Scheme of Learning

Year 2

#MathsEveryoneCan
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Welcome to the White Rose Maths’ new, more detailed schemes of learning for 2018-19.

We have listened to all the feedback over the last 2 years and as a result of this, we have made some changes to our primary schemes. They are bigger, bolder and more detailed than before.

The new schemes still have the same look and feel as the old ones, but we have tried to provide more detailed guidance. We have worked with enthusiastic and passionate teachers from up and down the country, who are experts in their particular year group, to bring you additional guidance. These schemes have been written for teachers, by teachers.

We all believe that every child can succeed in mathematics. Thank you to everyone who has contributed to the work of White Rose Maths. It is only with your help that we can make a difference.

We hope that you find the new schemes of learning helpful. As always, get in touch if you or your school want support with any aspect of teaching maths.

If you have any feedback on any part of our work, do not hesitate to contact us. Follow us on Twitter and Facebook to keep up-to-date with all our latest announcements.

White Rose Maths Team
#MathsEveryoneCan

White Rose Maths contact details

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What’s included?

Our schemes include:

- Small steps progression. These show our blocks broken down into smaller steps.
- Small steps guidance. For each small step we provide some brief guidance to help teachers understand the key discussion and teaching points. This guidance has been written for teachers, by teachers.
- A more integrated approach to fluency, reasoning and problem solving.
- Answers to all the problems in our new scheme.
- We have also worked with Diagnostic Questions to provide questions for every single objective of the National Curriculum.
Meet the Team

The schemes have been developed by a wide group of passionate and enthusiastic classroom practitioners.

Caroline Hamilton
Beth Smith
Kelsey Brown
Mary-Kate Connolly
James Clegg
Jane Brown
Sam Shutkever
Kate Henshall
The White Rose Maths team would also like to say a huge thank you to the following people who came from all over the country to contribute their ideas and experience. We could not have done it without you.

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How to use the small steps

We were regularly asked how it is possible to spend so long on particular blocks of content and National Curriculum objectives.

We know that breaking the curriculum down into small manageable steps should help children understand concepts better. Too often, we have noticed that teachers will try and cover too many concepts at once and this can lead to cognitive overload. In our opinion, it is better to follow a small steps approach.

As a result, for each block of content we have provided a “Small Step” breakdown. We recommend that the steps are taught separately and would encourage teachers to spend more time on particular steps if they feel it is necessary. Flexibility has been built into the scheme to allow this to happen.

Teaching notes

Alongside the small steps breakdown, we have provided teachers with some brief notes and guidance to help enhance their teaching of the topic. The “Mathematical Talk” section provides questions to encourage mathematical thinking and reasoning, to dig deeper into concepts.

We have also continued to provide guidance on what varied fluency, reasoning and problem solving should look like.
Alongside these overviews, our aim is to provide an assessment for each term’s plan. Each assessment will be made up of two parts:

**Part 1:** Fluency based arithmetic practice

**Part 2:** Reasoning and problem solving based questions

Teachers can use these assessments to determine gaps in children’s knowledge and use them to plan support and intervention strategies.

The assessments have been designed with new KS1 and KS2 SATs in mind.

For each assessment we provide a summary spreadsheet so that schools can analyse their own data. We hope to develop a system to allow schools to make comparisons against other schools. Keep a look out for information next year.
Teaching for Mastery

These overviews are designed to support a mastery approach to teaching and learning and have been designed to support the aims and objectives of the new National Curriculum.

The overviews:

- have number at their heart. A large proportion of time is spent reinforcing number to build competency
- ensure teachers stay in the required key stage and support the ideal of depth before breadth
- ensure students have the opportunity to stay together as they work through the schemes as a whole group
- provide plenty of opportunities to build reasoning and problem solving elements into the curriculum

For more guidance on teaching for mastery, visit the NCETM website:

https://www.ncetm.org.uk/resources/47230

Concrete - Pictorial - Abstract

We believe that all children, when introduced to a new concept, should have the opportunity to build competency by taking this approach.

Concrete – children should have the opportunity to use concrete objects and manipulatives to help them understand what they are doing.

Pictorial – alongside this children should use pictorial representations. These representations can then be used to help reason and solve problems.

Abstract – both concrete and pictorial representations should support children’s understanding of abstract methods.

Need some CPD to develop this approach? Visit www.whiterosemaths.com for find a course right for you.
Training

White Rose Maths offer a plethora of training courses to help you embed teaching for mastery at your school.

Our popular JIGSAW package consists of five key elements:

- CPA
- Bar Modelling
- Mathematical Talk & Questioning
- Planning for Depth
- Reasoning & Problem Solving

For more information and to book visit our website www.whiterosemaths.com or email us directly at support@whiterosemaths.com
In addition to our schemes and assessments we have a range of other materials that you may find useful.

**KS1 and KS2 Problem Solving Questions**
For the last three years, we have provided a range of KS1 and KS2 problem solving questions in the run up to SATs. There are over 200 questions on a variety of different topics and year groups. You will also find more questions from our Barvember campaign.

**End of Block Assessments**
New for 2018 we are providing short end of block assessments for each year group. The assessments help identify any gaps in learning earlier and check that children have grasped concepts at an appropriate level of depth.
Children who have an excellent grasp of number make better mathematicians. Spending longer on mastering key topics will build a child’s confidence and help secure understanding. This should mean that less time will need to be spent on other topics.

In addition, schools that have been using these schemes already have used other subjects and topic time to teach and consolidate other areas of the mathematics curriculum.

Each small step should be seen as a separate concept that needs teaching. You may find that you need to spend more time on particular concepts. Flexibility has been built into the curriculum model to allow this to happen. This may involve spending more or less than one lesson on a small step, depending on your class’ understanding.

The questions are designed to be used by the teacher to help them understand the key teaching points that need to be covered. They should be used as inspiration and ideas to help teachers plan carefully structured lessons.

The scheme has been designed to give sufficient time for teachers to explore concepts in depth, however we also interleave prior content in new concepts. E.g. when children look at measurement we recommend that there are lots of questions that practice the four operations and fractions. This helps children make links between topics and understand them more deeply. We also recommend that schools look to reinforce number fluency through mental and oral starters or in additional maths time during the day.

**FAQs**

*If we spend so much time on number work, how can we cover the rest of the curriculum?*

*How do I use the fluency, reasoning and problem solving questions?*

*How do I reinforce what children already know if I don’t teach a concept again?*

**Should I teach one small step per lesson?**

Each small step should be seen as a separate concept that needs teaching. You may find that you need to spend more time on particular concepts. Flexibility has been built into the curriculum model to allow this to happen. This may involve spending more or less than one lesson on a small step, depending on your class’ understanding.
Meet the Characters

Children love to learn with characters and our team within the scheme will be sure to get them talking and reasoning about mathematical concepts and ideas. Who’s your favourite?
<table>
<thead>
<tr>
<th>Week 1</th>
<th>Week 2</th>
<th>Week 3</th>
<th>Week 4</th>
<th>Week 5</th>
<th>Week 6</th>
<th>Week 7</th>
<th>Week 8</th>
<th>Week 9</th>
<th>Week 10</th>
<th>Week 11</th>
<th>Week 12</th>
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<tr>
<td><strong>Autumn</strong></td>
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<tr>
<td>Number: Place Value</td>
<td>Number: Addition and Subtraction</td>
<td>Measurement: Money</td>
<td>Number: Multiplication and Division</td>
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<td><strong>Spring</strong></td>
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</tr>
<tr>
<td>Number: Multiplication and Division</td>
<td>Statistics</td>
<td>Geometry: Properties of Shape</td>
<td>Number: Fractions</td>
<td>Measurement: Length and Height</td>
<td>Consolidation</td>
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<td><strong>Summer</strong></td>
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</tbody>
</table>
Overview

Small Steps

- Make equal groups – sharing
- Make equal groups – grouping
- Divide by 2
- Odd & even numbers
- Divide by 5
- Divide by 10

NC Objectives

Recall and use multiplication and division facts for the 2, 5 and 10 times tables, including recognising odd and even numbers.

Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs.

Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods and multiplication and division facts, including problems in contexts.

Show that the multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot.
Children divide by sharing objects into equal groups using one-to-one correspondence. They need to do this using concrete manipulatives in different contexts, then move on to pictorial representations.

Children will be introduced to the ‘÷’ symbol. They will begin to see the link between division and multiplication.

**Mathematical Talk**

How many do you have to begin with?  
How many equal groups are you sharing between?  
How many are in each group?  
How do you know that you have shared the objects equally?

___ has been shared equally into ___ equal groups.  
I have ___ in each group.  
___ groups of ___ make ___

**Varied Fluency**

- Share the 12 cubes equally into the two boxes.  
  - There are ___ cubes altogether.  
  - There are ___ boxes.  
  - There are ___ cubes in each box.

  Can you share the 12 cubes equally into 3 boxes?

- 24 children are put into 4 equal teams.  
  - How many children are in each team?

  Can you use manipulatives to represent the children to show how you found your answer?

- Ron draws this bar model to divide 20 into 4 equal groups.  
  - How does his model represent this?
  - He writes $20 \div 4 = 5$

  What other number sentences could Ron create using his model?
Jack says,

*I can work out 40 ÷ 2 easily because I know that 40 is the same as 4 tens.*

This is what he does:

\[
\begin{align*}
40 \div 2 &= 20 \\
\end{align*}
\]

Is it possible to work out 60 ÷ 3 in the same way? Prove it.

Is it possible to work out 60 ÷ 4? What is different about this calculation?

Possible answer:

For 60 ÷ 4 the children will need to exchange 2 tens for 20 ones so they can put one 10 and 5 ones into each group.

Alex has 20 sweets and shares them between 5 friends.

Tommy has 20 sweets and shares them between 10 friends.

Whose friends will receive the most sweets?

How do you know?

Alex’s friends get more because Tommy is sharing with more people so they will get fewer sweets each. Alex’s friends will get 4 sweets each whereas Tommy’s friends will only get 2 sweets each.
Make Equal Groups - Grouping

Notes and Guidance

Children divide by making equal groups. They then count on to find the total number of groups.

They need to do this using concrete manipulatives and pictorially in a variety of contexts.

They need to recognise the link between division, multiplication and repeated addition.

Mathematical Talk

How many do you have to begin with?
How many are in each group?
How many groups can you make?

How long should your number line be?
What will you count up in?

_____ groups of _____ make _____

Varied Fluency

翡

Pencils come in packs of 20
We need to put 5 in each pot.
How many pots will we need?

There are ___ pencils altogether.
There are ___ pencils in each pot.
There are ___ pots.

Mrs Green has 18 sweets.
She puts 3 sweets in each bag.
How many bags can she fill?

Mo uses a number line to work out how many equal groups of 2 he can make from 12

Use a number line to work out how many equal groups of 5 you can make from 30
### Make Equal Groups - Grouping

#### Reasoning and Problem Solving

<table>
<thead>
<tr>
<th>You have 30 counters.</th>
<th>10 groups of 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3 groups of 10</td>
</tr>
<tr>
<td></td>
<td>6 groups of 5</td>
</tr>
<tr>
<td></td>
<td>5 groups of 6</td>
</tr>
<tr>
<td></td>
<td>2 groups of 15</td>
</tr>
<tr>
<td></td>
<td>15 groups of 2</td>
</tr>
<tr>
<td></td>
<td>1 group of 30</td>
</tr>
<tr>
<td></td>
<td>30 groups of 1</td>
</tr>
</tbody>
</table>

You have 30 counters. How many different ways can you put them into equal groups? Write down all the possible ways.

Amir has some counters. He makes 5 equal groups.

The amount he started with is greater than 10 but less than 35

How many counters could he have started with?

How many will be in each group?

<table>
<thead>
<tr>
<th>He could have 30 counters in 5 groups of 6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>25 counters in 5 groups of 5</td>
</tr>
<tr>
<td>20 counters in 5 groups of 4</td>
</tr>
<tr>
<td>15 counters in 5 groups of 3</td>
</tr>
</tbody>
</table>

He could have 30 counters in 5 groups of 6
Divide by 2

Notes and Guidance

Children should be secure with grouping and sharing. They will use this knowledge to help them divide by 2.

They will be secure with representing division as an abstract number sentence using the division and equals symbol.

Children should be able to count in 2s and know their 2 times table.

Mathematical Talk

What do you notice when you group these objects into twos?

Is there a link between dividing by 2 and halving?

What is different about sharing into two groups and grouping in twos?

Can we write a multiplication sentence as well as a division sentence? What do you notice?

Varied Fluency

Complete the stem sentences.

I have ___ cubes altogether. There are ___ in each group. There are ___ groups.

Group the socks into pairs.

Complete the number sentences.

Mo and Tommy have 12 sweets between them. They share them equally. How many sweets does each child get?

There are ___ sweets altogether. There are ___ groups. There are ___ in each group.

Complete the bar model and write a calculation to match.
### Divide by 2

#### Reasoning and Problem Solving

<table>
<thead>
<tr>
<th>I have 24p. I divide it equally between 2 friends. How much will they get each?</th>
<th>The calculation is the same in both. In the first question we are sharing, whereas in the second question we are grouping.</th>
</tr>
</thead>
<tbody>
<tr>
<td>I have 24p in 2p coins. How many 2p coins do I have?</td>
<td>Ron has shared some grapes equally between two friends.</td>
</tr>
<tr>
<td>Consider the two questions above. What is the same and what is different?</td>
<td>Each friend receives fewer than 50 grapes.</td>
</tr>
<tr>
<td>Tommy and Annie have some counters. Tommy shares his counters into 2 equal groups. He has 15 in each group. Annie groups her counters in twos. She has 19 groups. Who has more counters and by how many? How did you work it out?</td>
<td>Complete the sentences to describe the number of grapes Ron started with.</td>
</tr>
<tr>
<td>Tommy has 30 counters. Annie has 38 counters. Annie has 8 more. Children could have compared 15 and 19 and realised they could have done $2 \times 4$</td>
<td>He must have started with...</td>
</tr>
<tr>
<td>Ron’s friends</td>
<td>He could have started with...</td>
</tr>
<tr>
<td></td>
<td>He can’t have started with...</td>
</tr>
</tbody>
</table>

Possible answer:
- He must have started with an even number of grapes.
- He could have started with 40 grapes.
- He can’t have started with 100 grapes.
Odd & Even Numbers

Notes and Guidance

Building on from Year 1, children should be able to recognise odd and even numbers.

They will use concrete manipulatives to explore odd and even numbers and the structure of these.

Mathematical Talk

Can you sort these objects (number pieces, ten frames, cubes, pictures etc) into an odd set and an even set?

What makes these odd/even?

How do you find out if ___ is an odd or even number?

Can you find all the odd and even numbers on a 100 square? What do you notice?

Varied Fluency

Use counters to make each number and share them into two equal groups. How does this help you decide whether a number is odd or even? Show this in the table.

Can you see any patterns?

Which number pieces are odd? Explain why.

Find or draw other odd and even pieces. What do you notice?

Spot the mistakes:

Can you make your own odd and even sets?
True or false?

12 is an odd number.

Prove your answer using concrete, pictorial and abstract representations. Explain each approach.

---

Tommy says that when he adds two odd numbers together, his total will be even.

Is he correct? Convince me.

What else can you find out?

---

Children can use concrete or pictorial methods to show 12 is divisible by 2 and therefore it’s false.

Tommy is correct because two odd numbers will always make an even total.

Children can use any manipulatives to show this.

Whitney says,

I have added two one-digit numbers. My answer divides into 2 equal groups.

What could Whitney's numbers be?

Is this the only possible answer?

Which numbers would not be possible?

Explain your answers.

---

Any two even one digit numbers or any two odd one digit numbers will give an even total.

E.g. 1 + 3 = 4

2 + 4 = 6

However, an odd number added to an even number will give an odd total so Whitney could not have this combination.
During this step, children focus on efficient strategies and whether they should use grouping or sharing depending on the context of the question.

They use their knowledge of the five times table to help them divide by 5.

They will continue to see the = sign both before and after the calculation.

How can we represent the problem using objects/images?

How does knowing your 5 times table help when dividing by 5?

Circle all the multiples of 5 on a 100 square. What do you notice about the numbers? Can you explain the pattern? How does this help you to divide these numbers?

When would we count in 5s?

Year 2 | Spring Term | Week 1 to 2 – Number: Multiplication & Division

Divide by 5

Notes and Guidance

Varied Fluency

Take 30 cubes. How many towers of 5 can you make? You can make ___ towers of 5. ___ towers of 5 is the same as 30. 30 is the same as ___ towers of 5.

40 pencils are shared between 5 children.

How many pencils does each child get?

Group the 1p coins into 5s. How many 5p coins do we need to make the same amount of money? Draw coins and complete the missing information.

20p = ___ × 5p

20p ÷ 5 = ___
A party bag contains 5 sweets.  
A jar contains 5 party bags.  

Ron has 75 sweets.  

<table>
<thead>
<tr>
<th>A party bag contains 5 sweets.</th>
<th>15 party bags.</th>
<th>10</th>
<th>20</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>A jar contains 5 party bags.</td>
<td>3 jars.</td>
<td>2</td>
<td>10</td>
<td>4</td>
</tr>
</tbody>
</table>

How many party bags will he need?  
15 party bags.  

How many jars will he need?  
3 jars.  

Use the number cards to make multiplication and division sentences.  

- 4 \times 5 = 20  
- 5 \times 4 = 20  
- 20 \div 4 = 5  
- 20 \div 5 = 4  
- 5 \times 2 = 10  
- 2 \times 5 = 10  
- 10 \div 2 = 5  
- 10 \div 5 = 2  
- 20 \div 2 = 10  
- 20 \div 10 = 2  
- 2 \times 10 = 20  
- 10 \times 2 = 20
Children should already be able to multiply by 10 and recognise multiples of 10. They will need to use both grouping and sharing to divide by 10 depending on the context of the problem.

Children start to see that grouping and counting in 10s is more efficient than sharing into 10 equal groups.

**Mathematical Talk**

What can we use to represent the problem?

How does knowing your 10 times table help you to divide by 10?

Circle all the multiples of 10 on a hundred square. What do you notice? Can you explain the pattern?

How many groups of 10 are there in ___?

**Varied Fluency**

- **Apples can be sold in packs of 10**
  How many packs can be made below?
  ![Apple packs](image)
  \[ \square \div \square = \square \]

  When 30 apples are sold in packs of 10, ___ packs of apples can be made.
  Can you show this in a bar model?
  ![Bar model](image)

- **I have 70p in my pocket made up of 10p coins. How many coins do I have?** Draw a picture to prove your answer.

- **Fill in the missing numbers.**
  - \[ 70 \div 10 = \square \]
  - \[ 6 \text{ tens} \div 1 \text{ ten} = \square \]
  - \[ 5 = \square \div 10 \]
  - There are ___ tens in 40
Mrs Owen has some sweets.

She shares them equally between 10 tables.

How many sweets could each table have?

Find as many ways as you can.

What do you notice about your answers?

**True or false?**

- Dividing by 10 is the same as dividing by 5 then dividing by 2
  - True

Cakes are sold in boxes of 10

Jack and Alex are trying to pack these cakes into boxes.

Jack says,

There are 5 groups of 10

Alex says,

There are 6 groups of 10

Who is correct? Explain how you know.

Alex is correct because there are 60 cakes and 60 divided by 10 is 6

Jack has incorrectly grouped the cakes, he might have counted the rows wrong. He hasn’t put them in 10s. He incorrectly assumed there were 10 in each row.