

## MATHEMATICS POLICY

This document is a statement of the aims, objectives and strategies for the teaching of mathematics at Deira Private School.

### Rationale

Numeracy is a key life skill and the subject of mathematics provides children with a bank of knowledge to help them make sense of the world. Mathematics should provide children with the ability to tackle practical tasks and problems they may encounter in their everyday lives by analysing and communicating information.

The intention is to provide mathematical experiences which equip the pupil/ students with the necessary knowledge and skills to lead as full and independent a life as possible within the community. The main aims and objectives for the Mathematics Curriculum are therefore related to the overall vision of the school by ensuring that the mathematics the children encounter is both practical and positive, related to their own experience and develops their ability to generalise concepts in achieving independence and social competence.

### Our Aims

The national curriculum for mathematics aims to ensure that all pupils:

- become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately
- reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
- can solve problems by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions

Mathematics is an interconnected subject in which pupils need to be able to move fluently between representations of mathematical ideas. The programmes of study are, by necessity, organised into apparently distinct domains, but pupils should make rich connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. They should also apply their mathematical knowledge to science and other subjects.

The expectation is that the majority of pupils will move through the programmes of study at broadly the same pace. However, decisions about when to progress should always be based on the security of pupils' understanding and their readiness to progress to the next stage. Pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems before any acceleration through new content. Those who are not sufficiently fluent with earlier material should consolidate their understanding, including through additional practice, before moving on.

## Spoken language

The national curriculum for mathematics reflects the importance of spoken language in pupils' development across the whole curriculum – cognitively, socially and linguistically. The quality and variety of language that pupils hear and speak are key factors in developing their mathematical vocabulary and presenting a mathematical justification, argument or proof. They must be assisted in making their thinking clear to themselves as well as others, and teachers should ensure that pupils build secure foundations by using discussion to probe and remedy their misconceptions.

## Mathematics Curriculum

Mathematics is a creative and highly inter-connected discipline that has been developed over centuries, providing the solution to some of history's most intriguing problems. It is essential to everyday life, critical to science, technology and engineering, and necessary for financial literacy and most forms of employment. A high-quality mathematics education therefore provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics, and a sense of enjoyment and curiosity about the subject.

The curriculum followed in Years 1 to 8 is based on the National Curriculum for England, adapted by DePS staff to have a global dimension and to be relevant to children living here in the UAE. The core of the curriculum is set but teachers are empowered to group areas of learning together to create topics that are of interest and of relevance to children in their class.

Numeracy has a spiraling curriculum with increasing levels of difficulty as pupils progress through the yearly schemes of work. Our pupils require additional time and input to acquire the relevant knowledge, skills and understanding in this subject. Here are the key stages:

- Early Years Foundation Stage (FS1 & FS2)
- Key Stage 1 (Year 1 & 2)
- Lower Key Stage 2 (Year 3 & 4)
- Upper Key Stage 2 (Year 5 & 6)
- Key Stage 3 (Year 7, 8 & 9)

STEAM stands for Science, Technology, Engineering, Arts and Mathematics. Through practical, hands-on problem solving, students will develop skills such as curiosity, creativity, critical thinking, collaboration, problem solving, resilience and confidence that opens the gate to a bright future.

STEAM helps students tap into their innate "creativity, curiosity, and persistence," and allows them to collaborate and communicate with each other in pursuit of this goal. Children also work well with working with items and materials, problem-solving, and testing designs – all of which are key elements of engineering instruction.

At DePS, we recognise that our students stand to gain significant benefits by starting on STEAM. We integrate technology education and digital literacy with our core British Curriculum. We ensure that we provide our students with a high-quality STEAM curriculum, which meaningfully integrates technology

into education and promotes design process thinking and enquiry into the scientific method. This way, students get all the benefits of British Curriculum coupled with modern STEAM education.

### **Attainment targets**

By the end of each key stage, pupils are expected to know, understand, apply and evaluate the content, skills and processes specified in the relevant programme of study.

At DePS, Statutory National Assessments are delivered in English Reading, Grammar, Punctuation, Spelling and Mathematics. Teachers can also teach the content indicated as being 'non-statutory'.

### **Teaching and Learning Method**

The daily mathematics lessons have a flexible three-part structure to include:

- a starter
- a main teaching activity
- a plenary session

Mathematics lessons will give opportunities for:

- directed, active whole-class teaching
- demonstrating or modelling a strategy or skill using a wide variety of resources
- practical activities to provide a secure foundation and to enable children to move from concrete to abstract thinking
- illustrating and explaining - providing reasons and giving examples
- discussing and questioning using a range of questioning techniques
- practising, rehearsing and reinforcing particular skills
- activities that involve whole class practical participation
- a creative and flexible approach to problem solving and investigations
- evaluating children's responses and identifying misconceptions and misunderstandings
- summarising and reviewing the children's progress.

Lessons will have clear learning objectives or intentions for pupils.

Teaching styles include:

- wide variety of interesting resources – to interact with
- demonstration – showing how
- explanation – giving examples
- questioning – challenging understanding
- discussion and evaluation – talking about it
- directing – encouraging independent work or copying adult model
- practicing – basic skills learnt

What should lessons be like?

Lessons should:

- Be highly motivating and relevant to pupils' abilities and actively demonstrate their
- relevance to real life as experienced by pupils.

- Be practical and experimental, where appropriate.
- Be student paced offering plenty of opportunity for consolidation and practice, extension and differentiation.
- Foster autonomy rather than dependence.
- Recognise and value the importance of social interaction.
- Acknowledge cross-curricular links.
- Use accessible materials.
- Move generally from the concrete to the abstract only if and when appropriate
- Foster the development of multiple strategies.
- Where possible work from examples to investigate rules.

### **Foundation Stage**

Teachers in the Foundation Stage follow the Mathematics strand of the Early Years Foundation Stage (EYFS) Framework. Children must be supported in developing their understanding of Mathematics (Number and Shape, space and measure) in a broad range of contexts in which they can explore, enjoy, learn, practise and talk about their developing understanding through adult led activities and child led activities.

They must be provided with opportunities to practise and extend their skills in these areas and to gain confidence and competence in their use.

### **Key Stage 1 (Year 1 & 2)**

The principal focus of mathematics teaching in key stage 1 is to ensure that pupils develop confidence and mental fluency with whole numbers, counting and place value. This should involve working with numerals, words and the 4 operations, including with practical resources [for example, concrete objects and measuring tools].

At this stage, pupils should develop their ability to recognise, describe, draw, compare and sort different shapes and use the related vocabulary. Teaching should also involve using a range of measures to describe and compare different quantities such as length, mass, capacity/volume, time and money.

By the end of year 2, pupils should know the number bonds to 20 and be precise in using and understanding place value. An emphasis on practice at this early stage will aid fluency.

Pupils should read and spell mathematical vocabulary, at a level consistent with their increasing word reading and spelling knowledge at key stage 1.

### **Lower Key Stage 2 (Year 3 & 4)**

The principal focus of mathematics teaching in lower key stage 2 is to ensure that pupils become increasingly fluent with whole numbers and the 4 operations, including number facts and the concept of place value. This should ensure that pupils develop efficient written and mental methods and perform calculations accurately with increasingly large whole numbers.

At this stage, pupils should develop their ability to solve a range of problems, including with simple fractions and decimal place value. Teaching should also ensure that pupils draw with increasing accuracy and develop mathematical reasoning so they can analyse shapes and their properties, and confidently describe the relationships between them. It should ensure that they can use measuring instruments with accuracy and make connections between measure and number.

By the end of year 4, pupils should have memorised their multiplication tables up to and including the 12 multiplication table and show precision and fluency in their work.

Pupils should read and spell mathematical vocabulary correctly and confidently, using their growing word-reading knowledge and their knowledge of spelling.

### **Upper Key Stage 2 (Year 5 & 6)**

The principal focus of mathematics teaching in upper key stage 2 is to ensure that pupils extend their understanding of the number system and place value to include larger integers. This should develop the connections that pupils make between multiplication and division with fractions, decimals, percentages and ratio.

At this stage, pupils should develop their ability to solve a wider range of problems, including increasingly complex properties of numbers and arithmetic, and problems demanding efficient written and mental methods of calculation. With this foundation in arithmetic, pupils are introduced to the language of algebra as a means for solving a variety of problems. Teaching in geometry and measures should consolidate and extend knowledge developed in number. Teaching should also ensure that pupils classify shapes with increasingly complex geometric properties and that they learn the vocabulary they need to describe them.

By the end of Year 6, pupils should be fluent in written methods for all 4 operations, including long multiplication and division, and in working with fractions, decimals and percentages.

Pupils should read, spell and pronounce mathematical vocabulary correctly.

### **Key Stage 3 (Year 7 - 8)**

Mathematics is an interconnected subject in which pupils need to be able to move fluently between representations of mathematical ideas. The programme of study for key stage 3 is organised into apparently distinct domains, but pupils should build on key stage 2 and connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. They should also apply their mathematical knowledge in science, geography, computing and other subjects.

The expectation is that the majority of pupils will move through the programme of study at broadly the same pace. However, decisions about progression should be based on the security of pupils' understanding and their readiness to progress to the next stage. Pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems before any acceleration through new content in preparation for key stage 4. Those who are not sufficiently fluent should consolidate their understanding, including through additional practice, before moving on.

## Mathematics Curriculum Planning

The HOD ensures that Long-Term Plan and Medium Term Plan (Scheme of Work) is prepared beforehand. The subject planner is responsible for writing the daily lesson plans for each lesson (short-term plans). Each individual teacher uses external & internal assessment data to further personalise the plans to suit the needs of the students in his/her class. These plans list the specific learning objectives and expected outcomes of each lesson. The class teacher keeps these individual plans, and s/he and the science subject leader discuss these weekly. Teachers should consistently personalise Mathematics lesson plans by triangulation of data (CAT4, PTM, internal data). Ensure consistency in provision for all groups of students including SEND and G&T in lessons.

The main scheme at KS1, KS2 and KS3 is Collins. Collins International Primary Maths takes a problem-solving and discovery approach to the learning of mathematics. It follows a clearly structured progression through six levels and supports learners with clearly defined skills and different levels of ability within each unit.

## Personalization of Learning in Mathematics

Based on the results of students' assessments, teachers can differentiate. Students will be grouped according to their ability into three – Spicy, Medium and Mild.

All children will be provided with the opportunity for extension or reinforcement appropriate to their ability. Generally, no more than three levels of work will be offered to each year group but, at the teacher's discretion, further extension work could be given. Those children who are more or less able than the norm will be given an activity more appropriate to their ability, on a daily basis.

Based on their CAT 4 results, they can be categorised as having Spatial bias, Verbal bias, Verbal surfeit/deficit, balance or imbalance in Maths car and could also have different multiple intelligences like Kinesthetics Learner, Visual Learner, Audio Learner, etc. Students may also have identified special educational needs, or English Language needs or maybe Gifted or Talented.

Work for pupils will be pitched at appropriate and differing levels by means of various strategies, and in accordance with their developmental needs, including:

- clear objectives and differentiated outcomes
- learning menus/choice boards
- use of sensory activities
- open-ended questions
- appropriate differentiated resources
- teacher/TA/LSA/buddy support
- a range of class/individual management techniques

## Mathematics and Inclusion

All pupils are given the opportunity to develop their potential to the maximum by removing the barriers to learning and providing effective support, guidance, modification and adaptation. There is personalised support provided for children with any specific need from the Inclusion Team ( with push in or pull out sessions or LSA as needed) as well as with personalisation and quality first teaching within the classroom.

The needs of pupils are constantly changing and all pupils at the school are involved in the “process” of inclusion. For all pupils this means having access to achieve the age related expectations from the National Curriculum and the full range of opportunities and activities available to all children in the school. It also means having the opportunity to work alongside peers in groups and adults other than teachers if needed, to visit the local community and to share activities with other children from other schools. For very few students with very high special needs, there may be modification in age related expectations as advised by the inclusion team.

In addition to this the more able/ gifted and talented children must get full extension, enrichment and if needed acceleration to enable them to maximise their achievements.

## Extension and Enrichment Programme in Mathematics

Extension and enrichment opportunities contribute to students’ personal and social development and support the development of their BRIDGES’ learning dispositions. In addition, the skills, experience and character gained through engagement in extension and enrichment activities are an excellent foundation for a successful life at school and beyond like Maths Club.

At Deira Private school, we believe that extra-curricular activities enrich the experience of students in numerous ways, including:

- supporting the existing taught curriculum and providing opportunities for deep learning
- providing an alternative experience to classroom-based lessons and the taught curriculum
- providing students with opportunities to take ownership of learning e.g. student-run activities and clubs
- supporting students to continue with an interest and/or to master a skill
- providing opportunities for students to learn from and with other people, including students of different ages, parents/carers and members of the local community
- providing students with opportunities to experiment and innovate

## Mathematics and Innovation

Innovation involves creating the conditions and giving meaningful opportunities across all subjects and phases. Students, teachers and leaders can develop their creativity, resilience, high order thinking, courage to take risks and incubate, deliver and use new ideas and approaches.

At DePS, our aim is to establish Innovation as a culture across the school. Creating new ideas and the use of new or improved approaches. Stimulating entrepreneurship and enterprise as an effective drivers of economic growth in the modern era.

- Integrate high level digital technology with the curriculum throughout all the subjects by use of desktops and interactive panels for students at different phases. Supporting this vision, Deira Private School proposes to integrate high level digital technology and embed it completely with curriculum in all subjects. BYOD (Bring Your Own Device) iPads/Tabs in primary school are some of our initiatives.
- Under our Innovation Program we will focus on ensuring that our 21st century skills are well incorporated into lesson plans, teaching and learning.
- Digital library is introduced to enhance and advance e-learning and reading especially in the primary students. E-learning platforms will be created and promoted across the school.
- Access to e-learning portals and online stimulation for all students that excite curiosity and invite interaction using different platforms.
- Implementation of STEM/STREAM/ coding education across school through platforms like LEGO Education, PITSCO Education, PASCO Scientific, SAM Labs, XYZPrinting.
- Enhancing immersive learning through AR/VR as innovative digital solutions.
- Classroom set up that fosters curiosity and investigation to develop higher order thinking.
- Formative assessment is not limited to written tasks but should be extended to hands on and verbal assessments as well to cater to all forms of Multiple Intelligence.
- Innovation in lesson planning to cater the ability of Multiple intelligence and individual need in each student through Learning Menus.
- Learning walks to ensure an effective teaching-learning process in school.

### **Cross-Curricular Links**

Elements of numeracy are incorporated into all other areas of the curriculum wherever possible and often occur naturally as part of the subject focus. Pupils are encouraged to view numeracy as an integral part of their daily lives both in school and in all other settings. Teachers show planning for numeracy in all subjects. In this way Numeracy can become an effective subject across the whole curriculum.

**English** Mathematics lessons can help develop literacy skills via the use of:

- counting rhymes
- sequencing events in stories
- use of correct mathematical vocabulary
- logical reasoning during discussion



**Science** Many opportunities will arise for:

- classifying
- sorting
- counting
- measuring
- calculating
- estimating
- recording
- interpreting data

**Arts** Through the use of:

- measurements
- sequencing
- shape
- space
- scale
- movement
- mathematical series e.g. Fibonacci, spirolaterals, parabolas etc.

**IT** Through:

- the collection and classification of data
- producing graphs and tables

**Humanities** Through:

- the collection and classification of data
- map studies making use of coordinates, angles, scales, negative numbers
- use of chronological timelines

**PE** Through:

- measurement of height, distance and time
- counting
- symmetry
- movement/direction
- position

**Music** Through:

- number rhymes and songs
- counting
- note values

### **Information and Communication Technology (ICT)**

Calculators should not be used as a substitute for good written and mental arithmetic. They should therefore only be introduced near the end of key stage 2 to support pupils' conceptual understanding and exploration of more complex number problems, if written and mental arithmetic are secure. In both primary and secondary schools, teachers should use their judgement about when ICT tools should be used.

## Assessment For Learning

Assessment, recording and reporting are important elements of our Mathematics teaching.

Assessment for Learning (Formative assessments) Formative assessments include diagnostic testing which includes a range of formal and informal assessment procedures conducted by teachers during the learning process in order to modify teaching and learning activities to improve student attainment. Some examples of formative assessments are classroom observations, questioning, discussions, learning menu, mind maps/ graphic organiser, peer and self-assessments with the help of rubrics, presentations, think –pair share, quizzes etc. Following which schemes of work will be reviewed and incorporated in planning to ensure focused intervention (whole class/ individual) is put in action for immediate impact. Formative assessments will empower students to identify their strengths and areas of development and help them plan next steps accordingly.

Assessment of Learning (Summative assessment) The goal of summative assessment is to evaluate student learning at the end of an instructional unit by comparing it against some standard or benchmark.

## Key International Benchmark Tests (GL Education)

The following benchmark are carried out at school as per KHDA guidelines and tests results are analysed and used to inform action points:

- CAT4 (Cognitive Abilities Test)  
CAT4 is an adaptive assessment of developed abilities in areas known to make a difference to learning and achievement – namely verbal, non-verbal, quantitative and spatial reasoning – and provides you with an accurate analysis of potential student achievement.
- PTs (Progress Tests)  
Measuring attainment in English, maths and science, these assessments are done at the end of the year to measure attainment as well as progress from data each year-on-year. Reports are set against national averages so you can reliably compare your results with those of schools across the country.
- PASS (Pupil Attitudes to Self and School - a Survey)  
PASS takes the guesswork out of understanding why pupils may be reluctant, disengaged or even disruptive learners by sensitively exploring social and emotional wellbeing. It also provides interventions and guidance so you can start to address issues immediately.
- TIMSS (Trends in International Mathematics and Science Study)  
A major purpose of TIMSS is to provide important background information that can be used to improve teaching and learning in mathematics and science.

## Monitoring and Review

The Head of Mathematics is responsible to monitor the standards of students' work and the quality of teaching in Mathematics. The Head of Mathematics is also responsible for supporting colleagues in their teaching, for being informed about current developments in the subject, and for providing a strategic lead and direction for science in the school. The Heads of Mathematics have allocated time for fulfilling the vital task of reviewing samples of students' work and visiting classes to observe Mathematics teaching.

This policy is reviewed annually by the Head of Department and SLT and with the feedback from school staff and students and based on the implications from the data both based on International Benchmark and Internal Assessments.

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