Ecole Internationale Provence-Alpes-Côte d'Azur

Forward Planning

Long-Term Semester Planning

Academic Year: 2022-2023

Class: S5
Subject: Mathematics 6P
Teacher: Mme Bonhomme
No. Students: 26

Curriculum – Long-Term Planning 2022-2023

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Date	Learning Objectives	Activities	Resources	Key Competences*	Learning Outcomes / Assessment
2.5 weeks	Quadratics 1: The three forms of a quadratic function and its graph: $y = ax^2 + bx + c$ $y = a(x - r)(x - s)$ $y = a(x - p)^2 + q$	**Determine** the standard form from the general form by completing the square **Determine** the axis of symmetry and the coordinates of the vertex of a parabola, graphically and algebraically **Calculate** the zeros of a quadratic function and interpret them graphically. **Solve** problems leading to a quadratic equation including word problems	Worksheets Geogebra Puzzles / games	1, 2, 3, 4, 5	Graded homework, tests (formative and sommative)
1 week	Introduction to radians	**Investigate** two unit-systems to measure angles: degrees and radians **Know** and **understand** the trigonometric ratios for a set of standard angles in degrees and radians: • 0°, 30°, 45°, 60° and 90° • $0, \frac{\pi}{6}, \frac{\pi}{4}, \frac{\pi}{3}$ and $\frac{\pi}{2}$ radians	Worksheets	1,2,3,4	Graded homework, tests (formative and sommative)
2 weeks	Negative and rational indices	**Calculate** powers with negative and rational indices **Understand** the relationship between rational indices $\left(\frac{1}{n}, \frac{m}{n}\right)$ and radicals **Use** negative and rational indices to rewrite scientific formulae, e.g. $T = 2\pi\sqrt{\frac{l}{g}} = 2\pi\left(\frac{l}{g}\right)^{\frac{1}{2}}$ or $l = g\left(\frac{T}{2\pi}\right)^2$	Worksheets Bingo	1,2,3,5,6	Graded homework, tests (formative and sommative)

		Convert between scientific notation (standard form) with positive and negative indices and decimals using a technological tool			
1.5 weeks	Probability laws	**Know** the following probability rules and apply them to solve problems: • $0 \leq P(A) \leq 1$ • $P(\bar{A}) = 1 - P(A)$ • $P(A \cup B) = P(A) + P(B) - P(A \cap B)$, $P(A \cup B) = P(A) + P(B)$ for mutually exclusive events	Worksheets Bingo	1,2,3,5,6	Graded homework, tests (formative and sommative)
OCTOBER HOLIDAYS					
1 weeks	Conditional probability & independence	**Understand** the concept of conditional probability, notations $P_B(A)$ and $P(A\|B)$ **Use** information from Venn diagrams, tree diagrams, contingency tables and $P_B(A) = P(A\|B) = \frac{P(A \cap B)}{P(B)}$ to calculate conditional probability **Understand** the concept of independent events **Use** the formulae $P(A \cap B) = P(A) \cdot P(B)$ and $P_B(A) = P(A\|B) = P(A)$ to check if two events are independent	Worksheets Monty Hall problem	1,2,3,5,6	Graded homework, tests (formative and sommative)
1 week	Simple programming	**Use** a software to break down a problem into sub-problems, and write, test and execute a simple program **Create** a flow chart for basic algorithm **Know** how to assign labels to variables in a program **Understand** and **apply** different types of conditional instructions **Understand** and **apply** different types of computer loops and notions	Worksheets, Castor informatique and Algorea competitions	1.2.3.4	Graded homework, tests (formative and sommative) Algorea competition (3 rounds) – throughout the year
2 weeks		*Revision & semester 1 exams*			
CHRISTMAS HOLIDAYS					

2.5 weeks	Vectors in two dimensions:	**Recognise** linearly dependent and independent vectors, a basis, a coordinate system and the dimension of a vector space **Define** a basis and a coordinate system **Express** a vector as a linear combination of two given vectors that form a basis **Show** the bijection which exists between the set of vectors and the set of ordered pairs of real numbers	Worksheets, Geogebra	1,2,3,4,5,6	Graded homework, tests (formative and sommative)
1.5 weeks	Exponential (growth) models and formulae $y = C \cdot a^x$	**Investigate** models that describe exponential growth and decay: • multiplication per (time) unit • growth factor: $a > 1$ and $0 < a < 1$ • standard model $y = C \cdot a^x$ **Use** technology to investigate the graphs of exponential growth **Solve** equations and inequalities from practical situations using a technological tool	Worksheets, Geogebra	1,2,3,4,5,6,7,8	Graded homework, tests (formative and sommative)
2 weeks	Measures of spread / Standard deviation Linear transformation of data Comparing data sets distributions	**Understand** the meaning of the standard deviation, **interpret** it and **calculate** it using a technological tool **Calculate** for a small sample size ($n \leq 6$) variance and standard deviation by hand, using one of the following formulas • $\sigma = \sqrt{\sum_{i=1}^{i=n} \frac{(x_i - \bar{x})^2}{n}}$ **or** $\sigma = \sqrt{\sum_{i=1}^{i=n} \frac{x_i^2}{n} - \bar{x}^2}$ **Know** and **use** the impact of a linear transformation of data on measures of central tendency and spread **Compare** and **interpret** frequency distributions with respect to their: • means and standard deviations • medians and interquartile ranges **Compare** histograms and box plots for two different distributions	Worksheet, Geogebra	1,2,3,4,5,6	Graded homework, tests (formative and sommative)
FEBRUARY HOLIDAYS					

2.5 weeks	Scalar /dot product of two vectors, orthogonality	**Define** and calculate the scalar product of two vectors *Note: This concept allows to make calculations in plane and solid geometry, especially on parallelism and orthogonality* **Investigate** geometrical properties of the scalar product **Define** the scalar product of a vector with itself **Define** the magnitude of a vector **Define** the orthogonality of two vectors and use the properties of the scalar product **Express** the scalar product of two vectors in terms of their magnitudes and the cosine of the angle between them **Use** the scalar product to verify orthogonality **Express** a scalar product in an orthonormal basis **Calculate** the distance between two points, $AB^2 = \left\|\overrightarrow{AB}\right\|^2 = \overrightarrow{AB}^2$	Worksheets, Geogebra	1,2,3,4,5,6,7	Graded homework, tests (formative and sommative)
2 weeks	Quadratics 2 : quadratic equations and inequalities	**Use** factorisation to solve a quadratic equation **Solve** a quadratic equation by completing the square **Apply** the formula for the general solution of a quadratic equation **Understand** the relation between the coefficients and the nature of the solutions of the general equation by using the discriminant. **Use** graphs to **find** the values of x when $f(x) < 0$ and when $f(x) > 0$ **Determine** algebraically and geometrically the intersection of a straight line and a parabola	Worksheets	1,2,3,4,5,6,7,8	Graded homework, tests (formative and sommative)

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		Solve problems leading to a quadratic equation including word problems			
1 week	Lengths and distances in 3D objects	**Apply** Pythagoras' Theorem and the intercept theorem to plane sections of solids **Calculate** the internal diagonal of a cube or cuboid, the edges of a pyramid or the height of a cone with particular angles **Recognise** and **solve** real problems which can be modelled with regular solids	Worksheets, Geogebra	1,2,3,4,5,6	Graded homework, tests (formative and sommative)
1.5 week	Periodic models Trigonometric functions	**Investigate** trigonometric functions $y = \sin x$, $y = \cos x$ and $y = \tan x$ and their expansion to domain $\mathbb{R}$ **Investigate** $y = a\sin(b(x+c)) + d$ and explore the impact of each parameter **Solve** equations of the type: $3\cos^2(q) - \sin q - 1 = 0$			
		EASTER HOLIDAYS			
2 weeks	Applications of dot product: finding angles and side of triangles	**Use and prove** the following formulae for any triangle: $a^2 = b^2 + c^2 - 2bc\cos\alpha \quad \frac{a}{\sin\alpha} = \frac{b}{\sin b} = \frac{c}{\sin c}$ Area $= \frac{1}{2}bc\sin\alpha$ **Apply** the formulae to determine angles and sides of triangles, including real life problems **Know** and **use** (only with numerical values of angles) formulae of the type $\cos(a \pm b)$, $\sin(a \pm b)$, $\sin(2a)$, $\cos(2a)$	Worksheets, Geogebra	1,2,3,4,5,6,7,8	Graded homework, tests (formative and sommative)
1.5 weeks	Introduction to logarithms .	**Understand** the concept of logarithm with a positive integer base *Note: logarithms should be introduced from powers*	Worksheets, Geogebra	1,2,3,4,5,6	Graded homework, tests (formative and sommative)

		Use the basic properties of indices and logarithms with a positive integer base **Solve** simple exponential and logarithmic equations of the type: • $2^x = 4^{2x+1}$ • $\log(3x) = \log(2x + 9)$ • $\log_3 x + \log_3 7 = \log_3 49$ **Check the answers** in the original equations			
1.5 weeks	Sampling & Inference	**Recognise** populations and random samples in everyday life situations and explain the difference between the two **Know** that different samples will show variation **Use** a digital tool to simulate statistical sampling and interpret the results **Know** that statistical inference concerns making claims about a population based on a sample and **know** that we can never be sure about these types of inferences **Generalise** findings from a sample to an underlying population, considering the uncertainty of these generalisations **Know** the main elements of the statistical enquiry cycle, i.e., problem definition, data collection plan, data collection, data analysis, conclusion	Worksheets, Geogebra	1,2,3,4,5,6,7,8	Graded homework, tests (formative and sommative)

* Link to 8 key competences:

1. Literacy (reading and writing)
3. Mathematics, Science, Technology and Engineering
5. Personal, Social and Learning to Learn
7. Entrepreneurship

2. Multilingualism
4. Digital
6. Citizenship
8. Cultural Awareness and Expression

Notes :
- The mathematics syllabus states "The European Schools' syllabuses seek to develop all of these key competences in pupils. Key competences are that general that we do not mention them all the time in the Science and Mathematics syllabuses".

- A self-assessment "Checklist" is available on myschool detailing the competencies and prior knowledge for each chapter.