

## Programme Plan and Report (2021/22)

(blue – planning stage; orange – reporting stage)

<b>Project title</b>	Y5-8 Continuity				<b>Project number:</b>	<b>NCP21-19</b>
<b>Maths Hub</b>	xxxxxx	<b>Maths Hub Code</b>	xxxx	<b>Work Group Ref</b>	xxxxxx	
<b>Cohort Lead/s</b>	xxxxxxxxxx					
<b>Plan/report author</b>	xxxxxxxxxx		<b>Partnership agreements in place for all Cohort Leads?</b>			xxxx
<b>MHLM team link</b>	xxxxxxxxxx					

### Programme reach and school profiles

<b>Planned reach</b>	Planned no. of schools/colleges/organisations	6	Planned no. of participants	10	Planned phases	KS2/KS3
<b>Actual reach</b>	Actual no. of completing schools/colleges/organisations	6	Actual no. of participants completing	10	Actual phases	KS2/KS3

#### Profile of schools and participants (add rows as necessary)

<b>School A, B, C etc</b>	<b>Phase</b>	<b>School context</b>	<b>Participant profiles(s)</b>	<b>Comment on engagement and completion</b>
Secondary school A	S	This is a secondary school and sixth form which is currently having monitoring visits from HMI following an inadequate Ofsted in 2018. Since then the full leadership team and most of the staff of the school has changed;	In all 4 of the maths team have attended every session with the head also popping by along with other senior members of the SLT.	Engagement has been excellent- in fact one of the maths teachers has applied and been successful to join the secondary specialist programme. This secondary school have been very engaged from the start and have put transition as a key area for development. They have thrown open their doors, provided year 7 lesson studies and spaces to meet

		monitoring visits report that many positive changes have been seen.	The maths lead, 2 maths teachers and an HLTA for maths attended throughout.	readily and have sent a large portion of the maths team along from HLTA to Maths department lead.
Primary School A	P	One form entry village school which is right on the edge of an LA boundary so although most pupils live in xxxxxx they attend a xxxxxxsecondary which is not part of the group.	Experienced year 5 teacher who has applied and been successful for Primary Mastery specialist role and experienced HLTA from year 6	Both attended every session and were highly engaged in the case studies- preparing and presenting their case study slides each time.
Primary School B	P	One form entry catholic village school which is right on the edge of an LA boundary so although most pupils live in xxxxxx they attend a catholic secondary on the border	Experienced year 6 teacher who is also part of an embedding work group	Excellent attendance and engaged with pupil case studies throughout and also engaging in Basecamp discussions
Primary school C	P	Small mixed age village school- most pupils attend the secondary school in the group	Experienced year 6 teacher who is also part of an sustaining work group	Excellent attendance and engaged with pupil case studies throughout and also engaging in Basecamp discussions. They hosted the final session for a live year 5/6 lesson study.
Primary School D	P	One form entry school with a proportion of the pupils attending the secondary school. Year 6 teacher is part of a sustaining work group and is a work group lead who is keen to take leadership of this project ongoing.	Experienced year 6 teacher who is also part of an sustaining work group	Excellent attendance and engaged with pupil case studies throughout and also engaging in Basecamp discussions

Primary School E	P	Small mixed age village school- most pupils attend the secondary school in the group	Experienced year 6 teacher who is also part of an sustaining work group	Excellent attendance and engaged with pupil case studies throughout and also engaging in Basecamp discussions
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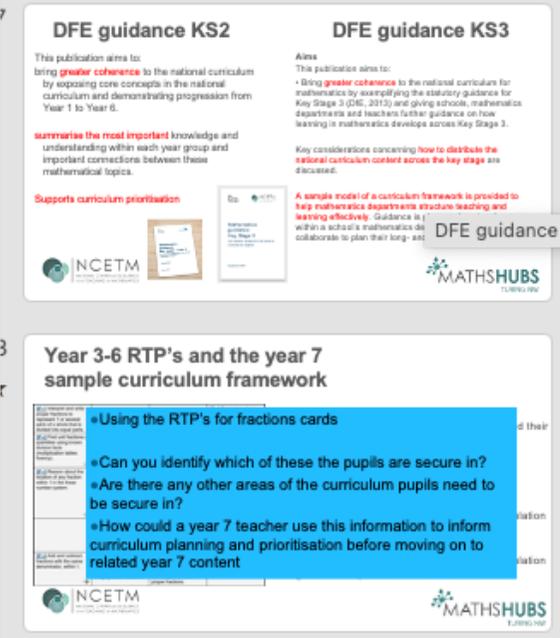
### Outcomes

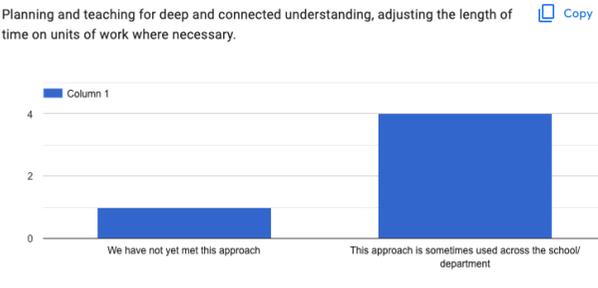
What are the specific intended outcomes of <i>this</i> programme?	What evidence will you look for? And when?	Actual outcomes What were the actual outcomes? What evidence did you have?
<p><b>Pupil outcomes</b></p> <ul style="list-style-type: none"> <li>pupils in KS2 and KS3 demonstrate a positive attitude to maths</li> <li>KS3 pupils show improved understanding of the chosen topics, based on strong connection with KS2 foundations.</li> </ul>	<p>Feedback from teachers Responses in Basecamp regarding feedback on Checkpoints completed with classes. Focus groups of students to focus on Summer survey Student Voice</p>	<p>Case studies across the sessions has enabled all participants to reflect on pupil impact using the checkpoints. Participants sent case studies ahead of the session and presented these with detail and passion showing a deep understanding of their KS outcomes which really supported comparisons across KS2 and 3 and the transition between.</p> <div style="display: flex; justify-content: space-around;"> <div> <p><b>Pupil E</b> <span style="float: right;">Checkpoint 16</span></p> <p>Include information about:</p> <ul style="list-style-type: none"> <li>Age 10 - Year 5</li> <li>Has an excellent attitude towards, school, maths and learning in general.</li> <li>Confident with number. Has efficient written methods for calculations.</li> <li>Can make careless calculation errors. Doesn't use mental methods efficiently. Recently got confused with dates in BCE.</li> <li>She is working above age related expectations and has done so consistently throughout school.</li> </ul> <p>NCETM MATHSHUBS</p> </div> <div> <p><b>Pupil A</b> <span style="float: right;">Pupil 2</span></p> <p>Include information about:</p> <ul style="list-style-type: none"> <li>Age 10 – Year 5</li> <li>Positive attitude towards school. Less confident with maths. Needs reassurance.</li> <li>Secure with number. Has efficient methods for addition and subtraction. Developing multiplication and division.</li> <li>Transference of skills – e.g. knowledge of multiplication into multiplying fractions. (Can add fractions)</li> <li>Working at age related expectations.</li> </ul> <p>NCETM MATHSHUBS</p> </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div> <p><b>Pupil E (Y5) – Checkpoint 16</b></p>  <p>NCETM MATHSHUBS</p> </div> <div> <p><b>Pupil A (Y5) – Checkpoint 16</b></p>  <p>NCETM MATHSHUBS</p> </div> </div>

What are the specific intended outcomes of <i>this</i> programme?	What evidence will you look for? And when?	Actual outcomes What were the actual outcomes? What evidence did you have?
		<p>An NCETM representative was able to visit a session and see the impact on pupil outcomes. They reflected:</p> <p>It was so powerful to have a secondary school together with some of its feeder primary schools looking at one concept across the transition. Year 6 teachers watching some of their former pupils – now in year 7 – building their learning on what they had taught them previously, was just a joy to observe. xxxxx epitomised what it means to be a local leader of maths education and there was no doubt that all lead participants from all schools experienced high quality professional development. Thank you so much for the opportunity to be involved.</p> <div> </div>
<p><b>Whole school/departmental policies and approaches</b></p> <ul style="list-style-type: none"> <li>• Collaboration between primary and secondary colleagues on</li> </ul>	<p>Collaboration between schools Professional discussions in work groups and between them</p>	<p>Post lesson discussion notes from a session reflected that:</p> <ul style="list-style-type: none"> <li>• Very positive and proactive discussion after the lesson. The group shared a very positive approach to what had been observed.</li> <li>• the group identified that there had been an obvious focus on appropriate vocabulary for the lesson. That vocabulary was repeated/rephrased. Stem sentences were beginning to emerge naturally from the children. Our</li> </ul>

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<p>issues of curriculum and pedagogy is a normal part of the school's transition practice (and policy)</p> <ul style="list-style-type: none"> <li>Curriculum planning at KS3 is better informed by KS2 content and identifies the priority learning needed to recover from Covid disruption</li> <li>Curriculum planning at KS2 identifies the priority learning which underpins progression, helping pupils to recover from Covid disruption and preparing</li> </ul>	<p>KS2 and 3 colleagues really aware of relevant documents from the Key Stage before and after theirs</p> <p>Checkpoints discussed and used to assist transition shared with the other maths teachers</p> <p>Use of the KS2 NCETM documents to assist this – participants to have a good knowledge of this.</p>	<p>secondary colleagues commented that this was really noticeable to them and they felt that they did not appreciate what the children coming to them knew in terms of 'words'.</p> <ul style="list-style-type: none"> <li>Some discussion then followed on how it would be useful to have a consistency in vocabulary that bridged the key stages – this could be something to work on next year. A progression of mathematical vocabulary would be a useful tool so that colleagues knew what had been covered. Discussion carried on around how vocabulary was constantly referred to daily so children embedded the words.</li> <li>Secondary colleagues also felt that stem sentences would be something that would be beneficial to look at as they were not aware of the impact of them and they could see from the lesson how they would help.</li> <li>These would definitely help secondary teachers plan for the year 7/8s as they felt that the children lose things if not revisited often and they could see what year 6 teachers had done. It was felt that there was no crossover between primary and secondary, that we were all in bubbles and our secondary colleagues did not have much if any awareness what was taught in year 5/6. Again this may be something that could be looked at in the future, where both secondary and primary look in more depth at expectations/curriculum.</li> <li>Within the lesson misconceptions were addressed through representation and discussion.</li> <li>There was discussion around how the children had used 3 of the steps from NRICH (reasoning) – describe, explain, convince . CB raised this and talked about the vocabulary workshops that the hub had done (shameless plug).</li> <li>We talked about the next steps for learning which revolved around the use of remainders in division – the children struggled with remainders being a fraction or part of the whole.</li> </ul>

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them for the KS3 curriculum		<ul style="list-style-type: none"> <li>• Secondary colleagues were very complimentary about what they had seen and felt it was extremely valuable and requested that there be more primary lesson studies in the new year.</li> </ul> <p>Activities were designed to ensure KS2 and KS3 colleagues could access and reflect on the DFE guidance for each Key Stage. These activities prompted KS3 colleagues to say: The DFE guidance for KS2 is so clear in identifying the core concepts. We can look at the RTP grids and see in conjunction with the checkpoints what KS2 pupils have mastered.</p>

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		 <p>Referring to the guidance from KS2 to KS3 was referred to in every session with the core theme of looking at the progression in fractions from KS2 to KS3. This gave us a really clear focus for identifying the small steps in the concept and how the checkpoints were instrumental in diagnosing pupils misconceptions in these.</p>
<b>Practice development</b> <ul style="list-style-type: none"> <li>participants make use of common approaches, representations</li> </ul>	Algebraic representation are used in planning, models given to the students and in lessons and in students' books.	Reflections from the sessions evaluated the impact of the project on practice development.

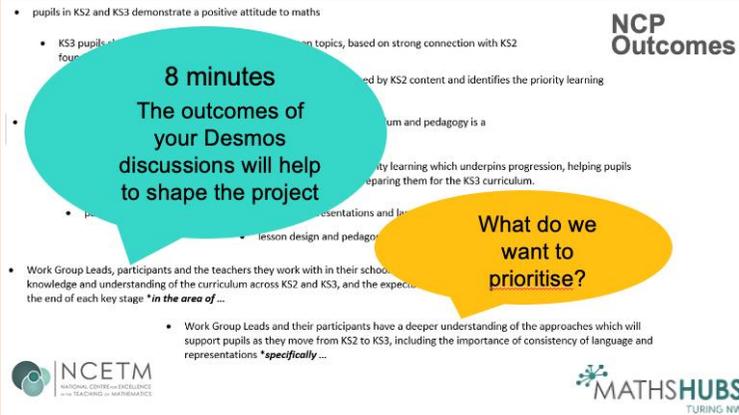
What are the specific intended outcomes of <i>this</i> programme?	What evidence will you look for? And when?	Actual outcomes What were the actual outcomes? What evidence did you have?
<p>and language across phases</p> <ul style="list-style-type: none"> <li>• lesson design and pedagogy demonstrate a secure knowledge of curriculum continuity.</li> </ul>	<p>Planning for lessons involving algebraic reasoning is clear and comprehensive</p>	<p>Which aspects of the year 5-8 project have been most useful and what could have been improved?</p> <p>7 responses</p> <p>Year 7 class demo and discussion</p> <p>Watching y7 lessons has been really useful to see the difference in approach.</p> <p>Forging links with local high schools has been brilliant. Being able to experience first hand the KS3 curriculum has been invaluable. Seeing the continuity in the curriculum adds value to what to teach at KS2. If possible, links with the high school closest to our primary school would be beneficial.</p> <p>Learning which areas of the curriculum high schools see as priorities for children to be confident in when they arrive.</p> <p>Being able to share good practice and know how work progresses between Key Stages.</p> <p>Watching the lessons and working with our secondary colleagues.</p> <p>Listening to ideas from other staff and watching Year 7 lessons. I have thoroughly enjoyed the sessions and don't know that anything could be improved.</p>
<p><b>Professional learning</b></p> <ul style="list-style-type: none"> <li>• Work Group Leads, participants and the teachers they work with in their schools have a deeper knowledge and understanding of the curriculum</li> </ul>	<p>Collaborative and/or shared planning shows good structure and revisits prior knowledge and progression in the planning. Knowledge of the KS2 and KS3 curriculum and the progression of the algebra strand</p>	<p>Planning and teaching for deep and connected understanding, adjusting the length of time on units of work where necessary. <a href="#">Copy</a></p>  <p>The initial participant survey form was used to gain a baseline and then was discussed in the final session to describe progress in certain areas.</p>

<b>What are the specific intended outcomes of <i>this</i> programme?</b>	<b>What evidence will you look for? And when?</b>	<b>Actual outcomes</b> What were the actual outcomes? What evidence did you have?								
<p>across KS2 and KS3, and the expectations of pupils at the end of each key stage *in the area of algebraic thinking</p> <ul style="list-style-type: none"> <li>• Work Group Leads and their participants have a deeper understanding of the approaches which will support pupils as they move from KS2 to KS3, including the importance of consistency of language and representations *specifically ...</li> </ul>	<p>Collaborative planning/teaching includes discussion around common approaches across Years 5-8 and how this deepens pupils' understanding</p>	<p>The use of representations for fractions was a particular focus across the sessions and discussions throughout showed how this was developing.</p> <div> <table border="1"> <caption>When appropriate, using representations and manipulatives to support understanding and reveal mathematical structure.</caption> <thead> <tr> <th>Category</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td>We are in the early stages of developing this approach</td> <td>3</td> </tr> <tr> <td>This approach is sometimes used across the school/department</td> <td>1</td> </tr> <tr> <td>This approach is now an established part of how all teachers teach maths</td> <td>1</td> </tr> </tbody> </table> </div> <p>In the final year 7 lesson study representations from the year 6 professional development were deliberately used to expose mathematical concepts about parts and wholes in fractions. The year 7 teacher reflected that they would not have used this in prior years and being exposed to the year 6 DFE guidance and NCETM materials had allowed them to diagnose misconceptions with his year 7 pupils.</p> <p>Reflections about the project noted that:</p>	Category	Value	We are in the early stages of developing this approach	3	This approach is sometimes used across the school/department	1	This approach is now an established part of how all teachers teach maths	1
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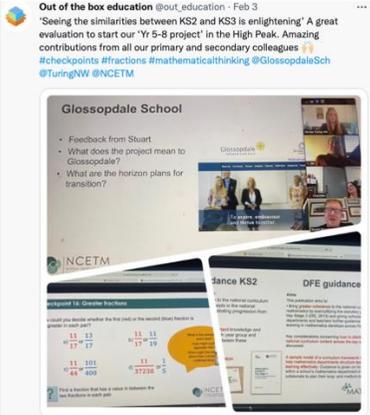
What are the specific intended outcomes of <i>this</i> programme?	What evidence will you look for? And when?	<b>Actual outcomes</b> What were the actual outcomes? What evidence did you have?
		<p>Please can you reflect on how the year 5-8 project has impacted on your classroom practice and development of transition in your school?</p> <p>7 responses</p> <p>Clear understanding of what is expected in primary school- really useful for teaching at secondary level</p> <p>Will impact upon my work next year when moving into y6.</p> <p>Being able to give real life examples to our upper KS2 children about maths in KS3 gives them a purpose for their learning other than the KS2 SATs.</p> <p>I have been able to alter the curriculum planning to prioritise the rtp areas.</p> <p>The development of visual representations</p> <p>Making connections between the curriculum and expectations.</p> <p>Using the checkpoints and the discussions after lesson observations have given me lots to think about, especially for next year.</p> <hr/> <p>Any other comments?</p> <p>6 responses</p> <p>Really brilliant discussions and sharing of materials</p> <p>Thank you!</p> <p>This has been an excellent project to be involved in. My own knowledge and understanding of the curriculum has increased and it has been really beneficial to be involved in professional dialogue with colleagues outside of our school. Thank you for facilitating this.</p> <p>I've enjoyed the project as it's been an opportunity to focus on maths in the specific age range with professionals who actually teach those year groups.</p> <p>Very enjoyable. Looking forward to next year.</p> <p>██████████ is great and I feel so fortunate to have taken part in the project.</p>

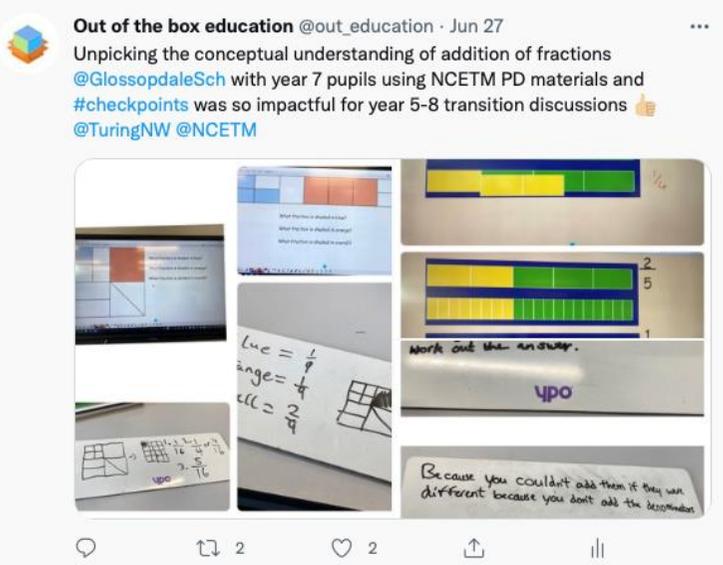
**Programme activity schedule** (To include workshop and school-based activities. Add rows as necessary)

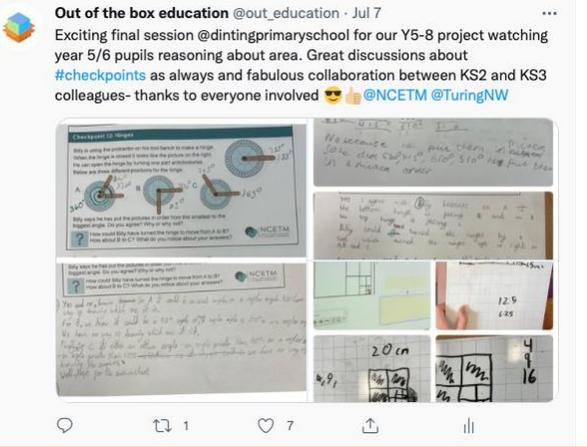
What is the activity setting and timing?	Who is involved in this activity?	What activity will take place?	What is the purpose of this phase of the programme?	Comments on activity completion, effectiveness and recommendations for future
Pre Task	All participants	<p><b>Pre-work:</b> Prior to the workshop, I would be very grateful if you could complete a few small tasks. There is also some time within the session to discuss and revisit these.</p> <p>1. Please complete the survey which can be found at the following link  <a href="https://docs.google.com/forms/d/e/1FAIpQLSf8g37OFqVn5LdSuUxXx6e8V9zeiff3bcO_sozhHSiaQN6FuA/viewform">https://docs.google.com/forms/d/e/1FAIpQLSf8g37OFqVn5LdSuUxXx6e8V9zeiff3bcO_sozhHSiaQN6FuA/viewform</a></p> <p>2. Please prepare a little background information about your school (e.g. setting, number of pupils, number of pupil premium etc.) and choose 3 pupils who can form the basis of an ongoing case study. We will capture this information during the first session and develop this case study across each session</p>	<p>To find a starting point for schools To understand how other schools prepare for transition</p>	<p><b>All schools engaged with pre-task and this was discussed in the first session. Introductions were made on basecamp, the first session was online and then face-to-face events developed this collaboration.</b></p>

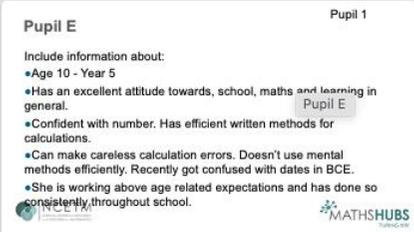
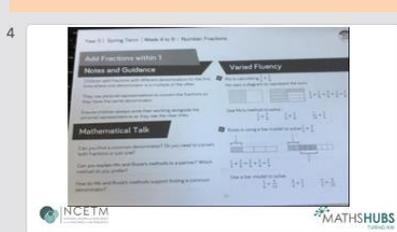
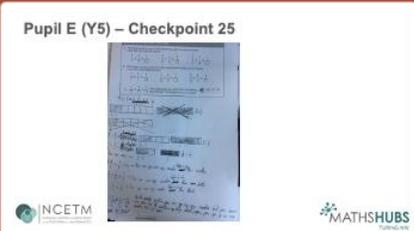
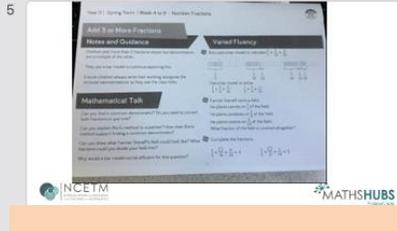
		<p>3. Please take a look at your school's transition policy (or determine whether there is one) or consider your school's approach to transition. We can then discuss these approaches during the workshop</p>		
<p>Session Online- Half day</p>	<p>All participants</p>	<p><b><u>Introduction – What is the purpose of the Y5-8 work group?</u></b></p> <ul style="list-style-type: none"> <li>• Welcome and introductions</li> <li>• Why this project?</li> <li>• What is important to us?</li> <li>• Welcome to ***** School The Secondary Schhol</li> <li>• Pre-task review</li> <li>• Fractions activity</li> <li>• DFE guidance for KS2 and KS3</li> <li>• Checkpoints</li> <li>• What next? Collaborative foci and next steps</li> <li>• Case studies and intersessional tasks</li> </ul>	<p>To understand the need to work as a continuum to develop understanding between KS2 and 3. Looking for the similarities and differences between the curriculum and expectations at KS2 and 3</p> <p>Beginning to raise awareness of the curriculum across the transition</p> <p>Sharing approaches and use of representations and approaches in aspects of maths which are</p>	<p>A discussion about NCP outcomes identified school priorities</p> <p>It became clear that participants valued curriculum design and lesson study with a focus on mastery pedagogy as their core outcomes for the project.</p> 

			<p>similar at the KS2-3 transition</p> <p>Introducing the Checkpoints materials</p>	<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <input type="checkbox"/> DH         </div> <div style="width: 45%;"> <input type="checkbox"/> Charlotte         </div> </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="width: 45%;"> <div style="border: 1px solid #ccc; padding: 2px; margin-bottom: 2px;">Collaboration between</div> <div style="border: 1px solid #ccc; padding: 2px; margin-bottom: 2px;">Curriculum planning a</div> <div style="border: 1px solid #ccc; padding: 2px; margin-bottom: 2px;">Lesson design and pe</div> <div style="border: 1px solid #ccc; padding: 2px; margin-bottom: 2px;">Pupils in KS2 and KS</div> <div style="border: 1px solid #ccc; padding: 2px; margin-bottom: 2px;">KS3 pupils show imp</div> </div> <div style="width: 45%;"> <div style="border: 1px solid #ccc; padding: 2px; margin-bottom: 2px;">Collaboration between</div> <div style="border: 1px solid #ccc; padding: 2px; margin-bottom: 2px;">Curriculum planning a</div> <div style="border: 1px solid #ccc; padding: 2px; margin-bottom: 2px;">Work Group Leads, p</div> <div style="border: 1px solid #ccc; padding: 2px; margin-bottom: 2px;">Participants make cor</div> <div style="border: 1px solid #ccc; padding: 2px; margin-bottom: 2px;">Lesson design and pe</div> </div> </div>	<p>We decided that we wanted our work group to have:</p> <ul style="list-style-type: none"> <li>● <b>A focus on Curriculum</b></li> <li>● Using the DFE guidance and RTP's to identify core concepts in fractions</li> <li>● Supporting with Checkpoints activities</li> <li>● <b>A focus on Pedagogy</b></li> <li>● Using the checkpoints to explore the use of representation across key stages</li> <li>● Using the Algebraic Thinking Units to model talk and an emphasis on mathematical language</li> <li>● Horizon knowledge on core concepts in fractions and where this goes in KS3 and beyond</li> </ul>
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School Based Task	All participants	Try a Checkpoint out with a class – reflect and bring reflection to the next session Set up a small group of 3 students to track over the work group	To develop the use of Checkpoints To set up students to track qualitative data for	<ul style="list-style-type: none"> <li>• Complete case study slides with chosen pupils</li> <li>• Identify an area of teaching fractions where you can use a checkpoints activity with pupils and record their responses</li> <li>• Annotate slides with evidence to share at session 2</li> <li>• Familiarise yourself with basecamp and engage with any reading or tasks posted</li> </ul> <p>All schools completed the tasks, and all their prepared slides were integrated into the sessions and teachers presented these independently. (See some examples above). All examples were pivotal in sharing expertise and understanding and the level of commitment seen from teachers to complete these was amazing.</p>
Lesson Study - Secondary	Primary teachers visiting the secondary school or observing	<ul style="list-style-type: none"> <li>• Pupils will complete one of the Checkpoints tasks (fractions yet to be published - due late January 2022).</li> </ul>	<ul style="list-style-type: none"> <li>• Gain a clearer understanding of some of the barriers secondary students face when fractional understanding and</li> </ul>	<p>This was completed in session 2 and 3 at the secondary school who hosted most sessions. Outcomes are detailed above. Lesson studies were valued by all and helped to promote deep discussions between Key Stages.</p>

	<p>lesson online/via recording.</p>	<p>Teachers to observe how the task is set up for pupils and how pupils approach and tackle to task.</p>	<p>multiplicative are not secure when they leave primary.</p> <ul style="list-style-type: none"> <li>• Compare and contrast the teaching approaches used at secondary and primary level.</li> </ul> <p>Develop working partnerships with local schools to improve transition conversations.</p>	
<p><b>Lesson Study - Primary</b></p>	<p>Primary and Secondary teachers visiting the primary school or observing lesson online/via recording.</p>	<ul style="list-style-type: none"> <li>• Pupils will complete one of the Checkpoints tasks (fractions yet to be published - due late January 2022).</li> <li>• Teachers to observe how the task is set up for pupils and how pupils approach and tackle to task.</li> </ul>	<ul style="list-style-type: none"> <li>• Gain a clearer understanding of some of the barriers secondary students face when fractional understanding and multiplicative are not secure when they leave primary.</li> <li>• Compare and contrast the teaching approaches used at secondary and primary level.</li> </ul> <p>Develop working partnerships with local</p>	<p>The final session saw secondary colleagues come to see representation and structure in action in KS2 and provided great discussion about continuity and how this had developed across the project.</p>

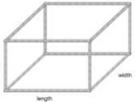
			<p>schools to improve transition conversations.</p>	 <p>Out of the box education @out_education · Jul 7 Exciting final session @dintingprimaryschool for our Y5-8 project watching year 5/6 pupils reasoning about area. Great discussions about #checkpoints as always and fabulous collaboration between KS2 and KS3 colleagues- thanks to everyone involved 🙌 @NCETM @TuringNW</p>
<p>Session 2 – ½ day</p>	<p>All participants at a Primary school</p>	<ul style="list-style-type: none"> <li>➤ Welcome</li> <li>➤ Year 7 lesson study</li> <li>➤ Case study reviews</li> <li>➤ Diagnostic evaluation- Fractions activity and curriculum progression</li> <li>➤ EEF and project development</li> <li>➤ What next? Collaborative foci and next steps</li> <li>➤ Intersessional tasks</li> </ul>	<ul style="list-style-type: none"> <li>● Recognise the common misconceptions in fractional understanding that primary pupils may take to secondary school with them.</li> <li>● Consider where these misconceptions may arise from, e.g. limited range of representations or an inappropriate choice of representation.</li> </ul>	<p>Activities which secured participant understanding of the KS2 and KS3 guidance and the small steps progression in fractions was linked to the lesson study and the case study slides.</p> <p>Reflective discussions identified that next steps would be to:</p> <ol style="list-style-type: none"> <li>1. Use checkpoints- <b>Additive structures for fractions</b> to investigate the use of representation to explain mathematical ideas.</li> <li>2. We will look at the continuity in these representations between KS2 and KS3</li> <li>3. Look at the checkpoint deck- which should we use? Which representations might the pupils use? How can we support them in their decisions and explanations?</li> </ol>

School Based Task	All participants	<ul style="list-style-type: none"> <li>• Complete case study slides with chosen pupils using the identified checkpoints</li> <li>• Annotate slides with evidence to share at session 3</li> <li>• Engage with basecamp discussion threads</li> </ul>	<p>To further develop bar model skills developed in the work group</p> <p>To track a groups of students to assess impact</p>	<p>All schools completed the tasks, and all their prepared slides were integrated into the sessions and teachers presented these independently. (See some examples above). All examples were pivotal in sharing expertise and understanding and the level of commitment seen from teachers to complete these was amazing.</p> <p>There was a focus on representation and structure/bar modelling for this session as agreed at the previous session.</p>
Session 3 – ½ day	All participants at a Secondary school	<ul style="list-style-type: none"> <li>• Welcome</li> <li>• Year 7 lesson study</li> <li>• Case study reviews</li> <li>• Representation and structure- SATS questions</li> <li>• What next? Transition pack for use before year 6 lesson study- which checkpoints?</li> <li>• Summer survey and reflection</li> </ul>	<p>To develop an understanding of how fractions are taught in primary schools</p> <p>To further develop the use of representations with bar model and multiplicative reasoning</p>	<p>Case studies highlighted how pupils were using bar modelling to express their ideas and also how this was seen in Primary SOL like White Rose.</p> <div style="display: flex; flex-wrap: wrap;"> <div style="width: 50%;">  <p><b>Pupil E</b></p> <p>Include information about:</p> <ul style="list-style-type: none"> <li>• Age 10 - Year 5</li> <li>• Has an excellent attitude towards, school, maths and learning in general.</li> <li>• Confident with number. Has efficient written methods for calculations.</li> <li>• Can make careless calculation errors. Doesn't use mental methods efficiently. Recently got confused with dates in BCE.</li> <li>• She is working above age related expectations and has done so consistently throughout school.</li> </ul> </div> <div style="width: 50%;">  <p><b>Pupil 1</b></p> <p>4</p> </div> <div style="width: 50%;">  <p><b>Pupil E (Y5) – Checkpoint 25</b></p> </div> <div style="width: 50%;">  <p>5</p> </div> </div>

Collaborative discussions about KS2 SATs identified how many of these questions could have the structure exposed with bar models.

Understanding of multiplicative structures

Kim makes a cuboid model using straws.



height  
length  
width

She sees straws that are 7.5 cm long for the height.  
She sees straws that are 11 cm long for the length.  
She sees straws that are 8.5 cm long for the width.

What is the total length of all the straws in her model?

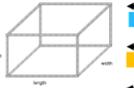
Is this the most efficient method?

How would KS2/KS3 pupils solve this?

How can pictorial representations expose the structure?

MATHSHUBS

How does the bar model expose the most efficient method?



height  
length  
width

She sees straws that are 7.5 cm long for the height.  
She sees straws that are 11 cm long for the length.  
She sees straws that are 8.5 cm long for the width.

What is the total length of all the straws in her model?

11 cm 11 cm 11 cm 11 cm  $11 \times 4 = 44$

8.5 cm 8.5 cm 8.5 cm 8.5 cm  $8.5 \times 4 = 34$

7.5 cm 7.5 cm 7.5 cm 7.5 cm  $7.5 \times 4 = 30$

Then...  $44 + 34 + 30 = 108$

OR...  $27 \times 4 = 108$

11 cm 8.5 cm 7.5 cm

NCETM MATHSHUBS

Multiplication as scaling

You can make green paint by mixing:

- 250 ml of blue paint
- 1,150 ml of yellow paint.

Stefan wants to make some of this green paint.

He uses 750 ml of blue paint.

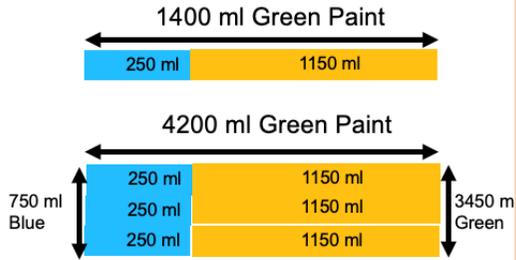
How much green paint does he make?

Is this the most efficient method?

How would KS2/KS3 pupils solve this?

How can pictorial representations expose the structure?

MATHSHUBS

				<p><b>Does it show the scaling nature of multiplication?</b></p> <p>You can make green paint by mixing:</p> <ul style="list-style-type: none"> <li>• 250 ml of blue paint</li> <li>• 1,150 ml of yellow paint.</li> </ul> <p>Stefan wants to make some of this green paint. He uses 750 ml of blue paint.</p> <p>How much green paint does he make?</p>  <p>INCETM NATIONAL CENTRE FOR EXCELLENCE IN TEACHING MATHEMATICS</p> <p>MATHSHUBS TEACHING MATHEMATICS</p>
School Based Task	All participants	<ul style="list-style-type: none"> <li>• Complete case study slides with chosen pupils using the identified checkpoints</li> <li>• Annotate slides with evidence to share at session 3</li> <li>• Engage with basecamp discussion threads</li> </ul>	<p>To further develop bar model skills developed in the work group</p> <p>To track a groups of students to assess impact</p>	<p>All schools completed the tasks, and all their prepared slides were integrated into the sessions and teachers presented these independently. (See some examples above). All examples were pivotal in sharing expertise and understanding and the level of commitment seen from teachers to complete these was amazing.</p> <p>There was a focus on representation and structure/bar modelling for this session as agreed at the previous session.</p>
Session 4 Half day	All participants	<ul style="list-style-type: none"> <li>➤ Welcome</li> <li>➤ Context of lesson study</li> <li>➤ Year 6 lesson study</li> <li>➤ Triad discussions- outcomes</li> <li>➤ Review from KS2 teachers</li> <li>➤ Review from KS3 teachers</li> </ul>	<p>To link algebra to graph work, to develop an understanding of the links.</p> <p>To be aware of PD resources produced to</p>	<p>The final session allowed all participants to reflect on the success of the project.</p> <p>One comment in Basecamp reflected the mood from all participants.</p>

			assist with planning of algebraic thinking.	<p>Hi</p> <p>I just wanted to say what a privilege it was to see a year 5/6 lesson yesterday, it was lovely to see all the students engaged in the lesson.</p> <p>The use of the mini whiteboards and stem sentences in the lesson was great to see, questioning was great.</p> <p>Next year will be bigger and better!</p> <p>Thank you once again</p>
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## Summary statements of overall impact and effectiveness

### *Short summary paragraph of the **impact** of the programme*

The project had an excellent flow to it this year and was much improved from previous years. The impact was achieved due to the curriculum focus using the DFE guidance and the NCETM checkpoints. This gave the project a tangible set out of outcomes which was purposeful for all participants and allowed them to really see and understand curriculum outcomes from KS2 to KS3. Having a clear focus on one strand of the curriculum (fractions) allowed participants to reflect deeply about aspects of curriculum design such as the use of representation and structure and accurate mathematical language. Being able to observe the checkpoints being used with year 5/6 pupils and year 7 pupils really enriched the continuity and was the highlight of the project. Indeed this affected year 7 teacher practice who began to experiment with Year 6 NCETM professional development materials to explore the concept before children engaged with abstract explanations. Overall the project generated deep discussion about curriculum provision and pedagogy and pupil outcomes.

### *Short summary paragraph on how the **design and delivery** of the programme contributed to, and/or limited, the impact*

The design and delivery of the programme was much improved on previous years. The use of DFE materials and NCETM checkpoints provided cohesion to the sessions and encouraged the effective use of pupil case studies. A large impact of the programme was the successful application of a secondary teacher to the secondary mastery specialist programme.

## Recommendations for the future

### *Suggested two to five recommendations. Be specific and use a numbered list or bullet points*

1. Engage another secondary school in the area and associated feeder schools to develop the project further
2. Develop even more use of basecamp for reflections
3. Identify key colleagues in secondary and primary schools to be advocates for the project and help with promotion and development for future years so this becomes a sustained model with a group of consistently collaborating schools year on year

4. Time sessions better to avoid KS2 SATS and Year 8 tests with enough time in between to allow transition activity booklets to be developed and used with Primary schools which can be shared with their transition school (these would be predominately the use of core checkpoints to identify key concepts the secondary schools have identified as critical to year 7 progress.