

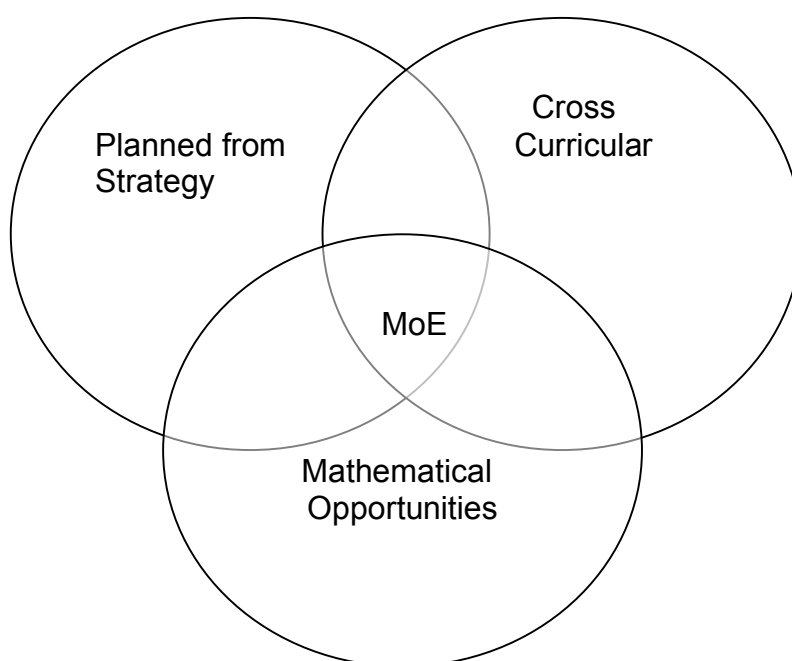
Maths In The Mantle Of The Expert To Integrate Or Not To Integrate?

There are three main approaches used by teachers to enable pupils to learn Maths:

1. Teaching a curriculum planned from the Primary Framework or the National Curriculum;
2. Teaching or consolidating Maths or mathematical language through a cross curricular approach;
3. Providing opportunities for children to explore mathematical concepts whilst responding to the spontaneous or unexpected.

MoE can successfully combine all these approaches thus providing the variety that children ask for from their Maths lessons:

Approaches to Teaching Maths



1. Planned From Strategy

It is a fallacy to say that teaching Maths through MoE means that the rigour, the curriculum coverage and the progressive build up of skills is lost.

For some commissions there may be some mathematical objectives for which there are, at best, tenuous links. In this instance the teacher would plan to teach those objectives completely separate from the mantle. Likewise for areas of the Maths curriculum which require so much time to embed, that it would slow down the pace of the commission.

However, for objectives where new mathematical knowledge is required, teachers plan to employ the 'inside-outside' technique. That is to say, the need to know the mathematical skill, knowledge or concept is identified within the commission, but the teaching of that skill is

done in a Maths lesson. Once pupils have acquired the skill they need, then they apply it back in the context of the mantle and continue with the commission.

2. Cross Curricular

Many teachers can think of an instance where pupils have successfully learnt mental strategies for addition, for example, but when asked to use them in a different context, revert to counting on in ones.

MoE provides a purpose for learning Maths, which is immediate. Skills are taught in context or for a context and children are more likely to transfer this knowledge. Like other cross-curricular provision, the maths objectives and contexts are planned.

3. Providing Mathematical Opportunities

In MoE, Teachers plan mathematical opportunities, but how children develop those opportunities may vary. Children have personal and collective responsibility and as such, they pursue their own lines of enquiry and make decisions. Children engage in mathematical thinking and questioning. They make connections within maths and deepen their understanding. They experiment with, develop, test and revise mathematical thinking. In other words, MoE provides opportunities, motivation and time to develop all children's creative thinking, Mathematically and not just the more able.

The issues:

Maintaining the strengths of the Primary framework without compromising the Mantle.

- curriculum coverage
- skills progression
- curriculum depth

One Approach To Planning

Using The Structure Of The Primary Framework Planning Blocks Within MoE:

Stage 1:

- Decide which of the planning blocks would best be addressed in this particular commission (remember, there is no prescribed order to the teaching blocks)
- Extrapolate all the objectives to be taught during the block(s)

[Hyperlink to stage 1 plan](#)

Stage 2:

- Consider the possibilities in the commission and the nature of the objectives to be learnt:

- Which objectives would not be covered within the context of the Mantle?
- Which objectives require so much specific teaching that they would slow down the pace of the mantle or would not be covered with enough rigour?
- Which objectives are you likely to want to practise regularly in your mental starter as well as in the context of the mantle?

These objectives would be identified on planning overview as 'separate context'.

- Number these objectives, because there may still be opportunities to apply this knowledge in the commission even if most of the teaching is separate.
- Sort the rest of the objectives into a 'within context' box
- Identify any other mathematical objectives which would be experienced within the commission.

Hyperlink to stage 2

Stage 3:

- Begin to plan the mantle, looking for opportunities to include the maths objectives identified.
- Identify the objectives in brackets by number.

Hyperlink to stage 3

- Return to stage 2 Maths overview. Identify which objectives will be taught within the mantle, which will be rehearsed within the mantle, which will need the pupils to come out of the mantle and learn the skills required before applying them in the mantle and where pupils will have experiences which could develop their understanding.

Hyperlink to stage 4 – final stage before ongoing adaptations. Separate maths planning for objectives taught outside the mantle

This is just one example of how, with careful planning, Maths within the Primary Strategy can be integrated within the Mantle. How an objective is taught might change. Teachers may find that an objective they thought would be applied within the mantle actually needs some direct teaching and so would teach this in a separate Maths lesson.

The benefits of keeping the structure of the planning blocks is that schools who are at the stage where they run Commissions for one or two weeks a term, can maintain the curriculum coverage during the commission and easily integrate the Maths planning afterwards. Some schools may prefer to use The Framework objectives but not the structure of the blocks, in which case they would need to have a yearly overview of objectives to ensure coverage.

And Finally

When first becoming involved in planning Maths through MoE, my concerns were the build up of skills. Going through the planning process has shown me that these concerns were logistical and could be easily overcome.

I am left with another problem:

How do we provide Mathematical opportunities where pupils can truly develop their own lines of enquiry and think creatively within Maths without the MoE?

Framework Objectives for Block A

- Describe ways of solving puzzles and problems, explaining choices and decisions orally or using pictures
- Count reliably at least 20 objects, recognising that when rearranged the number of objects stays the same; estimate a number of objects that can be checked by counting
- Compare and order numbers, using the related vocabulary; use the equals (=) sign
- [Read and write numerals from 0 to 20, then beyond; use knowledge of place value to position these numbers on a number track and number line](#)
- Say the number that is 1 more or less than any given number, and 10 more or less for multiples of 10
- Relate addition to counting on; recognise that addition can be done in any order; use practical and informal written methods to support the addition of a one-digit number or a multiple of 10 to a one-digit or two-digit number
- Understand subtraction as 'take away' and find a 'difference' by counting up; use practical and informal written methods to support the subtraction of a one-digit number from a one-digit or two-digit number and a multiple of 10 from a two-digit number
- [Use the vocabulary related to addition and subtraction and symbols to describe and record addition and subtraction number sentences](#)
- Solve problems involving counting, adding, subtracting, doubling or halving in the context of numbers, measures or money, for example to 'pay' and 'give change'

Title: Fairy Tale Problem Solvers – KS1/Reception

BACKGROUND	THE CURRICULUM	<p>U – To understand that you can make a difference to people’s lives. That problems have to be seen from all POV</p> <p>S – Problem solving, communication, negotiation, questioning, working as a team, empathy</p> <p>K – How o make a plan, how to make that plan understandable to others</p>
Developing the Situation	THEME	Fairy tales
	Inquiry Question(s)	How can we mediate between apparently opposite points of view?
	Situation	A very distressed mother, upset because her 3 boys are leaving home & 2 don’t know how to look after themselves, is standing outside the offices of the famous problem-solvers.
Designing the Expert Frame	The Team of Experts	A Team of Experts – who have past experience and expertise in solving apparently irreconcilable problems, through active listening & careful negotiation. The team are known for being fair and trying to work with all parties, regardless of their past.
	Client(s)	Characters from fairy-tales who have a problem that needs solving, often involving conflict resulting from holding a different POV to another character.
	Commission(s)	<p>Their first commission is to design homes that will be safe and comfortable for the sons of Mrs Pig.</p> <p>Their second commission will be to resolve the problem of the Big Bad Wolf in a way that will satisfy all parties, including the wolf.</p>

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Separate Maths Lessons

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Within MoE

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- [Use the vocabulary related to addition and subtraction and symbols to describe and record addition and subtraction number sentences](#)

Further Mathematical Objectives:

- [Estimate, measure, weigh and compare objects, choosing and using suitable uniform non-standard or standard units and measuring instruments \(e.g. a lever balance, metre stick or measuring jug\)](#)

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Key

taught within mantle (new learning)

mantle requires maths skills which will be taught outside

skills consolidated / applied within mantle

concepts experienced within mantle

Separate Maths Lessons

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- [Use the vocabulary related to addition and subtraction and symbols to describe and record addition and subtraction number sentences](#)

Further Mathematical Objectives:

- [Estimate, measure, weigh and compare objects, choosing and using suitable uniform non-standard or standard units and measuring instruments \(e.g. a lever balance, metre stick or measuring jug\)](#)
- [develop the use of the calculator as a tool to support calculating with larger numbers. Include, cancel, cancel entry, the digits, +, -, =](#)

Primary National Strategy

Theme: Solving Problems: To Solve problems involving measures and real life

Year Target		Group Target		Key Resources / Models and Images	Outcomes
Yr R		Must	Solve simple problems or puzzles in a practical context	Practical equipment. Stories. NNS Mathematical Vocabulary ITP Measuring Cylinder ITP Measuring Scales PNS Models and Images Charts	<ul style="list-style-type: none"> Build a tower of bricks as tall as the cupboard Are there enough mugs on the table for us all to have a drink? How many more do we need? Solve problems based on stories such as: The Very Hungry Caterpillar... Goldilocks and the Three Bears... <p>Most pupils will be able to for capacity :</p> <ul style="list-style-type: none"> Fill and empty containers describing them as full, half full, empty or as have more/less in them after filling/emptying. Find a container that 'holds more than this one.' <p>Higher attaining pupils will also be able to :</p> <ul style="list-style-type: none"> Compare the capacity of two containers and estimate how much can be poured from one to another. Measure and estimate using non-standard units in a variety of practical situations. <p>Most pupils will be able to for mass:</p> <ul style="list-style-type: none"> Use a balance to find out which of two, then three objects is lighter Use a balance to compare two objects and say which is the heaviest. Pick out an object that is 'heavier than this one.' <p>Higher attaining pupils will also be able to :</p> <ul style="list-style-type: none"> Hold two objects and say which is heaviest/lightest before checking with a balance Measure and estimate using non-standard units in a variety of practical situations. <p>Most pupils will be able to: length</p> <ul style="list-style-type: none"> Begin to use vocabulary related to length in a practical context. Compare the heights of two children and say who is taller and who is shorter. Compare the length of two paint brushes and say which is longer and which is shorter. Find a ribbon that is 'longer than this one.' <p>Higher attaining pupils will also be able to :</p> <ul style="list-style-type: none"> Compare the length of three or more items. Guess how far they can jump and then check. <ul style="list-style-type: none"> Estimate if the teddy is too tall for the bed before checking
Use developing mathematical ideas and methods to solve practical problems in the context of measures		Should	Solve problems in everyday life in the classroom, or in role play. Using the language of measures		
		Could	Solve simple word problems set in 'real life' contexts and explain how the problem was solved.		

Yr 1		Must	<i>I can compare the lengths/weights/capacities of more than two objects and put them in</i>		Which of these three objects do you think will be the
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			<i>order</i>	Practical equipment.	lightest? Which do you think will be the heaviest?
To Solve problems involving measures		Should	<i>I can use equipment to measure objects</i>	Non-standard and standard measuring equipment.	Which will you compare first?
		Could	<i>I can estimate by looking and feeling I know how to measure objects giving the measurements correctly</i>	Analogue clocks.	What else will you have to do to check if you have put them in order from lightest to heaviest? Which of the containers do you think will hold most? How many cups of water do you think it will take to fill the biggest jug? How do you know how much the biggest jug holds? Where do you start to measure the width of the hall? How many metres wide do you think the hall is? Write your guess on a piece of paper. Measure to halfway. Do you want to guess again? How many cubes balanced the tennis ball? How did you know when you had found the correct weight? <ul style="list-style-type: none"> • Can you build a tower of bricks that is higher than the one already made? How many bricks will you need? • Which of these two packages is heavier? • How long is it until playtime? • What is the height of the table? • Did you think the jug or the mug would hold more? How much more? What did you do to measure as carefully as you could? How do you know that the measurement is correct?
Yr 2		Must	<i>I can use equipment to measure objects</i>	Practical resources. Comparative items	Most pupils should be able to: Answer questions such as:

To Solve problems involving measures	Should	Estimate , compare and measure lengths, weights and capacities, choosing and using standard units (m , cm, kg , litres) and suitable measuring instruments.	eg boxes to compare height or weight of. Non-standard and standard measuring equipment.	<ul style="list-style-type: none"> • ?hich of these two packages is heavier? • How long is it until playtime? • What is the height of the table? Higher attaining pupils should be able to: Answer questions such as:. <ul style="list-style-type: none"> • How long would it take us to cook a cake? • Measure items in the classroom that are about 10cm long (to the nearest half cm). <p>Point out something that you think is about two metres high/tall/long.</p> <p>What can you see that you think is just shorter/longer than a metre?</p> <p>Which containers do you think will hold just a little more than a litre?</p> <p>This strip is 20cm long. How could you use this to help you find a book that is about 40cm tall? How could you use it to find a book that is about 10cm wide? Show me how you would use it to check that this book is about 23cm tall</p>
	Could	Know the relationships between kilometres and metres, metres and centimetres, kilograms and grams, litres and millilitres and choose and use appropriate units to estimate and measure and record measurements.	Analogue and digital clocks. NNS Mathematical Vocabulary PNS Models and Images Charts ITP: Ruler	

The 'measures' and 'time' strands are given separately for Years 3 – 6. (see below)

Yr	3	Must	Estimate , compare and measure lengths, weights and capacities, choosing and using standard units (m , cm, kg , litres) and suitable measuring instruments.	Measuring equipment including rulers, tapes, measuring jugs, scales etc. Practical resources to weigh and measure. A range of clocks / timepieces.	<p>Most pupils should be able to: Answer questions such as:</p> <ul style="list-style-type: none"> • Mark got into the pool at 3.30pm. He swam for 40 minutes. What time did he get out? • Lunch takes 50 minutes. It ends at 1.00pm. What time does it start? • The football team kicked off at 1.30pm. They played 45 minutes each way. They had a 10 minute break at half time. At what time did the game finish? • The swimming pool shut for repairs on Friday, 20 March. It opened again on Friday, 10 April. For how many weeks was the swimming pool shut? • Two rolls of tape are 35cm and 41cm long. What is their total length? What is the difference in their lengths? • A big potato weighs about $\frac{1}{4}$ kg on the scales. Roughly, what would be the weight on the scales of 10 big potatoes? • Two shelves are 75cm and 87cm long. What is their total length in centimetres? What is the difference in their lengths in centimetres? • A full jug holds 2 litres. A full glass holds $\frac{1}{4}$ of a litre. How many glasses full of water will the jug fill? <p>What measuring instruments would you choose to measure: the distance around your head? the temperature in the classroom? the weight of an orange? how much water a cup will hold? Holly estimates that the temperature outside today is 1°C. Do you think that this is a good estimate? A bottle holds 2 litres of juice. How many millilitres is this? A bench is 2 metres and 40 centimetres long. How many centimetres is this? Match the measurement to the appropriate unit: the amount of water in a cup kg the length of a road ml the weight of a dog km</p>
Solve simple word problems involving measures and explain how the problem was solved (measures).		Should	Know the relationships between kilometres and metres, metres and centimetres, kilograms and grams, litres and millilitres and choose and use appropriate units to estimate and measure and record measurements.		
		Could	Choose and use standard metric units and their abbreviations when estimating , measuring and recording, length , weight and capacity. Use decimal notation where appropriate		

Yr	4	Must	<ul style="list-style-type: none"> Know the relationships between kilometres and metres, metres and centimetres, kilograms and grams, litres and millilitres and choose and use appropriate units to estimate and measure and record measurements. 	<p>A range of measuring equipment and resources to weigh and measure.</p> <p>Empty containers eg squash bottles, milk containers.</p> <p>Recipe books A range of clocks / timepieces.</p>	<p>Most pupils should be able to: Answer questions such as:</p> <ul style="list-style-type: none"> Two shelves are 75cm and 87cm long. What is their total length in metres? What is the difference in their lengths in centimetres? A full jug holds 2 litres. A full glass holds $\frac{1}{4}$ of a litre. How many glasses full of water will the jug fill? <p>Higher attaining pupils should be able to: Answer questions such as:</p>
Use all four operations to solve word problems involving measures		Should	<ul style="list-style-type: none"> Choose and use standard metric units and their abbreviations when estimating, measuring and recording, length, weight and capacity. Use decimal notation where appropriate 	<p>Local leisure centre leaflets.</p> <p>Bus and train timetables.</p>	<ul style="list-style-type: none"> Dad bought a 2kg bag of carrots. He used 400 grams of carrots to make some soup. How many grams of carrots were left? Change this pancake recipe for 4 people to a recipe for 6 people. 240g flour, 300ml milk, 2 eggs. The football team kicked off at 1.30pm. They played 45 minutes each way. They had a 10 minute break at half time. At what time did the game finish?
		Could	<ul style="list-style-type: none"> Read, choose and record standard metric units to estimate and measure length, weight and capacity to a suitable degree of accuracy. Convert larger to smaller units using decimals to one place 		<ul style="list-style-type: none"> The swimming pool shut for repairs on Friday, 20 March. It opened again on Friday, 10 April. For how many weeks was the swimming pool shut? A car race began at 08:45 and finished at 14:35. How long did the race last? Four children in a relay team swim in a race. Here are their times for each lap. Craig: 92.4 seconds, Fiona: 86.3 seconds, Harun: 85.1 seconds, Jenny: 91.8 seconds. What is their total time for the four laps? Use correctly the abbreviations for millilitre and litre. Estimate and check measurements using standard units Choose a suitable measuring instrument to measure the capacity of a given container. Suggest a metric unit to measure in a range of contexts Solve word problems involving capacity. Use correctly the abbreviations for gram and kilogram. Estimate and check measurements using standard units Choose a suitable measuring instrument to measure the mass of an object Suggest a metric unit to measure in a range of contexts Solve word problems involving mass

Yr	5	Must	<ul style="list-style-type: none"> Choose and use standard metric units and their abbreviations when estimating, measuring and recording, length, weight and capacity. Use decimal notation where appropriate 	<p>A range of measuring equipment and resources to weigh and measure.</p> <p>'Real life' containers eg fizzy bottles, tins of beans.</p> <p>A range of clocks and timepieces (including a stop watch).</p> <p>Recipe books.</p> <p>Cooker / microwave oven instruction manual (for basic food item cooking times)</p>	<p>Most pupils should be able to:</p> <p>Answer questions such as:</p> <ul style="list-style-type: none"> Dad bought a 2kg bag of carrots. He used 400 grams of carrots to make some soup. How many grams of carrots were left? Change this pancake recipe for 4 people to a recipe for 6 people. 240g flour, 300ml milk, 2 eggs. Which is more: 10lb of potatoes or 10kg of potatoes? There are exactly 2.54cm to 1 inch. 1 yard is about 36 inches. About how many centimetres are there in 1 yard? A car race began at 08:45 and finished at 14:35. How long did the race last? Four children in a relay team swim in a race. Here are their times for each lap. Craig: 92.4 seconds, Fiona: 86.3 seconds, Harun: 85.1 seconds, jenny: 91.8 seconds. What is their total time for the four laps? Lamb must be cooked for 60 minutes for every kg. Chicken must be cooked for 50 minutes for every kg. Complete this table of cooking times. <table border="1" data-bbox="1227 810 2007 911"> <tr> <td>kgs</td> <td>1</td> <td>1.5</td> <td>2</td> <td>2.5</td> <td>3</td> <td>3.5</td> </tr> <tr> <td>Lamb</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Chicken</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table> <ul style="list-style-type: none"> Suggest things that could be measured in litres, millilitres, gallons and pints Respond to complex oral and written questions in a variety of real life Contexts Answer questions such as "If 300 grams of flour are taken off these scales how much will be left?" 	kgs	1	1.5	2	2.5	3	3.5	Lamb							Chicken						
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Chicken																										
Use all four operations to solve word problems involving measures		Should	<ul style="list-style-type: none"> Read, choose and record standard and metric units to estimate and measure length, weight and capacity to a suitable degree of accuracy. Convert larger to smaller units using decimals to one place 																							
		Could	<ul style="list-style-type: none"> Select and use standard metric units of measure and convert between units using decimals to two places eg to change 2.75 litres to 2750 ml 																							

Yr	6	Must	<ul style="list-style-type: none"> Read , choose and record standard and metris units to estimate and measure length, weight and capacity to a suitable degress of accuracy. Convert larger to smaller units using decimals to one place 	<p>A range of measuring equipment including imperial and metric measures.</p> <p>Practical resources to weigh and measure.A range of timepieces including a stop watch.</p> <p>Recipe books.</p>	<p>Most pupils should be able to: Answer questions such as:</p> <ul style="list-style-type: none"> Which is more: 10lb of potatoes or 10kg of potatoes? There are exactly 2.54cm to 1 inch. 1 yard is about 36 inches. About how many centimetres are there in 1 yard? A box of figs costs £2.80 per kilogram. A fig from the box weighs 150g. Find the cost of the fig. <p>The tins are to go in a cupboard which is 1.24m high. Each tin is 15cm high. many layers of tins will fit in the cupboard?</p> <ul style="list-style-type: none"> Lamb must be cooked for 60 minutes for every kg. Chicken must be cooked for 50 minutes for every kg. Complete this table of cooking times. <table border="1" data-bbox="1310 655 2092 756"> <tr> <td>kg</td> <td>1</td> <td>1.5</td> <td>2</td> <td>2.5</td> <td>3</td> <td>3.5</td> </tr> <tr> <td>Lamb</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Chicken</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table> <ul style="list-style-type: none"> Every morning Ramesh catches a school bus at 8.05am. It arrives at the school at about 8.40am. Each Friday, the bus takes longer and it arrives at 8.55am. How long does Ramesh spend coming to school over a school week, a term of 16 weeks, a year of 39 weeks...? Read a scale, converting the unit to an equivalent metric unit. State the approximate equivalence between commonly used imperial and metric units State the equivalent of one thousandth of 1 kilogram in grams. Record estimated and measured capacities in decimal form. 	kg	1	1.5	2	2.5	3	3.5	Lamb							Chicken						
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		Could	<ul style="list-style-type: none"> Solve problems by measuring, estimating and calculating; measure and calculate using imperial units still in everyday use. 	<p>Bus and train timetables.</p>																						