Hampshire Services
HIAS SCHOOL IMPROVEMENT

Briefing for Headteachers of Special School Mathematics
Autumn (1) 2022

National Centre for Excellence in the Teaching of Mathematics

Hampshire County Council

The HIAS Maths Team

Jo Lees- Lead Inspector Adviser for secondary mainstream and special schools
Jo.Lees@hants.gov.uk

Kate Spencer- Inspector Adviser for primary mainstream and special schools
Kathryn.Spencer@hants.gov.uk

Primary Teaching and Learning Advisors

Rebecca Vickers	Rebecca.Vickers@hants.sch.uk
Olivia Humphries	Olivia.Humphries@hants.sch.uk
Nikki Farrage	Nicola.Farrage@hants.sch.uk

Helen Martin- Maths Curriculum Centre Manager (resources and general queries)
Helen.Martin3@hants.gov.uk

Margaret Wood- Maths Curriculum Centre Manager (course and network meeting bookings and enquiries)
Margaret.Wood@hants.gov.uk

Questions to consider

What does a high quality, inclusive, mathematics curriculum look like in a special school setting ?

In what way is the pedagogy the same or different to mainstream ?

How do we add value to learners' mathematical understanding and application?

The Special Mathematics Curriculum Offer

Access and Success for All

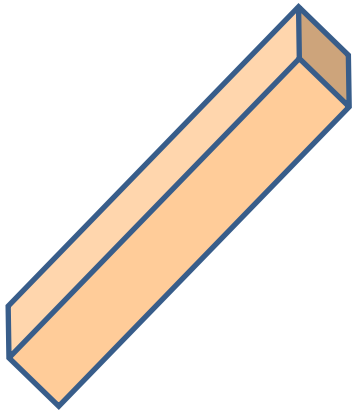
Mathematics can sometimes seem abstract and unattainable for some learners.

Why is maths so difficult for some learners ?

Vocabulary – many maths terms mean something different in everyday life.

For example ‘remote’ , ‘volume’, and ‘prime’ could be associated with the TV

How about ‘take-away’, ‘operation’ and ‘mean’ and later on ‘factor’, ‘product’ and ‘improper’ ?



What about similar sounding words ?

‘Today, we are going to learn about prisms’

‘Miss, my dad’s been in one of those’

Why is maths so difficult for some learners ?

Sentence structure.

Learners can struggle with comprehension of complex sentences such as:

- ‘A number that is not a multiple of ten’
- ‘How many more students in the survey chose football as their favourite sport than chose rugby?’

Why is maths so difficult for some learners ?

Everyday Conversations

Some learners may suffer from a lack of regular exposure to conversations other than those about events in the here and now.

The level of abstraction involved in learning maths can be a challenge, particularly when it moves beyond manipulatives into a world of disembodied symbols

Why is maths so difficult for some learners ?

Working memory

Some learners may have a restricted working memory capacity than others.

This can mean that:

- they are less likely to be able to transfer new learning into the long-term memory

- they may struggle to hold numbers in their heads when doing multi-step calculation problems (Gilmore et al, 2018)

- they may have mental organisational problems with the working memory demands of multi-step word problems such as ‘In William’s desk drawer there are 6 yellow pens. There are 12 more red pens than yellow pens and there are 3 more blue pens than red pens. How many pens are there in William’s desk drawer altogether?’

Why is maths so difficult for some learners ?

Literacy

Some learners may have dual difficulties with maths and literacy.
A great deal of maths work involves reading.

The words on the page, and the required comprehension, can be a stumbling block to accessing the maths.

What about: ‘Write an expression using a variable that shows how much 3 pairs of jeans will cost if you do not know the price of the jeans. Assume each pair costs the same amount’ ?

Why is maths so difficult for some learners ?

Key factors affecting progress and attainment

- Maths and its language
- The abstraction of the subject
- Memory difficulties
- Reading comprehension
- Confidence and motivation

Consider:

What should the maths curriculum look like in a special school setting to ensure access and success for all learners ?

We know that all learners and their needs are different

Teachers need to be flexible and adjust approaches, strategies and resources in response to the needs of their students

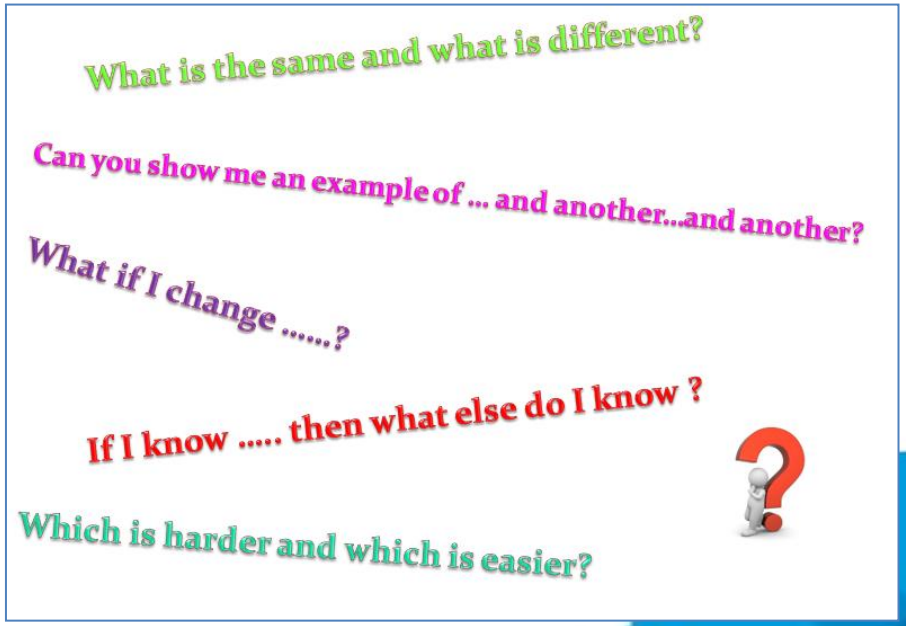
Access and success for all
Curriculum and pedagogical considerations

- **Maths and its language**

A focus on spoken language in the classroom such as **dialogic teaching**

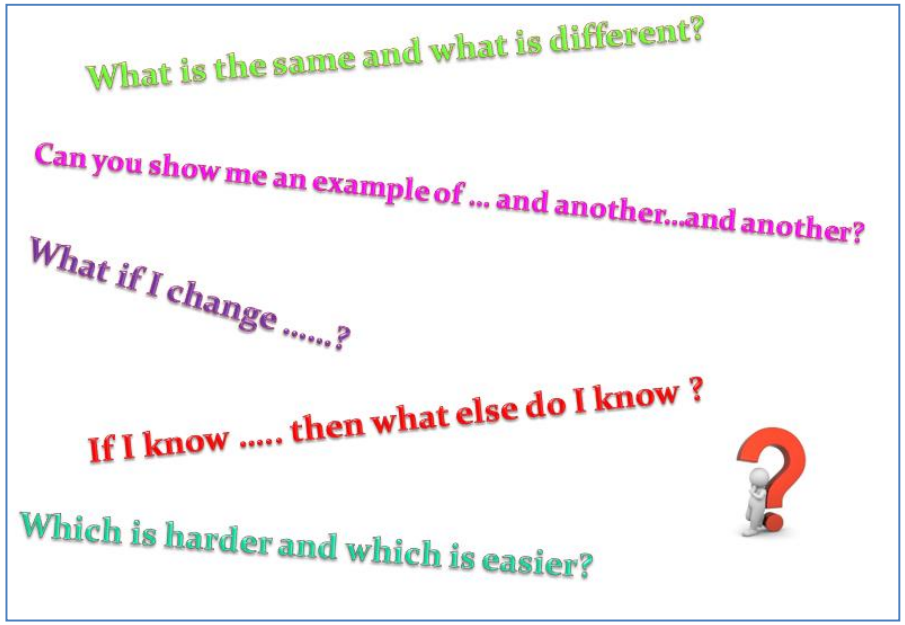
Research suggests that more purposeful talk in classrooms closes the attainment gap for learners with SEND

Dialogic teaching is when a learner's solution is used as a starting point for a dialogue.
This links to the use of **key questions**



Access and success for all
Curriculum and pedagogical considerations

- **Maths and its language**



Other strategies to draw on:

- Provide a running commentary on what the learner is doing: 'It looks as though you are expanding those brackets / putting those numbers in ascending order…'

- Reflecting back on what the learner has said in correct, expanded language: Student:' My shape has three corners' / Teacher: 'Yes, it has three vertices'

- Focussing on key vocabulary , the 'Goldilocks' words (just right). Exploring these words in some depth, using them throughout the topic in sentences etc.

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Maths and its language : The ‘Goldilocks’ words : Key topic vocabulary.

The Frayer Model

Word	Example
Picture, diagram or model	Non-example

Maths and its language : The ‘Goldilocks’ words : Key topic vocabulary.
The Frayer Model

Word:	Example:
pr (nu	
Picture, diagram or r	

Word:	Example:
capacit	
Picture, diagram or model:	

Word:	Example:
ten	
Picture, diagram or model	

Word:	Example:
Groups of	2 groups of 3 is the same as 6.
Picture, diagram or model:	Non-example:

H	T
	3

Access and success for all
Curriculum and pedagogical considerations

- **The abstraction of the subject**

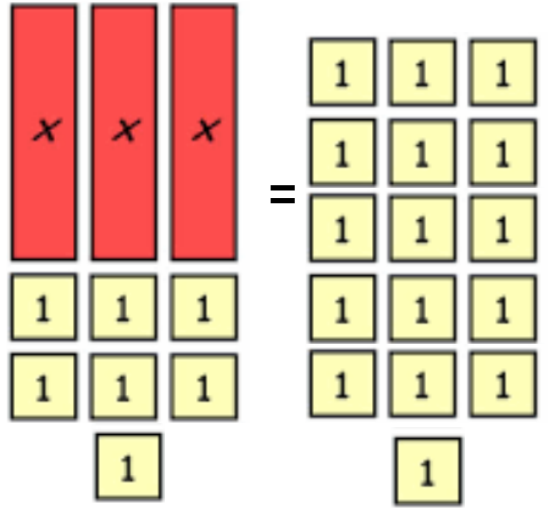
Dealing with abstraction: Concrete examples and situations

Teacher: ‘Mentally calculate the difference between 20 and 0.36’
Learner : ?????

Teacher: ‘I have £20 and spend 36p , how much money do I have left ?’
Learner: ‘64p makes £1 , so £19.64’
Use counting on , on a number line , or coins

Why is maths so difficult for some children ?
Key factors affecting progress and attainment

- **The abstraction of the subject**



Dealing with abstraction: **Concrete , pictorial , abstract**.

Teacher: 'Solve the equation $3x + 7 = 16$
Student : ?????

Teacher: 'Can you say it, make it , draw it , write it ?'
Student: 'Three ex plus seven is the same as sixteen'

$3x + 7 = 16 \quad (-7)$
$3x = 9 \quad (\div 3)$
$x = 3$

16			
x	x	x	7

Access and success for all
Curriculum and pedagogical considerations

- **Memory difficulties**

Working memory (short-term memory)
The ability to hold information in your mind while you manipulate it

Highly important in solving arithmetic and other maths problems

It is helpful to develop ‘automaticity’ with key facts

Reduce the memory load by securing additive and multiplicative facts (number bonds and times tables)

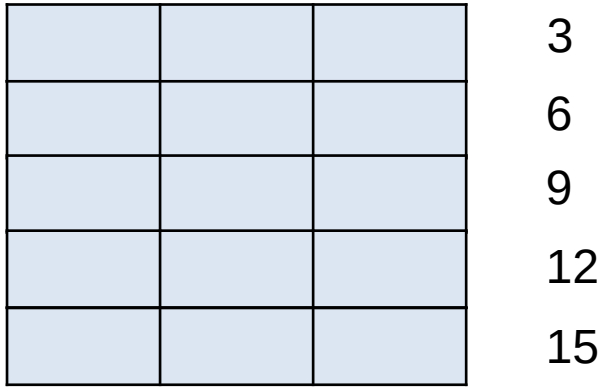
HOW ?

• Memory difficulties

Reduce the memory load by securing additive and multiplicative facts (number bonds and times tables)

- Focus on basic facts before teaching more complex areas
- Provide prompt sheets or grids to support recall (learners only look if they need to)
- Use knowledge organisers (not too busy !)
- Use tutor time or start/end of lesson to focus on practising key facts
- Use models and images to help learners (e.g. a number line, or an array)
- Use connections to help learners derive the facts they need
- Use mnemonics (e.g. All graphs need **SALT** – **S**cale , **A**xes , **L**abels , **T**itle)
- Make flash cards
- Regular retrieval practice such as challenge grids and low stakes quizzes

Memory difficulties
One Ten, Five…. Derive !



Use connections to help learners derive the facts they need

e.g. **‘one, ten , five , derive’**

Teacher says ‘The size of the group is 3’
Learners use a number line or track to place 3 , 30 and then 15 (‘one, ten , five’)
Now **‘derive’**
Learners add, subtract , double and half multiples of 3 to generate the 3x table facts

3	6	9	12	15	18	21	24	27	30
1x	2x	3x	4x	5x	6x	7x	8x	9x	10x

Access and success for all
Curriculum and pedagogical considerations

- **Reading comprehension**
  WORD PROBLEMS

Use small group work **guided reading** for readers at a similar stage:

- Use maths word problems as the text
- Develop comprehension-based strategies
- No ‘maths answer’ required. This is all about the reading.

Learners see and hear the way in which an expert reader automatically monitors their understanding ‘in the moment of reading’

Guided reading teaching sequence:

Before reading

- identify and activate prior experience of similar word problems
- clarify any challenging or technical vocabulary
- set one or two key questions to assist comprehension
  - What do we think this problem is going to be about?
  - What type of operation might be involved?
  - What clues can I find in a text to help me?

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Learners see and hear the way in which an expert reader automatically monitors their understanding ‘in the moment of reading’

Guided reading teaching sequence:

During reading

- model reading the text aloud
- look for clues as to the mathematical operations involved
- underline key words and phrases
- annotate text and raise questions
  - Does the problem remind me of anything else I have seen?
  - What part of the text is confusing and why?
  - Do I need to go back and re-read?
- think out loud about any ‘clues’ to signpost

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- **Reading comprehension**

Learners see and hear the way in which an expert reader automatically monitors their understanding ‘in the moment of reading’

After reading

- lead a discussion , returning to key questions identified before and during reading
- help learners revisit clues and questions that have arisen
- support learners to summarise the word problem and identify the mathematical strategies they need to solve it
- encourage learners to represent their thinking visually where possible to develop higher levels of comprehension
  - Can I draw a diagram or model to help me ‘see’ this better?

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What does the HIAS maths team offer to support you with delivering a high quality curriculum for your learners that enables access and success for all?

Jo Lees- Lead Inspector Adviser for secondary mainstream and special schools

Jo.Lees@hants.gov.uk

Kate Spencer- Inspector Adviser for primary mainstream and special schools

Kathryn.Spencer@hants.gov.uk

Core Provision structures 2022/23

(Primary subject leaders network meetings- district based)

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Maths

Summer 1: 2022

HT/MM Briefing: July 2022

Autumn 1: 2022

Autumn 2: 2022

HT/MM Briefing: December 2022

Spring 1: 2023

MM Conferences: March 2023

An opportunity to network with other primary maths managers in your local area, attendees include mainstream, specials and education centres

Secondary Head of Department Network meetings 2022/23
County-wide group

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Hampshire HoDs: Date schedule
All meetings start at 1315 with approximate finish of 1600

Date	Term	Format
05-07-22	Sum2	Webinar via MS Teams
12-10-22	Aut1	Face to face @ The Village, Eastleigh
06-12-22	Aut2	Face to face @ Holiday Inn, Eastleigh
09-02-23	Spr1	Webinar via MS Teams
21-03-23	Spr2	Webinar via MS Teams
27-04-23	Sum1	Face to face @ Holiday Inn, Eastleigh
26-06-23	Sum2	Webinar via MS Teams

An opportunity to network with other HoDs, attendees included mainstream, specials and education centres

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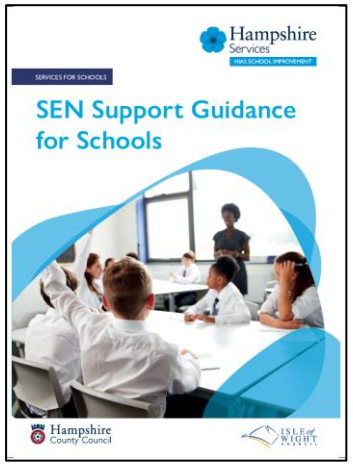
Focus for English and Maths Core Provision 2022-23, SEN Support



'Access for every CYP to suitable, high-quality provision, which meets diverse need and diminishes barriers to participation and engagement'

'A strong commitment to early intervention and prevention to tackle, diminish or avert potential barriers to success'

from The Hampshire and Isle of Wight principles of inclusion which underpin these guidelines

'The class teacher is the leader of provision for SEND at the point of delivery in the classroom and so occupies a pivotal – perhaps the most pivotal - role. Trained, skilful teachers who have a repertoire of teaching methods, strategies and resources, coupled with strong assessment practices and a responsive curriculum offer are therefore paramount to the success of provision and outcomes for CYP with SEND.' p21

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What has been happening in mainstream primaries with provision for SEND ?

Action Research and Case Studies developed at primary core provision network meetings

Maths and English subject leaders working with a colleague to produce case study about a child needing SEN support **not** in their class in the spring term.

- use known assessment information and undertake diagnostic assessment and to identify precise learning needs for pupil in colleague's class
- Identify how HQT strategies will be enhanced to support pupil's learning and progress
- Set review dates to check impact and consider tweaks
- Identify strategy for working closely with SENCo
- Consider how all staff will be informed and involved over time.
- Collate information about process and strategies used for sharing at next Core Provision meeting

Case Studies currently being reviewed and collated into one document for sharing with colleagues in schools to improve provision and outcomes for learners with SEND

HIAS Maths Moodle

Open resources

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Primary

- NCETM Resources
- Assessment Documents Archive from Primary National Strategy 2010
- End of Key Stage Assessment Materials
- Hampshire Maths Team progression documents
- Key Stage 1 and 2 SATs
- Planning Templates and Guidance
- Puzzle corner

Secondary

- Leadership
- Assessment
- Curriculum
- SEN
- Vulnerable/disadvantaged
- Maximising outcomes
- Literacy
- Adaptive teaching
- Subject specific pedagogy

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Maths Moodle: All courses (hants.gov.uk)

Primary Number Facts Posters updated and renewed

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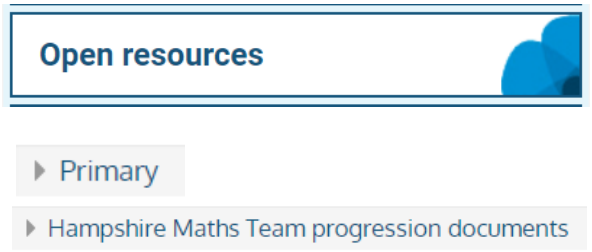

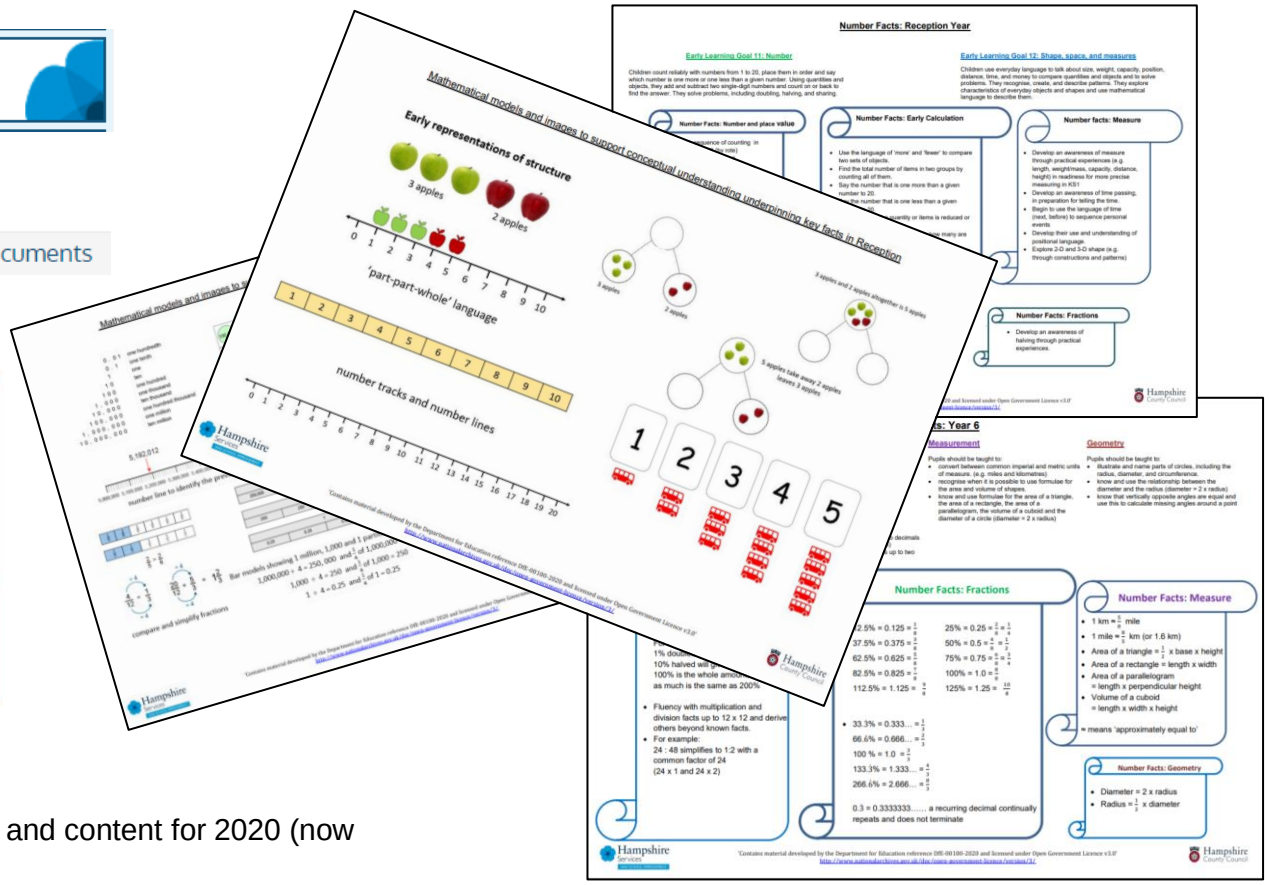

Updated with new models, images and content for 2020 (now including YR to Y6)

[Online Training - Course: Progression in Number Facts Year R - Year 6 (hants.gov.uk)]

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Times Tables

Open resources

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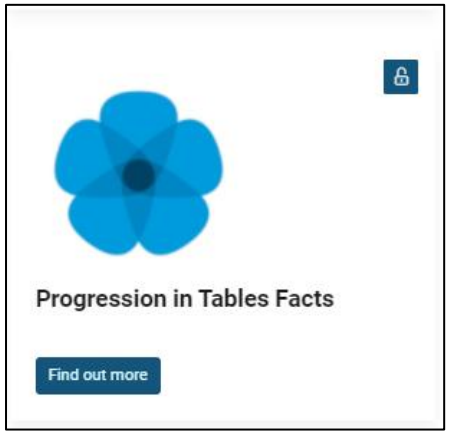
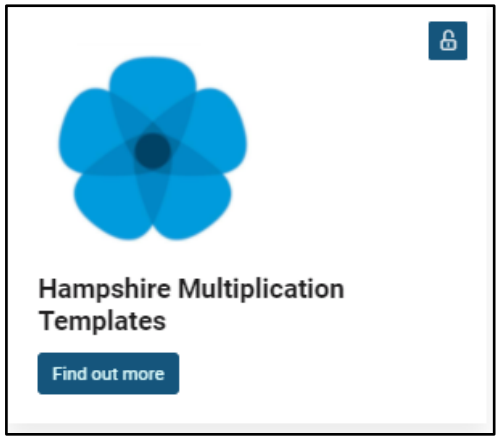
Primary

Hampshire Maths Team progression documents





Suggested whole school progression document for teaching and learning tables facts

Templates for teaching all tables in Y2 to Y6:

- Using representations: arrays, number lines
- Making links between facts and between tables
- Division linked to tables
- Links with fractions and decimals (Y6 SATs)

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Moodle+

PRIMARY

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[Maths Moodle: All courses (hants.gov.uk)]

Paired Examples
Find out more

Hampshire Assessment Model
Find out more

Connect4Maths - Primary
Find out more

Primary Vocabulary Cards
Find out more

Hampshire Schemes of Learning Updated 2021
Find out more

Year 2 Assessment Guidance - Spring and Summer 2022
Find out more

Planning Templates
Find out more

Primary Moodle+ Articles and CPD
Find out more

Year 6 SATs Preparation Resources - 2022
Find out more

Primary Transition and Catch-up Plans for Mathematics
Find out more

Primary Number Facts: Matching cards to support recall and retrieval
Find out more

Primary Mental Fluency Check and Progression Documents
Find out more

Primary TASC Resources
Find out more

Moodle+

[Maths Moodle: All courses (hants.gov.uk)]

SECONDARY

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Secondary - Entry and Exit Tickets

Find out more

Secondary Paired Examples

Find out more

Secondary Hampshire Schemes of Learning Updated 2021

Find out more

Connect4Maths - Secondary

Find out more

Secondary Variation

Find out more

Secondary Vocabulary Cards

Find out more

Hampshire Maths Scheme of Learning
Year 1 to Year 9

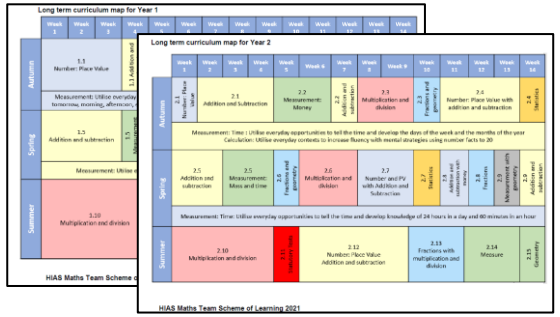
[Course: Hampshire Schemes of Learning Updated 2021 (hants.gov.uk)]

Combinations of domains in units of 2/3/4 week blocks revisiting the whole curriculum 3x with ‘red zone’ in summer term

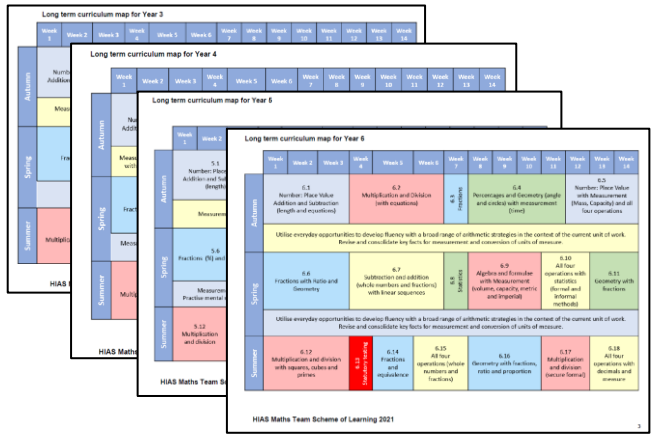
- Long term plans (including mixed age plans)
- Medium term plans: units of work with NC objectives identified
- Learning journey outlines
- DfE ‘Ready- to –progress’ criteria linked to plans

Any problem solving resources or textbook schemes can be used alongside these plans

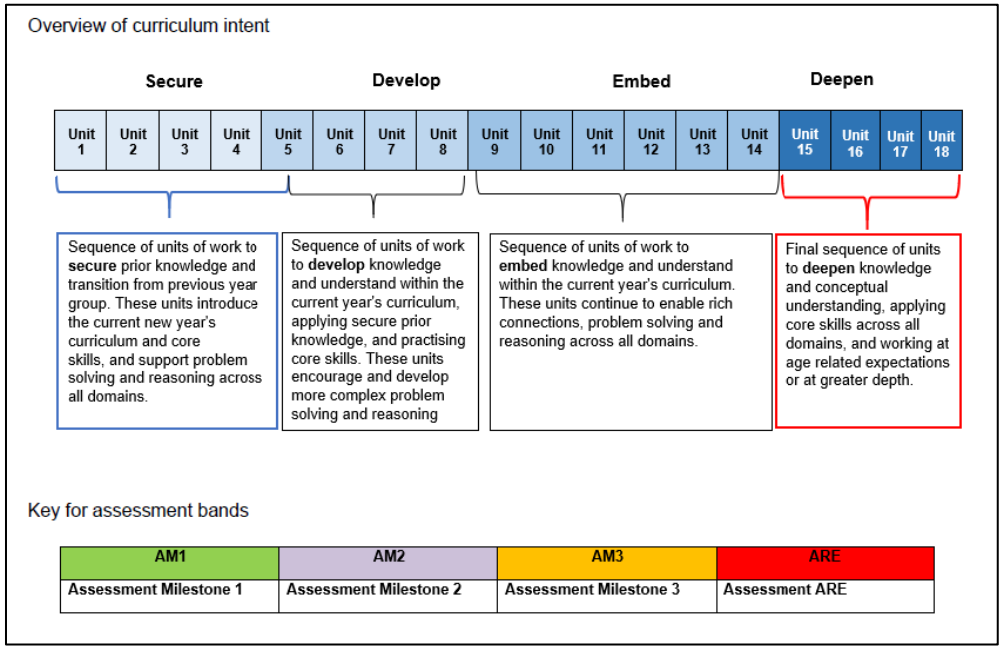
Updates: Hampshire Scheme of Learning: Y1 – Y9



Key stage 1

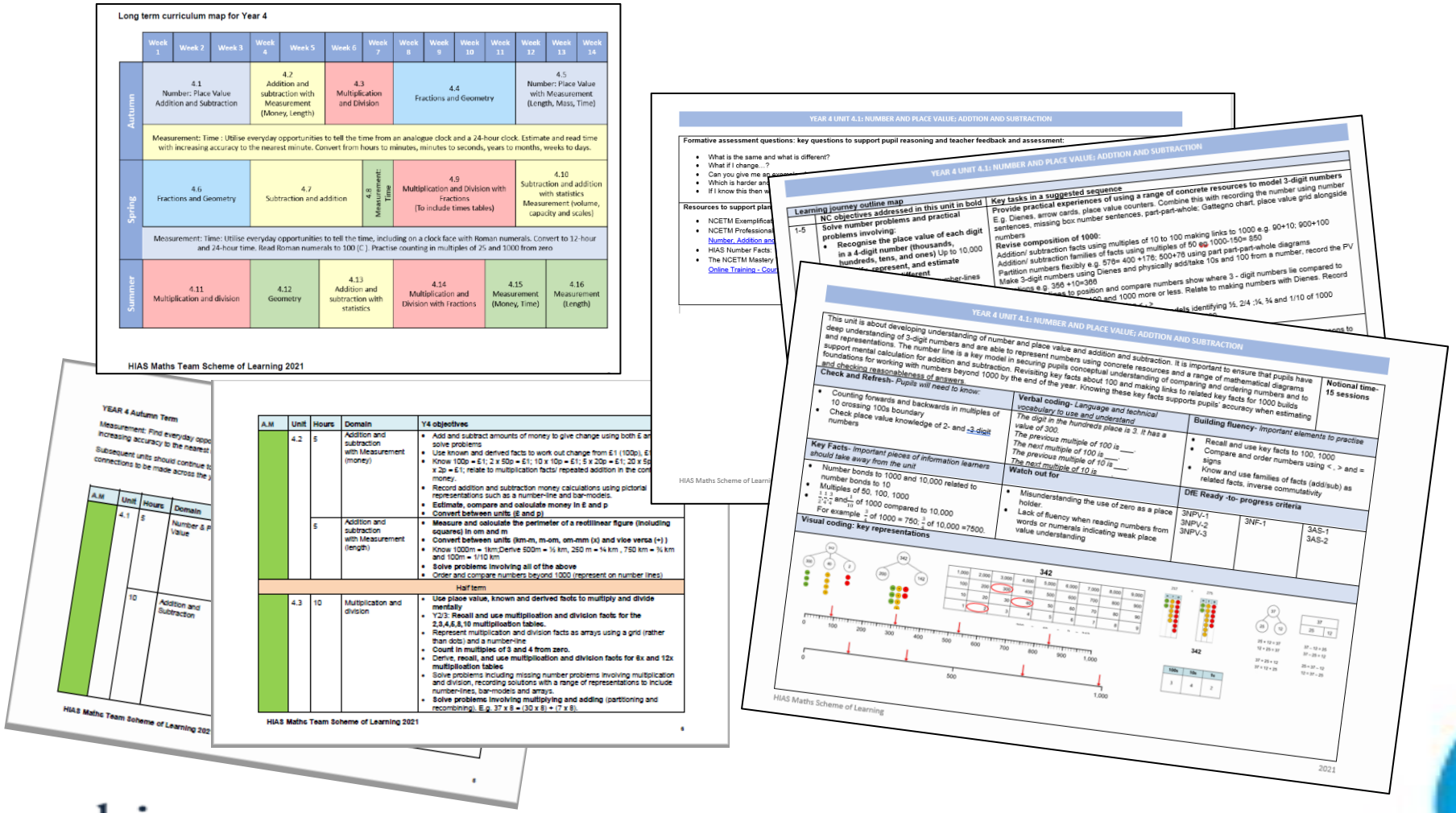


Key stage 2



[Course: Hampshire Schemes of Learning Updated 2021 (hants.gov.uk)]

Long, medium and unit plans



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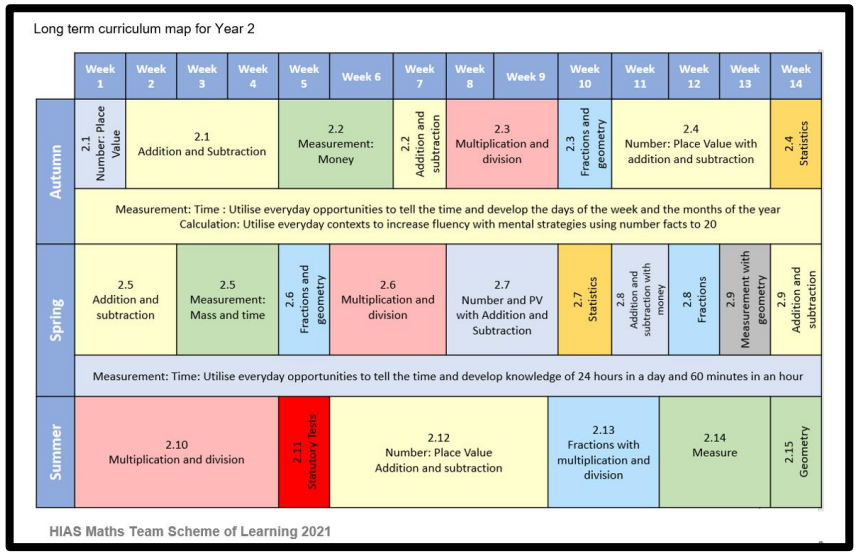
[Course: Hampshire Schemes of Learning Updated 2021 (hants.gov.uk)]



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Hampshire Scheme of Learning

A recursive spiral curriculum model- revisit, review , embed

Gap t o focus again on a few key concepts

ARE

Secure				Develop				Embed				Deepen		
Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8	Unit 9	Unit 10	Unit 11	Unit 12	Unit 13	Unit 14	Unit 15

Sequence of units of work to **secure** prior knowledge and transition from previous year group. These units introduce the current new year's curriculum and core skills, and support problem solving and reasoning across all domains.

Sequence of units of work to **develop** knowledge and understand within the current year's curriculum, applying secure prior knowledge, and practising core skills. These units encourage and develop more complex problem solving and reasoning across all domains.

Sequence of units of work to **embed** knowledge and understand within the current year's curriculum. These units continue to enable rich connections, problem solving and reasoning across all domains.

Final sequence of units to **deepen** knowledge and conceptual understanding, applying core skills across all domains, and working at age related expectations or at greater depth.

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[Course: Hampshire Schemes of Learning Updated 2021 (hants.gov.uk)]

SEND Planning Tool – Maths and English

The planning tool supports teachers to identify an appropriate starting point and plan aspirational expectations of progress over time. It is intended that the tool is used for individual pupils with the expectation this is integrated into whole class teaching - removing barriers and enabling participation in whole class learning.

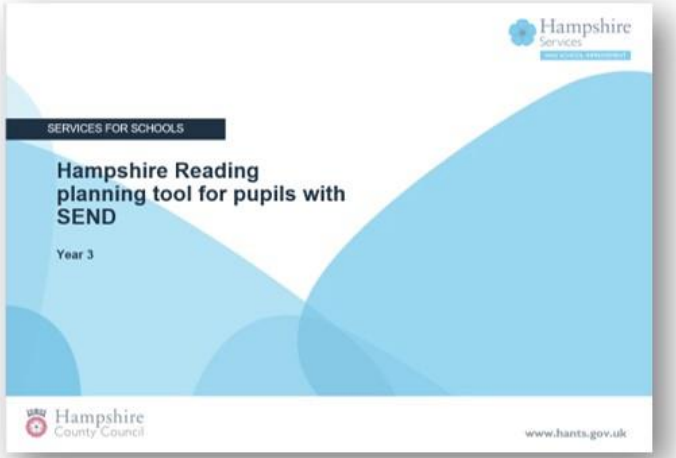
Each set contains four booklets:

Pre-Y1 to Y1; Y1; Y2; Y3.

Set 1 – Reading

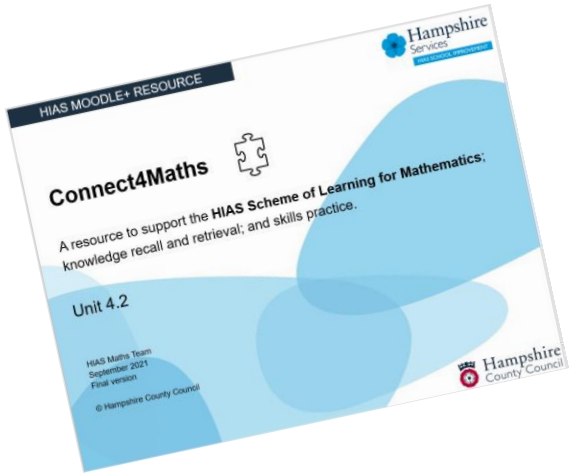
Set 2 – Writing

Set 3 – Mathematics



[Hampshire Planning Tool for Pupils with SEND.pdf (hants.gov.uk)]

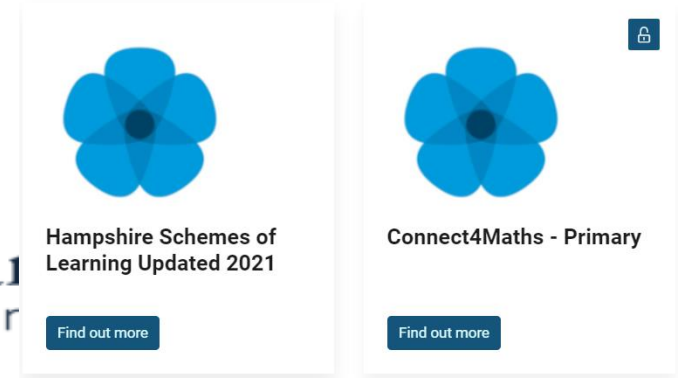
Connect4Maths



Year 1 to Year 9
Links to Hampshire scheme of learning

Moodle Plus

[Course: Connect4Maths - Primary (hants.gov.uk)]



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Links to Cognitive Psychology strategies

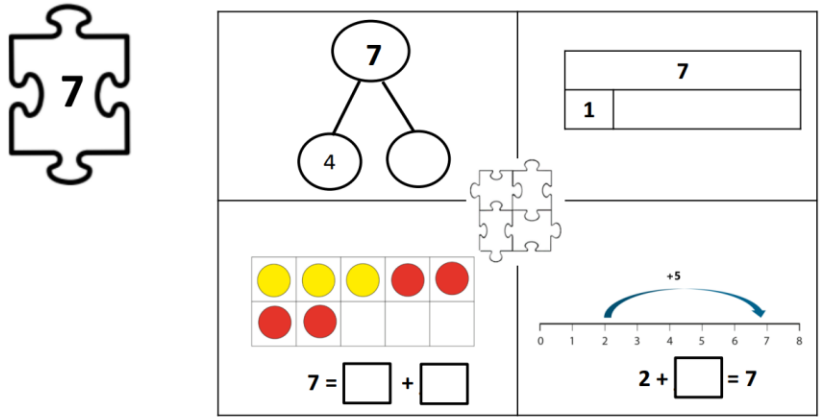
Overview:

- This document contains a set of connected low stakes questions to support knowledge recall and retrieval.

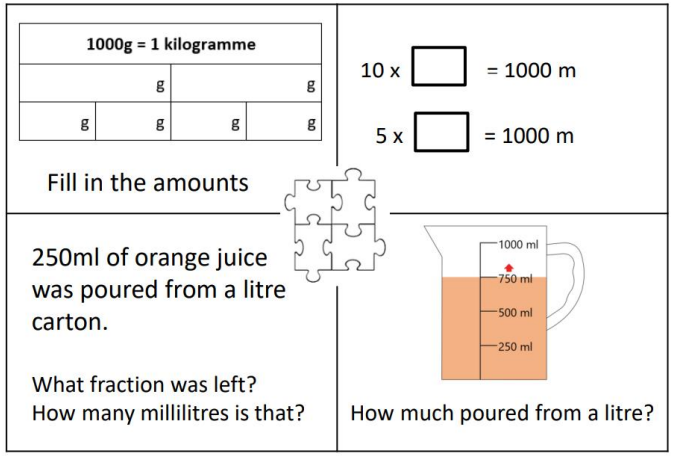
Points to consider when using this resource

- Teachers should review current learning within a unit of work and construct or adapt sets of questions that are relevant to the pupils.
- Connect4Maths is intended to be a daily, or regular, strategy that enables pupils to see connections across different areas of maths and to practise a range of skills, recalling known facts and using prior knowledge and understanding.
- Questions can be completed independently or collaboratively.
- Teachers should model solutions as appropriate and use pupil responses to inform next steps in their teaching

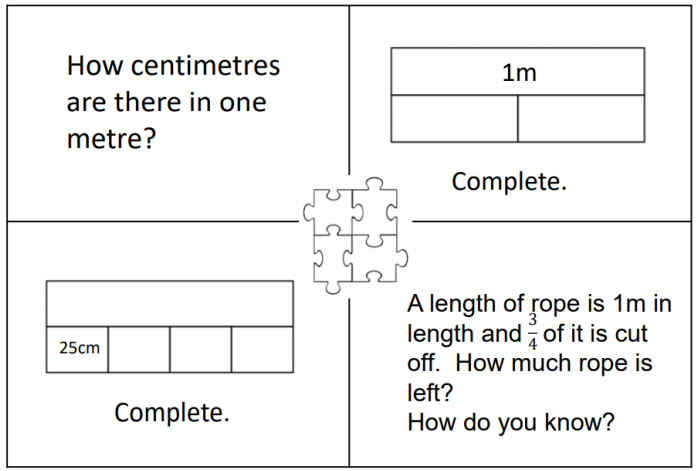
Connect4Maths



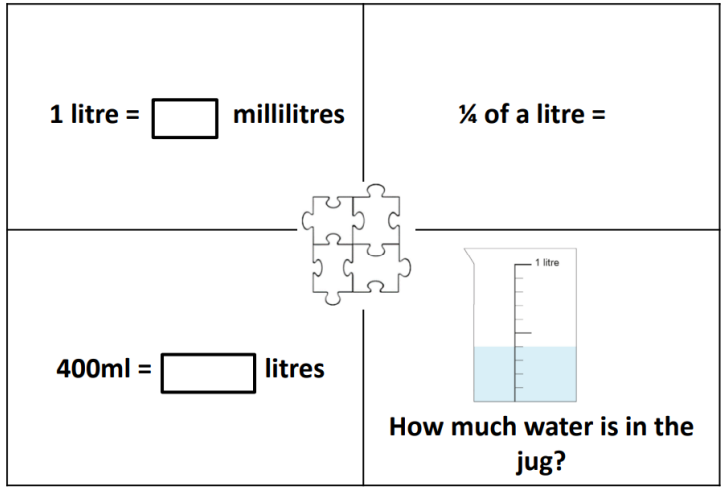
Y1 – linked to Unit 1.2 'Number bonds for 7 '



Y4 – linked to Unit 4.5 'measurement and reading scale'



Y3- linked to Unit 3.5 'Complements to 100 in context of length.'



Y5 – linked to Unit 5.5 – Measurement

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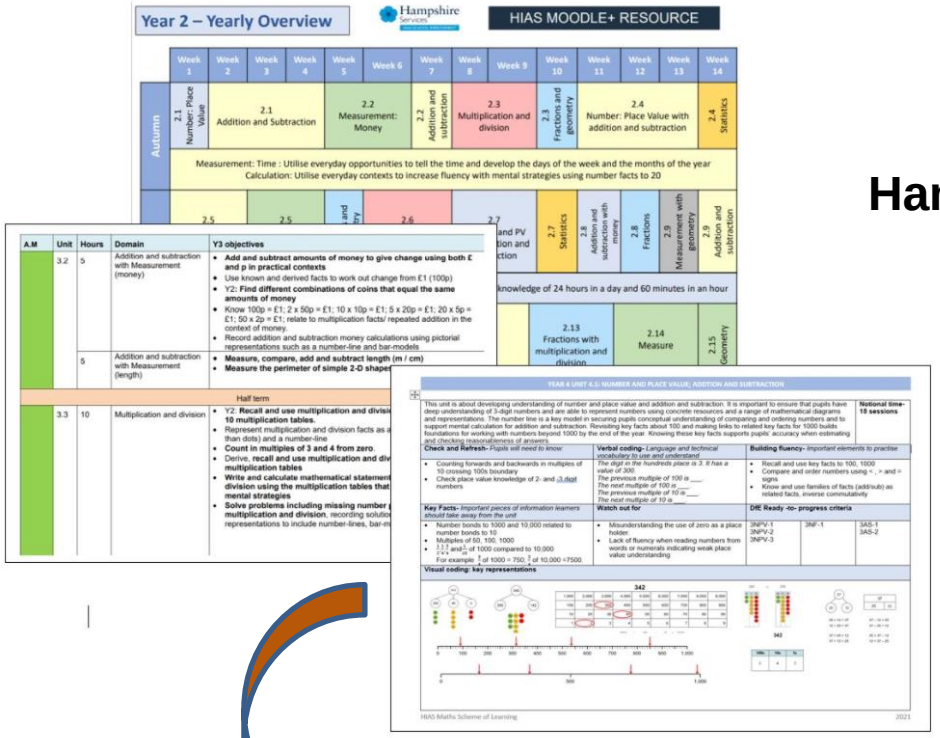
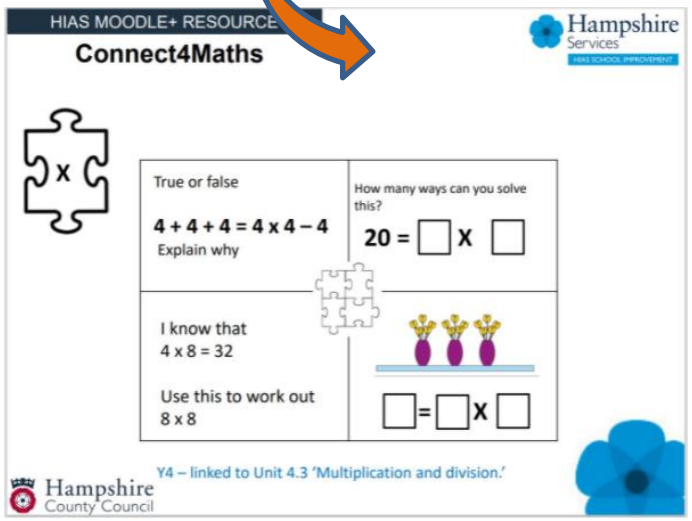
[Course: Connect4Maths - Primary (hants.gov.uk)]



Hampshire Planning Scheme

- Long term map showing sequence of units, revisiting all domains in different combinations several times
- Medium term objectives for each unit
- Unit Plans for each unit with outline learning journey



Connect4Maths

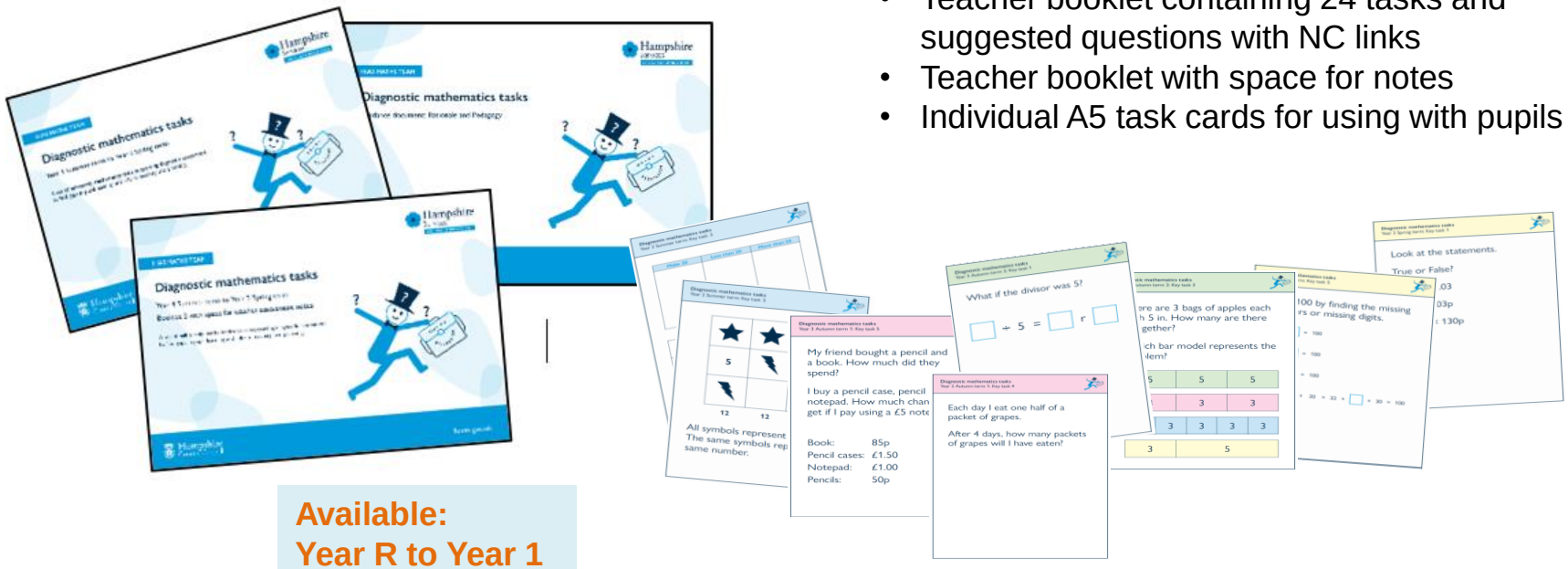
- Linked to each unit
- Also used as a 'stand alone resource'

HIAS Products and resources

Hampshire Services
HIAS SCHOOL IMPROVEMENT

Maths products

Diagnostic Mathematics Tasks
Key Stage 1 and 2 , 3 and 4



Each pack contains:

- Introductory rationale and principles booklet
- Teacher booklet containing 24 tasks and suggested questions with NC links
- Teacher booklet with space for notes
- Individual A5 task cards for using with pupils

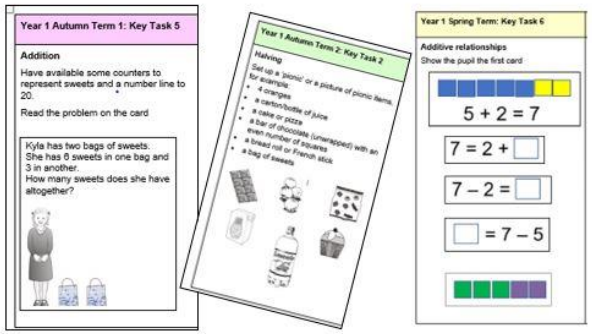
Available:
Year R to Year 1
Year 1 to Year 2
Year 2 to Year 3
Year 3 to Year 4
Year 4 to Year 5
Year 5 to Year 6
KS3
KS4

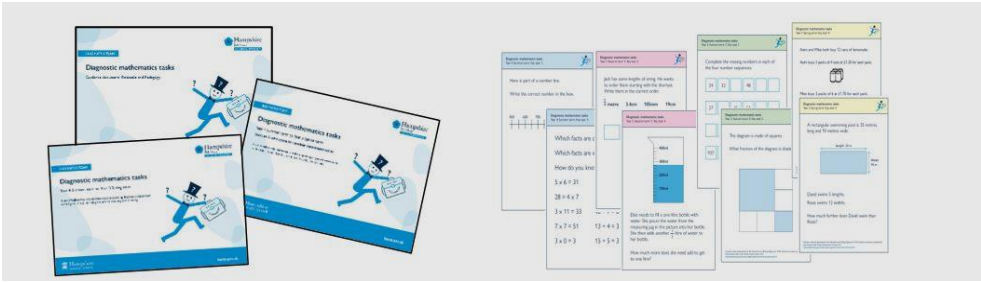
£45 per individual set
£40 per set when purchasing two or more sets

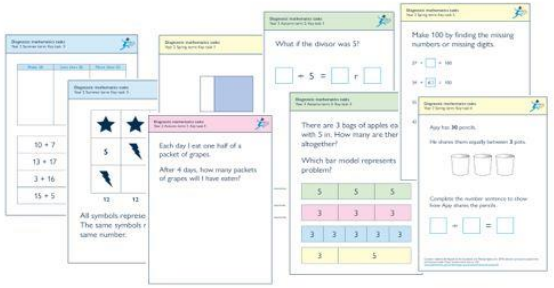
Hampshire County Council

Diagnostic Mathematics Tasks Packs

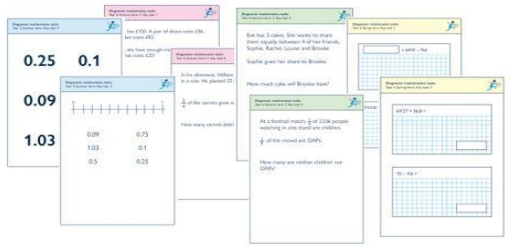
A set of half-termly mathematics tasks supporting diagnostic assessment to find gaps in pupil learning and inform teaching and planning.







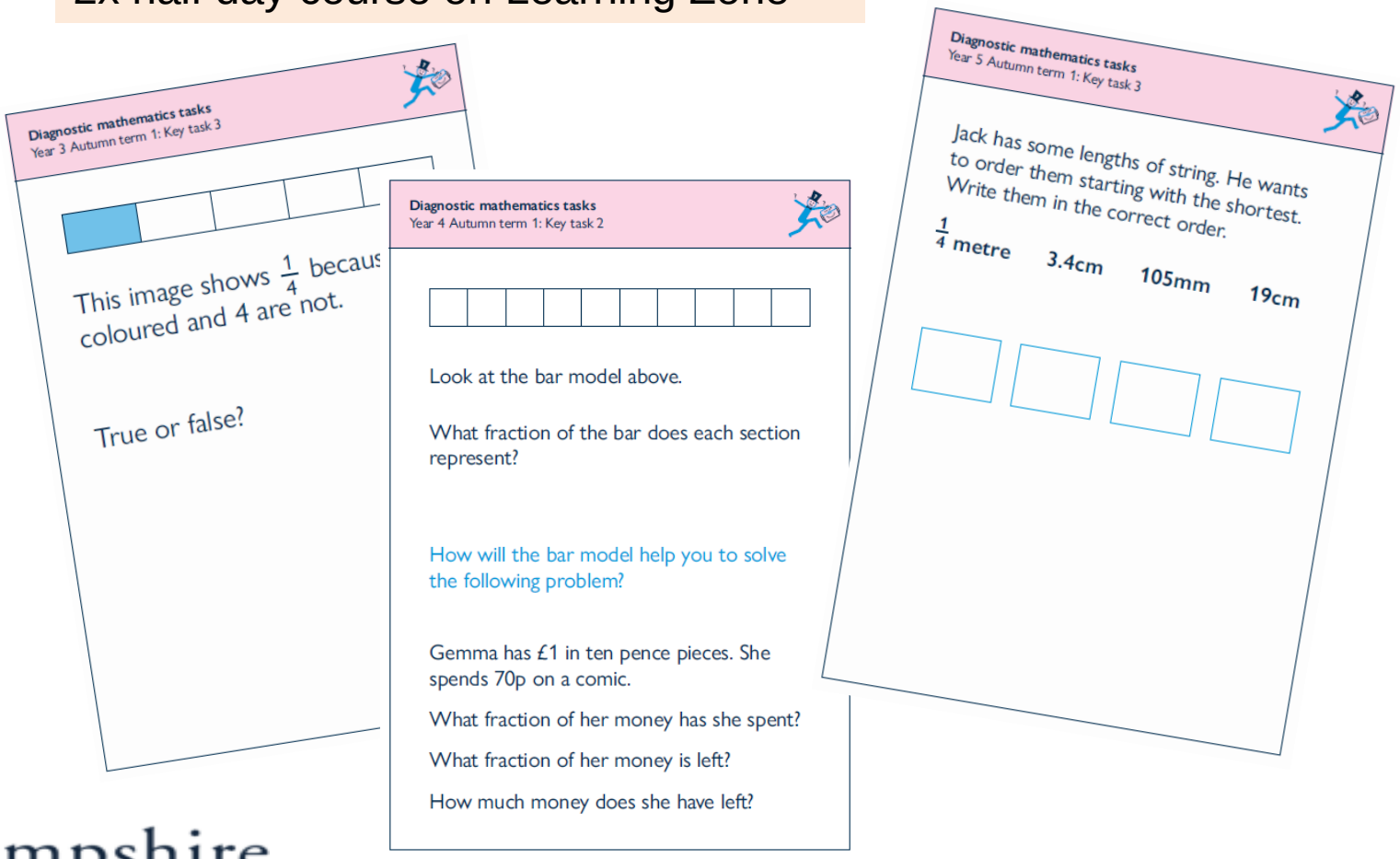
[Course: Diagnostic Mathematics Tasks (hants.gov.uk)]



Hampshire County Council

Diagnostic Mathematics Tasks

2x half day course on Learning Zone

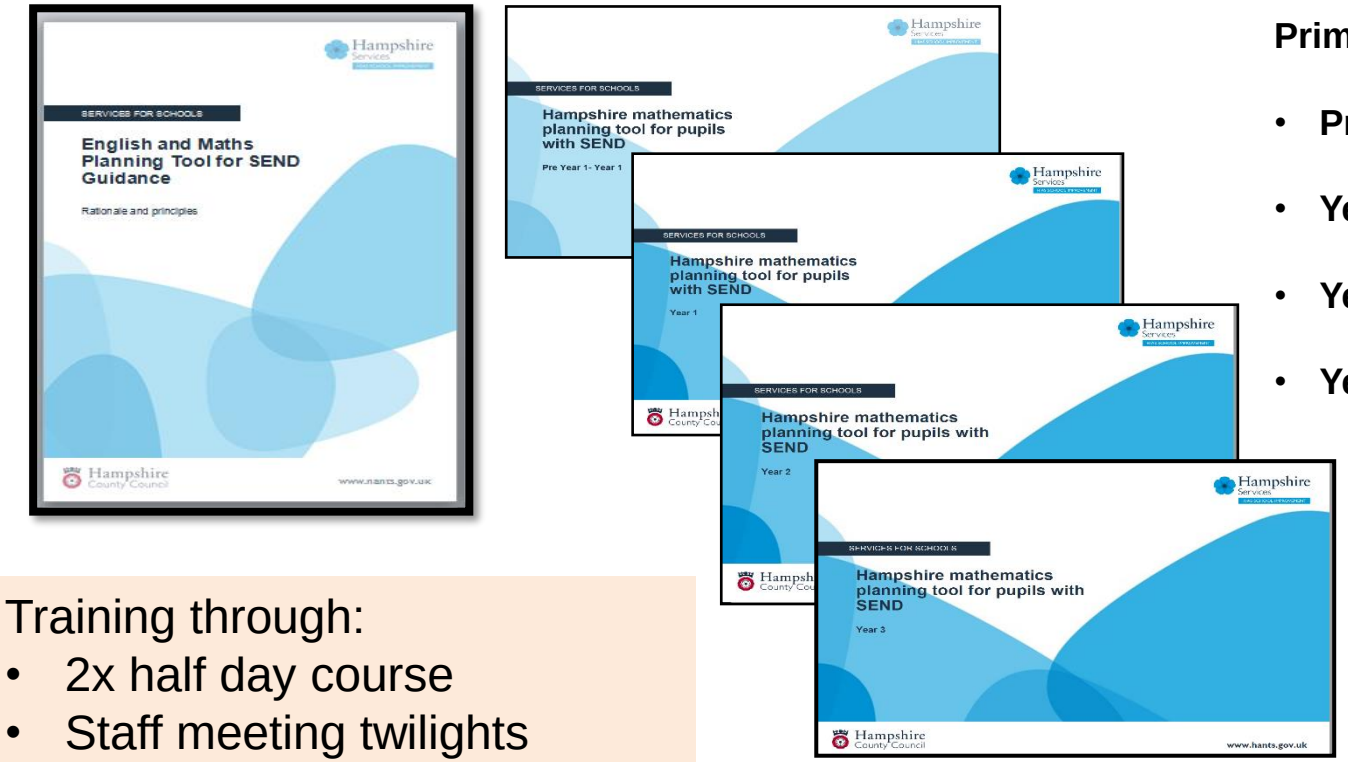


Hampshire County Council

[Course: Diagnostic Mathematics Tasks (hants.gov.uk)]

Hampshire Mathematics planning tools for pupils with SEND

Maths products



Primary SEND Tool kits:

- **Pre Year 1 to Year 1**
- **Year 1**
- **Year 2**
- **Year 3**

Training through:

- 2x half day course
- Staff meeting twilights
- Inset sessions

Electronic copies as part of any training. Hard copies available to purchase – reduced price if attended training.

Key Stage 1-4 Glossary and Word Cards:

A comprehensive resource to support accurate use of mathematical vocabulary

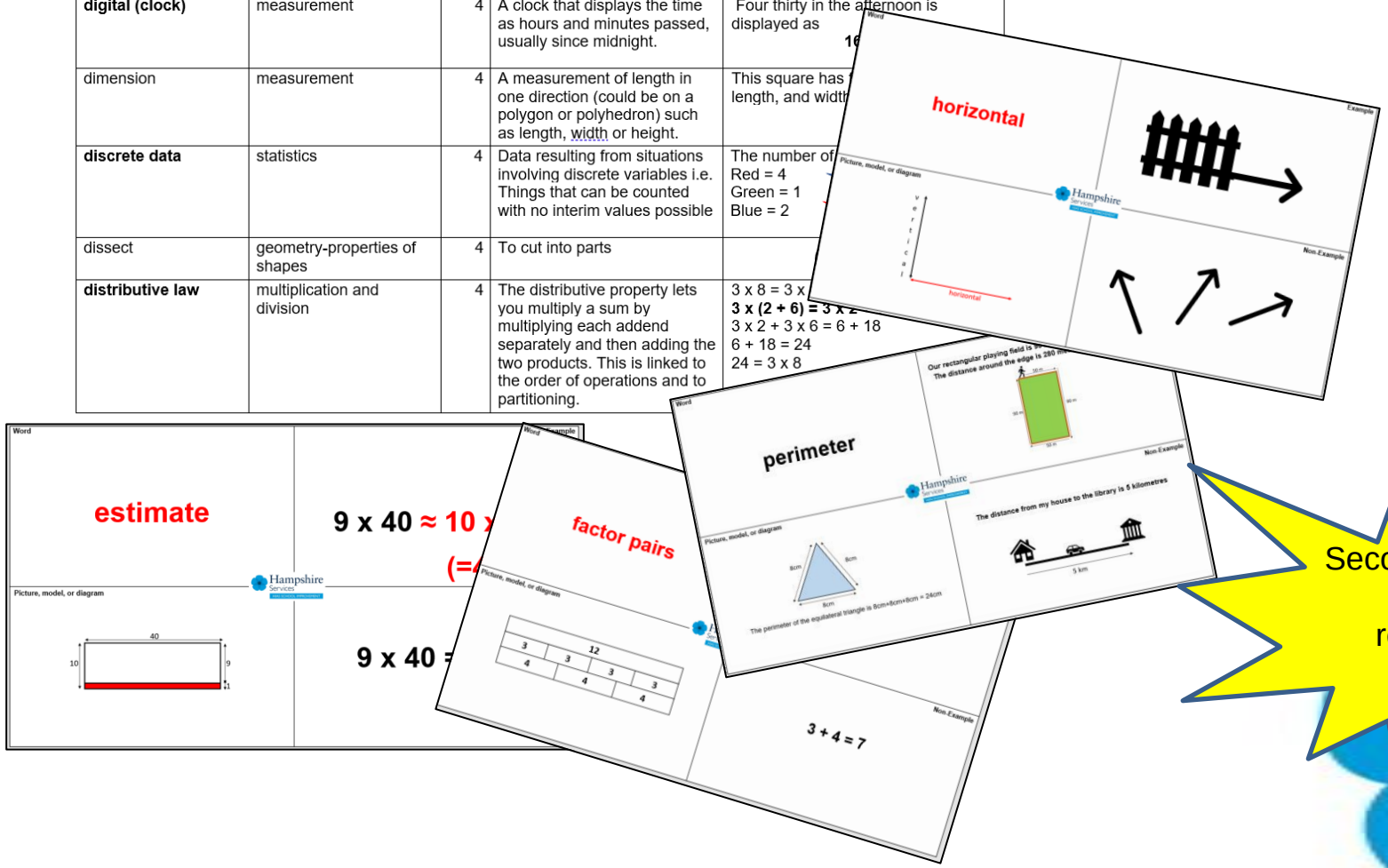
Primary resource from maths resources catalogue

HIAS maths team glossary and word cards PRIMARY

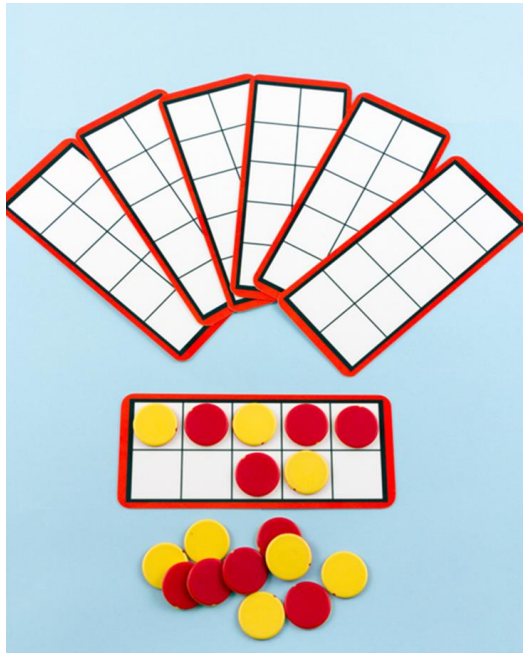
HAMPSHIRE MATHEMATICS TEAM

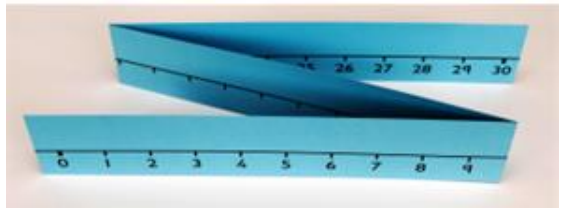
HIAS GLOSSARY FOR MATHEMATICS: LOWER KS 2

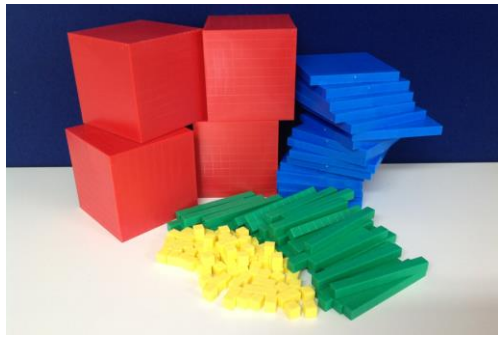
denominator	fractions	3	In the notation of common fractions, the number written below the line. i.e. The divisor. It 'names' the fraction by defining how many equal parts there are.	$\frac{1}{3}$ Three is the **denominator**, the whole is divided into three equal parts.
digital (clock)	measurement	4	A clock that displays the time as hours and minutes passed, usually since midnight.	Four thirty in the afternoon is displayed as 16
dimension	measurement	4	A measurement of length in one direction (could be on a polygon or polyhedron) such as length, width or height.	This square has length, and width
discrete data	statistics	4	Data resulting from situations involving discrete variables i.e. Things that can be counted with no interim values possible	The number of Red = 4 Green = 1 Blue = 2
dissect	geometry-properties of shapes	4	To cut into parts	
distributive law	multiplication and division	4	The distributive property lets you multiply a sum by multiplying each addend separately and then adding the two products. This is linked to the order of operations and to partitioning.	3 x 8 = 3 x **3 x (2 + 6) = 3 x** 3 x 2 + 3 x 6 = 6 + 18 6 + 18 = 24 24 = 3 x 8

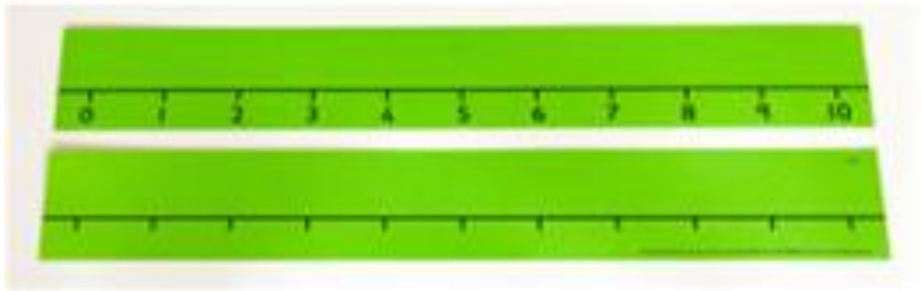


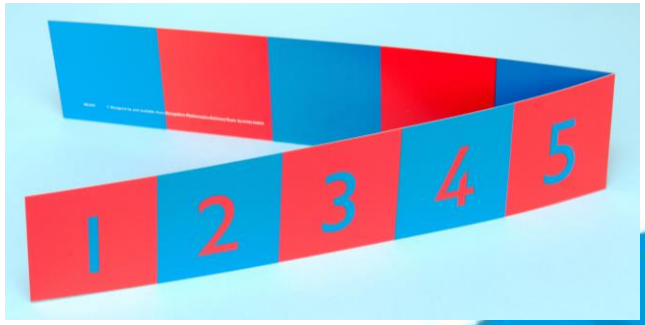
Secondary resource from open resources on moodle











Maths Resources

- Number Lines
- Dice
- Counters
- Number Cards
- Dienes
- Bead Strings
- Money and Number Grids

School subscription service to Hampshire Curriculum Resource Centres

Schools can subscribe to our HIAS curriculum centres. Curriculum Resource Centres A5 leaflet 2019 (hants.gov.uk)

All Maths Resources are available to all Subscribing Schools via our Catalogue maths-centre-catalogue.pdf (hants.gov.uk)

Success Across all Settings

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The HIAS Maths Team: Contact us

Jo Lees- Lead Inspector Adviser for secondary mainstream and special schools
Jo.Lees@hants.gov.uk

Kate Spencer- Inspector Adviser for primary mainstream and special schools
Kathryn.Spencer@hants.gov.uk

Primary Teaching and Learning Advisors

Rebecca Vickers	Rebecca.Vickers@hants.sch.uk
Olivia Humphries	Olivia.Humphries@hants.sch.uk
Nikki Farrage	Nicola.Farrage@hants.sch.uk

Helen Martin- Maths Curriculum Centre Manager (resources and general queries)
Helen.Martin3@hants.gov.uk

Margaret Wood- Hampshire Teaching and Learning College ~HTLC~ Learning Zone support (course and network meeting bookings and enquiries)
Margaret.Wood@hants.gov.uk

Your feedback matters

Please scan the QR code to complete our online training evaluation form

Or access the form using the URL below

https://forms.office.com/r/QE21XtDJ2r

Thank you!