

Teaching & Learning Guide

Adopted	April 2019
Lead	TS & KM
Reviewed	



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Aims

- To ensure progression in depth and content through well thought through lessons where every minute is learning driven.

Intelligent sequencing

- To ensure retention of key knowledge through regular retrieval practise.

Interrupt forgetting

- To ensure appropriate scaffold and challenge at every stage of the Maths learning journey.

Teach up & Keep up

- To dispel negative perceptions around Maths (Maths anxiety) and instil a belief in growth mindset in all our students.

Make Maths Magical

Teaching Sequence

Long term planning

Long term planning is taken from the Maths Nav

(<http://mathsnav.com/ks1.html>). This is broken down into weeks in the excel document entitled "Maths Long Term Plan 2019-2020". Where we have mixed stage classes it is advised that the following content should be taught

Year 1&2 - Year 1 content (45-minute Maths lesson & 20-minute skills session)

Year 2&3 - Split content (45-minute Maths lesson & 20-minute skills session)

Year 4&5 - Year 5 content (45-minute Maths lesson & 20-minute skills session)

Year 5&6 - Year 6 content (45-minute Maths lesson & 20-minute skills session)

The suggested number of weeks must be followed unless there is prior agreement from the headteacher.

To see how the curriculum progresses from one stage to the next, the "Curriculum Progression Document" should be used.

Reference should also be made to the BAM statements as a guide to which areas of study are most crucial in order to progress successfully in Mathematics.

Medium term planning

Medium term planning documents are found on the Maths Nav by clicking on the "Scheme of Work" tab.



The schemes of work offer advice on learning hours, suggested learning intentions, vocabulary and misconceptions. They also indicate the curriculum statements that are being covered in this unit.

The "Maths Planning Document - Front Sheet" should be used to record the learning intentions and vocabulary (both taken straight from the schemes of work) you will be teaching for a unit.

Unit Title			
Learning Intention 1	Learning Intention 2	Learning Intention 3	Learning Intention 4
Vocabulary	Learning Intention 7	Learning Intention 6	Learning Intention 5
	Learning Intention 8	Learning Intention 9	Learning Intention 10
Learning Intention 14	Learning Intention 13	Learning Intention 12	Learning Intention 11

Short term planning

There is no specific proforma that you must use for short term planning and if you prefer you might like to plan using your slides for your smart board. However, it is expected that you are well prepared for each lesson and have carefully thought through the different stages. If it becomes apparent you are struggling with this, it may be recommended that you use the "Daily Maths Planning" format.

Date:		LE:	
Responding to marking Max of 10 minutes	Children enter room and get out their <u>maths</u> books. They respond to closing the gap marking from you. This will involve either: Re teach Check Challenge		
Establishing the LJ Max of 3 minutes	What did we do last time? What is the goal for our learning for this unit? What are we covering this time? What is the key vocabulary?		
Teacher modelling and TA modelling			
Independent learning and guided groups	Do it	What are the key misconceptions addressed here?	Solve it
		Prove it	
Challenge/ Plenary Max of 3 minutes			

Cold tasks and vocabulary

Prior to starting a unit (one week before) you will complete a cold task for that unit. The rationale behind the cold task is to give you an idea of where

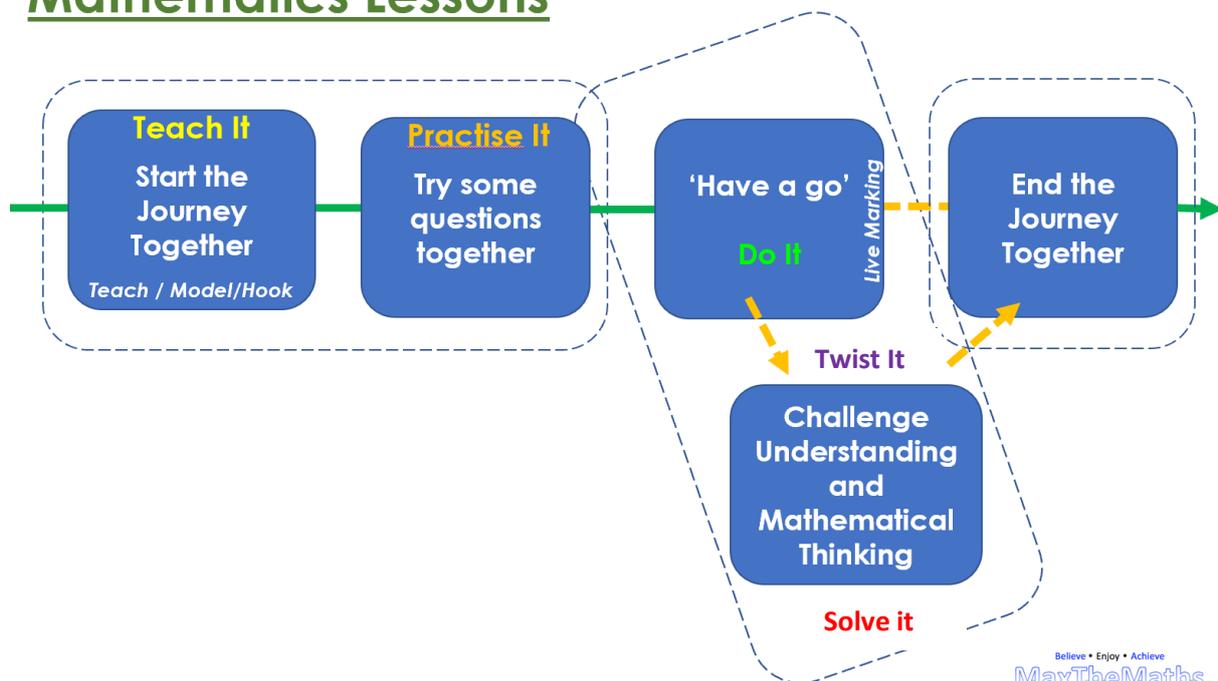


the pupils are with the prerequisites for that unit (the key learning from the previous year that relates to this unit). The cold tasks will give you an indication of any other input or support you need to give during the unit.

On the day of the unit starting, you will complete the vocabulary skills session with your class (see vocabulary skills guidance below). The session is aimed at making the teaching of vocabulary high profile in Maths and ensuring that key mathematical terms are explicitly taught. Further guidance on these sessions is given in the skills session section.

Lesson flow model

Mathematics Lessons



The diagram above outlines the different elements of the lesson. Each aspect is deliberately included to achieve a specific purpose.



Teach it

PURPOSE - model to the pupils how to be successful with the learning intention.

At this stage, it needs to be considered how you will demonstrate to the pupils how to do the mathematical skill you are working on. It will almost always be appropriate to use pictorial or concrete resources at this stage to help pupils understand the learning; however, only one representation or resource should be used (i.e. the one that is best to help the pupils understand).

It is important to drive home key messages at this stage that will help the pupils be successful. The key message could be

Learning	Key message
Recognise triangles	Triangles have three straight sides
Add fractions	We only add the numerators
Measuring with a ruler	Start from zero

The key message usually relates to a misconception. To test the pupils during the "Teach It" it is useful to try and trick them with a misconception (i.e. making the mistake deliberately and having the pupils correct you).

During the teach it, "Live Maths" should be created. This is where you record your modelling on flipchart paper so that the pupils can refer to it during the modelling. This flipchart paper should then be displayed on a Maths Washing Line for the duration of the Maths unit.

It is helpful to make use of the Maths No Problem Textbook to inform your teach it as they have helpful suggestions for different representations.

Practise it

PURPOSE - act as a bridge between the teach it and do it

Before the pupils move on to independent application, they first need to practise the skill you have taught them. This would often be on whiteboards. During the practise it, you need to be assessing whether pupils are ready to move onto the do it. If they are not, they might need some additional explanation or adult intervention during the do it.



Do it

PURPOSE - challenge procedural fluency



As the name suggests, the point of the "Do It" is for pupils to do the learning intention. It should not be over complicated but just be basic questions that follow on from what you have taught.

It is not necessary to have more than 5 "Do It" questions* as by that point you should know whether the pupil can move on or not.

The "Do It" questions should not simply be randomly selected but should get progressively harder. Within the do it, attention should be paid to variation theory (what it is, what it is also). Variation theory stresses making small, deliberate changes to how a question is presented in order to test procedural fluency.

This could look like this for two-digit number add one-digit number

$$\begin{array}{l} - 15 + 4 = \\ - 12 + 7 = \\ - 13 + 8 = \\ - 9 + 14 = \\ - \underline{\quad} = 3 + 14 \end{array}$$

Standard (What it is)

Non-standard (What it is also)

Often, it is easier to make up your own do it questions than to trawl the internet for them.

*If pupils have not got the majority of do it questions correct. They should not simply move onto the Twist it. Instead, they should be re-taught the content and have a go at more do it style questions.

Twist it

PURPOSE - challenge pupils understanding by making them explain misconceptions

The purpose of this stage of the lesson is to throw a misconception at pupils and get them to explain why it is wrong. This could be something like.





Melissa thinks this is a triangle because it has three sides. Is she correct?

$\frac{1}{4}$ is bigger than $\frac{1}{2}$ because 4 is bigger than 2. What is the mistake?

You should always be asking the pupils to explain why someone has made a mistake. Again, it is often easier to make up your own although the White Rose resource does offer some useful tips.

Solve it

PURPOSE - challenging pupils thinking by making them solve problems

The solve it is where the pupils use their learning to solve a problem. Often, the solve it may combine different areas of learning into one problem. It is important to note that word problems are only one type of problem (and indeed are often not particularly mathematically challenging).

Some really good solve its involve

a) Missing digits

$$1. \quad \square \overline{) 2 \square 2} \quad \begin{array}{r} 4 \ 2 \end{array}$$

$$2. \quad 7 \overline{) \square 5 \square} \quad \begin{array}{r} 6 \ 5 \end{array}$$

$$3. \quad \square \overline{) \square \square \square} \quad \begin{array}{r} 4 \ 6 \end{array}$$

- b) Always/Sometimes/Never. A prime number is odd - A/S/N
- c) This is the answer - what is the question?
- d) Create your own questions similar to the do it



The following are useful resources in crafting solve its



- 1) Teaching for mastery (Oxford Owl)
- 2) White Rose resources
- 3) Testbase

Differentiation

We do not differentiate by task instead looking to support & challenge through every step of our lesson design. This ensures that pupils do not get held behind by not being exposed to Age Appropriate Learning*. In addition, it stops being held back by being labelled as "low ability". Instead we provide support for any pupil who needs it.

Support means

- Always using pictorial and/or concrete resources to scaffold the learning.
- Using the "Practise It" as an opportunity for AFL and supporting further where necessary.
- Using adult support (without removing independence).
- Same day or next day intervention to stop gaps appearing in the first place.

*Some of our pupils will have recognised and specific SEND. These pupils will not be able to access the same learning as others at times (although assumptions should not be made that this is always true). Where they need to access a different curriculum, their learning should be guided by their PLPs.

Like we do not label pupils as low ability, we also do not label pupils as high ability. This means we do not have pupils who don't follow our normal lessons sequence. This is because we provide deliberate challenge at every stage of the lesson.



Key Learning Point

Do it

1. $0.51 + 0.3$
2. $0.42 + 0.3$
3. $0.2 + 0.42$
4. $0.2 + 0.42$
5. $0.5 + 1.23$

Challenge Fluency
Accuracy, Efficiency, Flexibility

$\square \cdot \square \square + \square \cdot \square$

Use the digits 0, 1, 2, 3, 4, 5 once to make the largest possible answer

1) The largest possible answer

2) The lowest possible answer

3) 5.73 at least three different ways to make

Challenge thinking

Twist it

What mistake has Mary made?



$0.41 + 0.41 = 0.413$

Challenge understanding
Conceptual

Solve it

Opportunities for pupils to describe, explain, justify, convince, prove

However, for some pupils in some lessons careful attention will need to be paid to the speed at which they progress. This means

- If you sense they are ready to move to the "Do It" during the teach it move them on.
- Quickly assess during the "Practise It" whether the pupils are ready to move on.
- Limit the "Do It" to around 5 questions to ensure pupils are not engaged in mechanical repetition.

If pupils move through to the end of the "Solve It" they can be challenged in two ways.

- If appropriate, let them be a lead learner. This works well for pupils who can explain their thinking and help without giving away answers. It works less well when pupils are likely to just tell other their own answers.
- Give pupils a bank of rich challenges. They should be more open ended and ongoing. They do not necessarily need to be linked to that days learning.

Mini-Plenaries

Mini plenaries should be used where there is a misconception/ lack of understanding common to several pupils. They are used to pull pupils together



and re-model an aspect of the learning. Care should be given not to “plough on” with a lesson when a mini plenary is needed.

Plenary

The plenary should be used in every lesson to bring all the elements of the lesson back together. It is another chance to reiterate the key learning point for the lesson. It is also a chance to celebrate the success of some pupils and showcase their thinking using a visualiser.

At this time, the teacher should also check back in with the learning journey and signpost the pupils to where they've come from and what they are going to be doing next.

AFL

Daily Feedback

All calculations must be marked with a tick or a dot. Where possible, ensure marking takes place within the lesson through marking as you go or use of mini-plenaries.

To indicate the success the pupil has had in that lesson the do it, twist it or solve it should be highlighted in pink (to indicate that learning has been achieved).

Following the lesson, at least twice per week pupils should edit and improve their learning using the following system.

Re-teach is used for groups who don't understand the learning and need time with an adult to have skills re-taught. Purple pen should be evident on the learning.

Check is used where a child has made a few errors but is able to correct on their own. **Check** should be accompanied with a comment helping the child see their error. A question prompt could be used. The errors could be underlined. A correct example could be provided. Purple pen should be evident on the learning.

Challenge is used where a child has got the learning. They should then complete a challenge activity to add depth to the objective (make use of the already planned for challenge).



When the pupil has already completed all the challenge, they act as a lead learner.

BAM Tasks

COMPARING AND ORDERING						
Name:						
<u>BAM Indicator:</u> Compare and order whole numbers up to 100						
1. Place these numbers in order from smallest to largest:	F					
<table border="1"><tr><td>59</td><td>54</td><td>50</td><td>44</td><td>53</td></tr></table>	59	54	50	44	53	
59	54	50	44	53		
2. What is the same and what is different about these numbers?	R					
<table border="1"><tr><td>65</td><td>56</td></tr><tr><td>96</td><td>95</td></tr></table>	65	56	96	95		
65	56					
96	95					
Explain your answer.						
3. Baz says that:	M					
<p style="text-align: center;"><i>"59 is greater than 68"</i></p>						
Baz has made a mistake.						
Explain what the mistake is.						

BAM stands for "Building a Mathematician". For each year group, there are 13 statements which are considered crucial for progression in Maths. The BAM Tasks are designed to assess whether pupils can achieve the BAM statement.

Informed by the research into cognitive science, it is recognised that success in a single lesson does not mean learning is encoded into long term memory so that it can be retrieved at a later date.

The BAM tasks, which take place a week after a unit has finished, are designed to assist into assessing whether the knowledge has stuck. They then inform

further gap fillings (for pupils who have not been successful).

Even where pupils are successful at the BAM Task, further retrieval practise will be needed so that the knowledge does not drop out of their long-term memory.

Environment & Exercise Books

Working Wall

Working walls for Maths should include the following

- "Maths road" with all the learning intentions for the unit on.
- Vocabulary for that unit on traffic light system.
- Space for WAGOLs (celebrations of good work) that should be changed every two weeks.

Live Maths



On a Maths washing line, you should display the live Maths created for that unit of work. Each piece of live Maths should have the learning intention on it.

Equipment Zones

To encourage pupil to use concrete resources when they need, an equipment zone should be in every class. This should contain

KS1

Numincon (EYFS)

Bead strings (EYFS)

Objects for counting (EYFS)

100 squares (Yr 1 & 2)

Place Value grids (Yr 1 & 2)

Number Lines (Yr 1 & 2)

Base 10 (Yr 2)

Counting sticks in bundles of 10 (Yr 2)

KS2

Bead strings

100 squares

Place Value grids

Number Lines

Base 10

Counting sticks in bundles of 10

Place Value Counters

Maths Dictionaries

Exercise Books

Units should be set out in exercise books as follows

1. Unit Front Sheet (just the planning front sheet)
2. Cold Task (not Year 1)
3. Work from the unit
4. BAM Task (if there is one connected to that unit)

Skills session work will be done in a separate exercise book. All skills work should be dated and



expectations in terms of presentation are exactly the same.

Skills Sessions

Rationale

Our skills sessions are primarily aimed to ensure that key knowledge & skills in Maths become part of a pupil's long-term memory. This is based on the following principles:

1. "If nothing in the long-term memory has been altered, nothing has been learning" (Sweller et al 2011).
2. It is good practice to repeat practice over time, as this leads to better long-term retention of knowledge (Rohrer & Taylor 2006; Rawson & Kintsch 2005).
3. Retrieval practice (recalling something you have learned in the past and bringing it back to mind) strengthens memory and makes it easier to retrieve information later (Barenberg Order & Dutke 2018; Roediger & Karpicke 2006)
4. Retention of knowledge and development of schemata will not happen if the working memory is overloaded (Kirschner et al 2006)



Monday (Vocabulary & Cold Tasks)

Cold Tasks

On the Monday a week before a new unit starts, pupils will complete a cold task for that unit in years 2- 6. The purpose of the cold task is to inform the teacher of where the pupils are with their learning. Teachers are to use the appropriate cold task for the unit they are going to teach.

Below is an example of a cold task for Stage 2.

Read these numbers: 15 9 11	Write these numbers in words: 14 = _____ 10 = _____ 8 = _____	How many sweets do I have? 	Fill in the blanks with more than, less than or equal to. 18 is _____ 19 11 is _____ 9 Twelve is _____ 12
Write these numbers in figures: -seven = _____ -twelve = _____ -seventeen = _____			
Fill in the missing number on this number line?			
			

Number and the Number System

GLW

Stage 2

MathsHUBS

Vocabulary

Before the first unit in a lesson going through the key vocabulary and RAG rating it. Ask children questions related to the vocabulary such as can you draw it? Can you describe it? Can you show me an example of it?

Tuesday (Times Tables & Arithmetic Gap Getting)

Times Tables (Year 2 - 6)

Targeted teaching of times tables. Children should be fluent in the previous year's expectations before moving on. They should be able to recall and use multiplication and division facts for their age band.

Year 2 - teach 2x, 10x, 5x and 3x table

Year 3 - review 2x, 3x, 5x and 10x table teach 6x, 8x, and 4x table

Year 4 - teach 4x, 8x, 3x, 6x, 12x, 9x, 11x, and 7x table

Year 5 - All up to 12 x 12



Year 6 - All up to 12×12

Sessions will follow a three-week cycle. In each cycle, only one times table should be taught in each year group. The only exception to this is children who are SEND who may be taken by the TA to do a different times table that is more appropriate. The sessions should take the following format:

Week 1

- Got it times table sheets (just multiplication facts) (5 minutes).
- Write out the times table on whiteboards (e.g. $7x$, $70x$, $700x$, $0.7x$, $0.07x$) (5 minutes max).
- Whole class recalling of the times table in order (2 minutes).
- Counting stick building the tables combined with writing out the number sentences (10 minutes).

Week 2

- Write out the times table on whiteboards (e.g. $7x$, $70x$, $700x$, $0.7x$, $0.07x$) (5 minutes) (5 minutes max).
- Whole class recalling of the times table in order (2 minutes).
- Counting stick building the tables combined with writing out the number sentences (8 minutes).
- MAGs problem solving based around the times table (stick on the maths or Tarsia puzzle) (8-10 minutes).

Week 3

- Write out the times table on whiteboards (e.g. $7x$, $70x$, $700x$, $0.7x$, $0.07x$) (5 minutes) (5 minutes max).
- Whole class recalling of the times table in order (2 minutes).
- Counting stick building the tables combined with writing out the number sentences (8 minutes).
- Got it assessments (10 minutes).



Counting (Year 1)



Year 1 - counting in 1s, 2s, 5s and 10s

In counting skills sessions, the following activities could take place

- Oral chanting (backwards/ forwards, whispering/shouting, boys/girls)
- Ordering number cards
- Counting songs
- Counting objects in groups

Times Tables (Year 1)

teach 2x, 5x and 10x table

Times table skills sessions are taught in 3-week blocks

Week 1

- Writing out times tables in order on whiteboard (3 minutes)
- Oral chanting of times table (5 minutes)
- Building times table on counting stick (10 minutes)

Week 2

- Writing out times table in order on whiteboard (3 minutes)
- Oral chanting of times table (5 minutes)
- Counting stick (8 minutes)
- Tarsia Puzzle (matching (5 minutes)

Week 3

- Writing out times table in order on whiteboard (3 minutes)
- Oral chanting of times table (5 minutes)
- Counting stick (8 minutes)
- Got it assessment (just multiplication facts) (matching (5 minutes)

Wednesday (BAM Gap Getting)



Key 'Build a Mathematician (BAM) Indicators	Essential knowledge
<ul style="list-style-type: none"> Identify multiples and factors of a number Count forwards and backwards through zero Round to one decimal place Use columnar addition and subtraction with numbers of any size Multiply a three- or four-digit number by a two-digit number using long multiplication Divide numbers up to four-digits by a single-digit number using short division and interpret the remainder Add and subtract fractions with denominators that are multiples of the same number Write decimals as fractions Understand that per cent relates to number of parts per hundred Convert between adjacent metric units of measure for length, capacity and mass Measure and draw angles Calculate the area of rectangles Distinguish between regular and irregular polygons 	<ul style="list-style-type: none"> Know the place value headings up to millions Recall primes to 19 Know the first 12 square numbers Know the Roman numerals I, V, X, L, C, D, M Know the % symbol Know percentage and decimal equivalents for $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{2}{5}$, $\frac{4}{5}$ Know rough conversions between metric and Imperial units Know that angles are measured in degrees Know angles in one whole turn total 360° Know angles in half a turn total 180° Know that area of a rectangle = length \times width

Stage 5 BAM Progress Tracker Sheet

Each stage of the MathsNav planning has BAM indicators and essential knowledge (see above). These are used to inform the Wednesday skill session

Part 1 - essential knowledge (5 minutes)

Recap of some of the essential knowledge statements (you will most likely start the year recapping essential knowledge from the previous stage).

Part 2 - BAM indicator (10 minutes)

Time for pupils to practice and embed one of the key skills for their stage. The identification of what to cover will come from your AFL but across the year it is important to spend time practising all statements.

For pupils who have not grasped a concept yet, they might need modelling and/or guided group work.

Thursday (BAM Gap Getting & BAM Assessments)

BAM Gap Getting

As above

BAM Assessments



Name:

BAM Indicator: Add and subtract fractions with denominators that are multiples of the same number

1. Calculate the following:

a) $\frac{5}{13} + \frac{2}{13}$

b) $\frac{1}{8} + \frac{3}{4}$

c) $\frac{18}{25} - \frac{2}{5}$

d) $\frac{5}{9} - \frac{1}{6}$

F

Every BAM statement has a corresponding assessment. In a week after a unit has finished, the Thursday skills session will be used to complete the BAM assessments relevant to that unit.

This will help to assess retention and also inform future BAM Gap Getting.

Friday (Calculation Gap Getting)

Targeted teaching of calculation.

TA and Teacher both to have a guided group to teach a particular calculation skill to. This group will be selected on a weakness identified in books, CLIC tests or BAM Assessment that is relevant to calculation.

Children not in a target group will complete a CLIC calculation sheet working with peers and using equipment to support. This is not a timed activity. Once the children have completed the questions you should mark them together (Unless this would not be purposeful or manageable, say with Year 1 children). Once someone has 3 consecutive



weeks of getting 10/10 this should be celebrated, and they are then moved to the next level.

