

EFFECTIVE MATHS

Curriculum for children with additional educational needs (Key Stage 2)

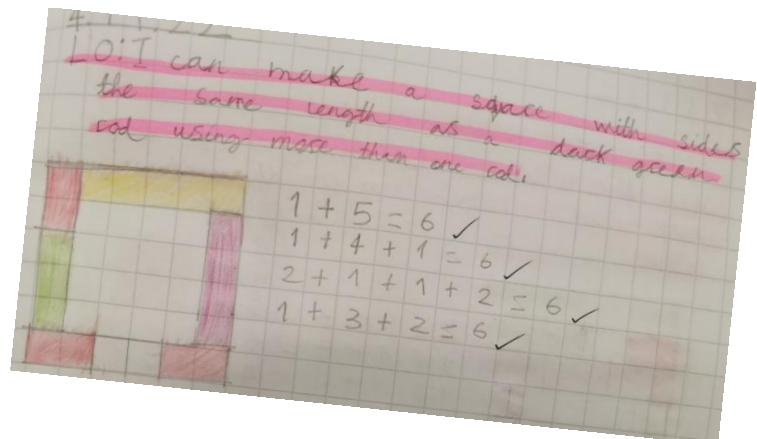
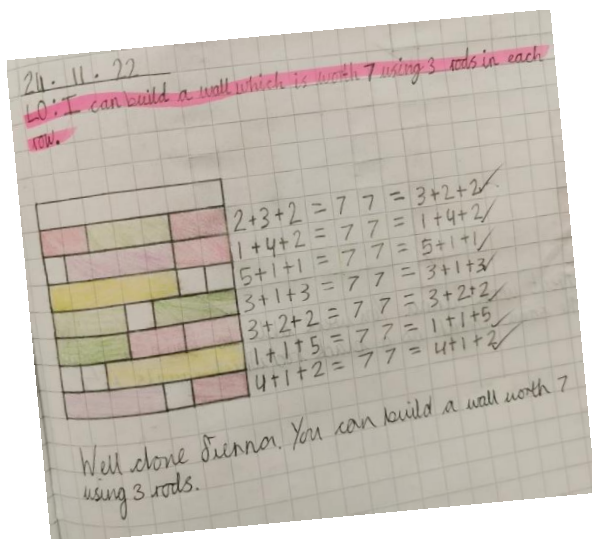
Introduction

The *Effective Maths* KS2 curriculum for children with additional educational needs (AEN curriculum) provides an alternative curriculum for pupils in key stage 2 that need a fresh start with their mathematical education. The intention is that this curriculum is used instead of the main curriculum pathway, although aspects may be used in addition to the main curriculum pathway as intervention/additional support if this is deemed appropriate. This document outlines using the AEN curriculum as an alternative curriculum.

Ofsted highlighted the need for such an approach in their July 2023 report, *Coordinating Mathematical Success*.

27. In some schools, leaders tried to maintain the ideal of all pupils moving on together when this was not a successful approach for pupils who were working at significantly below age-related expectations. Pupils in some schools, particularly those with SEND, were less likely to be 'keeping up and catching up' in lower year groups. Further, some pupils were less secure in the basic facts than their peers. Teachers' instructions and explanations of relatively advanced mathematical concepts were beyond their comprehension, even if the teacher explained them well. In these situations, the 'appearance' of inclusivity may be taking the place of real inclusivity. These pupils' needs might be better met if they were to learn different content practised using different tasks. This could be in groups of pupils with a similar level of attainment. This approach would be similar to how schools manage the teaching of early reading for older pupils who have yet to master basic reading skills.

The curriculum can be delivered by confident teaching assistants, who are well-supported by regular team-taught sessions with the school's designated lead for the AEN curriculum. (This is usually the SENCO, supported by the maths lead.) All class teachers are trained in the programme and they also have a role in supporting the progress of the pupils from their classes that are receiving the AEN curriculum. Class teachers have a role in marking some of the pupils work, checking in on a weekly basis.



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AEN curriculum overview

NB All the codes used in the stages below, eg 1NF-1, link to the DfE Ready to Progress criteria.

	Focus	Prior knowledge
Stage 1	1NF-1 Fluently add and subtract within 10 2NF-1 Fluently add and subtract within 10	Able to count forwards and backwards to 20.
Stage 2	2AS-1 Add and subtract across 10 3NF-1 Fluently add and subtract within and across 10	Fluently add and subtract within 10.
Stage 2.1	1G-2 Compose 2D and 3D shapes from smaller shapes	Recognise common 2D and 3D shapes
Stage 2.2	1NPV-1 Count within 100, forwards and backwards, starting with any number 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. 2NPV-2 Reason about the location of any two-digit number in the linear number system, including identifying the previous and next multiple of 10.	Able to count forwards and backwards to 20.
Stage 2.3	2AS-3 Add and subtract within 100 by applying related one-digit addition and subtraction facts: add and subtract only ones or only tens to/from a two-digit number. 2AS-4 Add and subtract within 100 by applying related one-digit addition and subtraction facts: add and subtract any 2 two-digit numbers.	Add and subtract within and across 10 Place value of each digit in two-digit numbers

After Stage 4, a bespoke programme of lessons from the main Effective Maths programme and the Effective Maths securing fluency programme inform the curriculum.

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NB All the codes used in the stages below, eg 1NF-1, link to the DfE Ready to Progress criteria.

Stage 1 **1NF-1 Fluently add and subtract within 10**
 2NF-1 Fluently add and subtract within 10

It is very important for pupils to be able to add and subtract within 10, fluently, by the end of Stage 1. This should be taught and practised until pupils move beyond counting forwards or backwards in ones, to more efficient strategies and eventually to **automatic recall of these number facts**. This is necessary before pupils move on to additive calculation with larger numbers. (Adapted from DfE primary maths teaching guidance.)

Prior knowledge: Able to count forwards and backwards to 20.

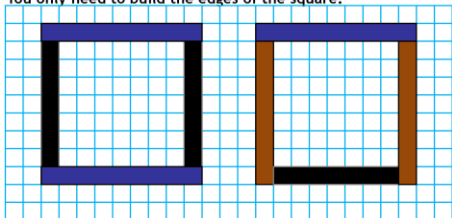
The AEN curriculum at Stage 1 makes extensive use of Cuisenaire® rods as the core resource to support the embedding of additive facts within 10. There are 6 units: additive facts for 5, 6, 7, 8, 9 and 10.

The use of the resource is a key factor in ensuring pupil success in mastering recall of additive facts. Training and teaching guidance stresses the need for the adults leading sessions to provide very regular opportunities for children to verbalise the additive facts as part of the process that will see them committed to long term memory.

The primary focus of Stage 1 is about understanding how numbers within 10 can be composed and partitioned, alongside developing recall of the additive facts. The AEN curriculum places the development of this understanding in rich contexts that include problem solving, geometry and statistics.

ACTIVITY • A square with sides the same length as rod B

Build a square that has sides the same length as the blue rod.
 Use one rod on each side.
 You only need to build the edges of the square.



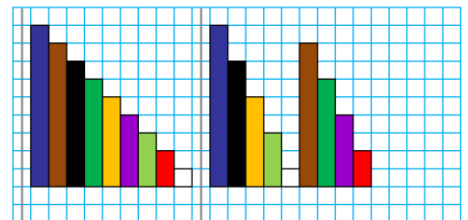
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SOLUTION [a]

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ACTIVITY • More than one

Arrange the rods so the difference between them is **more than one**.



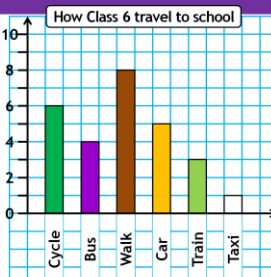
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SOLUTION

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ACTIVITY • Bar chart

- [1] How many children either cycle or get the train?
 $6 + 3 = 9$
- [2] How many children either get the bus or come by car?
 $4 + 5 = 9$
- [3] Find the difference between the number of children that walk and the number that come by car.
 $8 - 5 = 3$



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SOLUTION

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These are the quantities of Cuisenaire rods needed for Stage 1 (per child or per pair if working in partners). Please note the quantities suggested are different to those suggested for the main EM Cuisenaire rod lessons.

w	20
r	10
g	10
p	5
y	4
d	4
b	4
t	4
B	4
o	4

Developing Stage 1

Once children are developing some recall of additive facts within ten, start to build on their knowledge by scaling the number facts.

Children in Year 3 should scale facts by 10.

Children in Year 4 should scale facts by 10 and 100.

Children in Year 5 and 6 should scale facts by 10, 100, one-tenth and one-hundredth.

The use of language and correct modelling are essential. See below.

Say, '5 plus 2 is 7'.

So... '5 tens plus 2 tens is 7 tens'.

Then write on the white board:

$50 + 20 = 70$ (whilst saying again '5 tens plus 2 tens is 7 tens', underlining the zeros as you say 'tens').

Say, '5 plus 2 is 7'.

So... '5 hundreds plus 2 hundreds is 7 hundreds'.

Then write on the white board:

$500 + 200 = 700$ (whilst saying again '5 hundreds plus 2 hundreds is 7 hundreds', underlining the zeros as you say 'hundreds').

Say, '5 + 2 = 7'.

So... '5 tenths plus 2 tenths is 7 tenths'.

Then write on the white board:

$5/10 + 2/10 = 7/10$ (whilst saying again '5 tenths plus 2 tenths is 7 tenths', underlining the tenths (denominator) as you say 'tenths').

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Curriculum for children with additional educational needs (Key Stage 2)

AEN curriculum overview

Stage 2 2AS-1 Add and subtract across 10 3NF-1 Fluently add and subtract within and across 10

Pupils need to have a strategy for confidently and fluently carrying out calculations such as: $7 + 5 = 12$ and $15 - 6 = 9$.

Before pupils begin work on columnar addition and subtraction (3AS-1), it is essential that pupils have automatic recall of addition and subtraction facts within and across 10. These facts are required for calculation within the columns in columnar addition and subtraction. All mental calculation also depend on these facts... Without this practice many pupils are likely to still be reliant on counting on their fingers to solve within-column calculations in columnar addition and subtraction.
(Adapted from DfE primary maths teaching guidance.)

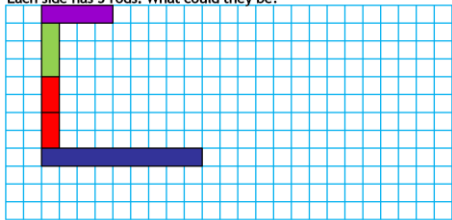
Prior knowledge: Fluently add and subtract within 10

The AEN curriculum at Stage 2 continues to make use of Cuisenaire® rods as a supporting resource. The core resources in this unit are tens frames and two-colour counters. There are 12 units. Units alternate between addition across 10 and subtraction across 10. (The odd numbered units are addition.) The core strategy modelled to children is making the next/previous ten.

As at Stage 1, the AEN curriculum places the development of this understanding in rich contexts that include problem solving, geometry and statistics.

INDEPENDENT WORK • Missing rods on the sides of a rectangle

Rods are used to make the sides of a rectangle.
Length = 13 cm; width = 9 cm. Part of the rectangle is shown below.
Each side has 3 rods. What could they be?



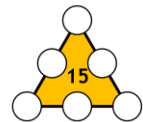
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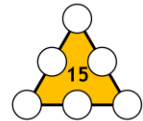
ACTIVITY • Problem solving [a]

Triangle totals

Put the numbers 2, 3, 4, 5, 6 and 7 in the circles so that each side of the triangle totals 15.



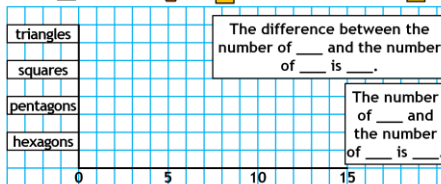
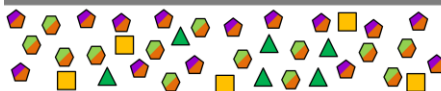
Now try using the numbers 2, 3, 4, 5, 7 and 8.



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ACTIVITY • Bar chart



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Developing Stage 2

Once children are developing some recall of additive facts that bridge ten, start to build on their knowledge by scaling the number facts.

Children in Year 3 should scale facts by 10.

Children in Year 4 should scale facts by 10 and 100.

Children in Year 5 and 6 should scale facts by 10, 100, one-tenth and one-hundredth.

The use of language and correct modelling are essential. See below.

Say, '5 plus 7 is 12'.

So.... '5 tens plus 7 tens is 12 tens'.

Then write on the white board:

$50 + 70 = 120$ (whilst saying again '5 tens plus 7 tens is 12 tens', underlining the zeros as you say 'tens').

Then point to the 12 tens written as a numeral (120) and say: 12 tens is one hundred and twenty.

Say, '5 plus 7 is 12'.

So.... '5 hundreds plus 7 hundreds is 12 hundreds'.

Then write on the white board:

$500 + 700 = 1200$ (whilst saying again '5 hundreds plus 7 hundreds is 12 hundreds', underlining the zeros as you say 'hundreds').

Then point to the 12 hundreds written as a numeral (1200) and say: 12 hundreds is one thousand two hundred.

Say, '5 + 7 = 12'.

So.... '5 tenths plus 7 tenths is 12 tenths'.

Then write on the white board:

$5/10 + 7/10 = 12/10$ (whilst saying again '5 tenths plus 7 tenths is 12 tenths', underlining the tenths (denominator) as you say 'tenths').

Now point to the improper fraction 12/10. Model partitioning it into 10/10 and 2/10 as you say '12 tenths is made up of 10 tenths and 2 tenths which is 1 and 2/10 which is 1.2'.

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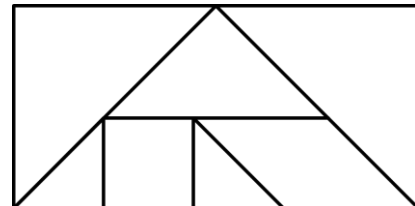
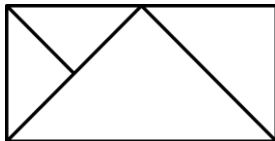
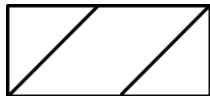
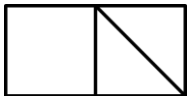
AEN curriculum overview

Stage 2.1 1G-2 Compose 2D and 3D shapes from smaller shapes

The ability to compose and decompose shapes, and see shapes within shape, is a skill which runs through to key stage 3 and key stage 4, and beyond. At Stage 2.1, it is vital that pupils work practically, exploring shapes (for example, shapes cut from card, pattern blocks and tangrams) and putting them together to make new shapes. Pupils must be able to arrange 2D shapes to match an example compound shape. To begin with, the constituent shapes in a given example image should be the same size and colour as the actual shapes that pupils are using. This allows pupils to begin by laying the pieces over the example image, rotating individual pieces to match the exemplars. By the end of this stage, though, pupils should be able to copy a pattern block picture, and make a good attempt at copying a tangram picture, without overlaying the pieces on the example. (Adapted from DfE primary maths teaching guidance.)

Prior knowledge: Recognise common 2D and 3D shapes

Start Stage 2.1 once Stage 2 is underway. Approaches to what this looks like will vary. Stage 2.1 may form the last 15 mins of sessions or it may be done once a week. The core resources used are tangrams and unifix cubes.



AEN curriculum overview

Stage 2.2 1NPV-1 Count within 100, forwards and backwards, starting with any number

Teaching counting provides a good opportunity to link number names to numerals, and to the position of numbers in the linear number system. Practice includes:

- reciting number names, without the support of visual representations, to allow pupils to focus on and develop fluency in the verbal patterns
- counting with the support of visual representations and gestural patterns, for example pupils can point to numerals on a 100 square or number line
- starting the counting sequence with numbers other than 1 or 100

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.

Children learn to connect the way two-digit numbers are written in numerals to their value. They demonstrate their reasoning.

Children learn that 42, for example, can be composed either of 42 ones, or of 4 tens and 2 ones. They group objects into tens, with some left over ones, to count efficiently and to demonstrate an understanding of the number. Children partition two-digit numbers into tens and ones parts, and represent this using diagrams, and addition and subtraction equations. They also learn to think flexibly about number: 42 can be 30 and 12 or 20 and 22.

2NPV-2 Reason about the location of any two-digit number in the linear number system, including identifying the previous and next multiple of 10.

Children learn to identify or place two-digit numbers on marked number lines. They use efficient strategies and appropriate reasoning, including working backwards from a multiple of 10.

Children learn to estimate the value or position of two-digit numbers on unmarked numbers lines, using appropriate proportional reasoning, rather than counting on from a start point or back from an end point.

Prior knowledge: Able to count forwards and backwards to 20.

AEN curriculum overview

Stage 2.3 2AS-3 Add and subtract within 100 by applying related one-digit addition and subtraction facts: add and subtract only ones or only tens to/from a two-digit number.

Children learn to apply known one-digit additive facts to:

- adding and subtracting 2 multiples of ten ($7 - 4 = 3$ so $70 - 40 = 30$)
- adding and subtracting ones to/from a two-digit number ($7 - 3 = 4$ so $37 - 3 = 34$)
- adding and subtracting multiples of ten to/from a two-digit number ($45 + 30 = 75$)
- the special case of subtracting ones from a multiple of ten, by using complements of 10 ($10 - 3 = 7$ so $30 - 3 = 27$)

2AS-4 Add and subtract within 100 by applying related one-digit addition and subtraction facts: add and subtract any 2 two-digit numbers.

Base 10 blocks and partitioning diagrams are used to support children as they learn about strategies for adding and subtracting any 2 two-digit numbers.

They learn that when we add numbers we can partition *one* or *both* addends:

$$64 + 25 = 60 + 4 + 20 + 5 = 80 + 9 = 89$$

And then

$$64 + 25 = 64 + 20 + 5 = 84 + 5 = 89$$

And finally that when we subtract, we partition (at this stage) the subtrahend:

$$64 - 21 = 64 - 20 - 1$$

Prior knowledge: Add and subtract within and across 10; place value of each digit in two-digit numbers

After Stage 4, a bespoke programme of lessons from the main Effective Maths programme and the Effective Maths securing fluency programme inform the curriculum.