Routes to Inclusion

R2i Maths Resources Launch

Please put your name, role and school in the chat to sign in

Nottingham City
Educational Psychology Service
And
Learning Support Team

Nottingham City Council

CONTENT

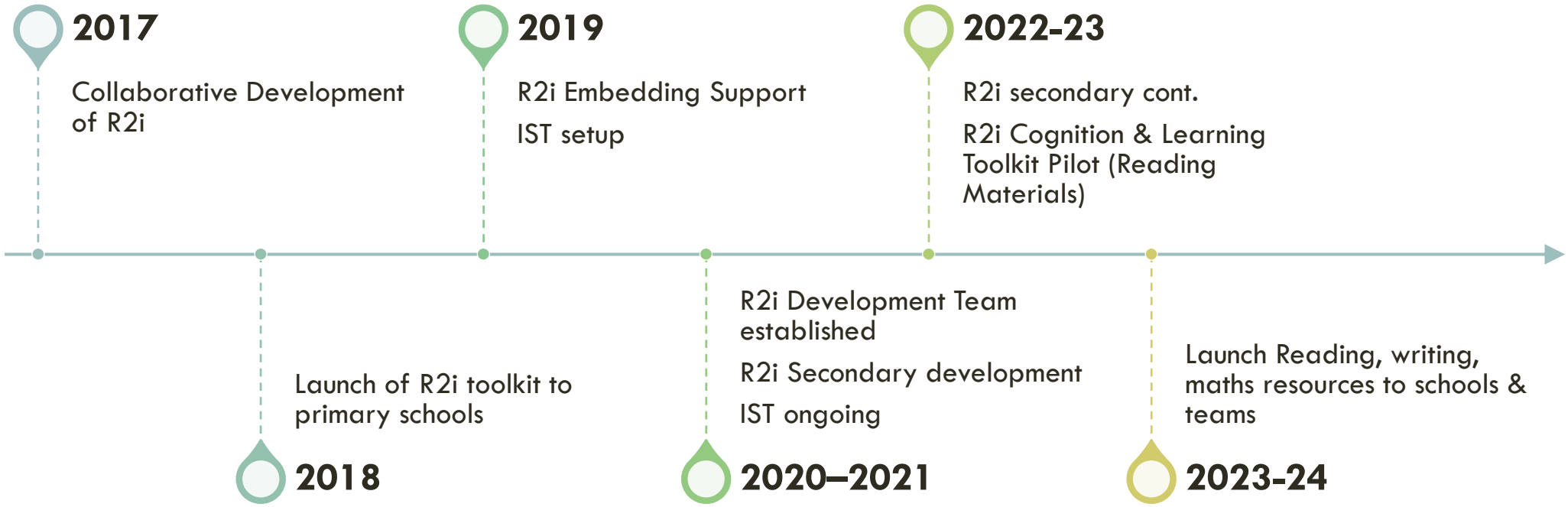
Routes to Inclusion (R2i) – A quick recap

Maths Resources

Questions

Nottingham City Council

R2I INITIATIVE TIMELINE – SO FAR



CONTENT AND TIMELINES

SEND / C&L & Reading Resources

- Guide; assessments; interventions
- Launch October

Writing Resources

- Guide; assessments; interventions
- Launch November/December

Maths Resources

- Guide; assessments; interventions
- Launch January

GRADUATED RESPONSE

UNIVERSAL PROVISION

IDENTIFICATION

Initial Concerns Checklist

Plan Do Review

ASSESSMENT

Learning Environment Checklist

Developmental Environment Checklist

Plan Do Review

ASSESSMENT

GCA (Baseline Assessment Stage 1)

My Views About School

Executive Functions Checklist

Family Views Questionnaire & SDQ

Behaviour Frequency Count

Plan Do Review

ASSESSMENT

GCA (Baseline Assessment Stage 2)

Target Behaviour Monitoring Form

ABC Analysis (Antecedent, Behaviour, Consequence)

FBA (Functional Behaviour Analysis)

Plan Do Review

R2i SEND Graduated Response Toolkit

R2i SEND GRADUATED RESPONSE

UNIVERSAL PROVISION

IDENTIFICATION

Initial Concerns Assessment

Plan Do Review

ENVIRONMENTAL ASSESSMENTS

Learning Environment Assessment

Developmental Environment Assessment

Plan Do Review

GENERIC CORE ASSESSMENT – BASELINE ASSESSMENTS

My Views About School

Executive Functions Assessment

Family Views & Strengths and Difficulties Questionnaire (SDQ)

Behaviour Frequency Count

Plan Do Review

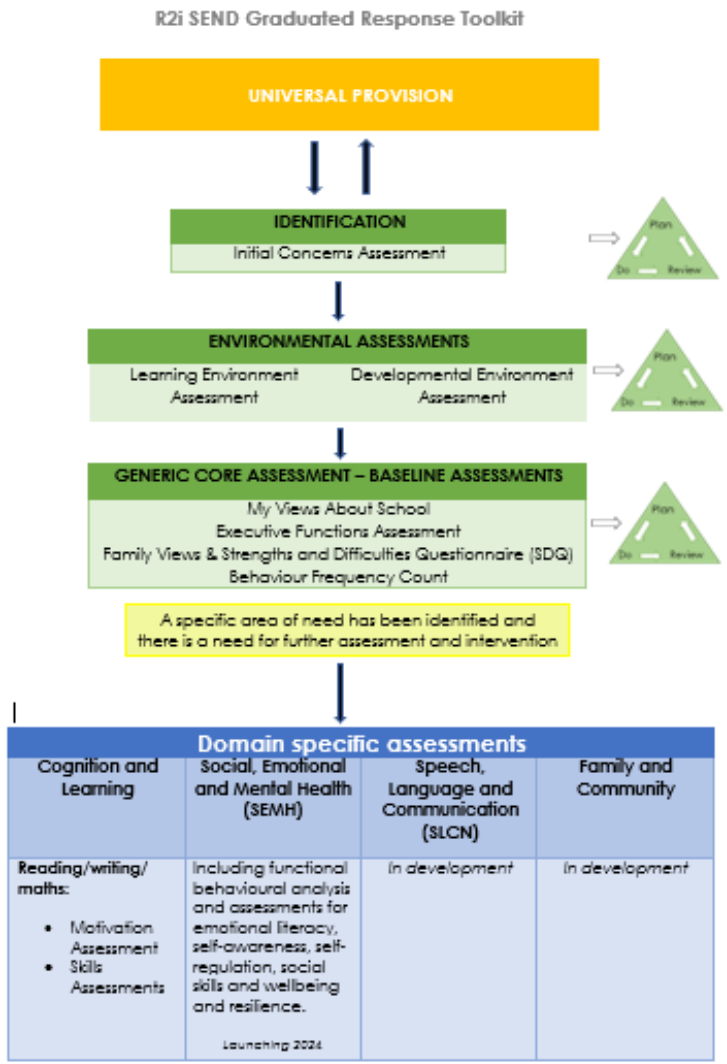
A specific area of need has been identified and there is a need for further assessment and intervention

Domain specific assessments

Cognition and Learning	Social, Emotional and Mental Health (SEMH)	Speech, Language and Communication (SLCN)	Family and Community
Reading/writing/ maths: • Motivation Assessment • Skills Assessments	Including functional behavioural analysis and assessments for emotional literacy, self-awareness, self-regulation, social skills and wellbeing and resilience. *Launching 2024*	*In development*	*In development*

INITIAL ASSESSMENT STAGE

DOMAIN ASSESSMENT STAGE

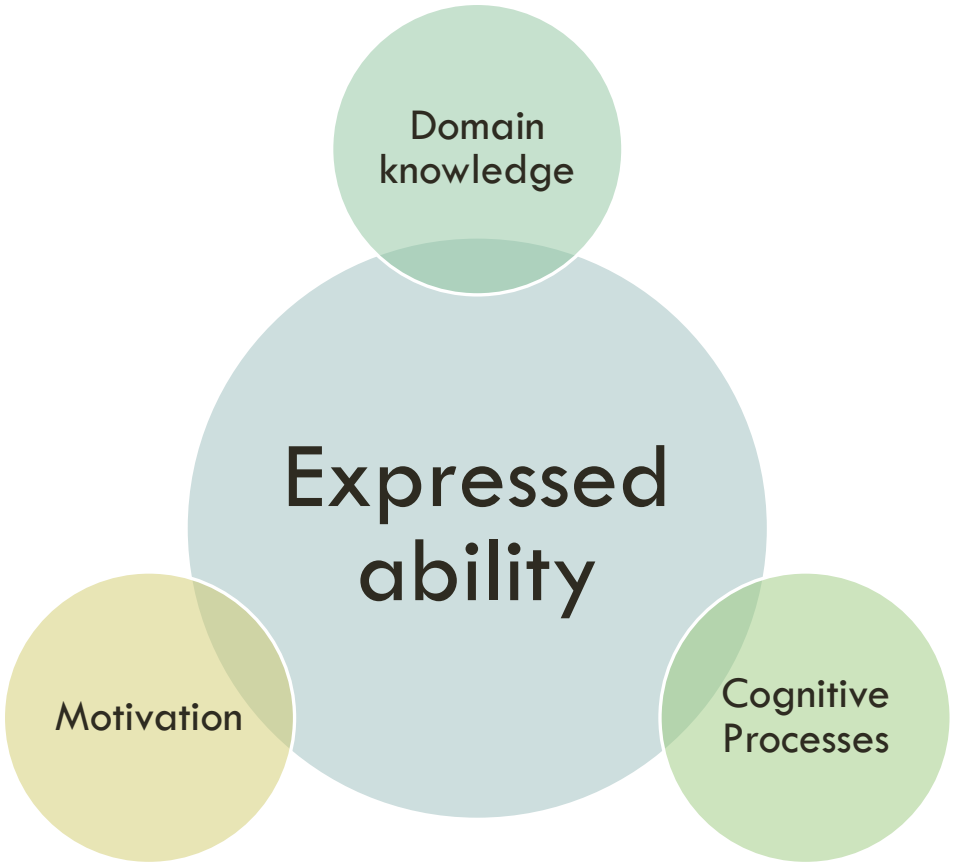


HOW DO THE R2I RESOURCES FIT WITH LST WORK?

- The R2i Cognition and Learning domain resources are about empowering schools to carry out early identification and early intervention
- The resources are there to support schools SEN support response before they contact agencies
- Enable schools to intervene early, and when needed, will support the provision of useful information for which LST can build on, and/or help schools to analyse

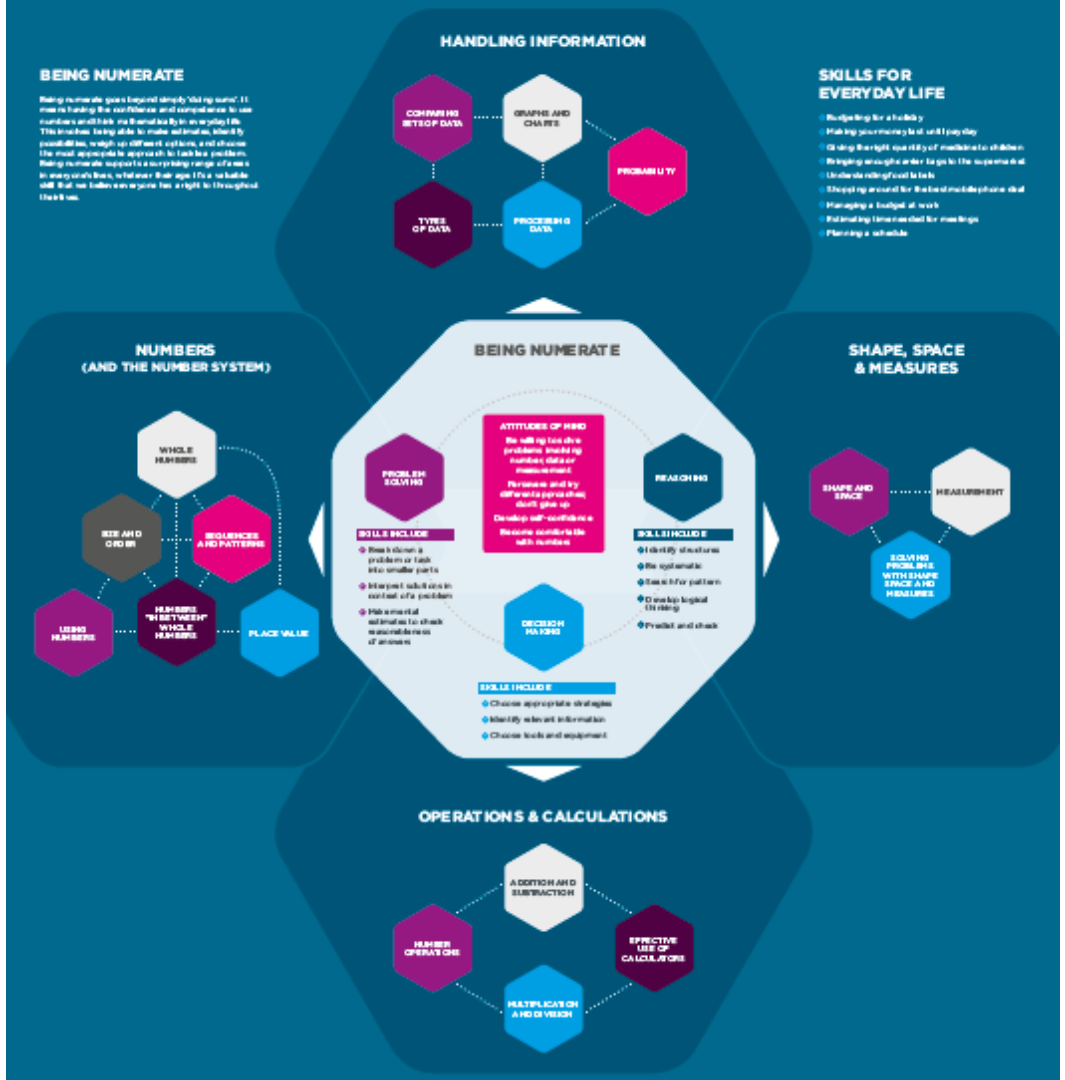
COGNITION & LEARNING TOOLKIT

HAYWOOD'S MODEL OF LEARNING (2010)



WHAT IS MATHS?

THE ESSENTIALS OF NUMERACY FOR ALL



HANDLING INFORMATION

Whether cooking, browsing the web, interpreting a pay slip, giving medicine to children, watching the news, working out personal finances, or taking part in sketchbars, everyone needs to make sense of data and information presented in a variety of ways.

SKILLS FOR EVERYDAY LIFE

- Understanding staff shifts on a rota
- Making sense of statistics in the news
- Understanding journey times

NUMBERS (AND THE NUMBER SYSTEM)

Numbers are all around us. To have a sense of the size of a number and what it is to do the number system we need to understand how the pattern and structure in the number system works and how numbers relate to each other.

SKILLS FOR EVERYDAY LIFE

- Understanding discounts in the sales
- Squeezing enough portions out of your ingredients
- Presenting numerical information accurately so that others can understand

OPERATIONS & CALCULATIONS

Being numerate means understanding the ways in which numbers can be used or combined. This allows us to make confident and sensible choices about which methods to use in a given context and then to calculate accurately.

SKILLS FOR EVERYDAY LIFE

- Paying household bills
- Mentally estimating an answer before using a calculator or spreadsheet
- Splitting a restaurant bill without hassle

SHAPE, SPACE & MEASURES

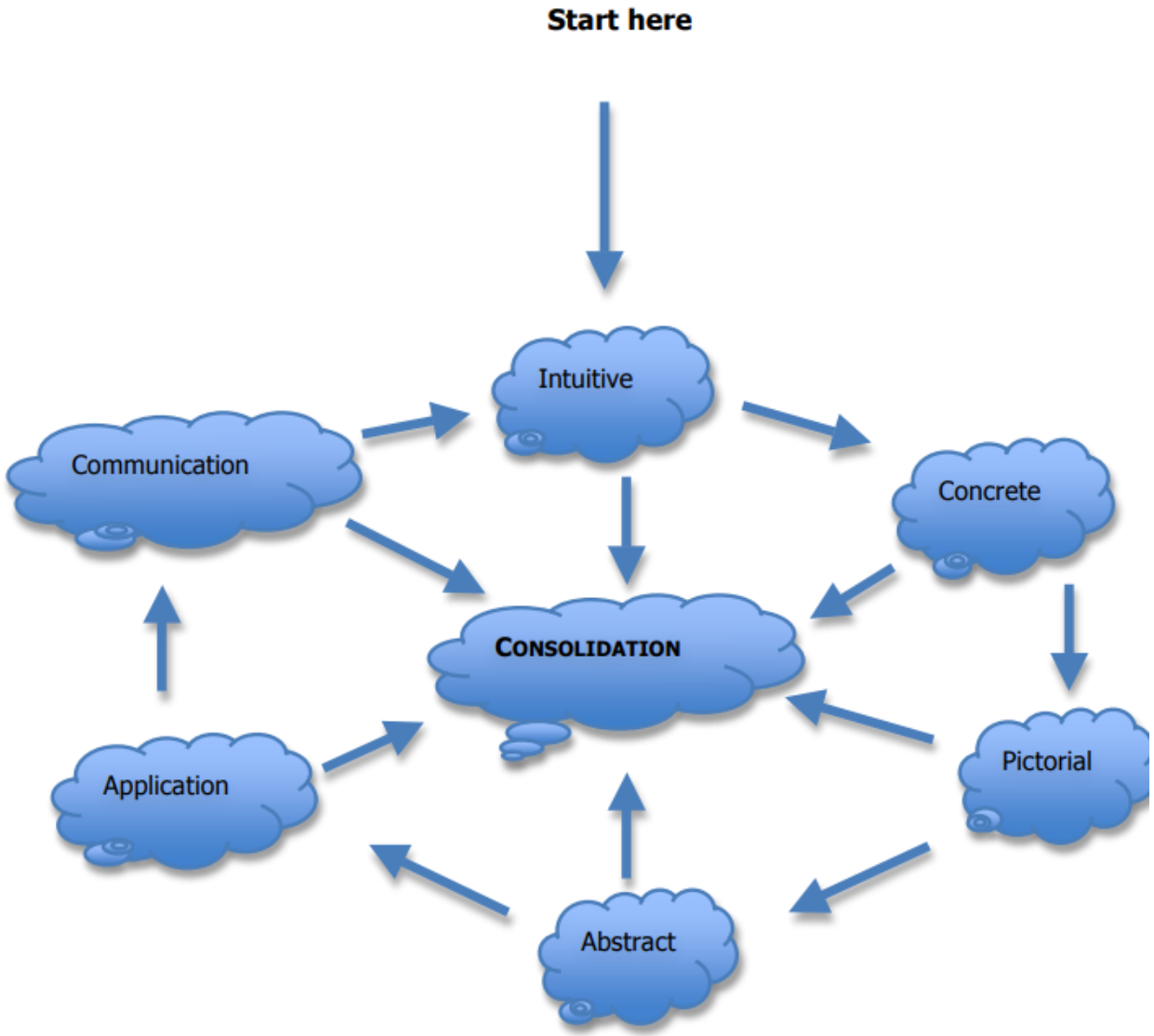
We use measurement all the time, and we measure lots of different things such as time, length, and temperature. We regularly ask questions using our knowledge of shape, space and measure.

SKILLS FOR EVERYDAY LIFE

- Buying enough paint to cover a room
- Knowing your height and weight
- Converting pounds to kilograms

HIERARCHICAL ORDER OF "LEVELS OF MATHS"

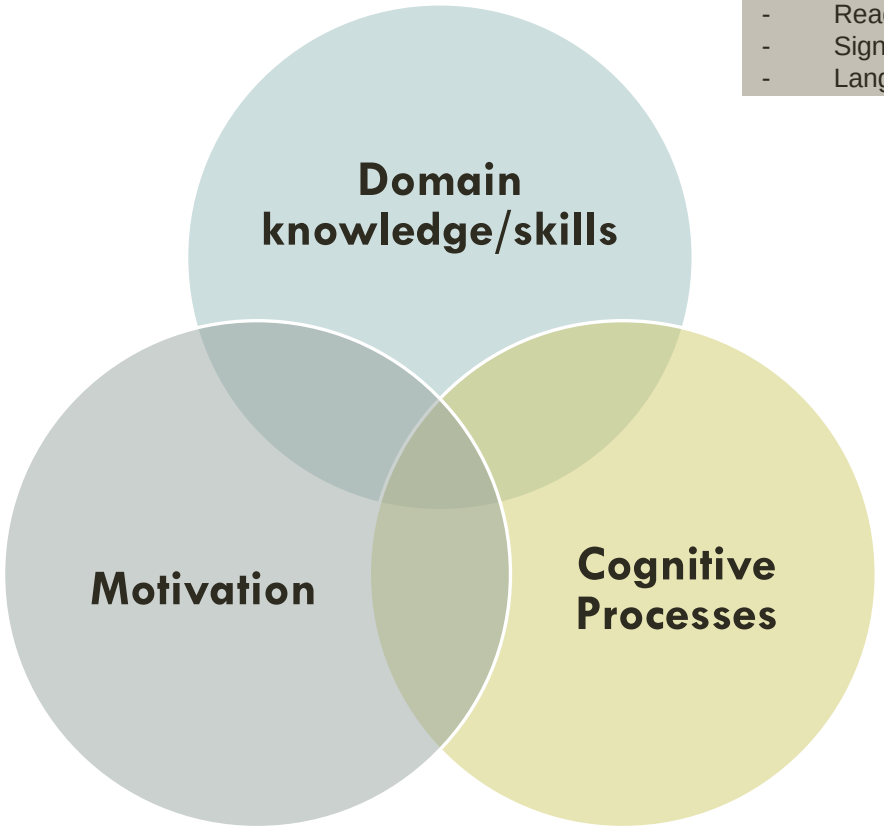
file:///C:/Users/sgrayb/Downloads/Sharma's%20Hierachy%20(2).pdf



WHAT IS MATHS?

Domain skills for Maths

- **Concept**
  - Magnitude
  - Meaning/Counting
  - Referents
  - 'More' or 'less' comparisons
  - Relationships
- **Procedure.**
  - Use of knowledge of mathematical operations
- **Language.**
  - Read & write numbers
  - Sign & symbol recognition
  - Language in context of maths



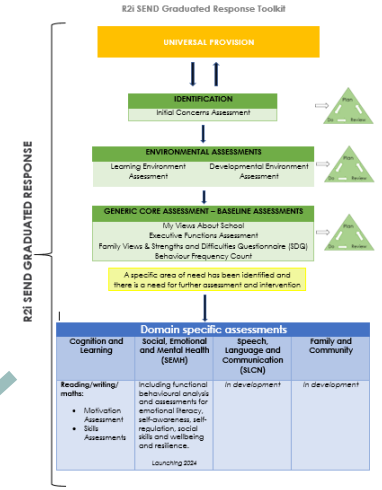
Motivation for Maths, arises from:

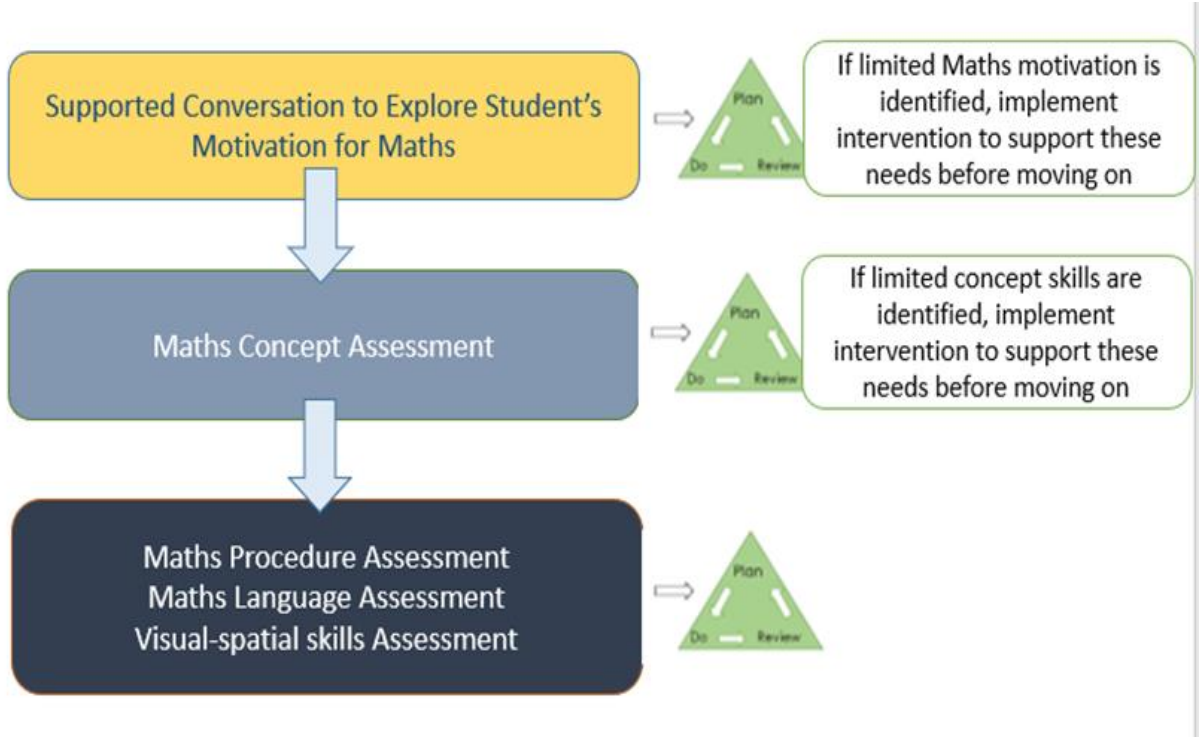
- Being comfortable with number and willing to solve problems with number and data
- Self-efficacy and self-confidence in relation to maths
- Successful and positive experiences of maths learning

Cognitive processes for Maths

- Executive functions
- Visuospatial processing of space, shape and measure
- Memory
- Reasoning skills
- Problem solving skills

MATHS ASSESSMENT PROCESS





Routes to Inclusion

Maths Guidelines – How to use the resources

Introduction
You have come to this section because you feel that the young person is experiencing maths difficulties. In this section we will outline what Maths is and the core component skills that underpin maths ability. We then introduce the assessment of these underpinning skills to help you to explore the young person's areas of strength and needs. Finally, we provide a helpful intervention pack to provide ideas around the strategies and support you may want to put in place based on your analysis.

What is Maths?
Maths competence relies on a complex interplay of multiple skill areas. Where there are difficulties in aspects of these skill areas, children can struggle to achieve at maths, and motivation can start to decrease. Therefore it is essential that the core underpinning skills are secure, and that, where difficulties exist, an in-depth understanding is obtained about the nature and root of any difficulty.

Domain skills and knowledge
Mathematical performance is made up of three broad skills areas as given below; for in-depth explanation of each area, see *'R2i Guide to Understanding Maths'*

- **Concept.** This is **'Number sense'** which is the basic understanding of the concept of number; it includes: counting skills, numerical language, and relationships between numbers (including understanding patterns and sequences). This underpins the development of problem-solving skills and the use of mathematical operations and procedures.

- **Procedure.** This is the ability to use learnt **mathematical knowledge**:
  - Retrieval and use of arithmetic facts from long term memory.
  - Understanding and execution of learnt procedures for solving arithmetical problems.

- **Language.** Learning and using mathematical vocabulary and language. This includes learning and understanding the language for signs, symbols and shapes.

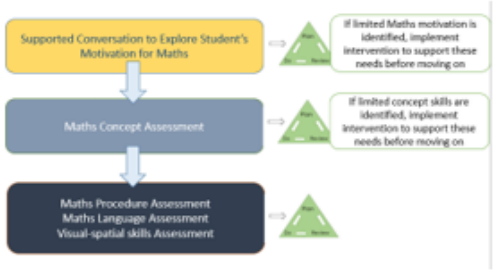
Cognitive Processes
The skills areas above rely on, and link to, key cognitive skills and processes, i.e.:
- **Executive functions.** All three components of the executive functions are fundamental to effective maths performance, i.e. working memory, inhibitory control, and cognitive flexibility.
In addition to:
- **Processing skills** including **visual spatial processing skills**, and especially in relation to Space, shape, and measure.

Other important cognitive processes for maths competence, include:
Memory skills (i.e. short-term and long-term memory); **reasoning skills** (such as sequential and logical thinking); and **Problem-solving skills.**

Routes to Inclusion

Motivation
Being motivated to learn is key for being engaged in the learning area. Motivation arises from successful experiences of the learning areas which leads to consequent self-efficacy for maths, see below for further explanation.

How we assess Maths
The assessments provided here enable the user to focus in on the young person's key strength and difficulties in the underpinning component maths skills. First, print off the *'R2i Maths skills Assessment Results Summary Sheet'* so that you can track progress of the assessments. Motivation and strong number sense (concept) will underpin maths performance, so these should be done first. For the last three assessments, you may need to do all of these, or may focus on one if there is a suspected difficulty around, for example, Maths language. **N.B.** For each of the Maths skill assessments we have created associated resource packs to support their use – these are found on the R2i Website after the associated assessment.



Plan, Do, Review

Once you have reviewed and analysed the assessment data and developed ideas of what component skills the young person needs support in developing, you can review the strategy list at the end of each assessment to select relevant strategies. The identified targets and chosen strategies should then be added to the **'R2i Plan-do-review Target Tracker Template'** so that progress and outcomes can be tracked.

Links to additional resources
Numeracy probes / assessment
National centre for excellence in teaching Maths
https://nrich.maths.org/frontpage
https://www.nationalnumeracy.org.uk/essentials-numeracy

Routes to Inclusion

Summary of Component Skills of Maths

Domain skills for Maths
- **Concept**
  - Magnitude
  - Meaning/Counting
  - Referents
  - 'More' or 'less' comparisons
  - Relationships
- **Procedure.**
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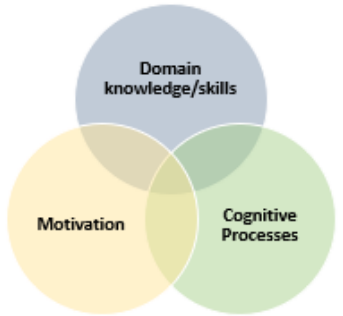

Motivation for Maths, arises from:
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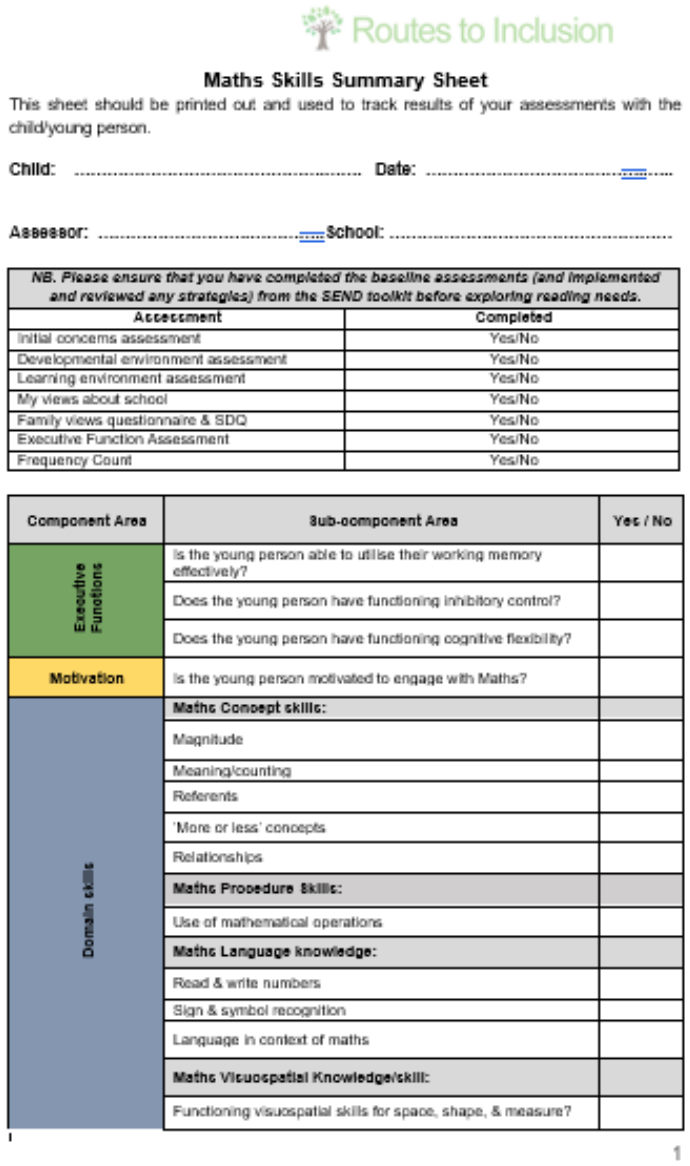
- Successful and positive experiences of maths learning

Cognitive processes for Maths
- Executive functions
- Visuospatial processing of space, shape and measure
- Memory
- Reasoning skills
- Problem solving skills

MATHS SKILLS SUMMARY SHEET



Routes to Inclusion

Maths Skills Summary Sheet

This sheet should be printed out and used to track results of your assessments with the child/young person.

Child: ..... **Date:** .....

Assessor: .....**School:** .....

NB. Please ensure that you have completed the baseline assessments (and implemented and reviewed any strategies) from the SEND toolkit before exploring reading needs.	
Assessment	**Completed**
Initial concerns assessment	Yes/No
Developmental environment assessment	Yes/No
Learning environment assessment	Yes/No
My views about school	Yes/No
Family views questionnaire & SDQ	Yes/No
Executive Function Assessment	Yes/No
Frequency Count	Yes/No

Component Area	Sub-component Area	Yes / No
Executive Functions	Is the young person able to utilise their working memory effectively?	
	Does the young person have functioning inhibitory control?	
	Does the young person have functioning cognitive flexibility?	
Motivation	Is the young person motivated to engage with Maths?	
Domain skills	**Maths Concept skills:**	
	Magnitude	
	Meaning/counting	
	Referents	
	'More or less' concepts	
	Relationships	
	Maths Procedure Skills:	
	Use of mathematical operations	
	Maths Language knowledge:	
	Read & write numbers	
	Sign & symbol recognition	
	Language in context of maths	
	Maths Visuospatial Knowledge/skill:	
	Functioning visuospatial skills for space, shape, & measure?	

Generic Core Assessment - Executive Function Checklist

Executive Function (EF) Skills are generally viewed as three core skills, all of which are fundamental for an individual to be an effective learner. These are: **Working Memory** (being able to hold information in mind and while using or manipulating the information, such as in mental maths; working memory is also important for supporting inhibitory control); **Cognitive Flexibility** (ability to change perspectives or approaches to a problem; and, flexibly adjusting to new demands, priorities, or rules, such as when switching between tasks); and **Inhibitory Control** (being able to ignore (internal and external) distractions in order to maintain focus; and being able to inhibit impulses and control of one's behaviour, which is important to regulate emotions). These core executive functions underpin higher level executive skills such as reasoning, problem solving, planning and organising (Diamond, 2013)[1].

Difficulties with EF skills can lead to children displaying behaviour that can be misinterpreted, e.g. as disruptive behaviour. For example, children who have difficulty staying on task may experience working memory difficulties; children who shout out in class, may struggle with inhibitory control; and children who become upset in the face of being told 'No' may have difficulties in the area of cognitive flexibility. Therefore, it is important to unpick behaviour in relation to EF in order that relevant strategies can be used to support the young person.

Assessment name	What is it?	How it works	What it can tell you
Executive Function (EF) Checklist[2]	A checklist to help you assess a young person's skills across the three key EF areas of working memory, inhibitory control and cognitive flexibility. The checklist compliments information gathered in the Initial Concerns checklist.	Answer each item by circling either yes or no. Consider your responses by following the analysis guidance at the end of the checklist. Consider picking three key priority items to support the young person in developing and refer to the strategy recommendations at the end of the document for ideas.	It can help you identify key executive function areas for which the young person may need support to develop in order that they can better access learning activities.

Student:		**Date completed:**	
School:		**Completed by (staff name):**	

WORKING MEMORY	
Does the young person often appear to not pay attention to classroom instructions/task directions?	Yes/No
Does the young person find it difficult to follow 2 (or more)-step instructions? Or ask to have instructions repeated?	Yes/No
Does the young person require frequent adult prompting to stay on task?	Yes/No
Does the young person forget what they are doing halfway through a task?	Yes/No
If sent to collect something from another classroom would the young person forget what they have been sent for?	Yes/No
Is the student slow to process information, e.g. do they take time to think of a response	Yes/No
Does the young person struggle to remember things? And/or bring necessary materials to, from and about school, such as permission slips, homework, PE kit, lunch money, coat etc.	Yes/No
COGNITIVE FLEXIBILITY	
Does the young person struggle to generalise learning to new situations?	Yes/No
Does the young person struggle to switch tasks/activities?	Yes/No
Does the young person get upset in response to the unexpected? (e.g. changes in routines, being told 'No', disappointments)	Yes/No
Does the young person find it difficult to come up with alternative ways of solving a problem, or get stuck on one way of solving a problem?	Yes/No
(Task initiation) Does the young person require prompts to begin a task/activity even when they appear interested by the task/activity?	Yes/No
(Task initiation) Is the young person slow to respond to instructions to get started on tasks?	Yes/No
INHIBITORY CONTROL	
(SA)* Does the young person struggle to maintain attention on task, or lose focus?	Yes/No
(SA) Does the young person talk irrelevantly in the middle of working on a discrete task, such as a test?	Yes/No
(SA) Is the young person often drawn off tasks by small distractions (e.g. external: sights and sounds, or internal: thoughts, daydreams)	Yes/No
(SA) Does the young person tend to need to be reminded to get back to work?	Yes/No
(RI)* Does the young person get up from their seat to retrieve items (e.g. sharpener) even when they have been told not to?	Yes/No
(RI) Does the young person tend to talk over peers when offering responses in teacher-directed activity?	Yes/No
(RI) Does the young person find it difficult to wait their turn?	Yes/No
(RI) Does the young person often gives a quick answer and then change it?	Yes/No
(RI) Does the young person shout answers out, or blurt out inappropriate comments?	Yes/No
(RI) Does the young person struggle to stop what they are doing when asked?	Yes/No

SA = Sustained attention; RI = response inhibition

Analysis of Executive Function Checklist Results

Review the number of 'Yes' answers for each item. Several 'Yes' answers may indicate a specific difficulty in the corresponding EF area. Consider if the area of difficulty interferes with the student's access to learning and support the young person's development accordingly: suggested strategies for each area are given below.

N.B. If the child is showing difficulties across multiple areas of the 'cognitive flexibility' section, AND shows difficulties with social communication and social interaction, contact the ASD team for advice: email AutismTeam@nottinghamcity.gov.uk or call 0115 876 5311

Suggested strategies

Working Memory Working memory refers to an individual's ability to hold information in mind and then mentally manipulate it. Therefore, working memory is central to all tasks that involve making sense of anything that unfolds over time (e.g. relating what happened earlier, even if that is just 5 seconds ago, with what happened now). Working memory is critical to the understanding of language, such as through reading, listening, following instructions.	• Provide CYP extra time to process information in the classroom situation. • Chunk instructions to the task / provide step by step instructions that are one part. • At the end of an activity or learning sessions, the student may benefit from a brief review about what has just been completed. It need only take a few minutes, which can help the CYP retain the information in long term memory as well as make associations and links between ideas, reflect on and absorb what they have just learned. • Teach CYP to use pictures or drawings to remind herself/himself of things. The main thing is to make it fun. • Make the task less demanding: Reduce the amount of information the student will have to remember (freeing up processing space). Make it more meaningful/familiar (allowing the student to rely on what she already knows to free up space). Break down tasks to make them simpler. • Repeat information – repeat what is important – either you or someone else in the class (e.g. a partner). • Use memory aids – wall charts, writing frames, word lists, counters, abacus …. Anything that takes the load off the student. • Help the student help themselves – encourage the student to self-monitor how they're doing …let them know it's 'Ok' to forget. Encourage the use of strategies like rehearsal (repeating something over and over in your head) and asking for help.
Cognitive Flexibility The ability to revise plans in the face of new obstacles, setbacks, new information on the mistakes. It relates to an adaptability to changing conditions, and also includes being able to apply learning from one setting to another setting. Students with difficulties and flexibility may find it difficult to accept change e.g. find it hard to cope and have a supply teacher. Successful use of this skill includes: • Being able to problem solve and go with the flow and plans have to change • Recovering quickly from a disappointment e.g. a school trip being postponed	• Use of social stories to address situations where the child is predictably inflexible. For more information see www.thegraycentre.org • Give children choices to help the feel in control • Use visual timetables • Model adapting to change • Give children advance warning when things are going to change; provide advance warning of what is coming next • Reduce the novelty of the situation by not introducing a lot of change all at once • Keep to schedules and routines where possible • Give the child a script for handling the situation, and rehearse the situation in advance • Reduce the complexity of the task – break tasks down to one step at a time • Teach self-talk techniques through modelling, narration • Scaffold collaborative learning tasks **'flexible' thinking skills may be enhanced through:** • taking part in Organised sport; team sport • Logic & reasoning games & puzzles • Dancing • Chess • Learn musical instrument • Theatre/Drama • Post-task review and analysis **Task Initiation Strategies** • Have equipment ready for the children before the start of a task. • Give children rewards. • Model starting tasks, praise a child that has already started the task as an example. • Use of timers. • Use of 'ready, steady, go'. • Give verbal and visual cues. • Helping the child with the first part of the task to get them started. • Have the child specify when they will start the task (e.g. homework) or decide how they will be cued to start. • Break overwhelming tasks into smaller more manageable pieces.

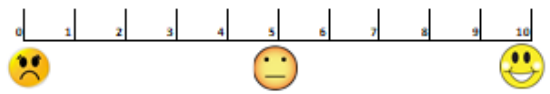
Maths Conversation

CHILD VERSION

Young person's name:		Date:
Assessor name:		School:

1. View of school

What do you think of school?



What are you good at? What do you like doing?

What do you find tricky?

2. View of Maths

What do you like about maths?

Why do you think we need to learn maths?

3. Maths confidence

What type of maths lessons are the easiest/do you prefer? And why?

for example, is a) or b) the easiest?

a) *5+4 =*

Or

b) *Rebecca has five balls and Jaspreet has four balls. How many balls do they have altogether?*

What things you do find tricky in maths?

4. Yourself as a maths learner

Where would you put yourself on a rating scale for maths, where 'I love maths' is at '10' and 'I hate maths' is at '1'?

How about for how good you are at maths, where 10 is very good?

Why there?

Where would you like to be, and what would help you move up?

2. View of maths

What do you like about maths? *Note any behaviours indicating discomfort e.g. did the student look away, fiddle with hands, and appear uncomfortable?*

Encourage the child to think about aspects of maths they think they can do, e.g. Numbers, counting, adding, graphs. This is a good starting point to build confidence and for the student to engage in assessment)

Why do you think we need to learn maths?
Probe: What does the student see as the purpose of maths? Can they think of areas of their life where they use maths skills? How might they use maths in the future?

What type of maths lessons are the easiest/do you prefer? And why?
E.g. type of teaching (small groups/ 1-1/ groups away from the class/ in the main class) and topic, e.g. geometry, shapes, addition sums, word problems etc.; for example, is a) or b) the easiest?

3. Maths confidence

Are there any things you find tricky in Maths?
Approach sensitively so as not to distress the student.
Are there any particular areas the student dislikes, e.g. having to work things out in your head? adding, subtracting, division, multiplication, times table, money, decimals, fractions?

4. View of self as maths learner

So, you've put yourself here. Why is that?

Where would you want to be?

And what would help / need to change to help you move towards the higher number?

5. Use of strategies

Do you ask for help when you need it? *If 'No' why not?*

How does the teacher /adult help you? *Does the teacher / adult show you what to do, provide extra explanation?*

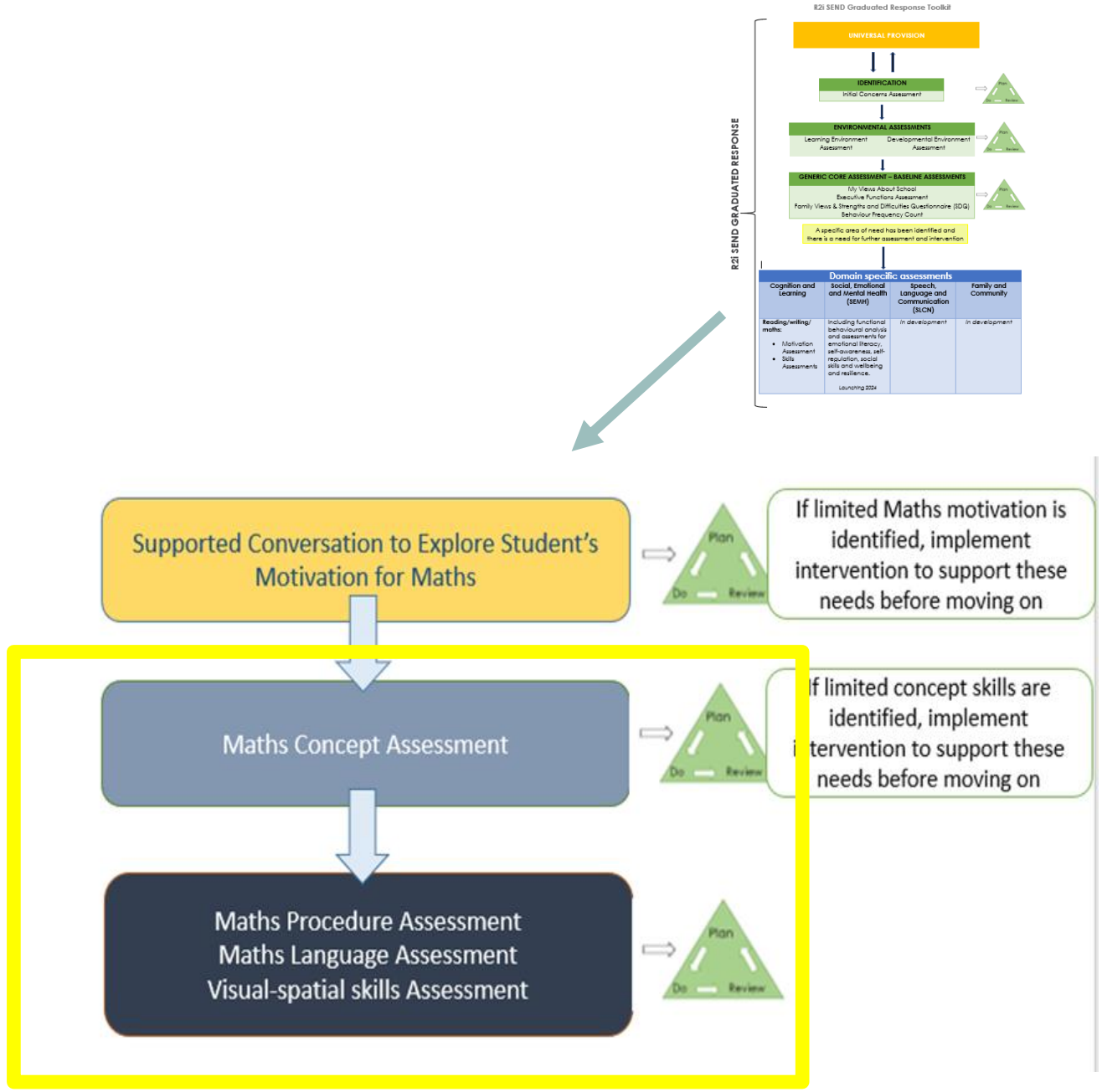
What things do you use to help you with maths? *E.g. unifix cubes, number line etc. Does the student feel confident using the resources? E.g. Some children don't know how to use a 100 square and number lines*

What would you like to have to help you get better at Maths?

Analysis of maths conversation questionnaire

Items from Questionnaire	Questions to Ask?	Questions to Guide Planning of Next Steps
2	**Maths Motivation & Interest** What parts of maths is the student interested and motivated towards? What does the student see as the purpose of maths?	**How can you increase maths motivation?** Do you need to increase the student's maths motivation? If so, how will you do this? Do you need to explore a wider variety of maths activities and how these are presented (e.g. practical, exploratory, worksheets, linked/embedded in topics of interest (e.g. football scores)? Do you need to highlight the different purposes of maths and how they are useful in our everyday lives (for example make this real for the particular student and their interests)?
3	**Maths competence and confidence** In which lessons does the student find maths easiest? What's different about the teaching approach during these lessons (e.g. small groups, one-to-one support)? What's different about the types of maths the student is being asked to do?	**What supports the student's maths confidence?** How can you provide more of these opportunities and supports across lessons?
4	**What are the student's perceptions of their ability in maths, and how much they like it?** How does the student feel about their maths skills? What do they feel their strengths/needs are? How close are they to their ideal? Are they worried about Maths and fearful of getting it wrong?	**How can you support the student's view of themselves as a maths student?** Do you need to expand the student's view of what it means to be good at maths? How will you do this? Do you need to show them evidence of their skills/celebrate their successes to support their maths self-efficacy?
5	**What strategies does the student use, and they think would help them?** What strategies does the student currently use? What changes does the student think they need to make when maths? What other changes do they think would help them?	**What student strategies can you implement?** Allowing students to talk about the changes they can make and then actioning any other suggestions they make should support both skill development and maths motivation, such that the student will feel they have been listened to and have increased ownership of any strategies put in place.

MATHS ASSESSMENT PROCESS

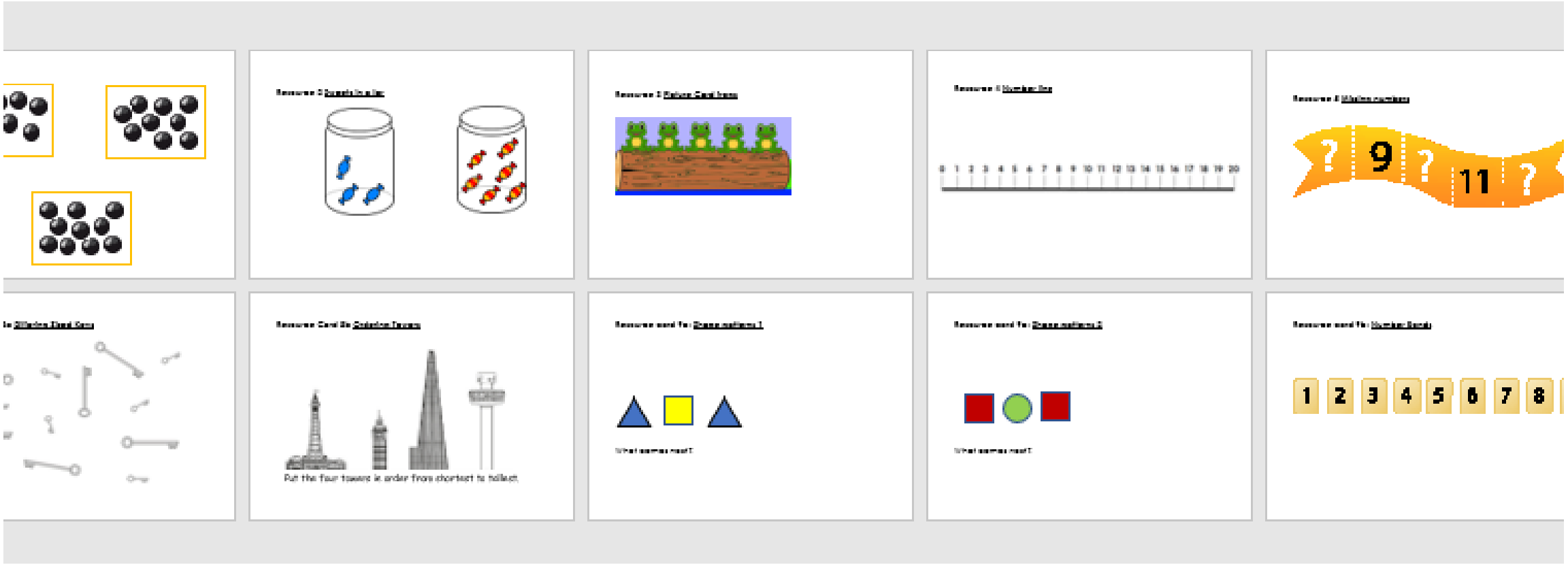


CONCEPT: BASIC UNDERSTANDING OF NUMBER

- Number Magnitude
- Meaning/Counting
- Number Referents
- Concepts of more and less
- Number Relationships

1. Number Magnitude	
Subitising Primary school children (KS1 upwards) should be able to subitise up 4-5 items e.g. instantly recognise the size of a quantity without counting. Three-year-olds can subitise 3 items, and 4-year-olds can recognise 5 dots on the side of a dice. Difficulties with Subitising suggest poor number sense <u>Resources</u> • Resource card 1 Subitising Dot cards • Counters and a piece of large paper or cloth https://www.twinkl.co.uk/	**Subitising Example Activities** <u>Cards</u>: show the child a card, one at a time for a few seconds. Use Dot Cards – selection of 6 cards showing random dots **Q** How many dots?  <u>Counters</u>: start by showing the child two counters, cover with a sheet of paper or cloth**.** Group counters in 2,3,4,5,6,7, in separate containers so child does not see adult counting the counters out **Q** How many counters do you think there are? How many counters did you see? 
Comparisons Understanding <u>comparisons</u> between different magnitudes, e.g. 12 is greater than 10.	**Comparison Activities** i) When shown a group of objects can the child recognise which has more and less? Give a child two boxes and explain one has 5 sweets in and the other has 3 sweets in. - *Which box would they pick to keep and why?* - *Does the child recognise if one more is added that the size of the group is larger?* - *Does the child see that if an object is one less their size of the group is smaller?*

2. Meaning/Counting	
Recitation Recitation is the learning of the numbers names and reciting them in sequence. Children need to know number names, initially to five, then ten, and extending to larger numbers, including crossing boundaries 19/20 and 29/30.	**Recitation/oral counting activities** **Q.** How far to do you think you can count up to? Ask the child to count in 1's as far as they can. Can they start from any given number?
One to one correspondence Learning to synchronise each number name with one object counted.	**One to one correspondence activities** Provide the child with a range of opportunities to count, e.g.: • Counting things of different sizes helps children focus on the numerosity of the count. E.g. How many children sitting on the carpet or lining up • counting things that can't be seen, such as sounds, actions e.g. Clap hands, tap a drum, • counting things that cannot be moved, such as pictures on a screen, birds at the bird table, faces on a shape
Cardinality Understanding that the last number in a set represents the quantity in the group Children need the opportunity to count out or 'give' a number of things from a larger group, not just to count the number that are there. This is to support	**Cardinality activities** E.g. Count these shells carefully. How could you make sure that you have counted them correctly? Now, count out 9 items from the group (e.g. of 12 items)



MATHS CONCEPT RESOURCE PACK

Guidelines for analysis of CONCEPT assessments

See considerations below when reviewing the responses from the child as explanations for a child's difficulties with specific assessment tasks above.

Subitising task. Does the child experience a lack of connection between counting as an activity and the realisation this procedure represents a quantity?

Comparison task

- Comparing numbers involves knowing which numbers are worth more or less than each other. This depends on 1, understanding cardinal values of numbers, and 2, knowing that the later counting numbers are worth more (because the next number is always one more).
- Difficulties might arise due to the child not comparing the numerosity of the group but instead considering the group in terms of size of objects e.g. four dinosaurs in comparison to five counters.
- Does the child know what the next number is in the number line?

Estimation task. Is the child able to consider the context in their estimations? That is, giving a larger number that the initial number involved, e.g. *'There are 5 sweets in this box and then I add 3 more sweets, how many do you think there are?'* The child guesses there are 4 sweets in total.

Counting skills task

- Does the child have working memory difficulties, and/or short-term and long-term memory difficulties?
- Has the child had sufficient time (in relation to their individual capabilities) to develop and practic

Recitation difficulties may arise if the child mis-hears / confuses the numbers such as the teens with t with 30 and 50.

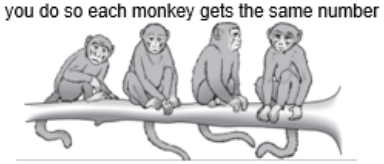
Strategies to support development of CONCEPT skills

Area targeted	Suggested interventions
Subitising	Issues with subitising, i.e. instantly recognise a group that contains up to four, then five, in a range of ways fingers, dice, random arrangement: • Create spatial patterns e.g. line, dice pattern to develop child awareness • Present opportunities for children to see and make arrangements of a range of manipulatives/objects, as dice patterns and be encouraged to say the quantity represented. • Children also need opportunities to recognise objects (up to five) when they are not in the 'regular' arrangement, e.g. small handfuls of objects • Encourage children to show fingers e.g. show me five, show me three (provide visual image of fingers zero –closed fist- up to ten fingers) • using numeral dice in games; matching numerals with varied groups of things
Estimation skills	• Numbers that can be checked by counting, • Guessing then counting the number of counters or children in a group; pencils in the pot, objects in a h

PROCEDURE: ABILITY TO USE LEARNT MATHEMATICAL KNOWLEDGE

- **Mathematical Operations**
  - Addition and subtraction
  - Multiplication and Division

Mathematical Operations	
Competence with simple numerical operations, i.e. +, -, x, ÷ **Addition and subtraction** Children need to know how to break larger number into smaller numbers. <u>Resources</u> Resource card 10 and 11	**Suggested Operations Activity** <u>Addition</u> - **Can you count one more, two more?** - 9 and one more is? - 15 and one more is? - 29 and one more is? - **Show number cards Q Can you do this** - **5+1=, 12+1=, 29+1=** <u>Subtraction</u> - **Can you count one less, two less** - 8 and 1 less is? - 13 and 1 less is? - 31 and one less is? - **Show number cards Q** - 12-1 =,

Multiplication and Division Children should understand multiplication and division are inverse operations <u>Resources</u> Resource cards 12 and 13 (Inverse statements) Resource card 14 (Word Problem Card multiplication) Resource card 15 (Word Problem Division)	**Multiplication & Division Example Activities** Q. Which tables do you know 2's, 5's 10? Q. How do you think you work out the 4's times table? <u>Use 10 counters and show me how</u> Q. Can you use the counters and show me how would you make 2x5? Q. Split the counters into two groups… etc. Q. Use the counters to make 3x2 Q. Can you make 2x3 <u>Show Word problem card</u>. Ajay, Sam, and Kemi have 4 conkers each (then expand for four people).  How many conkers do they have altogether? <u>Show them the Monkey card</u> 20 bananas and four monkeys. Q What could you do so each monkey gets the same number of bananas? 

Resource card 10 Number Operations Two More addition

5+2=

17+2=

29+2 =

Resource 11 Number Operations: Two Less subtraction cards

8-2=

11-2=

31-2=

Number Operations Inverse Statements resource card 12 and 13

Q. If 3 × 2 = 6 then 6 ÷ 3 = ?

Q. If 5 x 2 = ? then 10 ÷ 5 =

Number Operations Word problem Multiplication resource card 14

Ajay, Sam and Kemi have 4 conkers each

How many conkers do they have altogether?

How many will they altogether if Lucy joins the group?

How do you know?

Number Operation Word problem Division resource card 15

There are 20 bananas and four monkeys.

Q. What could you do so each monkey gets the same number of bananas?

MATHS PROCEDURE RESOURCE PACK

Guidelines for analysis of PROCEDURE assessments

Children may experience difficulty with successfully completing these assessments due to a range of reasons:

Addition and subtraction

- Not knowing where to start counting from. For example, when asked to count 'one more from 13' the child may say '15' due to thinking they need to start counting from the next number, i.e. in this example from 14 rather than 13.
- Recognising quantities- Subitising.
- Lack of knowledge of the 'sight facts' of numbers 5 and 10, e.g. number bonds to 10.
- Weak retention and recall of a visual cluster, auditory numeral, and symbol as a number.
- Being able to compose /decompose, such as breaking larger number into smaller numbers.

Multiplication and Division

- Difficulties may arise with division if multiplication is not fully understood.
- Children not understanding that multiplication and division are inverse operations
- Using manipulatives to demonstrate their understanding of multiplication and division e.g. being unable to group counters or present as an array.
- Not understanding the commutative and associative properties of multiplication, i.e. *Commutative property of multiplication: Changing the order of factors does not change the product. For example, 4 × 3 = 3 × 4 4 \times 3 = 3 \times 4 4×3=3×44, times, 3, equals, 3, times, 4. Associative property of multiplication: Changing the grouping of factors does not change the product (cited from https://www.khanacademy.org/math/pre-algebra/pre-algebra-arith-prop/pre-algebra-arithmetic-properties/a/properties-of-multiplication#:~:text=Commutative%20property%20of%20multiplication%3A%20Changing.doe . Retrieved from website on 11.03.20)*
- Children may continue to use fingers to answer multiplication and division questions which migh strategies, use of materials or a combination of both. Concrete, pictorial, and abstract method w

Strategies to support development of PROCEDU

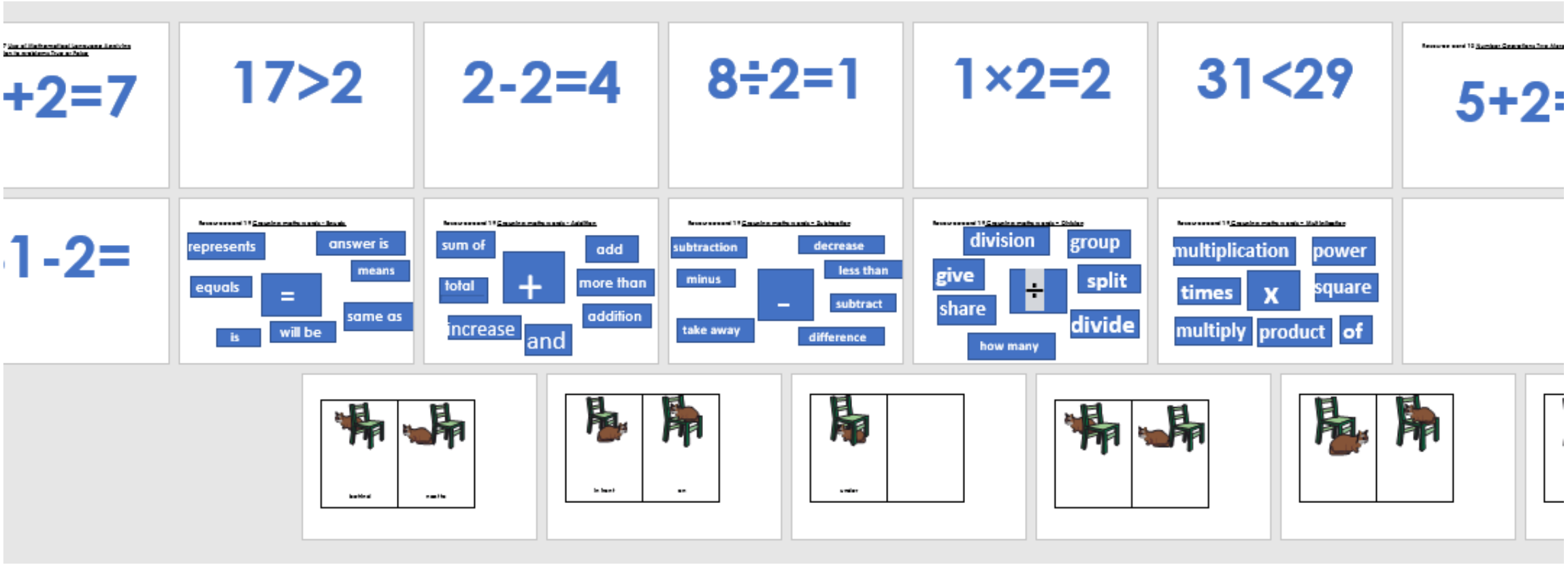
	Suggested Interventions
ons	• Count forward and back by 1, 2 and 10 starting from a • Recognise quantities without counting of a least ten it • Teach sight facts of numbers, 5 and 10. • Use base 10 frames. • Use repeated addition, groups of, an array and the properties of multiplication. • Using manipulatives such as Cuisenaire rods for r rectangle.

LANGUAGE: USING MATHEMATICAL VOCABULARY AND LANGUAGE

Use of Mathematical language

- Ability to read and write numbers
- Sign and symbol recognition
- Language in the context of Maths
- Knowledge of spatial language

Use of Mathematical language	
Ability to read and write numbers	**Activity** Adult says number can child write number • Match picture of visual clusters – to numeral 20 and beyond • Can child read numbers 1 -20, 50 100
Sign and symbol recognition Resources	**Activity** Show child flash cards of signs and symbols (Use the symbols +, -, x, ÷ and =) • Ask child to say what each one means • Ask child to write each symbol • Provide child with a range of problems using the Signs and Symbol recognition.



MATHS LANGUAGE RESOURCE PACK

Guidelines for analysis LANGUAGE assessments

The child may experience difficulties with the assessments due to a range of factors, for example:

Read and write numbers assessment

- Difficulties with recall the numeral representation for a given number from long term memory.
- Auditory discrimination difficulties, such as not being able to hear and differentiate between number names.
- Fine motor difficulties with formation of number.
- Poor visuo-spatial skills.
- Poor memory to retain and recall all the steps required to complete a multi -step problem e.g. with place value child needs to understand place value, and the principle of exchange before formally recording the answer.

Signs and symbols assessment

- Communicating ideas and justifying arguments using mathematical symbols, diagrams, images, or language.
- Understanding how to use models and images and practical equipment.
- Difficulties with spatial language, such as understanding positional language.

Language in the context of Maths assessment

- Difficulty with correctly interpreting questions
- Difficulty with identifying and understanding the keywords
- Not knowing how to use sentence starters or words such as 'therefore', 'because', 'then' and 'so' that you want children to use in their replies so that they make use of the language of reasoning
- Difficulty with verbally communicating their ideas to others

Strategies to support development of mathematical LANGUAGE skills

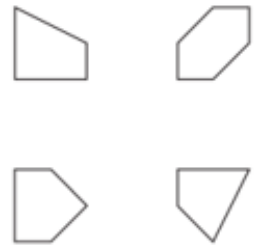
Area Targeted	Suggested interventions
Ability to read and write numbers	• Provide children with number lines, number patterns to consolidate the visual representation with the auditory • Provide opportunities for children to practice this skill and extend their knowledge with a variety of objects m pencils with number 5 matching 5 cars with 'five' word, matching 5 balls with domino 5. • Provide opportunities for children to trace over numbers from large to smaller to form fluency of written numbe • Record number sentences and explain what the signs and numbers mean for all four operations write number s and explain what the strategies used e.g. division is the inverse of multiplication
Sign and symbol recognition	• Provide problems using the correct and incorrect signs and symbols can the children sort these and exp reasoning. • Provide sentence starters or words such as 'because', 'then' and 'so' that you want children to use in their r

VISUOSPATIAL: SKILLS IN RELATION TO WORKING WITH SPACE, SHAPE, AND MEASURE

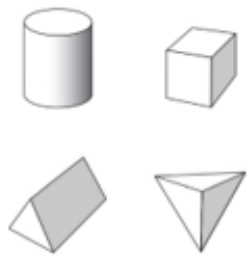
Visuospatial Knowledge

- Space and Shape (understanding relationships between)
- Measure (comparatives)

- Show me the pentagon.
- How do you know?

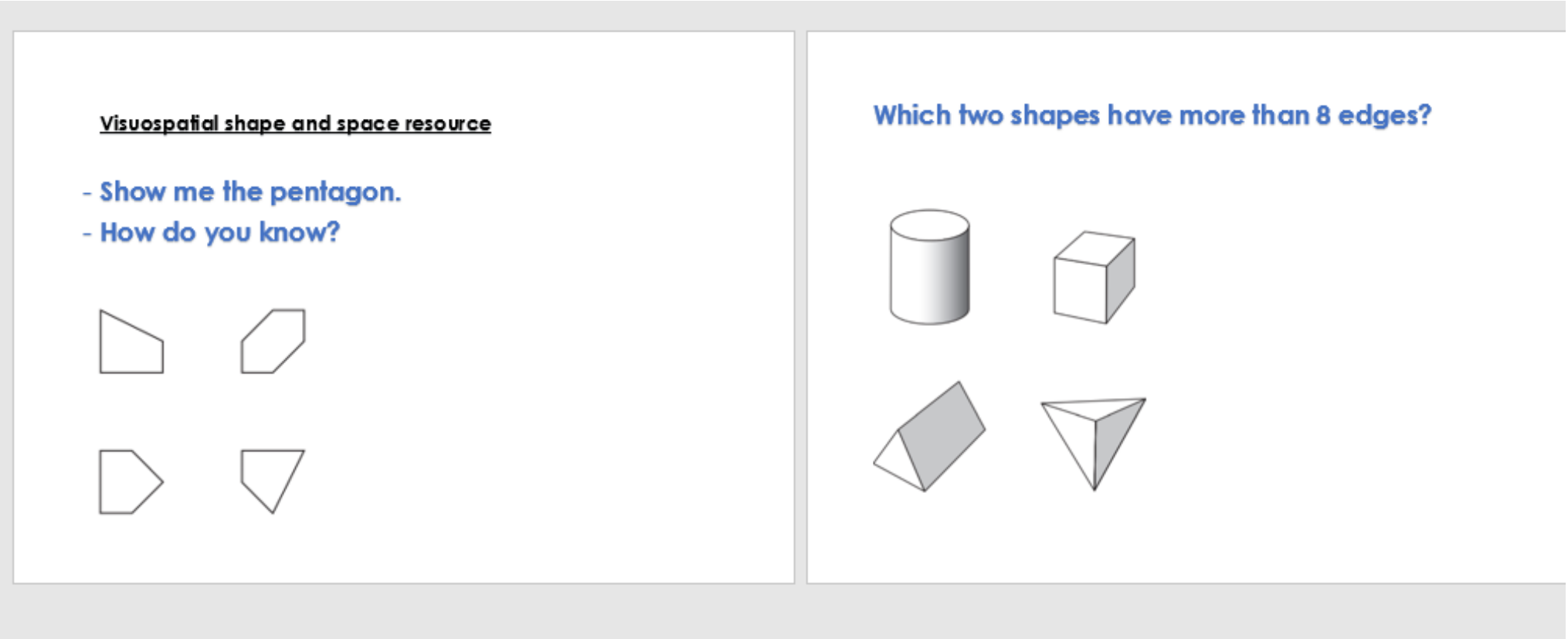


Which two shapes have more than 8 edges?



Note the pupils' answers

- Record pupil answers as the pupil says them e.g. 'pointy bits at the end' vertices/corners, sides /edges, and faces
- Does the pupil count the sides or recognise the shape quickly?
- Does the pupil attempt to count the edges? Is the pupil able to visualise the edges?



MATHS VISUOSPATIAL SKILLS RESOURCE PACK

Guidelines for analysis of VISUOSPATIAL skills assessment

Analysis of shape and space

The area of shape and space involve developing visualisation skills and understanding relationships between shape and space, such as combining shapes. Children need explicit and structured activities to develop these skills, which will underpin aspects of mathematical thinking (https://www.ncetm.org.uk/, 2018)

Pupils may have difficulty with:

- Describing the shape by their properties
- Recognising shapes defined by their orientation e.g. thinking that squares are only squares when the bottom is horizontal
- selecting and rotating shapes to fit into a given space
- Using positional vocabulary,
- Recognising that shapes in different orientations are still the same shape
- Selecting shapes for a particular purpose

The test administrator should look for evidence of difficulties with the above aspects and can then refer to the intervention section of this toolkit for prompts of how the child can be helped.

Strategies to support development of mathematical VISUOSPATIAL skills

(The majority of strategies have been taken from https://www.ncetm.org.uk/, Dec 2018)

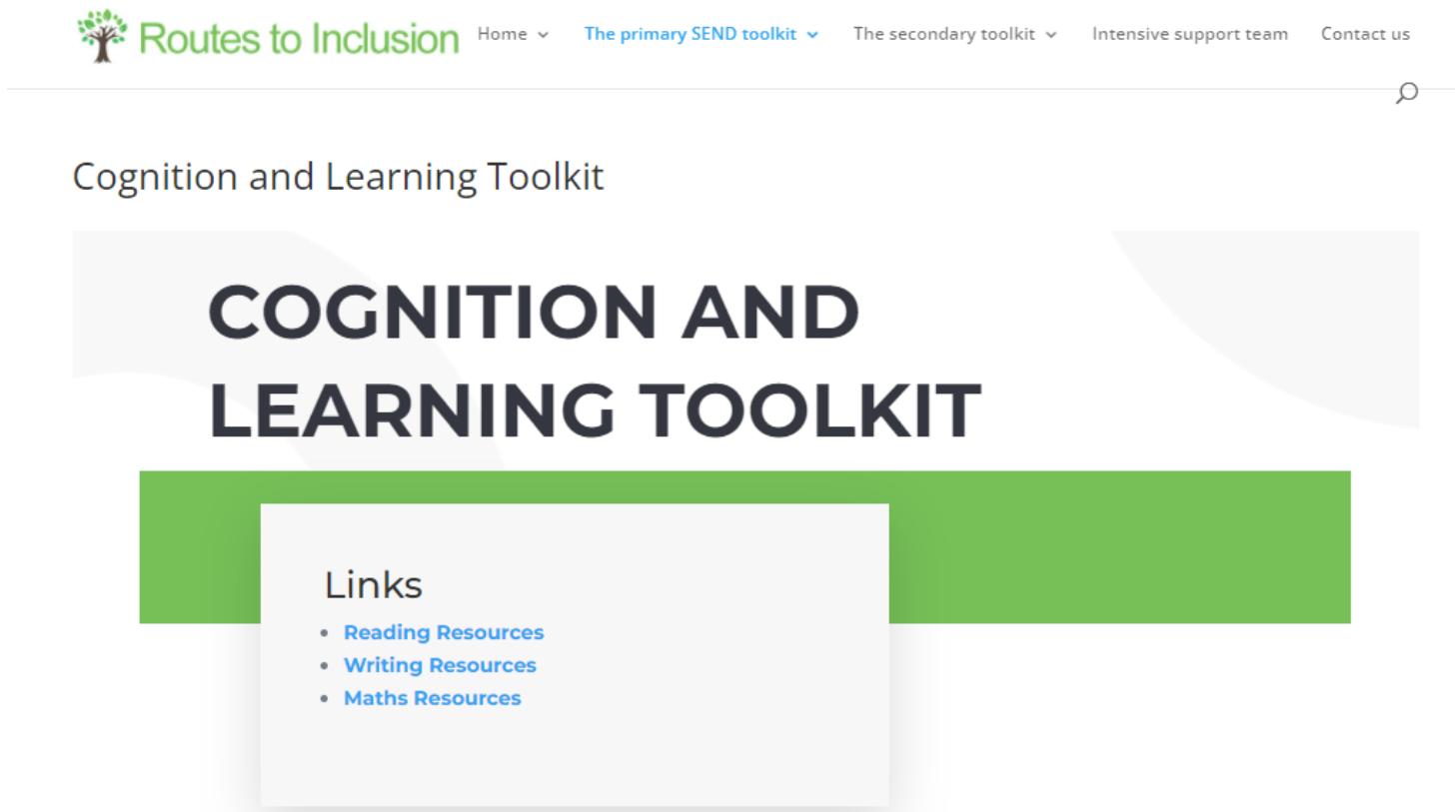
Area Targeted	Suggested interventions
developing shape awareness through construction	Provide pupils with a range of construction opportunities with structured and unstructured materials, e.g. • Designing a plan for a garden or play area, using a small tray with sand, twigs, building bricks, etc. • Drawing or making a simple map of a route with 'landmarks', e.g. houses and trees. • Following a simple map of an excursion. • Use stories as a prompt for creating representations, e.g. building a house for the three bears. • Making pictures with found materials, as well as structured shapes and blocks.
Representing spatial relationships	• Provide lots of opportunities for children to describe things being 'in front of', 'behind', 'on top of' et consider objects from different perspectives.

R2I Plan-do-review tracker template for targeted domain skills (Maths Example)

This tracker should be used to track progress of selected developmental targets. Three targets are ideal for working on with the young person. See below for guidelines for completion of the tracker.

Name of child/ young person (CYP):		**Class:**	**Staff member:**		**REVIEW DATE:**
Area targeted for development e.g. subitising skills	**Current skill level** (What the young person can do independently) e.g. Seema is unable to subitise	**Next step targeted skill** (~~make~~ SMART) e.g. Seema to learn to subitise up to 3 objects	**Intervention / strategy** (~~target~~ directly the skill to improve) e.g. Present opportunities for Seema to see and ~~make~~ ~~arrangements~~ of a range of objects and be encouraged to say the quantity represented.	Rate Effectiveness of ~~interv~~ 0-5 *0= no impact* *5=full impact*	**Progress made at review date/ comments**
1.					
2.					
3.					

WEBSITE


Routes to Inclusion
Home
The primary SEND toolkit
The secondary toolkit
Intensive support team
Contact us
Cognition and Learning Toolkit
COGNITION AND LEARNING TOOLKIT
Links
Reading Resources
Writing Resources
Maths Resources

EMBEDDING ACROSS SCHOOL

How will you cascade to your teams and staff?

- Staff Meeting?
- Case study child / children
- Support from us
- Your own systems

QUESTIONS OR COMMENTS?

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https://www.nationalnumeracy.org.uk/