Remote Learning Autumn 2020: Mathematics

The HIAS maths team has developed the following resource to support teachers should class-based learning need to be blended with remote learning for an individual, a class or a bubble.

It is our intention to support you to:

- identify materials and resources to use as an initial two-day emergency plan for each learning journey / unit of work

  This emergency plan can be used alongside similar plans available from HIAS English and the 2-day HIAS primary curriculum projects available on Moodle+

- convert existing plans, when required, into a structured remote teaching sequence to ensure continuity of curriculum learning

First 2 days – emergency plan

As part of medium-term planning, schools might identify school-based or online resources which support **a relevant key skill or aspect of knowledge in each unit of work which could support learning for two days**. The two-day window created by these resources allows time for the remaining class-based learning sequence to be adapted to suit remote learning practices. This prepared resource could help reduce the initial workload demands on teachers.

Key sites recommended for online materials which include video material and tasks:

- NCETM https://www.ncetm.org.uk/in-the-classroom/support-for-schools-addressing-ongoing-coronavirus-impact/
- BBC Bitesize https://www.bbc.co.uk/bitesize
- BBC Teach https://www.bbc.co.uk/teach
- Oak National Academy https://www.thenational.academy/oaks-curricula
- White Rose scheme of learning task resources https://whiterosemaths.com/homelearning/

In June 2020, the DfE produced a guidance document, 'Teaching mathematics in primary schools, Guidance for teaching mathematics at key stages 1 and 2 to help pupils progress through the national curriculum'. DfE https://www.gov.uk/government/publications/teaching-mathematics-in-primary-schools

This guidance includes 'ready to progress' (RTP) criteria identifying essential concepts and skills for Years 2 to 6 for use from September 2020. This might also inform planning for the 2-day emergency plan.

During these initial 2 days, pupils can be sent home with instructions to complete the remote activities as planned, or as appropriate to pupil needs.

During this initial day (or two) of activities drawn from English, mathematics and foundation emergency curriculum planning (See Moodle+ for further resources), teachers should plan to adapt the planning from classroom based to remote delivery. This will use the school's preferred approach to remote teaching, in accordance with the relevant expectations in DfE guidance.

HIAS REMOTE LEARNING

It is important that pupils are engaged in relevant learning in the initial two days of an isolation.

1. Plan a key skill for each learning journey considering what will be a useful focus for all pupils that reinforces an important aspect of the whole learning journey.
2. Choose a linked available remote teaching resource that includes relevant activities that will support pupils key learning or identify a school specific task that will be available for use, if required.
3. Consider the needs of the range of learners in your group/class (Refer to DfE 'Ready to Progress' (RTP) criteria) and how previous learning will be revisited/consolidated.
4. Ensure all pupils have access to remote learning resources they need e.g. internet access if required. If this is not possible, consider how pupils with limited or no access to the internet will access materials during any isolation from school.

A year group emergency plan overview for autumn term might look like this:

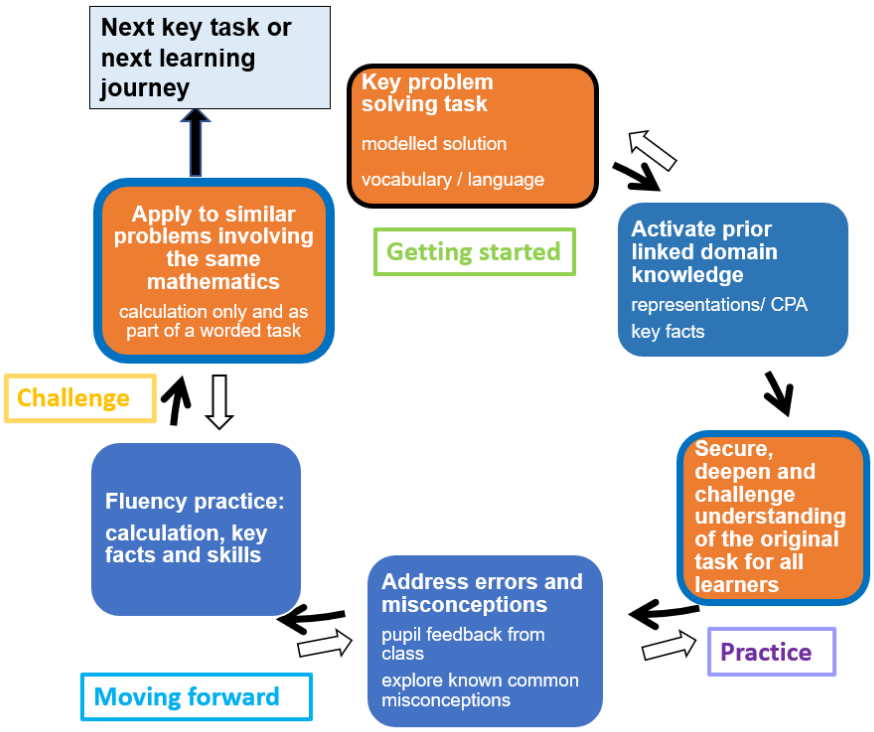
Year 1: Unit/ length Hampshire scheme of learning		**Unit 1.1** **(4 weeks)**	**Unit 1. 2** **(3 weeks)**		**Unit 1. 3** **(3 weeks)**	**Unit 1.4** **(4 weeks)**
	Domain focus	NPV; add/sub	Measurement (money/ length); add/sub		Multiplication/ division Fractions, Geometry	NPV; add/sub
2 days	**Key skill focus**	• Position numbers on number lines up to 30 • Represent numbers different ways	• Know coins/ Pennies = 2p, 5p, 10p • Represent as addition facts		• Count in 2s, 10s on number lines • Cut and fold shapes for half/ not half	• Position numbers on number lines up to 50 • Represent numbers different ways • Show all bonds 6-10
	Focus for application of a previous skill	• Represent number bonds problem context	• Identify addition facts to solve simple problem/ pictures (diagrams), number sentences		• Solve simple multiplication problems using pictorial representations	• Identify addition and subtraction facts to solve simple problem/ pictures (diagrams), number sentences
	Linked remote learning resources including relevant activities (carefully chosen online published and /or specific school-planned tasks)	Add/sub lesson 1 https://www.ncetm.org.uk/classroom-resources/vl-key-stage-1-number-addition-and-subtraction-video-lessons/ (unit 1.1) Oak Acad Unit 1 https://classroom.thenational.academy/subjects-by-year/year-1/subjects/maths BBC bitesize https://www.bbc.co.uk/bitesize/articles/zt4ytrd	Add/sub lesson 9 https://www.ncetm.org.uk/classroom-resources/vl-key-stage-1-number-addition-and-subtraction-video-lessons/ Oak Ac. Unit 2 https://classroom.thenational.academy/subjects-by-year/year-1/subjects/maths		Multiplication lesson 2&3 https://www.ncetm.org.uk/classroom-resources/vl-key-stage-1-multiplication-1-video-lessons/ Oak Acad: Unit 3 https://classroom.thenational.academy/subjects-by-year/year-1/subjects/maths	NCETM Add/sub lesson 10 https://www.ncetm.org.uk/classroom-resources/vl-key-stage-1-number-addition-and-subtraction-video-lessons/ Oak Acad: Unit 5 https://classroom.thenational.academy/subjects-by-year/year-1/subjects/maths

Specific guidance for the re-planning of Mathematics curriculum content for remote delivery comprises:

1. 6 step planning process for adapting from classroom to remote delivery
2. Applying effective strategies supporting recall of learning identified through cognitive psychology research
3. Converting between class-based learning and remote learning

Remote Learning sequence guide

A six-step remote learning sequence has been developed to support you in converting a 'typical' teaching sequence into blended / remote learning (8/9 days after initial 1/2 days). These are not "fill-in" tasks but should be planned to provide for appropriate curriculum coverage and progress in key skills. The six-steps suggest a focus for some essential key tasks and activities for a unit of work. This is intended as a prompt for re-shaping the purpose of each lesson or sequence of lessons **at the point of the need for remote learning**. Refer to DfE 'Ready to Progress' (RTP) criteria to consider **inclusion needs of pupils** in emergency 2- day planning for a unit of work for Year 2, Year 3, Year 4, Year 5 and Year 6. A suggested sequence of planned learning steps is as follows: getting started, practice, moving forward and challenge.



Key

	Focus on problem solving process Focus on domain(s) of mathematics i.e. NPV, calculation, fractions, measurement, geometry Connections between these steps means that the order may vary according to pupil need

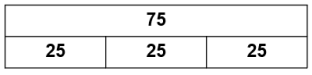
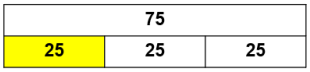
A typical learning journey / unit of work is often composed of a **sequence of key tasks** developing both **conceptual understanding and skills** in a maths domain(s) and **application** of the maths to **solve problems**. Each problem-solving task can be used as a context and purpose for developing mathematical **reasoning** across several lessons.

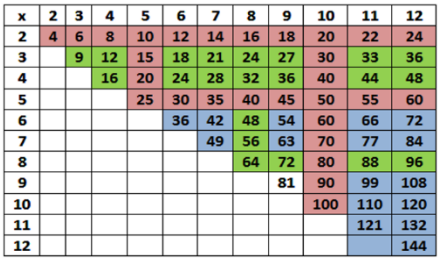
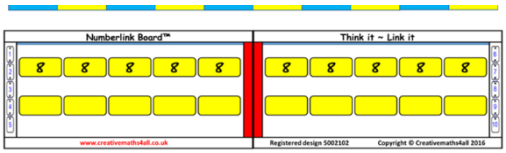
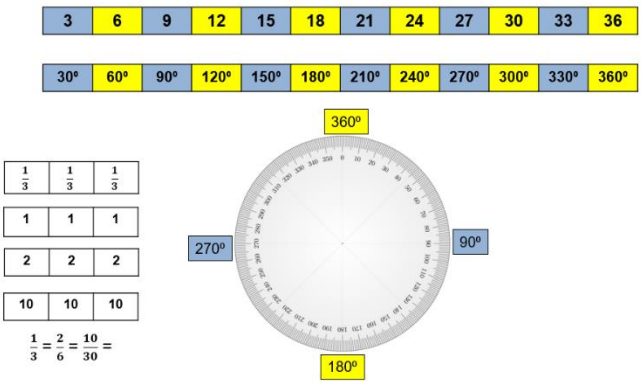
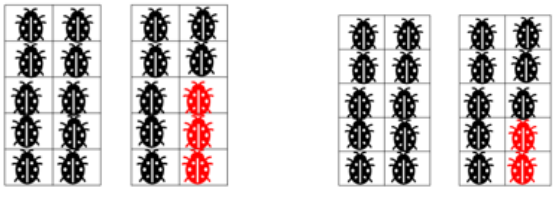
Applying effective strategies from cognitive psychology research

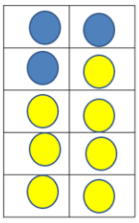
Effective strategies supporting recall of learning identified through cognitive psychology research have been included in the 6-step model. It is important that children are prompted to access their memories of prior teaching and learned knowledge during periods of remote teaching.

The overlapping and linked strategies are: retrieval practice, spaced practice and interleaving; elaboration, concrete examples and dual coding (Weinstein, Sumeracki and Caviglioli, 2019)

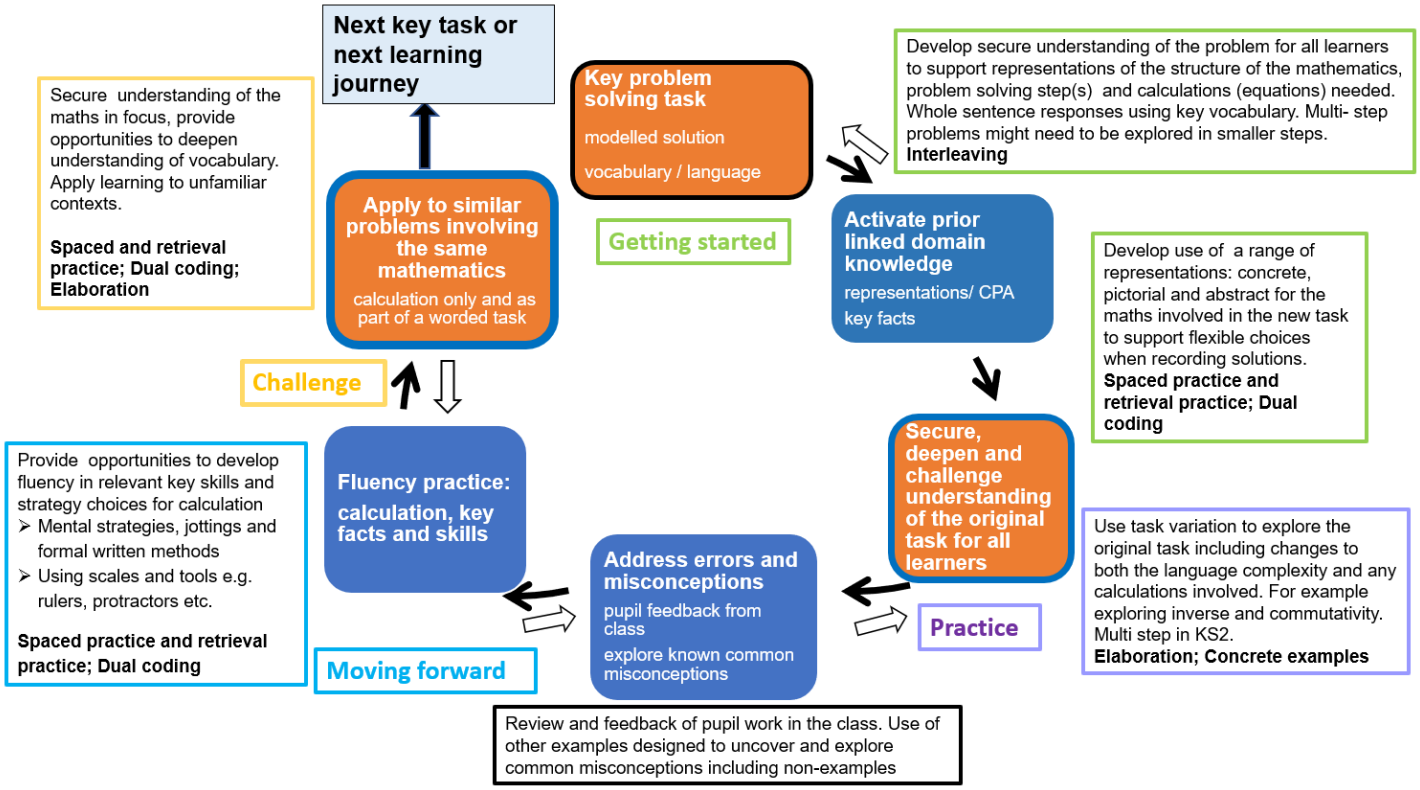
These strategies can be used to inform the purpose of the tasks set during periods of remote teaching (learning when in isolation). For example, retrieval practice and spaced practice can be supported by selecting a task which is based in a domain of maths from an earlier unit of work. Elaboration and dual coding can be considered when deciding on the expectations for pupils' recording of solution to problems and calculations using a CPA approach involving a range of representations. The following chart summarises these key cognitive strategies and gives further examples of application in a learning journey.

Strategy	Definition	Example
retrieval practice	**Retrieval practice** is the act of actively trying to recall information (using visual, audial, concrete prompts perhaps), a strategy in which calling information to mind subsequently enhances and boosts learning - spiral curriculum Recall is not a 'test' necessarily. Tasks promoting collaboration and saying / doing will re-stimulate neural pathways	 Visual prompt What information does this bar model give us ?  How about now? Same ideas or does it make you think of something else?

Strategy	Definition	Example
spaced practice	Pupils review material over a long period of time. This gives their minds time to form connections between the ideas and concepts so knowledge can be built upon and easily recalled later. They repeatedly come back to acquire learning in multiple short sessions over time. Long and medium term planning which enables revisiting of domains of maths throughout the year supports spaced practice.	Daily times table practice using consistent methods such as 'one, ten, five, derive' with arrays  
interleaving	**Interleaving** is a process where pupils mix, or **interleave**, multiple subjects or topics while they study. Blocked practice, on the other hand, involves studying one topic very thoroughly before moving to another topic. Pupils revisit previously acquired concepts to bring them to mind.	revisit the 3x table, then look at thirds and equivalence, then move to geometry and sums of angles (such as 3 x 60º = 180º) and so on 
elaboration	**Elaboration** is the development of an existing idea by incorporating new information to augment the idea. It can be used as a method of memory retention by making a memory or idea with greater detail to remember it accurately. **Elaborations** concerns going deeper, mastery, asking how and why, e.g. different ways to get to a solution.	 17 + 3 = 18 + 2 Why is this true ? 10 + 7 + 3 = 10 + 8 + 2

Strategy	Definition	Example
dual coding	**Dual coding** can be thought of as more than one representation of the same idea or concrete, pictorial, abstract (CPA). It is often helpful to show verbal and visual information together.	"Three and seven is the same as ten" 3 + 7 = 10 
concrete examples	Pupils use concrete resources and real-life contexts to explore abstract ideas. Using actual examples in a simple form and then building the complexity towards more abstract ideas will help secure firm conceptual foundations.	"What is ten more than thirty six?"  "I have 36 marbles and I find 10 more. How many do I have now ?"

Applying cognitive strategies into the six-steps of remote curriculum planning enables teachers to identify the purpose of tasks within the learning journey sequence and shape remote learning:



Depending on the number of key tasks planned in the unit of work this sequence of six steps may be used once or some steps in the sequence might be repeated.

The amount of time for each step is determined in response to the needs of learners. Similarly, the order of steps and which ones might be included will vary according to needs of learners and the point in the learning journey when remote learning is needed.

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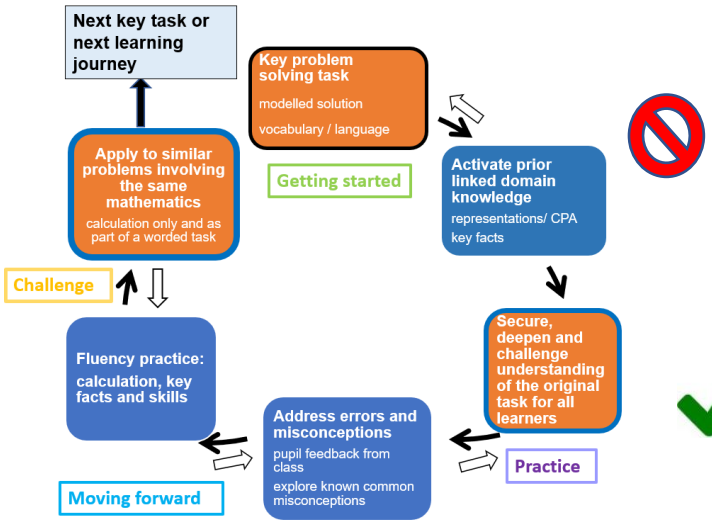
Converting between class-based learning and remote learning

Teachers can use the six-step plan to identify the correct starting point within the learning journey sequence and shape remote learning provision accordingly. An isolation period could be needed at any point of the learning journey, e.g. – when remote learning is required 5 days into a teaching sequence.



Pupils have been introduced to the **key problem solving task** and have completed work on representations for the relevant domain(s), **activating prior knowledge**

Remote learning starts at the task variation stage to **secure, deepen and challenge understanding**.

Decide how many lessons are needed for each subsequent step.

The following additional guidance contains worked examples for Year 1, Year 4 and Year 6.

Across the three examples we have recognised the possibility of an isolation period starting at any point and the need for remote learning at different starting points within a learning journey or to bridge the end of one learning journey and the beginning of another. An example is shown below:

Remote learning sequence guide **Identify the correct starting point after your initial 2 days of emergency tasks and shape provision accordingly**			
Introduce key problem-solving task	• Language/ vocabulary • Modelled solutions • Multi-step in KS2	**Already completed in class prior to isolation starting**	...and starts work on next unit
Activate domain knowledge	• Concrete, Pictorial, Abstract (CPA) • Representations • Key facts	**Implement 2-day emergency plan**	
Task variation of key task	• Secure, deepen and challenge for all • Inverse/ commutativity	✓ Remote plan completes re-planned sequence of linked lessons …	**Return to class-based learning**
Errors and misconceptions	• Feedback to individuals/ groups • Explore common misconceptions		
Fluency practice	• Calculation mental/ written • Skills		
Apply to unfamiliar contexts	• Secure and deepen conceptual understanding of the maths in focus		

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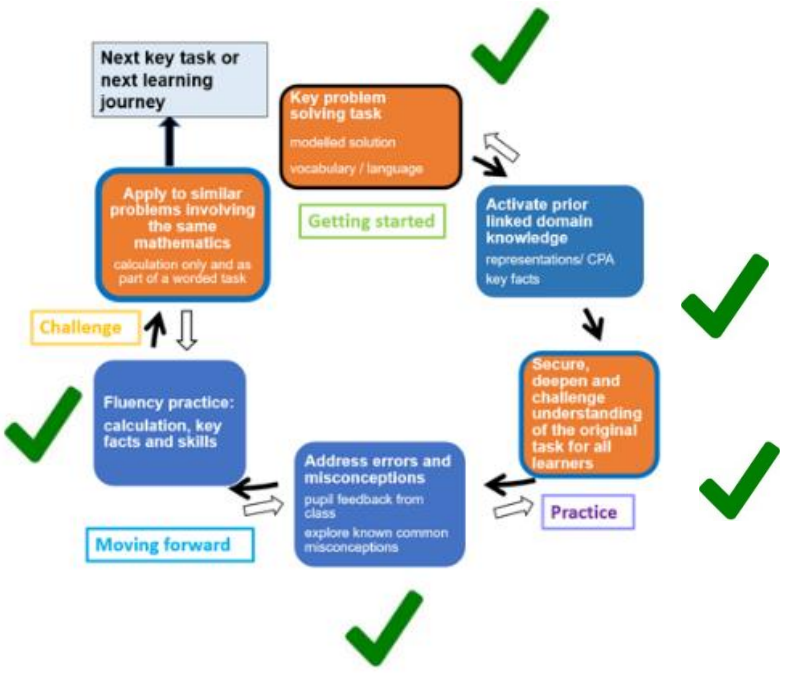
Year 1 example (from Hampshire Maths Primary Scheme of Work); learning journey has been started before isolation period begins and triggers need for remote teaching

Lessons	Year 1 Unit 1.1 NPV, Add and Subtract Possible 4 week Learning Journey*		Blended Learning
1	Oral Counting Completing sequence using different number tracks Reading numbers Dice and counter Board Games		Class based learning already completed prior to period of isolation
2			
3			
4	Representing numbers using collections of objects Writing numbers Using language: more than/ fewer Matching numeral to set of objects		
5			**2 days emergency planning**
6			**used at outset of isolation**
7			**4 lessons** Use online video lesson Oak Academy/ NCETM as stimulus with follow up home based activities and teacher designed tasks. Develop fluency
8	Problem context for ordering and comparing numbers -as collection of objects - using numerals, inc different starting points		
9			
10			
11	Review previous lessons using a problem eg 'I'm thinking of a number. It's larger than XX but fewer than YY. What is my number?'		**2 lessons** Provide teacher designed task to recap class-based learning and address any errors/ misconceptions that were emerging- possibly inaccurate counting, number formation etc
12			
13	Partitioning numbers: 2,3,4,5 Build number bonds Represent using CPA and part whole representations Use a problem context to use bonds for solutions recording using CPA approach		**2 lessons** Use online video lesson (NCETM) to introduce key task with follow up teacher prepared tasks
14			
15			Return to class-based learning after completion of isolation at home
16			
17			
18			
19			
20			

*Further guidance can be found in Hampshire primary scheme of learning on Moodle Plus

Steps used to support blended learning



Why these steps?

The planning has focused on introducing a new key task.

There was sufficient work on representations and class-based work in number & place value revealed some errors which could be addressed with some carefully designed tasks (revisiting the earlier class- based work).

The first four lessons could be focused on developing fluency with representing numbers. Applying the same maths to another context is possibly best supported by waiting until back in class-based learning.

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Year 4 example (from Hampshire Maths Primary Scheme of Work): Remote learning starts mid-way through a learning journey *Further Learning Journey guidance can be found in Hampshire primary scheme of learning on Moodle Plus

Lessons	Year 4 Unit 4.1 NPV, Addition and subtraction Possible 3 week Learning Journey*		Blended Learning
1 2 3 4 5	**Practical experiences of using a range of concrete resources to model 3 -digit numbers** **Revise composition of 1000:** -Addition/ subtraction families of facts using multiples of 10/ 100 and 50 e.g. 1000-150= 850 -Partition numbers flexibly e.g. 576= 400 +176; 500+76 using part part-part- whole diagrams Make 3- digit numbers using Dienes and physically add/take 10s and 100 from a number, record the PV equations eg 356 +10=366 **Use number lines** to position and compare numbers **Key facts about 1000 and 10,000 using bar models** identifying ½, 2/4 ;¼, ¾ and 1/10 of 1000		Class based learning already completed prior to period of isolation
6	**Problem solving** Identify a few key tasks involving addition and subtraction in two-step problems in contexts, deciding which operations and methods to use and why- adapt numbers to reinforce the key concepts and facts from place value work.		**2 days emergency planning** including DfE 'Ready to progress' criteria from Year 3 related to this unit. Eg 3NPV-1, 3NPV-2, 3NPV-3, 3NF-1
7			Solve addition and subtraction calculations showing solutions with a range of representations
8 9			**4 lessons** Provide modelled solution for key add/sub task that supports all learners (using video of CT?) Use task variation for more examples and practice to develop fluency
10 11	**Mental strategies (addition/ subtraction)** Use unstructured number lines to record mental calculations discussing appropriate strategies		
12			**2 lessons** Oak Academy video Unit 2 to introduce Provide modelled examples of mental strategies appropriate to all leaners using number lines related to earlier class based NPV learning
13	Problem solving: addition/ subtraction Review learning for unit		
14 15			**2 lessons** Address errors and misconceptions eg steps in problem solving or calculation errors or misconceptions Fluency practice: addition and subtraction E.g. Match/ sort solutions to word problems

Why these steps?

In this suggested example, there is an opportunity to develop almost all of the steps in the diagram.

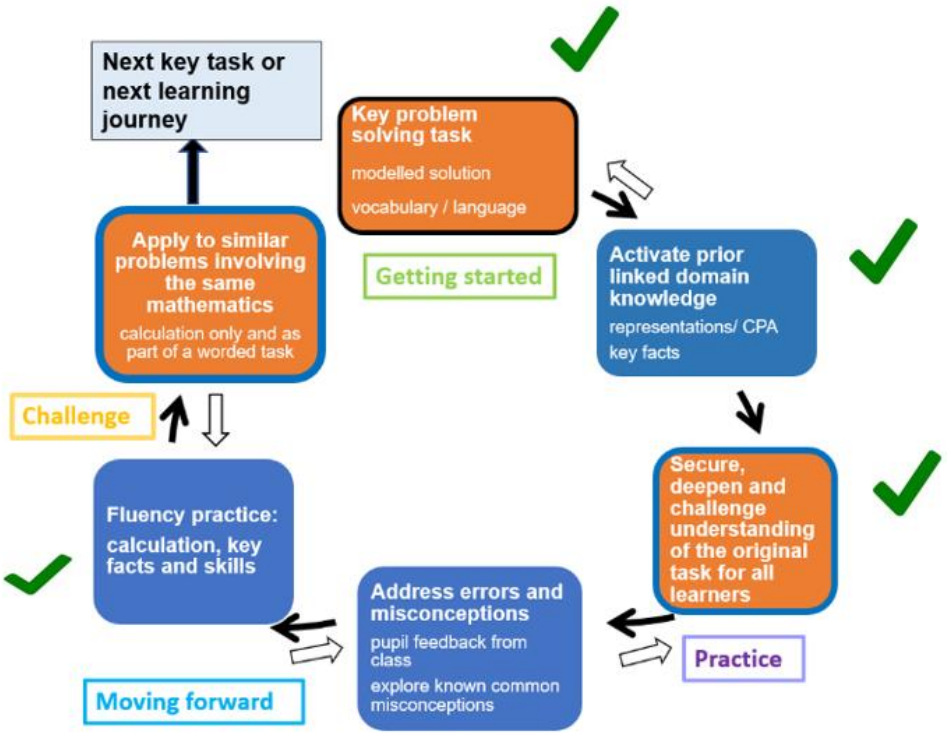
The focus on applying the same maths in a different context could be the next planned focus when returning to class based learning.

Year 6 example (Uses Hampshire Primary Scheme of Work); Remote learning starts towards the end of a learning journey

Lesson	**Year 6 Unit 6.1 NPV, Addition and subtraction Possible 3 week Learning Journey***		**Blended Learning**
1 2 3 4 5	**Practical experiences of larger numbers:** Use a numberline and Dienes to look at the proportional size of 100,000 in comparison with 1,000,000. Refer to a Gattengo chart **Read and write numbers:** place value of all digits, include zero. Count forwards/ backwards from a range of given numbers, including 10s, 100s, 1000s and including bridging. Make predictions, check with a calculator. **Include real life examples** of when larger numbers are used such as house prices. **Rounding –** Share real life examples and when pupils will be required to round such as population Key number facts for 1,000,000 etc		Class based learning already completed prior to period of isolation
6 7 8 9 10	**Efficient strategies for addition and subtracting: -**when to select formal written methods and when mental strategies may be more efficient. **Mental strategies:** Teach mental strategies such eg Rounding and adjusting; Application of number bonds to bigger numbers; approximation **Problem solving:** Solve problems in which pupils are required to select the most efficient strategy. Include problems in which more than one operation is required.		
11 12 13	**Perimeter and area:** Apply strategies taught to questions that include area and perimeter. Remind pupils of how to find the perimeter of different shapes. Include real life context to ensure pupils can explain what is meant by area and perimeter and what is the difference between the two. include decimals as well as larger numbers. Give pupils time to make estimations in relation to perimeter before solving.		**2 days emergency planning** including DfE 'Ready to progress' criteria from Year 5 related to this unit. Eg 5NPV-2, 5NPV-3
14	Find perimeter of composite shapes with missing side values,		Area / perimeter problems continued
15	find the value of the side using the measurements given, before finding the area and perimeter. Investigate the area and perimeter of shapes.		**1 lesson**; Oak Academy Unit 5 video Retrieval practice from current unit: eg NPV: (rounding, ordering and comparing); Area /perimeter or calculation; Or area /perimeter problems
	Year 6 Unit 6.2 NPV, multiplication and division Possible 3 week Learning Journey*		
1 2	**Ensure pupils gain a conceptual understanding of multiplication and division revisiting and using** an array making the link with the formula of area. Apply to a range of regular and irregular shapes. Include examples with and without squares.		**3 Lessons** Use online video to introduce: Oak Academy Unit 2 Provide modelled solution for key task that supports all learners Use task variation for more examples and practice
3 4 5	**Factors and multiples:** Remind pupils of factors and multiples.. Understand that meaning of prime numbers. Pupils to use concrete resources to find prime numbers up to 20 including the use of arrays. Understand the terminology of common factors and give examples – Find numbers that have common factors of 5 and 13.		**4 lessons** Use online BBC Super Movers: Prime Numbers to introduce Provide modelled solution for finding common factors. Use task variation for more examples and practice. Link with tables practice/ fluency
6	**Explore multiplying and dividing by 10, 100 and 1000.**		Class- based learning

Further Learning Journey guidance can be found in Hampshire primary scheme of learning on Moodle Plus

Year 6 example Steps used to support blended learning:



Why these steps?

In this example, where isolation comes near the end of a unit and the start of another, the remote learning focuses on a series of tasks that require pupils to access prior knowledge and consolidates this through further activities. The teacher accesses the pupils' responses in order to understand common or individual misconceptions and errors. This forms the basis of planning for the return to class-based work unless the teacher is confident that these can be tackled remotely.

Further remote teaching gives important opportunities for pupils to improve their fluency in calculation, key facts and skills.

Applying the maths to similar problems might need a class-based discussion to support pupils making links with previous tasks.

Blank Remote Planning Master

Medium term pre-planning		Learning Journey 1	Learning Journey 2	Learning Journey 3	Learning Journey 4
Domain Focus					
2 days Emergency Plan	Focus skill/ knowledge	•	•	•	•
	Application	•	•	•	•
	Linked remote learning resources (online or school planned)				

Remote learning sequence guide Identify focus of tasks using 6 steps diagram. Change order of steps and group several lessons together as appropriate to the learning journey		
Key problem solving task	• Language/ vocabulary • Modelled solutions • Multi -step in KS2	Use live teaching/ pre-recorded videos/ worked example to model and explain the task
Activate Prior domain knowledge	• Concrete, Pictorial, Abstract (CPA) • Representations • Key facts	Provide examples of particular representation(s) to be used
Task variation of key task	• Secure, deepen and challenge for all • Inverse/ commutativity	Provide examples of key task with appropriate changes to language, calculation and or number of steps involved
Errors and misconceptions	• Feedback to individuals/ groups • Explore common misconceptions	Assess pupil responses, identify and address common or individual misconceptions and errors
Fluency practice	• Calculation mental/ written • Skills	Provide more examples for practice when pupils reasonably secure with the focus and not making too many conceptual errors
Apply to unfamiliar contexts	• Secure and deepen conceptual understanding of the maths in focus	Provide examples where the maths needed is the same but the problem/ context unfamiliar