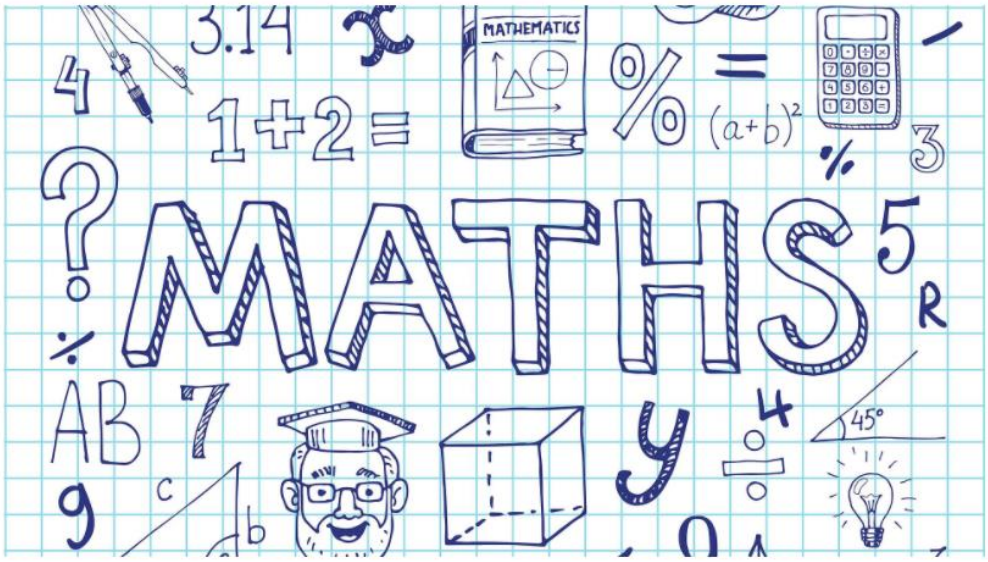


# Teaching & Learning Guide

CASTLEWARD SPENCER ACADEMY

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| Adopted | September 2021 |
| Author | LT |
| Reviewed | |

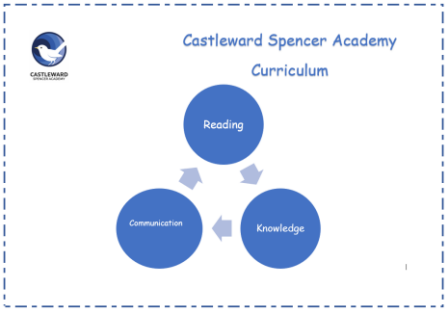
# Contents

## Aims

The National Curriculum for mathematics aims to ensure that all pupils:

- become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.
- reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language.
- can solve problems by applying their mathematics to a variety of routine and non- routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

## Curriculum Drivers





- **Reading-** We firmly believe that if children can read well and read widely, they will be best placed to achieve in all areas of the curriculum. By the time pupils leave Castleward, they will be able to read with accuracy and fluency, to analyse what they have read and developed an enjoyment of reading for pleasure.
- **Knowledge-** Knowledge is like glue that sticks information as well as learning together. When we have prior knowledge about a topic, we understand it better. Topics are personalised to meet the needs of the pupils who attend the school, ensuring that they have opportunities to apply prior knowledge to new learning experiences and developing reasoning and problem solving skills.
- **Communication**- Pupils learn to articulate their ideas, feelings and understanding of new vocabulary in order to engage with others through spoken language. They become effective speakers and listeners empowering them to better understand themselves, each other and the world around them. Being able to effectively communicate allows pupils to

develop and deepen their subject knowledge and understanding through talk in the classroom, which has been planned, designed, modelled, scaffolded and structured to enable them to learn the skills needed to communicate effectively.

## Our vision for Mathematics

- To promote a positive attitude towards mathematics in all pupils
- To ensure all pupils are engaged in and are enjoying exploring Mathematics
- To enable all pupils to find links between mathematics and other areas of the curriculum, including Science
- To ensure all pupils progress in mathematics and are challenged appropriately through an in depth understanding
- To use a wide range of concrete, pictorial and abstract representations to develop all pupils' relational understanding of mathematics
- To ensure all pupils are confident using mathematical vocabulary when reasoning about mathematics

### Teaching and Learning - A 'Mastery' Approach

The teaching and learning of mathematics at Castleward Spencer Academy should include aspects of the following Mastery approach strategies in every lesson and/or over a series of lessons:

**CONCRETE-** Concrete is the "doing" stage, using concrete objects to model problems. Instead of the traditional method of mathematics teaching, where a teacher demonstrates how to solve a problem, the CPA approach brings concepts to life by allowing pupils to experience and handle physical objects themselves. Every new abstract concept is learned first with a "concrete" or physical experience. For example, if a problem is about adding up four baskets of fruit, the pupils might first handle actual fruit before progressing to handling counters or cubes which are used to represent the fruit.

**PICTORIAL-** Pictorial is the "seeing" stage, using representations of the objects to model problems. This stage encourages pupils to make a mental connection between the physical object and abstract levels of understanding by drawing or looking at pictures, circles, diagrams or models which represent the objects in the problem. Building or drawing a model makes it easier for pupils to

grasp concepts they traditionally find more difficult, such as fractions, as it helps them visualise the problem and make it more accessible.

**ABSTRACT-** Abstract is the "symbolic" stage, where pupils are able to use abstract symbols to model problems. Pupils are introduced to the concept at a symbolic level, using only numbers, notation, and mathematical symbols, for example +, –, x, / to indicate addition, subtraction, multiplication, or division.

**FLUENCY-** Fluency comes from deep knowledge and practice. This is the first stage of pupil's understanding. Fluency includes: conceptual understanding, accuracy, rapid recall, retention and practice Accuracy – Pupils carefully completing calculations with no or few careless errors. Pace – Pupils are able to quickly recall the appropriate strategy to solve the calculation and progress through a number of questions at an age appropriate pace. Retention – Pupils will be able to retain their knowledge and understanding on a separate occasion to when the concept was first introduced. The key to fluency is deep knowledge and practice and making connections at the right time for a child.

**REASONING-** Verbal reasoning demonstrates that pupils understand the mathematics. Talk is an integral part of mastery as it encourages students to reason, justify and explain their thinking. This is tricky for many teachers who are not used to focusing on verbal reasoning in their mathematics lessons. You might, for example, get young learners to voice their thought processes. Older students could take part in class debates, giving them the space to challenge their peers using logical reasoning. Mathematical Talk A mastery classroom should never be a quiet classroom. To encourage talk in mathematics, teachers may introduce concepts by including sentence structures (stem sentences). Pupils should be able to say not just what the answer is, but how they know it's right. This is key to building mathematical language and reasoning skills. This gives pupils the confidence to communicate their ideas clearly, before writing them down. By also displaying the vocabulary during the lesson, pupils will be able to use this independently. When questioning and encouraging mathematical talk, teachers should provide regular, purposeful opportunities.

**PROBLEM SOLVING-** Mathematical problem solving is at the heart of the Mastery Approach. Pupils are encouraged to identify, understand and apply relevant mathematical principles and make connections between different ideas. This builds the skills needed to tackle new problems, rather than simply

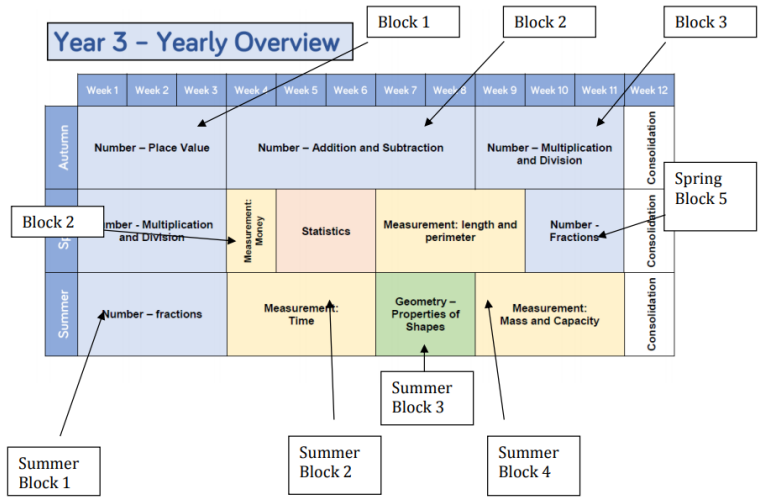
repeating routines without a secure understanding. Mathematical concepts are explored in a variety of representations and problem-solving contexts to give pupils a richer and deeper learning experience. Pupils combine different concepts to solve complex problems, and apply knowledge to real-life situations. Through problem solving, pupils are required to select their mathematical knowledge and apply this to a new concept.

## Teaching Sequence

### Long term planning

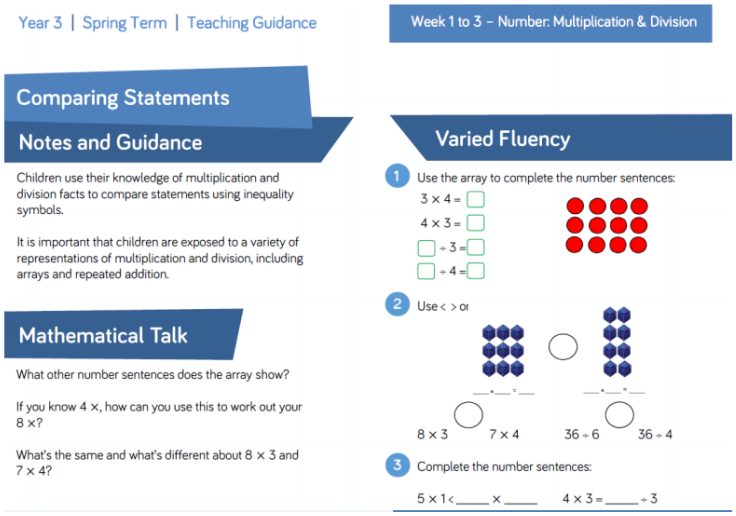
Long term planning is taken from The White Rose maths programme https://whiterosemaths.com/resources/primary-resources/ . This is broken down into a variety of different mathematical concepts throughout the year.

The yearly overview provides a Long Term Plan and is arranged into 'Blocks'




### Medium term planning

Medium term planning is taken from The White Rose maths planning, following the concepts identified in the Long-term plan. This has all been downloaded onto the school server.



Year 3 | Spring Term | Teaching Guidance

Week 1 to 3 – Number: Multiplication & Division

Comparing Statements

Notes and Guidance

Children use their knowledge of multiplication and division facts to compare statements using inequality symbols.

It is important that children are exposed to a variety of representations of multiplication and division, including arrays and repeated addition.

Mathematical Talk

What other number sentences does the array show?

If you know 4 ×, how can you use this to work out your 8 ×?

What's the same and what's different about 8 × 3 and 7 × 4?

Varied Fluency

1 Use the array to complete the number sentences:

3 × 4 = ☐

4 × 3 = ☐

☐ ÷ 3 = ☐

☐ ÷ 4 = ☐

2 Use < > or

8 × 3 7 × 4 36 ÷ 6 36 ÷ 4

3 Complete the number sentences:

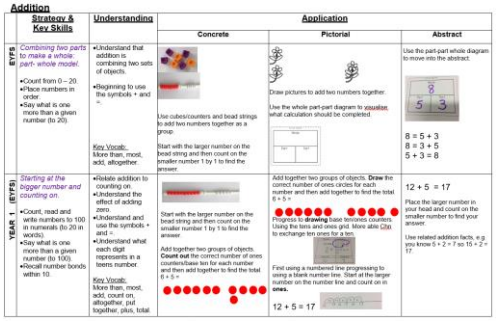
5 × 1 < ____ × ____ 4 × 3 = ____ ÷ 3

## Short term planning

Teachers write their own unit plans using the Short-term Planning template provided. This incorporates modelling, misconceptions and key questions and clearly identifies how learning will be scaffolded for those who need it and any pre-teaching that will be completed to ensure that all pupils can access the lesson.

## Calculation Policy

Castleward Spencer Academy has a clear and progressive Calculation Policy. The policy is displayed in the classroom and followed when teaching written methods. The policy demonstrates our Mastery Approach and shows progression through each operation for each stage of learning.



Addition

| | Strategy & Key Skills | Understanding | Application | | |
|---|---|---|---|---|---|
| | | | Concrete | Pictorial | Abstract |
| EYFS | *Combining two parts to make a whole: part- whole model.* •Count from 0 – 20. •Place numbers in order. •Say what is one more than a given number (to 20) | •Understand that addition is combining two sets of objects. •Beginning to use the symbols + and =. Key Vocab: More than, most, add, altogether. | Use cubes/counters and bead strings to add two numbers together as a group. Start with the larger number on the bead string and then count on the smaller number 1 by 1 to find the answer. | Draw pictures to add two numbers together. Use the whole part-part diagram to visualise what calculation should be completed. | Use the part-part whole diagram to move into the abstract. 8 5 3 8 = 5 + 3 8 = 3 + 5 5 + 3 = 8 |
| YEAR 1 (EYFS) | *Starting at the bigger number and counting on.* •Count, read and write numbers to 100 in numerals (to 20 in words). •Say what is one more than a given number (to 100). •Recall number bonds within 10. | •Relate addition to counting on. •Understand the effect of adding zero. •Understand and use the symbols + and =. •Understand what each digit represents in a teens number. Key Vocab: More than, most, add, count on, altogether, put together, plus, total. | Start with the larger number on the bead string and then count on the smaller number 1 by 1 to find the answer. Add together two groups of objects. **Count out** the correct number of ones counters/base ten for each number and then add together to find the total. 8 + 5 = | Add together two groups of objects. **Draw** the correct number of ones circles for each number and then add together to find the total. 6 + 5 = Progress to **drawing** base ten/bead counters. Using the tens and ones grid. More able Chn to exchange ten ones for a ten. Find using a numbered line progressing to using a blank number line. Start at the larger number on the number line and count on in **ones**. 12 + 5 = 17 | 12 + 5 = 17 Place the larger number in your head and count on the smaller number to find your answer. Use related addition facts, e.g. you know 5 + 2 = 7 so 15 + 2 = 17 |

## Differentiation

We do not differentiate by task instead looking to support & challenge through every step of our lesson design. This ensures that pupils do not get held behind by not being exposed to Age Appropriate Learning*. In addition, it stops being

held back by being labelled as "low ability". Instead we provide support for any pupil who needs it.

Support means:

- Pre-teaching content in advance of the unit.
- Always using pictorial and/or concrete resources to scaffold the learning.
- Using adult support (without removing independence).
- Same day or next day intervention to stop gaps appearing in the first place.

*Some of our pupils will have recognised and specific SEND. These pupils will not be able to access the same learning as others at times (although assumptions should not be made that this is always true). Where they need to access a different curriculum, their learning should be guided by their PLPs.

Like we do not label pupils as low ability, we also do not label pupils as high ability. This means we do not have pupils who don't follow our normal lessons sequence. This is because we provide deliberate challenge at every stage of the lesson.

However, for some pupils in some lessons careful attention will need to be paid to the speed at which they progress. This means

- If you sense they are ready to move to reasoning during the fluency session then move them on.
- Quickly assess during the fluency whether the pupils are ready to move on.
- Limit the fluency to around 5 questions to ensure pupils are not engaged in mechanical repetition.

If pupils move through to the end of the problem solving tasks they can be challenged in two ways.

- If appropriate, let them be a lead learner. This works well for pupils who can explain their thinking and help without giving away answers. It works less well when pupils are likely to just tell other their own answers.
- Give pupils a bank of Oxford Owls challenges. They should be more open ended and ongoing. They do not necessarily need to be linked to that days learning.

**Mini-Plenaries**

Mini plenaries should be used where there is a misconception/ lack of understanding common to several pupils. They are used to pull pupils together and re-model an aspect of the learning. Care should be given not to "plough on" with a lesson when a mini plenary is needed.

**Plenary**

The plenary should be used in every lesson to bring all the elements of the lesson back together. It is another chance to reiterate the key learning point for the lesson. It is also a chance to celebrate the success of some pupils and showcase their thinking using a visualiser.

At this time, the teacher should also check back in with the learning journey and signpost the pupils to where they've come from and what they are going to be doing next.

**AFL**

***Daily Feedback***

All calculations must be marked with a tick or a dot. Where possible, marking takes place within the lesson through marking as you go, or use of mini-plenaries. Following the lesson, at least twice per week pupils should edit and improve their learning using the following system.

***Re-teach*** is used for groups who don't understand the learning and need time with an adult to have skills re-taught. Purple pen should be evident on the learning.

***Check*** is used where a child has made a few errors but is able to correct on their own. *Check* should be accompanied with a comment helping the child see their error. A question prompt could be used. The errors could be underlined. A correct example could be provided. Purple pen should be evident on the learning.

***Challenge*** is used where a child has got the learning. They should then complete a challenge activity to add depth to the objective (make use of the already

planned for challenge). When the pupil has already completed all the challenge, they act as a lead learner.

# Environment & Exercise Books

## Working Wall

Working walls for Maths should include the following:

- "Maths road" with all the learning intentions for the unit on.
- Vocabulary for the unit
- Space for WAGOLLs (celebrations of good work) that should be changed as necessary.

## Live Maths

On a Maths washing line, you should display the live Maths created for that unit of work. Each piece of live Maths should have the learning intention on it.

## Equipment Zones

To encourage pupil to use concrete resources when they need, an equipment zone should be in every class. This should contain

### KS1

Numincon (EYFS)

Bead strings (EYFS)

Objects for counting (EYFS)

100 squares (Yr. 1 & 2)

Place Value grids (Yr. 1 & 2)

Number Lines (Yr. 1 & 2)

Base 10 (Yr. 2)

Counting sticks in bundles of 10 (Yr. 2)

### KS2

Bead strings

100 squares

Place Value grids

Number Lines

Base 10

Counting sticks in bundles of 10

Place Value Counters

Maths Dictionaries

## Exercise Books

All pupils have a square-paged Maths Exercise Book each. All Learning (every lesson) is evidenced. This could be photographs, questions or explanations of today's learning.

The presentation of mathematics books to be consistent, age appropriate and show that pupils take pride in the appearance of their work. - The date to be written as figures e.g. 05.07. - The Learning Objective to be at the top of the page on the left hand side (handwritten or typed). When sticking in question sheets/resources, these to be trimmed to ensure they fit onto the page 16 - Pencils and rubbers to be used – no pens (except Purple Pen comment)

## Times Tables

Times Tables are a mathematics 'Non-negotiable' and must be taught and then practised. TT Rockstars is available for the practice of times tables as well as other online games, songs and rhymes.

We teach times tables using the following progression:
Year 1 – Be able to count in multiples of twos, fives and tens
Year 2 - Be able to recall 2, 5 and 10 multiplication and division facts
Year 3 - Be able to recall 3, 4 and 8 multiplication and division facts
Year 4 - Be able to recall 6, 7 and 9 multiplication and division facts
Year 5/6 - application of multiplication and division facts to problem solving

NB: All times tables to be learnt up to 12 x 12 in preparation for the Year 4 multiplication check.

## TT Rockstars

TT Rockstars is an intiative for Year 2 – 6. It is a fun way to practise times tables. In school, awards are given for pupils who participate and make progress on TT Rockstars.

Pupils are expected to log onto TT Rockstars at home for 15 minutes per week. In school, pupils complete the TT Rockstar Paper worksheets 3-5 times per week. Each worksheet is timed and takes 3 minutes and the results are recorded onto the website. At the start of the year, a baseline test is completed and then repeated at the end of the programme.