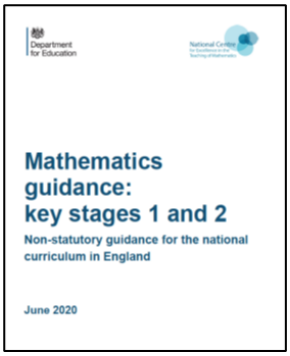
Mathematics and learners of English as an Additional language (EAL)



A new guidance document: ***Mathematics guidance: key stages 1 and 2*** was launched by the DfE in June 2020. The document summarises "the most important knowledge and understanding within each year group" and provides tools to assess and teach these essential core elements. The guidance has huge significance for teachers of pupils with English as an additional language (EAL).

Why is the guidance so important for EAL learners?
EAL learners have the same capacity for maths as their English first language (EFL) peers. Newly arrived overseas pupils may be well grounded in maths as it is well taught in many other countries (Poland is seven places ahead of the UK in the 2018 PISA mathematics rankings and Asian countries dominate the top places). The challenge for schools is to recognise the mathematical skills and knowledge of EAL learners and to challenge them through accessible learning and teaching targeted on need. The new guidance document helps schools to do this.

What are the barriers?

- EAL learners can easily experience language and information overload in the school classroom.
- Processing language takes time and means that EAL learners will need more time than their English first language (EFL) peers.
- Translation may lack precision leading to misconceptions and misinterpretations.
- EAL learners may be perceived as being below age expectation when they may already be exceeding the expected standard; only the language barrier is preventing them from participating in challenging learning pitched at an appropriate level.
- EAL Learners are likely to struggle in language rich lessons leading to poor self-esteem and lower expectations for learning.
- Newly arrived EAL learners will be disorientated by the new setting and approaches to learning. Consequently, it may be weeks before a newly arrived EAL learner can focus on curriculum based learning.

How the guidance supports EAL learners

- The guidance focuses teaching on six strands of learning and essential prerequisites for progress in mathematics . In doing this, it shifts the emphasis away from a coverage model that might overwhelm an EAL learner.
- The prerequisites for progress establish a profile of a learner's mathematical skill and knowledge - they are a highly effective assessment tool that pinpoints the precise focus for teaching. If the EAL learner is secure in these areas, they will be able to access all of the wider learning in that year without further support - they will be "ready for learning".
- The guidance gives emphasis to "language structures" which establish accurate grammatical models that can be applied in a wide range of contexts. This develops "academic language", an area of immense importance to the progress of EAL learners. It is key to their ability to fully engage with the curriculum. Social language is quickly developed, but academic language can take EAL learners six years to establish
- The guidance is supported by a wealth of practical resources that are ideally suited to needs of EAL learners.

This guidance sits within the National Curriculum and is additional guidance. It is intended for 1-2-1 or small group (2-3) support and is delivered by a teacher.

"It supports teachers to know where to focus. It highlights the core elements, where more time needs to be spent, because these elements are the core knowledge and understanding that is important for progression". All materials are downloadable.

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DfE Mathematics guidance - June 2020

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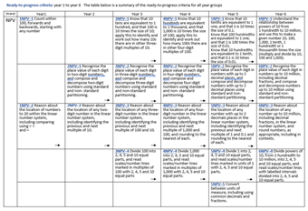
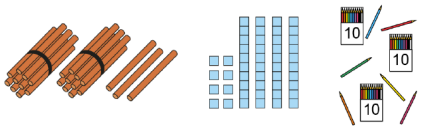
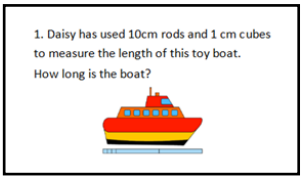
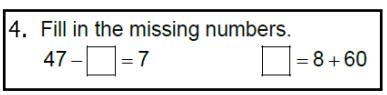
	Elements of the guidance	Implications for EAL pupils
Video overview for each year group (available on NCETM or Youtube)	 https://www.ncetm.org.uk/classroom-resources/training-materials-for-dfe-mathematics-guidance/	Aimed at all children, the guidance could well have been written with EAL learners specifically in mind.
The six strands NOTE: Measurement and statistics are integrated as applications of number criteria. Elements of measurement that relate to shape are included in the *Geometry* strand	<table><tr><th>Ready-to-progress criteria strands</th><th>Code</th></tr><tr><td>Number and place value</td><td>NPV</td></tr><tr><td>Number facts</td><td>NF</td></tr><tr><td>Addition and subtraction</td><td>AS</td></tr><tr><td>Multiplication and division</td><td>MD</td></tr><tr><td>Fractions</td><td>F</td></tr><tr><td>Geometry</td><td>G</td></tr></table>	The guidance provides a progression model based on core knowledge and understanding. Readiness for the next step is explored and revisited in a variety of ways - perfect for EAL learners as they require repetition and consolidation.
Ready-to-progress criterion table for each of the six strands from year 1 to year 6		EAL learners may be perceived, wrongly, as lacking in mathematical ability and knowledge. Ready-to-progress criteria identify the most important conceptual knowledge and understanding that pupils need from year 1 to 6.
Year group Chapters Written teaching guidance Ready-to-progress criterion, with conceptual prerequisites and future applications	<table><tr><th>Year 1 conceptual prerequisites</th><th>Year 2 ready-to-progress criteria</th><th>Future applications</th></tr><tr><td>Know that 10 ones are equivalent to 1 ten. Know that multiples of 10 are made up of a number of tens, for example, 50 is 5 tens.</td><td>2NPV–1 Recognise the place value of each digit in two-digit numbers, and compose and decompose two-digit numbers using standard and non-standard partitioning.</td><td>Compare and order numbers. Add and subtract using mental and formal written methods</td></tr></table>	The conceptual prerequisites ensure that pupils have no gaps in their knowledge and understanding that would prevent them from accessing the ready-to-progress criterion. For EAL learners this is also an opportunity to meet new language and contexts.
Representations of the mathematics Core representations that expose important mathematical structures and ideas, are used **across year groups** to connect prior learning to new learning	 Varied representations of two-digit numbers as groups of tens and additional ones.	Learners are presented with a core set of mathematical representations. These visual and concrete elements (essential for EAL learners) are common across strands and years. They don't get "overloaded"!
Language structures Suggested sentences structures for pupils to use to capture, connect and apply important mathematical ideas. Core structures will be adapted by pupils and will support their reasoning	**Language structures** 8 plus 6 is equal to 14, so 8 hundreds plus 6 hundreds is equal to 14 hundreds. 14 hundreds is equal to 1,400.	This section is hugely beneficial to EAL learners as it provides models of mathematical language and question phrasing that are manageable in number and applicable in a wide range of contexts.
Making connections Important connections between the ready-to-progress criteria within each year group	**Making connections** Learning about place value should include connection with addition and subtraction in the form of partitioning two-digit numbers according to tens and ones, and writing associated additive equations. Pupils should also partition two-digit numbers in ways other than according to place value to prepare them to solve addition and subtraction calculations involving two-digit numbers.	The guidance connects prior learning to new learning through consistent representations. The consistency of representations and language structures supports EAL learners in demonstrating their true mathematical ability. The representations also provide familiar context for EAL learners.
Assessment questions For each of the 79 Ready-to-progress criteria. They assess the depth and breadth of understanding that pupils need in order to be ready to progress to the next year group	 	Assessment questions are provided that support "transition conversations" between years and, accordingly, will provide valuable base-line information for newly arrived pupils. Areas where a pupil is not yet ready to progress provide key teaching foci for EAL learners.

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All materials are downloadable:

- Overview of mathematics guidance for key stages 1 and 2 (Introduction and Slides)

https://www.ncetm.org.uk/classroom-resources/training-materials-for-dfe-mathematics-guidance/

- Video overviews for each year group

One for each year group which outlines the most important conceptual knowledge and understanding that pupils need as they progress from year 1 to year 6. Available on NCETM site or Youtube:

https://www.youtube.com/playlist?list=PL6gGtLyXoeq-FMWk00AlcIPo3fhGmi03D

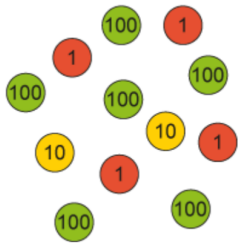
- Assessment questions

There are a set of questions for each of the 79 Ready-to-progress criteria.

They assess the depth and breadth of understanding that pupils need in order to be ready to progress to the next year group. These questions have been very carefully selected to ensure that they consider the concept for different perspectives. They are about more than getting the right answer - they are about the application of learning across different contexts.

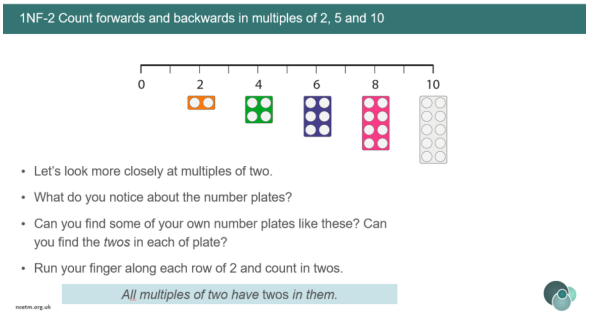
3NPV–2 Example assessment questions

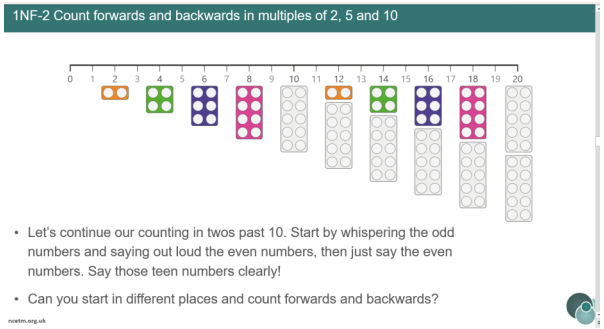
1. What number is represented by these counters?



- Mastery Professional Development Materials

https://www.ncetm.org.uk/teaching-for-mastery/mastery-materials/





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New to English and new to the country

EAL learners should be challenged at age expectation in mathematics. Visual representations, and physical resources to manipulate, will open the learning up to the pupil. EAL learners will pick up the learning expectations and ways of responding from their peers. The role of the teacher in relation to the EAL learner is to encourage positive learning behaviours and install self-belief. The teaching of mathematics to EAL learners is no different to the teaching of any other pupil and the new guidance will help teachers equip all pupils with the knowledge and skills they need to make progress.

Newly arrived overseas pupils should not be withdrawn from mathematics lessons — it provides an ideal learning environment for them. However, time needs to be given to the new arrival by the teacher to gauge their mathematics competence and attributes as a learner. Time should not be wasted on any type of formal testing as the teacher will learn more from working with pupil and the test experience could take a heavy emotional toll on the EAL learner. Remember that EAL learners are resourceful and they will work out a lot of things on their own; EAL learners are always looking for patterns and will naturally extrapolate from previous to current learning.

Do

- Use the DfE guidance to tailor the learning and profile the learner
- Keep the pupil in the maths lesson
- Maintain high expectations
- Foster positive learning behaviours
- Encourage self-belief and recognise achievement
- Sit the learner with pupils with positive learning behaviours
- Encourage alternatives to writing
- Encourage first language learning when dealing with extensive language content
- Use consistent representations and language
- Allow time for language processing backwards and forwards between their first language and English
- Provide tools for showing understanding and exploring ideas, such as numicon or dienes (any of the resources used as representations in the guidance document)

Don't

- Set low demand activities, such as colouring.
- Sit the learner with lower attaining pupils (the default is that new EAL learners are competent mathematicians)
- Leave the EAL learner to the teaching support assistant for support - the teacher's specialist input is crucial.
- Test an EAL learners until it is fair to do so. (It is fair to do so when they will experience success rather than failure).
- Isolate the pupil on a maths (or other) software programme while the class are having a lesson
- Don't rush to fill in perceived gaps or ensure national curriculum coverage if the pupil have not mastered the conceptual requisites. EAL learners are also likely to experience 'cognitive (over) load' from processing a second language, unfamiliar contexts and a lot of new vocabulary.

Use physical tools for learning, showing learning and understanding and engagement:

Examples below: soft dominoes, single colour solid shapes, place value dice, number squares, straw bundles, matching cards, double-sided counters and dienes apparatus.