Overview

The maths curriculum at Princess Frederica School covers the National Curriculum for Maths, including mental strategies. We adopt a growth mindset approach, believing that everyone can do maths. It is okay to get it wrong and mistakes are valuable opportunities to re-think and understand more deeply. We praise hard work, encouraging children to take risks and persist for longer. We build in opportunities for success, using a step-by-small-step approach which enables children to enjoy the experience of success.

Vision

- Children 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.
- Children reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language.
- Children 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.
- Children have an understanding of mathematical concepts which can be applied throughout their lives.
- Children can explain their mathematical thinking, using the correct terminology.
- Children can choose the most effective method to solve a problem.

Intent

By the end of EYFS, children should be able to:
- Use quantities and objects to start adding and subtracting two single-digit numbers and counting on or back to find the answer.
- Link the number symbol with its cardinal value.
- compare numbers and know one more and one less up to 10.
- count beyond 10.
- Estimate a group of objects up to 5.
- Say what needs to be added or taken away to get a number in a real life situation.
- They solve problems, including doubling, halving and sharing.

By the end of Year 1, children should be able to,

- Count to and across 100, forwards and backwards, starting with any number?
- Read and write the numbers to 100?
- Recall and use addition and subtraction facts to 10 fluently?
- Recognise odd and even numbers?
- Recognise, find and name ½?
- Tell the time to the hour and half past the hour on a clock face?
- Name rectangles, squares, circles, triangles, cuboids, pyramids and spheres?
- Read and write numbers to 100?
- Identify one more and one less than a given number?
- Use more than > ,less than < and equals = ?
- Count in multiples of twos, fives and tens?
- Add and subtract one-digit and two-digit numbers to 20, including zero?
- Solve one step problems involving addition and subtraction?
- Solve missing number problems?
- Recognise, find and name 1/4 ?
- Solve practical problems for lengths, mass, capacity and time?
- Recognise and know the value of different denominations of coins and notes?

- Recognise and use the language of days of the week, weeks, months and years?
- Describe position, direction and movement, including whole, half, quarter and three-quarter turns?

By the end of Year 2, children should be able to,

- Recognise the place value of each digit in a two-digit number and partition two-digit numbers?
- Recall and use addition and subtraction facts to 20 fluently?
- Recognise the place value of each digit in a two-digit number and partition two-digit numbers?
- Recall and use addition and subtraction facts to 20 fluently?
- Recall and use multiplication and division facts for the 2, 5 and 10 times tables?
- Recognise odd and even numbers?
- Recognise and write the fractions ½ ¼ ¾ and 1/3?
- Tell and write the time to five minutes, including quarter past and quarter to the hour?
- Find different combinations of coins that equal the same amounts of money?
- Describe properties of 2-d and 3-d shapes, naming edges, vertices and faces?
- Name tally charts, tables and pictograms?
- Compare and order numbers to 100?
- Count in multiples of 2 and 5?
- Count on and back in tens from any two-digit number?
- Add three one-digit numbers?
- Add and subtract mentally a two-digit number and ones or tens?
- Solve problems with addition and subtraction using concrete objects and pictorial representations?
- Use < and > and = signs correctly?
- Solve problems with addition and subtraction?
- Solve missing number problems, checking with the inverse operation?
- Solve multiplication and division problems?
- Find fractions ½ 1/3, ¼, 2/4 and ¾ of a number?
- Choose standard units for length (m/cm); mass (kg/g); temperature (°C); capacity (litres/ml)?
- Solve problems in a practical context involving addition and subtraction of money in the same unit including giving change?
- Use mathematical vocabulary to describe position, direction and movement and use quarter, half and three-quarter turns (clockwise and anti-clockwise)?
- Interpret and construct simple pictograms, tally charts, block diagrams and simple tables?
- Ask and answer questions about data?

By the end of Year 3, children should be able to,

- Recognise the place value of each digit in a three-digit number and partition three-digit numbers?
- Add and subtract numbers mentally - a three-digit number and ones, tens or hundreds?
- Recall and use multiplication and division facts for the 10, 5, 2, 3, 4 and 8 multiplication tables?
- Recognise and use unit fractions and non-unit fractions with small denominators?
- Estimate and read time to the nearest minute?
- Identify right angles?
- Draw bar charts?
- Compare and order numbers to 1000?
- Exchange 10 ones for a ten and 10 tens for a hundred and vica versa?
- Read scales marked in multiples of 100 with 2, 4, 5 and 10 equal parts?
- Find two numbers with a total of 100?
- Add and subtract numbers with up to three digits, using column addition and subtraction?
- Solve missing number problems?
- Solve problems involving addition and subtraction
- Solve problems involving multiplication and division?
- Recognise and show equivalent fractions with small denominators using diagrams?
- Solve problems with fractions?
- Measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml)?
- Compare the duration of events?

- Measure the perimeter of simple 2-D shapes?
- Identify whether angles are greater than or less than a right angle?
- Add and subtract amounts of money to give change, using both £ and p in practical contexts?
- Solve questions using information presented in scaled bar charts, pictograms and tables?

By the end of Year 4, children should be able to,
- Recognise the place value of each digit in a four-digit number?
- Count backwards through zero to include negative numbers?
- Add and subtract numbers mentally – a three-digit number and ones, tens or hundreds
- Solve missing number problems?
- Recall multiplication and division facts for multiplication tables up to 12x12?
- Add and subtract fractions with the same denominator?
- Read, write and convert time between analogue and digital 12- and 24-hour clocks?
- Identify acute and obtuse angles?
- Understand time graphs?
- Count in multiples of 6, 7, 9, 25 and 1000?
- Round any number to the nearest 10, 100 and 1000?
- Read Roman numerals to 100?
- Read scales marked in multiples of 1000 with 2, 4, 5 and 10 equal parts?
- Add and subtract numbers using the formal written methods?
- Solve addition and subtraction two-step problems?
- Solve division problems involving remainders?
- Solve problems involving fractions?
- Round decimals with one decimal place to the nearest whole number?
- Solve problems involving converting from hours to minutes; minutes to seconds; years to months; weeks to days?
- Convert between different units of measure eg kilometre to metre; hour to minute?
- Measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres?
- Identify lines of symmetry in two dimensional shapes presented in different orientations?
- Plot specified points and draw sides to complete a given polygon?
- Interpret discrete and continuous data from graphs?

By the end of Year 5, children will be able to,
- Read, write and order numbers to at least 1,000,000 and those with up to 2 decimal places, determining the value of each digit?
- Use rounding to check answers?
- Count forwards and backwards with positive and negative whole numbers including through zero?
- Use rounding to check answers?
- Add and subtract whole numbers with more than four digits using formal written methods?
- Multiply and divide numbers mentally drawing upon known facts?
- Recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3)?
- Compare and order fractions whose denominators are all multiples of the same number?
- Recognise units of measurement: km, m, cm, mm, g, kg, l, ml, cm2, m2, cm3?
- Draw and measure angles?
- Solve comparison, sum and difference problems using information presented in a line graph?
- Interpret negative numbers in context?
- Round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000?
- Add and subtract whole numbers with four digits mentally where appropriate?
- Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why?
- Use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers?
- Multiply numbers up to 4 digits by a one- or two-digit number using a formal written method?
- Divide numbers up to 4 digits by a one-digit number using the formal written method?
- Identify multiples and factors including finding all factor pairs of a number?
- Identify common factors of two numbers?

- Solve problems involving multiplication and division by using a knowledge of factors or multiples?
- Read and write decimals as fractions?
- Round decimals with two decimal places to the nearest whole number and to one decimal place?
- Solve problems which require knowing percentage equivalents of ½ , ¼ , 1/5, 2/5, 4/5 and those fractions with a denominator of a multiple of 10 or 25?
- Convert between different units of metric measure?
- Measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres?
- Calculate and compare the area of rectangles (including squares), and including using standard units, square centimetres (cm2) and square metres (m2)?
- Use all four operations to solve problems involving measure?
- Identify, describe and represent the position of a shape following a reflection or translation, using the appropriate language, and know that the shape has not changed?

By the end of Year 6, children should be able to,
- Recognise the place value of each digit in numbers up to 10 000 000, including decimals?
- Use negative numbers in context and calculate intervals across zero?
- Perform mental calculations, including with mixed operations and large numbers?
- Solve multi-step problems in contexts, deciding which operations and methods to use and why?
- Identify common factors, common multiples and prime numbers?
- Compare and order fractions, including fractions > 1?
- Recall and use equivalences between simple fractions, decimals and percentages?
- Explain radius, diameter and circumference?
- Use letters and symbols to stand for unknown numbers?
- Explain percentage is out of 100?
- Round any whole number to a required degree of accuracy?
- Solve problems involving addition, subtraction, multiplication and division?
- Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy?
- Multiply multi-digit numbers up to four digits by a two digit number using long multiplication?
- Divide numbers up to four digits by a two digit number using the formal written method of short division where appropriate?
- Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions?
- Multiply simple pairs of proper fractions, writing the answer in its simplest form?
- Solve problems using ration relationships?
- Solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places?
- Convert between miles and kilometres?
- Recognise when it is possible to use formulae for area and volume of shapes?
- Draw 2-D shapes using given dimensions and angles?
- Describe positions on the full coordinate grid (all four quadrants)?
- Express missing number problems algebraically?
- Generate and describe linear number sequences?
- Solve problems involving the calculation of percentages and the use of percentages for comparison?
- Solve problems involving similar shapes where the scale factor is known or can be found?

Implementation
- Daily maths lessons from Nursery through to Year 6. Nursery lessons will consist of short lessons, based on rhymes and practical work.   - In Reception to Year 6, the scheme 'Power Maths' will form the basis of lessons (from September 2019), leading to implementation of Maths Mastery across the school.   - Concrete manipulative materials provide models as the first steps and to return to whenever necessary.   - Pictorial representations of objects enable discussion and comparisons.   - Abstract mathematical concepts, signs and notations are explained verbally.

- Mathematical vocabulary is encouraged in all full sentence explanations, by teachers and pupils.
- Mental maths strategies will be taught weekly.
- Number facts will be reinforced weekly and will form part of the homework.
- Engagement with Mastering Number through the NCETM for children in Reception, Year 1 and Year 2 with this taught daily as an addition to maths in Year 1 and Year 2 and as an important guide for ideas in teaching for Reception.
- KIRFs outlined for Year 1 to Year 6 with this outlined clearly for staff and provided for parents and carers.

Impact

- Children will have a secure mathematical understanding, which can be applied to problem solving.
- Children will be able to explain their mathematical thinking.
- Children will use mathematical vocabulary accurately.
- Children will be able to solve problems, choosing the most efficient method and working systematically.

Power Maths

The school uses the Power Maths scheme from Reception to Year 6, which supports a maths mastery approach to teaching the National Curriculum for maths.
- Mastering maths means pupils acquiring a deep, long-term, secure and adaptable understanding of the subject.
- Pupils are taught through whole class interactive teaching.
- Significant time is spent developing deep knowledge of the key ideas.
- Mathematical language is used and children answer in full sentences.
- The emphasis is on understanding.
- There are three phases of understanding – concrete, pictorial and abstract. A typical Power Maths lesson:
  -Power up ~ 5 mins
  -Discover ~10 mins
  -Share ~ 10 mins
  -Think together ~ 10 mins
  -Practice ~ 15 mins
  -Reflect ~ 5 mins
- All children have workbooks in class, which provide practice of the skills learnt and extension activities. When a child has not grasped a concept, extra teaching is given in the lesson and occasionally outside the whole class lesson.

Calculation Policy

The calculation policy can be found on the school website under policies and on the maths website page. It shows the methods for teaching addition, subtraction, multiplication and division, setting out the concrete, pictorial and abstract phases of understanding, with progression from year 1 to year 6.

Mathletics and Homework

Mathletics is an on-line program which is to support maths learning at home. Teachers from Year 2 to Year 6 set Mathletics homework regularly. When a child logs on to the Mathletics site, the activities set are shown and need to be completed first. Children can then move on to further activities and games of their choice to continue practising maths skills. It is particularly important that children practice learning key facts— addition and subtraction to 20 and times tables up to 12 x 12. Children's achievements in Mathletics are celebrated on a weekly basis, with children earning bronze, silver and gold awards acknowledged in assembly.
Further homework learning key facts is set in years 1 to 4. Year 6 may also have additional maths homework to reinforce aspects of maths in preparation for their Standard Assessment Tests (SATs).

Maths Books and Extending Children

Maths books are used to support and extend learning in Power Maths workbooks. When an extra lesson is needed to understand a concept, work may be recorded in maths books. Maths books are also used for recording number facts tests. One of the main intentions of the Power Maths scheme is to ensure children are extended through increasing the breadth of their knowledge rather than introducing them too quickly to new concepts. This happens through the increased challenge within the Power Maths books but there are some situations where children may require further challenge beyond the Power Maths books. Extension activities, beyond those in the Power Maths workbooks, are stuck into maths books then children record the solutions.

Assessment

Formative assessment is carried out during lessons, by the teacher observing the children's understanding and ability to apply their knowledge. Marking of work also provides assessment. Both these processes allow teachers to adapt the subsequent maths lessons to meet the requirements of the class. In years 1 to 6, children are assessed on a termly basis through both teacher assessment and through a test on mathematical concepts that have been studied during the term, or throughout the year (in the summer term). Children are then graded according to whether they are working at the expected level, working towards the expected level or exceeding the expected level. The levels are included in the end of year reports to parents. Teachers also record these judgements on their assessment overviews against the main unit targets. .

Supporting all learners

Children are supported through differentiation where this is needed. SEND Pupils are supported by additional scaffolding in the lesson. This might be through personalised templates for written work, word mats, visuals, overlays or personalised visuals such as focus slides.

There is an expectation that SEND children will succeed against targets outlined in bold on the end of year expectations for what a child has achieved. These act as an overriding focus through the unit for SEND children (This is a minimum expectation and any SEND children who show confidence and success in a particular area will be challenged with other areas).

Website Links

Maths National Curriculum:
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/335158/PRIMARY_national_curriculum_-_Mathematics_220714.pdf

Mathletics:
https://login.mathletics.com/

Other useful websites:
https://www.familymathstoolkit.org.uk/

https://www.oxfordowl.co.uk/for-home/kids-activities/fun-maths-games-and-activities

https://mathsframe.co.uk/en/resources/category/22/most-popular