

# France

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## Introduction

### Overview of Education System

France's education system is a state responsibility with the Minister of National Education responsible for defining and implementing education policy. The Ministry's goals are to distribute resources allocated to education, guarantee equal access to this public service, and monitor education policies. Specifically, the government defines education policies and curricula; recruits, trains, and manages education staff; determines the status of schools and the rules under which they function; and appoints teachers and administrative staff. Only the state government may define and establish diploma levels.

France provides free education for all students in primary and secondary public schools, and schooling is compulsory at the primary and lower secondary levels from ages 3 to 16. Children must be registered at a primary school at the beginning of the school year (September) in the calendar year in which they reach the age of 3. The proportion of students enrolled in public state education in France is 86% at the primary level and 78.9% at the secondary level.<sup>1</sup> Private schools are primarily religious, mostly Roman Catholic, and are subject to monitoring by the state.

Since 2016, education at the primary and lower secondary levels has been organized in four cycles: Cycle 1 encompasses early learning (first, second, and third years of preprimary); Cycle 2 encompasses fundamental learning (Grades 1 to 3); Cycle 3 encompasses the consolidation of learning (Grades 4 to 6), with Grade 6 being the first grade of lower secondary schooling; and Cycle 4 encompasses the deepening (enhancing) of learning (Grades 7 to 9).

Hence, primary schooling is divided into two levels: the preprimary level (*maternelle*) covering Cycle 1 and the elementary level covering Cycles 2 and 3 up to Grade 5. Preprimary school (*maternelle*) has been compulsory since September 2019 and accepts children ages 3 to 5, as well as at age 2 when places are available. In 2022, 98% of children in France ages 3 to 5, as well as 9.9% of 2-year-old children, attended a *maternelle* school.<sup>2</sup>

Schooling at the primary level comprises 8 years from the first year of preprimary to Grade 5. At the primary level, many schools have classes composed of two or more grade levels. In 2022, the average class size in elementary schools was 21.8 students. In 2022, there were 43,568 public schools and 4,652 private schools in France at the elementary level.<sup>3</sup> Promotion from primary to secondary education is automatic.

Secondary education is divided into two successive levels: lower secondary and upper secondary. Lower secondary education comprises Grades 6 to 9 (typically ages 11 to 15). In 2022, the number of students enrolled in public and private lower secondary schools in France was 3.4 million.<sup>4</sup> In 2022–2023, there were 5,316 public schools and 1,660 private schools in France at the lower secondary level.<sup>5</sup> Upon completion of Grade 9, students attend a general, technological, or a vocational upper secondary school that prepares them for the corresponding *baccalauréat*, a certification examination taken at the end of Grade 12. There are three types of *baccalauréats*:

- general *baccalauréat*, which was reformed in 2021
- technological *baccalauréat*, which includes tertiary science and technology, industrial science and technology, and laboratory science and technology
- vocational *baccalauréat*, which includes production and services sectors

As of 2021, students aiming for the general *baccalauréat* (about 59% of the age cohort) must choose three specific subjects among 13 from Grade 11.<sup>6</sup> Additionally, all students take core courses in mathematics, science, French, foreign languages, and philosophy.

### Use and Impact of TIMSS

At the fourth-grade level, France participated in the 2015, 2019, and 2023 TIMSS assessment cycles. At the eighth-grade level, France participated in the 1995, 2019, and 2023 TIMSS assessment cycles.

## The Mathematics Curriculum in Primary and Lower Secondary Grades<sup>7,8</sup>

France has a national curriculum that covers mathematics and science instruction; it has been renewed 12 times over a 95-year period. The 2015 mathematics curriculum was revised in July 2018 and again in July 2020. The curriculum is national and compulsory for all teachers and students, and it governs teacher practice. Teachers are responsible for building a coherent progression through the curriculum, adapting the pace of the curriculum to suit their students' abilities and needs, defining instruction strategies, and evaluating students. Since May 2019, annual progression benchmarks and end-of-cycle expectations in mathematics complement the school curricula, providing a balanced approach to the knowledge and skills targeted for students throughout the 3 years of each cycle.

The mathematics curriculum is organized into three themes from Grade 1 to Grade 6: Numbers and Calculations, Quantities and Measurements, and Space and Geometry. It is organized into five themes from Grade 7 to Grade 9: Numbers and Calculations; Data Handling and Functions; Quantities and Measurements; Space and Geometry; and Algorithms and Programming. Problem-solving is an important focus while making sure automatism (the body of knowledge and automated procedures immediately available in memory) are available. Regular and balanced practice of diverse activities enables the development of six specific skills

that are the major components of mathematical activity: researching, modeling, representing, reasoning, calculating, and communicating.

In the mathematics curriculum for Grades 1 to 3 (second cycle of primary school), problem-solving is at the center of students' mathematical activity, developing their ability to research, reason, and communicate. The written component of mathematical activity is essential. Students consolidate their understanding of whole numbers, which were already encountered in Cycle 1. The study of the four operations (addition, subtraction, multiplication, division) starts at the beginning of the second cycle with problems that help make sense of the operations, particularly problems involving quantities or their measurements.

Students work on skills including researching, modeling, representing, reasoning, calculating, and communicating.

Exhibit 1 lists expectations for three mathematics content areas at the end of Cycle 2.

### Exhibit 1: Expectations for Mathematics Content at the End of Cycle 2

Content Area (Theme)	Expectations at the End of Cycle 2
Numbers and Calculations	<ul style="list-style-type: none"> <li>• understand and use whole numbers to count, order, locate, and compare</li> <li>• name, read, write, and represent whole numbers</li> <li>• solve problems using operations and whole numbers</li> <li>• calculate using whole numbers</li> </ul>
Quantities and Measurements	<ul style="list-style-type: none"> <li>• compare, estimate, and measure lengths, masses, capacities, and durations</li> <li>• use the lexicon, units, and specific measurement instruments of these quantities</li> <li>• solve problems involving lengths, masses, capacities, durations, and prices</li> </ul>
Space and Geometry	<ul style="list-style-type: none"> <li>• locate and relate objects in space using directional representations</li> <li>• recognize, name, describe, and reproduce some solids</li> <li>• recognize, name, describe, reproduce, and construct some geometric figures</li> <li>• recognize and use the concepts of alignment, right angles, equality of length, center, and symmetry</li> </ul>

In continuity with the previous cycles, the mathematics curriculum for Cycle 3 (Grades 4 to 6) ensures the further development of the six major mathematics skills (researching, modeling, representing, reasoning, calculating, and communicating). Problem-solving is the main criterion for mastery of knowledge in all areas of mathematics. Cycle 3 aims to deepen the mathematics concepts covered in Cycle 2; to extend the field of study; to consolidate the automation of written calculation techniques introduced previously (addition, subtraction, and multiplication), as well as mental calculation results and procedures from Cycle 2; to construct new written (division) and mental calculation techniques; and to introduce new

concepts, such as decimal numbers, proportionality, and the study of new quantities (area, volume, and angle, in particular). The geometric activities in Cycle 3 are a continuation of those in Cycle 2. They are distinguished by a greater emphasis on reasoning and argumentation, which complements the perception and use of instruments. They are also an opportunity to frequent new representations of space (patterns; perspectives; front, side, and top views, etc.). In addition to the use of paper and pencil and the manipulation of concrete objects, digital tools are gradually introduced. Thus, the use of calculation and numbering software enables students to deepen their knowledge of the properties of numbers and operations, as well as increase the mastery of certain calculation techniques. Quantities are taught in a structured and explicit way, with a focus on sound knowledge of the units of the international system of measurement. The study of the prefixes of decimal units of measurement, in relation to units of numeration, facilitates understanding and learning of units of measurement for most of the quantities in Cycle 3.

Students work on skills including researching, modeling, representing, reasoning, calculating, and communicating.

Exhibit 2 lists expectations for three mathematics content areas at the end of Cycle 3.

### Exhibit 2: Expectations for Mathematics Content at the End of Cycle 3

Content Area (Theme)	Expectations at the End of Cycle 3
Numbers and Calculations	<ul style="list-style-type: none"> <li>• use and represent large whole numbers, simple fractions, and decimal numbers</li> <li>• calculate with integers and decimals</li> <li>• solve problems using operations on simple fractions and decimals</li> </ul>
Quantities and Measurements	<ul style="list-style-type: none"> <li>• compare, estimate, and measure geometric quantities with integers and decimal numbers: length (perimeter), area, volume, and angles</li> <li>• use lexicon, units, and instruments of measurement specific to these quantities</li> <li>• solve problems involving quantities (geometric, physical, and economic) using integers and decimals</li> </ul>
Space and Geometry	<ul style="list-style-type: none"> <li>• locate and relate objects in space using directional representations</li> <li>• recognize, name, describe, reproduce, represent, and construct usual figures and solids</li> <li>• recognize and use some geometric relationships (notions of alignment, belonging, perpendicularity, parallelism, equality of length, equality of angle, distance between two points, symmetry, enlargement, and reduction)</li> </ul>

For Grades 7 to 9 (Cycle 4), school staff decide on the distribution of content across grades. Hence, the content taught in Grade 8 might differ slightly from one school to another.

Exhibit 3 lists expectations for all five mathematics content areas at the end of Cycle 4.

### Exhibit 3: Objectives of Mathematics Curriculum Themes in Cycle 4

Content Area (Theme)	Expectations at the End of Cycle 4
Numbers and Calculations	<ul style="list-style-type: none"> <li>• use numbers to compare, calculate, and solve problems</li> <li>• understand and use concepts of divisibility and prime numbers</li> <li>• use calculations in algebra</li> </ul>
Data Handling and Functions	<ul style="list-style-type: none"> <li>• interpret, represent, and process data</li> <li>• understand and use basic probability concepts</li> <li>• solve proportionality problems</li> <li>• understand and use the notion of function</li> </ul>
Quantities and Measurements	<ul style="list-style-type: none"> <li>• calculate with measurable quantities; express results in appropriate units</li> <li>• understand the effect of some transformations on geometric shapes</li> </ul>
Space and Geometry	<ul style="list-style-type: none"> <li>• represent space</li> <li>• use plane geometry concepts to prove</li> </ul>
Algorithms and Programming	<ul style="list-style-type: none"> <li>• write, develop, and run a simple program</li> </ul>

### The Science Curriculum in Primary and Lower Secondary Grades<sup>9,10</sup>

In science, teachers are responsible for building a coherent progression through the curriculum, adapting the pace of the curriculum to suit their students' abilities and needs, defining instruction strategies, and evaluating students. Hence, the content taught in Grade 4 might differ slightly from one school to another.

The 2015 sciences curriculum (natural and technical systems) was revised in July 2018 and again in 2020. The sciences curriculum for Grades 1 to 3 (the second cycle of primary school) may be summarized as follows: Questioning the world is the preferred mode of teaching students to formulate questions, make suppositions, imagine exploratory devices, and propose answers. Through the detailed observation of reality in three fields—living, matter, and objects—an investigative approach provides knowledge of some characteristics of the living world, the observation and description of some natural phenomena, and an understanding of the functions and workings of simple objects.

Students work on the following skills: practicing scientific approaches; imagining, realizing; using appropriate tools and methods; practicing languages; mobilizing digital tools; adopting ethical and responsible behavior; and situating oneself in space and time.

Exhibit 4 lists expectations for three science content areas at the end of Cycle 2.

#### Exhibit 4: Expectations for Science Content at the End of Cycle 2

Content Area (Theme)	Expectations at the End of Cycle 2
What Is Matter?	<ul style="list-style-type: none"> <li>• identify the three states of matter and observe changes in state</li> <li>• identify a change in the state of water in a phenomenon of daily life</li> </ul>
How to Recognize the Living World?	<ul style="list-style-type: none"> <li>• know the characteristics of the living world, its interactions, and its diversity</li> <li>• recognize behaviors that are favorable to health</li> </ul>
What Are Technical Objects? What Needs Do They Meet? How Do They Work?	<ul style="list-style-type: none"> <li>• understand the function and functioning of manufactured objects</li> <li>• make a few simple electrical objects and circuits while observing basic safety rules</li> <li>• begin to appropriate a digital environment</li> </ul>

The sciences curriculum (science and technology) for Grades 4 to 6 (Cycle 3) is divided into four main themes: (1) Matter, Movement, Energy, Information; (2) Living Things, Their Diversity, and Their Functions; (3) Technical Materials and Objects; and (4) Planet Earth—Living Beings in Their Environment. Each of these themes enables the construction of concepts or notions that find their application in education for sustainable development. The concept of energy, progressively constructed, is present in each theme and links them.

Students work on the following skills: practicing scientific approaches; imagining, realizing; using appropriate tools and methods; practicing languages; mobilizing digital tools; adopting ethical and responsible behavior; and situating oneself in space and time.

Exhibit 5 lists expectations for the four content areas at the end of Cycle 3.

#### Exhibit 5: Expectations for Science Content at the End of Cycle 3

Content Area (Theme)	Expectations at the End of Cycle 3
Matter, Motion, Energy, Information	<ul style="list-style-type: none"> <li>• describe the states and constitution of matter on a macroscopic scale</li> <li>• observe and describe different types of motion</li> <li>• identify different sources of energy</li> <li>• identify a signal and information</li> </ul>
Living Things, Their Diversity, and Their Functions	<ul style="list-style-type: none"> <li>• classify organisms, using kinship to understand and explain the evolution of organisms</li> <li>• explain the varying food needs of humans, and the origin and techniques used to process and preserve food</li> <li>• describe how living things develop and become capable of reproduction</li> <li>• highlight the place and interdependence of different living beings in a food chain</li> </ul>

### Exhibit 5: Expectations for Science Content at the End of Cycle 3 (Continued)

Content Area (Theme)	Expectations at the End of Cycle 3
Technical Materials and Objects	<ul style="list-style-type: none"> <li>• identify the main changes in needs and objects</li> <li>• describe the functioning of technical objects, their functions, and constitutions</li> <li>• identify the main families of materials</li> <li>• collaborate to design and produce a piece of technology that satisfies a need</li> <li>• identify and understand communication and information management</li> </ul>
Planet Earth—Living Beings in Their Environment	<ul style="list-style-type: none"> <li>• locate Earth in the solar system and characterize the conditions of life on Earth</li> <li>• identify issues related to the environment</li> </ul>

In lower secondary schools in France, sciences are taught in two separate subject groups: (1) physics and chemistry, and (2) biology and earth science. Both subject groups are compulsory for Grade 8 students.

At Cycle 4, the study of sciences—physics, chemistry, life science, and earth science—enables young people to distance themselves from their beliefs about the world and enter into a scientific relationship with natural phenomena, the living world, and technology. This scientific approach is based on attitudes (curiosity, open-mindedness, questioning one’s own ideas, making the most of mistakes, etc.) and skills (observing, experimenting, measuring, reasoning, modeling, etc.). In this way, students understand that the knowledge they acquire and memorize, which is already useful to them, will necessarily need to be explored in greater depth, revised, and perhaps questioned, not only during the rest of their school career but also throughout their lives.

For Grades 7 to 9 (Cycle 4) in France, school staff decide on the distribution of content across grades. Hence, the sciences curriculum content taught in Grade 8 might differ slightly from one school to another.

Exhibit 6 lists the learning objectives in Cycle 4 in physics and chemistry, which is organized into four themes.

### Exhibit 6: Learning Objectives in Cycle 4 in Physics and Chemistry

Theme	Expectations at the End of Cycle 4
Organization and Transformation of Matter	<ul style="list-style-type: none"> <li>describe the constitution and states of matter</li> <li>describe and explain chemical transformations</li> <li>describe the organization of matter in the universe</li> </ul>
Movement and Interaction	<ul style="list-style-type: none"> <li>characterize a movement</li> <li>model an action exerted on an object by a force characterized by a direction, a sense, and a value</li> </ul>
Energy, Its Transfer and Conversion	<ul style="list-style-type: none"> <li>identify sources, transfers, conversions, and forms of energy</li> <li>use conservation of energy</li> <li>make simple electrical circuits and apply the laws of electricity</li> </ul>
Signals to Observe and Communicate	<ul style="list-style-type: none"> <li>characterize different types of signals (light, sound, radio, etc.)</li> <li>use properties of these signals</li> </ul>

Exhibit 7 lists the learning objectives in Cycle 4 in biology and earth science, which is organized into three themes.

### Exhibit 7: Learning Objectives in Cycle 4 in Biology and Earth Science

Theme	Expectations at the End of Cycle 4
Planet Earth, the Environment, and Human Action	<ul style="list-style-type: none"> <li>explore and explain certain geologic phenomena linked to the way Earth works</li> <li>explore and explain certain aspects of meteorology and climatology</li> <li>identify the main impacts of human activity, benefits, and risks on the surface of planet Earth</li> <li>envisage or justify responsible behavior with regard to the environment and the planet's limited resources</li> </ul>
Life and Its Evolution	<ul style="list-style-type: none"> <li>explain the organization and functioning of the living world and its dynamics at different scales of space and time</li> <li>establish causal relationships between different facts to explain the following: <ul style="list-style-type: none"> <li>the nutrition of organisms</li> <li>population dynamics</li> <li>classification of living organisms</li> <li>biodiversity (species diversity)</li> <li>genetic diversity of individuals</li> <li>the evolution of living organisms</li> </ul> </li> </ul>
The Human Body and Health	<ul style="list-style-type: none"> <li>explain some biological processes involved in the functioning of the molecular level: muscular, nervous, cardiovascular, and respiratory activity; brain activity and respiratory activity; nutrition and digestion; relationships with the microbial world; reproduction and sexuality</li> <li>link knowledge of these biological processes to the challenges of responsible individual and collective health behaviors</li> </ul>



## Teacher Professional Development Requirements and Programs

Teachers of mathematics and science in primary school may have followed several different paths of study and certification.

Teachers benefit from ongoing training provided by the French Ministry of Education, which can take place in person or by distance learning. At the local level, seminars and teaching events are organized throughout the year. Teachers can apply for or be selected to take part in these events.

Teachers also have access to a wide range of teaching resources, such as the EDUSCOL website<sup>a</sup> (a national portal for education professionals) and M@gistère courses<sup>b</sup> (a tutored and interactive continuing education system).

As part of their statutory service obligations, primary school teachers devote 18 hours a year to continuing education activities, including 9 hours in the form of distance learning sessions on digital media.

## Monitoring Student Progress in Mathematics and Science

School report cards are sent to parents regularly, facilitating communication between teachers and families. Report cards detail the results of periodic competency assessments, recommendations for student promotion to the next grade or education cycle, and final decisions. The cycle council of teachers decides whether students will be promoted to the next cycle, taking into account teacher recommendations. In France, there are no examinations of consequence for students at the primary level, and promotion or retention depends on academic progress at key points rather than at each grade.

The Personal Skills Booklet (*Livret Personnel de Compétences*) is part of a student's report card and provides evidence of student attainment of knowledge and skills from primary school to the end of compulsory education.<sup>11</sup> At every stage, families are informed of student progress. At the end of primary school, the booklet is passed on to the appropriate lower secondary school. Since 2016, a new version of the Personal Skills Booklet has been implemented for primary and lower secondary students, making reporting to parents simpler and more accurate. This booklet is also available online.

Required student competencies are fixed for each education cycle. If a student has not met the required competencies at the end of a cycle, the cycle council of teachers may recommend retention for 1 year, and the head of school would present the recommendation to the student's parents.

From Grades 1 to 9, national assessments are numerous and diverse. Exhibit 8 provides a summary of the main national assessments.

a See <https://eduscol.education.fr/> for more information.

b See <https://magistere.education.fr/> for more information.

## Exhibit 8: Summary of Main National Assessments

National Assessment	Grade(s)	Subject(s)	Frequency	Type
<i>Repères</i> <sup>12</sup>	1 and 2	mathematics	start of every school year	diagnostic, census based
<i>CEDRE (Cycle des Évaluations Disciplinaires Réalisées sur Échantillons)</i>	5 and 9	mathematics and science	every 5 years at the end of the school year	sample based
National Assessment in Grade 6 <sup>13</sup>	6	mathematics	start of every school year	diagnostic, census based
<i>Diplôme national du brevet</i>	9	mathematics and science	end of every school year	national examination with a certificate

## Special Initiatives in Mathematics and Science Education

Every year, the Ministry of National Education organizes or supports a number of nationwide mathematics and science events. These events primarily aim to facilitate an interest in scientific languages and to promote access to mathematics and science in or outside of school. Examples of these events include the following:

- *La Semaine des mathématiques* (Week of Mathematics)—This event is designed to engage students at the primary and secondary levels and their parents by presenting a current, lively, and attractive picture of mathematics.<sup>c</sup> It stresses the importance of mathematics in educating citizens and its role in their daily lives. It shows the diversity of professions in which mathematics plays an important or essential role and the richness of the links between mathematics and other disciplines. Finally, it shows that the practice of mathematics can stimulate emotions of an aesthetic nature to reveal the link between mathematics, fun, and creativity.
- *La fête de la Science* (Science Festival)—Founded in 1991, the Science Festival promotes exchanges between the scientific community and the general public.<sup>d</sup> The aims of the Science Festival are to foster interest in science and curiosity about scientific careers among young people and to inspire them to pursue scientific vocations, to stimulate knowledge sharing and exchange between researchers and citizens, to facilitate access to quality scientific information, to enhance popular understanding of the challenges of scientific development, to publicize the work of scientists and research opportunities, and to raise public awareness of scientific culture.

c See <https://www.education.gouv.fr/la-semaine-des-mathematiques-7241> for more information.

d See <http://www.fetedelascience.fr/> for more information.

- *Les Rallyes mathématiques* (mathematical rallies) are organized for students and schools in most academies. Modeled on the Olympics, the aim of mathematical rallies is to give students the opportunity to take a different approach to mathematics. Requiring curiosity, ingenuity, and initiative, the rallies develop the ability of students to work in teams and enable them to discover the pleasure of research.

There are numerous foundations, associations, and networks engaged in promoting mathematics and science. Most of them are involved in the events described above. Some also organize their own events, such as *La main à la pâte* and *Canopé*:

- *La main à la pâte*—Managed by the Scientific Cooperation Foundation for Science Education, *La main à la pâte* (which may be translated as “Hands On and Join In”) was founded in 1996.<sup>e</sup> The primary objective of the initiative is to reform the teaching of science and technology in primary schools by promoting education based on scientific investigation. *La main à la pâte* awards annual prizes under the auspices of the Academy of Sciences. In particular, the annual primary school award distinguishes classes that lead experimental science activities using an investigative approach.
- *Canopé*—*Canopé* is a network that publishes educational multimedia resources (i.e., print, digital, cellular, and television) to meet the needs of the education community.<sup>f</sup> *Canopé* organizes a mental calculation contest (*Mathador*) for classes in Grades 3 to 9.<sup>g</sup>

21 Actions for the Teaching of Mathematics is an important institutional initiative and was launched in 2018 by the Minister of National Education.<sup>h</sup> The 21 actions are issued from the work of a national committee tasked with evaluating strengths and weaknesses of France’s education system with regard to mathematics teaching, identifying issues and potential levers of change before formulating concrete proposals based on the most conclusive practices and in light of international studies, such as TIMSS and the Programme for International Student Assessment (PISA). The initiative gave birth to a national mathematics teacher training program.

## Suggested Reading

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e See <https://fondation-lamap.org/en> for more information.

f See <https://www.reseau-canope.fr/> for more information.

g See <https://www.mathador.fr/classe.html#concours> for more information.

h See <https://www.education.gouv.fr/21-mesures-pour-l-enseignement-des-mathematiques-3242> for more information.

Ministère de l'Éducation nationale et de la jeunesse—Direction de l'Évaluation de la Prospective et de la Performance. (2023). *L'état de l'école, une analyse statistique du système éducatif* [The state of education, a statistical analysis of the education system]. Paris: Author. Retrieved from <https://education.gouv.fr/media/158436/download>

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## References

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- 9 Ministère de l'Éducation nationale et de la jeunesse. (2020). *Cycles 2, 3 and 4 curricula in Arrêté du 17-7-2020 and J.O. du 28-7-2020*. Retrieved from <https://www.education.gouv.fr/bo/20/Hebdo31/MENE2018714A.htm>
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