## Medium Term Plans for Mathematics (revised 2020) - Year Six (Autumn Term)

## Suggested oral mental starters (ongoing, throughout the term)

- Identify multiples and count from (and back to) 0 in multiples of 3, 4, 6, 7, 8, 9, 11,12, 25, 50, 100 and 1000
- Count from (and back to) 0 in multiples of $0.3,0.4,0.5,0.6,0.7,0.8,0.9$ (using known multiples and knowledge of place value)
- Recall multiplication and division facts for all multiplication table to $12 \times 12$ (See Multiplication Tables Guidance, 2020)
- Find all factor pairs of a given number; find all common factors for a pair of numbers; identify common multiples
- Add, subtract, multiply and divide numbers mentally using known facts and a range of strategies (See Mental Calculation Strategies, 2017)
- Read, write, compare and order numbers within 5,000,000
- Read, write, compare and order numbers with up to three decimal places
- Multiply numbers by 10,100 and 1,000 and divide corresponding numbers by 10,100 and 1,000 (with up to three decimal places)
- Count forwards and backwards with positive and negative whole numbers, including through zero; calculate intervals across zero (in context)
- Recognise, describe and extend linear number sequences, including those involving decimals, e.g. $0.9,1.8,2.7$; find the term to term rule
- Compare and order fractions, including those greater than one (consider the use of diagrams and fraction walls)
- Find unit and non-unit fractions of numbers and quantities e.g. $1 / 7$ of $£ 56 ; 3 / 7$ of $£ 56$
- Know and use the vocabulary of prime numbers and establish whether a number up to 100 is a prime number
- Recognise and use square numbers (up to $12 \times 12$ ) and the notation e.g. $9^{2}=81$
- Convert between different units of measurement (including time), using decimal notation up to three decimal places when appropriate
- Consolidate telling the time to the nearest minute on an analogue clock and relate to $12 / 24$ hour digital clocks; interpret timetables


| Number |
| :---: |
| Decimals/ |
| place value |

## place value

## \&

Addition/ Subtraction

Week 2

## Number

Multiplication

Week 3

Read and write numbers with up to three decimal places; order and compare numbers with up to three decimal places (including in the context of money and measures); identify the place value of each digit in a decimal number with up to three decimal places (thousands, hundreds, tens, units/ones, tenths, hundredths, thousandths)
Round decimal numbers with one or two decimal places to the nearest whole number; extend by rounding decimal numbers with two decimal places to one decimal place

Consolidate using the formal written method of addition to add two or more large numbers (with four or more digits), including decimal numbers (up to three decimal places), including in the context of

Consolidate the formal written method of subtraction to subtract two or more large numbers (with four or more digits), including decimal numbers (with up to three decimal places), including in the context of money and measures (See Written Calculation Policy, 2017 - Y5 guidance)
Solve addition and subtraction one-step, two-step and multi-step word problems (including money and measures problems), deciding which operation to use; use rounding and inverse operations to estimate and check answers to calculations

Consolidate all mathematical vocabulary related to multiplication; use the term product; calculate mathematical statements for all multiplication tables up to $12 \times 12$; include multiplying by 0 ; solve missing number problems (consider as mental/oral activities)
Use understanding of place value to multiply whole numbers and decimals by 10,100 and 1,000 Consolidate recognising and using square numbers up to $12 \times 12$ and the notation ${ }^{(2)}$ for squared number e.g. $7^{2}=7 \times 7=49$; recognise and use simple cube numbers and the notation ${ }^{(3)}$ e.g. $2^{3}=2 \times 2 \times 2=8 ; 10^{3}=10 \times 10 \times 10=1,000$; relate to volume and $\mathrm{cm}^{3}$ Consolidate the formal written method of short multiplication to multiply multi- digit numbers; multiply decimal numbers (with up to 2 decimal places) by a single digit number, initially in the context of money or measures; consolidate the formal written method of long multiplication to multiply multi-digit numbers; multiply decimal numbers (with up to two decimal places) by a two-digit number, initially in the context of money or measures (See Written Calculation Policy, 2017)
Solve word problems, which involve short and long multiplication e.g. Bags of apples cost $£ 2.45$. I buy seven bags. How much do I spend? There are 125 cars in each row of the car park and there are 37 rows. How many cars are in the car park? A bottle of orange squash contains 1.75 litres. I have bought 12 bottles for the school party, how much orange squash do I have? Solve number problems e.g. 'Farida's Fish' (See Mathematical challenges for all pupils, 2016)

Partition, Place value Digit, number, decimal, decimal place tenth, hundredth thousandth
Order, compare
More than, greater than,
less than, <, >
Round
Inverse operations
Addition, plus, add, sum of, total, more than, increase Subtraction, subtract, minus, less than, decrease Estimate, check
Square numbers (²)
Cube numbers ( ${ }^{3}$ )
Multiply, multiplication, times, product

Formal written method of short multiplication
Formal written method of long multiplication

Problem, solution

\begin{tabular}{|c|c|c|c|}
\hline Number
Division

Week 4 \& 5 \& \begin{tabular}{l}
Consolidate all mathematical vocabulary related to division including the terms divisor, dividend, quotient e.g. In this calculation, what is the divisor, the dividend and the quotient? $72 \div 9=8$ <br>
Find all factor pairs of a given number; find all common factors for a pair of numbers (consider as mental/oral starters) <br>
Use understanding of place value to divide whole numbers and decimals by 1,10, 100 and 1,000 Recall prime numbers up to 19; establish whether a number up to 100 is prime, using knowledge of multiplication and division facts, factors and multiples (consider using 'The sieve of Eratosthenes'); use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers <br>
Consolidate the formal method of short division to divide numbers with up to four digits by a single digit number with whole number answers or with remainders, including expressing the remainder as a fraction; divide decimal numbers (with up to 2 decimal places) by a whole single digit number, initially in the context of money or measures <br>
Use the formal method of short division to divide numbers with up to four digits by a two- digit number, where appropriate e.g. $192 \div 12=16 ; 258 \div 12$ (See Written Calculation Policy, 2017); use the formal method of short division where the answer has up to two decimal places NB long division will be covered in the spring term <br>
Solve word problems, which involve short division, with and without remainders; interpret remainders appropriately for the context e.g. <br>
A school has 336 pupils and an equal number of children in each of the 12 classes. How many children are in each class? I collect eggs from my hens and put them into boxes of one dozen (12). How many boxes do I need if I collect 135 eggs? <br>
In our school we are collecting tokens for free books. For every eight tokens we can have one book. We have collected 1,134 tokens. How many books will we get for the library?

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Divide, division, divisor, dividend, quotient <br>
Factor, factor pairs, common factors <br>
Prime number, composite number, prime factor <br>
Short division <br>
Formal layout <br>
Round up/down, remainder
\end{tabular} <br>

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\end{tabular}

\begin{tabular}{|c|c|c|c|}
\hline Algebra

Week 5 \& 5 \& \begin{tabular}{l}
Introduce the use of symbols and letters to represent variables and unknown numbers or quantities <br>
Express missing number problems algebraically e.g.
$$
a+58=100, a=42 ; 6 n=42, n=7 ; 120=180-m, m=60
$$ <br>
Find pairs of numbers that satisfy an equation with two unknowns e.g. $a \times 12=30+b, a=3$ and $b=6$ <br>
Solve problems and number puzzles using algebra e.g. <br>
$\mathrm{n} \times \mathrm{m}=36$. What are the possible values of m and n ? <br>
If $a=7$ and $b=9$ what is the answer to: $3 a+9 b ; 4 b+1 ; 8 a-3 ; a^{2}+b^{2}$ ? <br>
Pens cost 25 p each. I buy $n$ pens and it costs me $£ 1.50$. What is the value of $n$ ? <br>
The number of bean sticks needed for a row which is $n$ metres long is $2 n+1$. How many bean sticks do you need for a row which is 60 metres long? <br>
Recognise, generate and describe simple linear number sequences, first using words and then algebra e.g. describe and extend this sequence: $4,8,12,16,20,24 \ldots$ (multiples of 4 ), in words (add 4 each time); write a formula for the $n$th term ( $4 \times \mathrm{n}$ or 4 n ); $6,11,16,21 \ldots$ (multiples of 5 plus 1 ), formula for the nth term $5 n+1$ <br>
NB continue to use algebra throughout the year by substituting values into a simple formula, as appropriate e.g. when expressing formula for perimeter; finding missing angles; finding missing numbers; when interpreting sequences, patterns and relationships <br>
(Possible links to Science curriculum)

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Algebra <br>
Symbol, represent, equation <br>
Problem, puzzle, solution <br>
Number sequence, $\mathrm{n}^{\text {th }}$ term
\end{tabular} <br>

\hline | Number |
| :--- |
| Calculation (mental methods) | \& 2 \& | Consolidate mental methods of calculation, for all operations, choosing the most efficient/ appropriate strategies for the numbers involved e.g. |
| :--- |
| Solve the following using a mental method of your choice (with jottings as appropriate): $1,258+999 ; 7 \times 900 ; 2,018-1,995 ; 38 \times 5 ; 88+75+12 ; 98 \div 7 ; 3.5 \times 200 ; 25 \times 16$ $6004-5,899 ; 8,897+n=9000$, what is the value of $n$ ? |
| (See Mental Strategies Policy 2017 for further examples) | \& All relevant vocabulary relating to mental calculation from previous years <br>


\hline |  |
| :--- |
| Statistics |
| (mean average) | \& 1 \& | Explore the order of operations using brackets (BODMAS) $\text { e.g. }(3+2) \times 7=5 \times 7=35 ; 3+(2 \times 7)=3+14=17$ |
| :--- |
| Introduce the mean as an average. |
| Discuss when it is appropriate to find the mean of a set of data | \& BODMAS <br>

\hline Week 6 \& 2 \& Calculate the mean average of a simple set of numbers e.g. $10,8,12,7,8,9$ (find the total of the set of numbers and divide by the number of items in the set) \& Mean average <br>
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\end{tabular}



## Percentages and Ratio

Week 8

Consolidate understanding of per cent as number of parts per hundred and record fraction and decimal equivalents of $1 \%, 10 \%, 20 \%, 25 \%, 50 \%$
Find percentages of whole number quantities using and applying known fraction equivalences e.g.
$10 \%$ of $140=14 ; 20 \%$ of $140=28 ; 50 \%$ of $140=70 ; 25 \%$ of $£ 140=£ 35$

$10 \%$ of $140=14 ; 5 \%$ of $140=7 ; 15 \%$ of $140=21$ (find $10 \%$ of 140 and $5 \%$ of 140 and combine)
Solve word problems involving the calculation of percentages e.g.
A football team played 40 games. They lost $20 \%$ of the matches. How many matches did they lose? How many matches did they win?
I have $£ 240$. I spend $25 \%$ of my money on a pair of trainers. How much do the trainers cost?
Reason about percentages e.g. Would you rather have $20 \%$ of $£ 120$ or $50 \%$ of $£ 52$ ? Why?
Introduce ratio and understand that it is a comparison of part to part e.g
I want to mix some orange paint. For every spoonful of red paint I need two spoonful's of yellow paint;
Describe ratio using words and notation e.g. what is the ratio of red cubes to blue cubes in this tower of cubes. Make another tower using the same ratio.
Solve ratio problems involving the relative size of two quantities using integer multiplication and division e.g. Zara uses 8 tomatoes to make a litre of sauce. How many tomatoes does she need to make 3 litres of sauce? Half a litre of sauce?
For every three boys at the gym club there are four girls. What is the ratio of boys to girls? Altogether there are 28 children at the club. How many are boys and how many are girls?
Solve problems involving similar shapes where the scale factor is known e.g. using a given rectangle with sides of 8 cm and 5.5 cm , enlarge using a scale factor of two (double the length of the sides)

Per cent, percentage, \%

Ratio (:)

Scale factor


Produced for Southwark Primary Schools by a working party led by Diane Andrews, maths consultant

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## Measurement

(units of measurement)
\&

Statistics
(straight line graphs)

Week 11

2 12-hour clock is 21:35? What time on the 24-hour clock is 3:25 pm? Solve problems involving duration of events, including reading timetables
Convert between units of time e.g. How many seconds in twenty minutes? How many days altogether in the months beginning with J? How many hours in two weeks? How many months in a century?
Consolidate reading, writing and converting between standard metric units, converting measurements of length, mass and capacity/volume from a smaller unit to a larger unit and vice versa, using decimal notation up to three decimal places e.g.
How many ml in a $31 / 4$ litre jug of juice? My brother is 185 cm tall - how tall is he in metres? My parcel weighs $1,365 \mathrm{~g}$ - how many kg does it weigh? A piece of ribbon measures $1,650 \mathrm{~mm}$. How long is this in cm ? How long is it in metres? The capacity of my mug is 300 ml - what is the capacity in litres? Consolidate understanding of approximate equivalences between metric units and common imperial units, such as feet and inches, pounds and pints. Establish where we still see/use imperial units e.g. I bought 2 pints of milk, I am 5 feet and 2 inches tall, my cat weighs 8 pounds
Know that miles are an imperial measurement of length; extend by converting between miles and kilometres (one $\mathrm{km}=5 / 8$ mile)

Interpret a straight line graph showing conversion from km to miles; know that intermediate values have meaning; answer related questions converting between miles and kilometres (and vice versa) e.g.

Tower - how far is this in kilometres? It is 37 kilometres from Paris to the Palace of Versailles - how far is this in miles?

All relevant vocabulary from previous years relating to measures (including time)

Metric measures, imperial measures

Straight line graph, conversion

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## Additional weeks

To be used for:

- assessment, consolidation and responding to AfL
- additional using and applying activities
- Christmas maths activities

