quantifiers); mobilize a counter-example to show that a proposition is false; to formulate an implication, a logical equivalence, and to mobilize them in a simple reasoning; ● Formulate the reciprocal of an implication; read and write propositions containing universal or existential quantification (the ∀ and ∃ symbols are out of the program).	✔	✔

	• Produce reasoning by disjunction of cases and by the absurd.		