Spring Scheme of Learning

Year 3

#MathsEveryoneCan

2020-21
New for 2020/21

2020 will go down in history. The world has changed for all of us.

We want to do as much as we can to support children, teachers, parents and carers in these very uncertain times.

We have amended our schemes for 2020/21 to:

★ highlight key teaching points
★ recap essential content that children may have forgotten
★ flag any content that you might not have covered during the school closures period.

We hope these changes will add further value to the schemes and save you time.

Lesson-by-lesson overviews

We’ve always been reluctant to produce lesson-by-lesson overviews as every class is individual and has different needs. However, many of you have said that if blended learning becomes a key feature of school life next year, a weekly plan with linked content and videos could be really useful.

As always, we’ve listened! We’ve now produced a complete lesson-by-lesson overview for Y1 to Y9 that schools can use or adapt as they choose. Each lesson will be linked to a free-to-use home learning video, and for premium subscribers, a worksheet. This means that you can easily assign work to your class, whether they are working at home or in school.

Inevitably, this lesson-by-lesson structure won’t suit everyone, but if it works for you, then please do make use of this resource as much as you wish.
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.
Supporting resources

NEW for 2019-20!

We have produced supporting resources for every small step from Year 1 to Year 11.

The worksheets are provided in three different formats:

• Write on worksheet – ideal for children to use the ready made models, images and stem sentences.
• Display version – great for schools who want to cut down on photocopying.
• PowerPoint version – one question per slide. Perfect for whole class teaching or mixing questions to make your own bespoke lesson.

For more information visit our online training and resources centre resources.whiterosemaths.com or email us directly at support@whiterosemaths.com
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?
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Spring - Block 1

Multiplication & Division
Overview

Small Steps

- Consolidate 2, 4 and 8 times-tables
- Comparing statements
- Related calculations
- Multiply 2-digits by 1-digit (1)
- Multiply 2-digits by 1-digit (2)
- Divide 2-digits by 1-digit (1)
- Divide 2-digits by 1-digit (2)
- Divide 2-digits by 1-digit (3)
- Scaling
- How many ways?

Notes for 2020/21

The 2, 4 and 8 times-tables are revisited here to ensure children are fully equipped for the rest of the learning in this block.

Base 10 equipment and place value counters are useful to explore the topic. Some children may find the jump from Base 10 to counters quite difficult and they should only be moved on when they are ready.
Notes and Guidance

Children should be comfortable with the concept of multiplication so they can apply this to multiplication tables.

Images, as well as number tracks, should be used to encourage children to count in twos.

Resources such as cubes and number pieces are important for children to explore equal groups within the 2 times-table.

Mathematical Talk

If 16 p is made using 2 p coins, how many coins would there be?

How many 2s go into 16?

How can the images of the 5 bicycles help you to solve the problems?

Varied Fluency

Count in 2s to calculate how many eyes there are.

There are ___ eyes in total.
___ × ___ = ___

Complete the number track.

<table>
<thead>
<tr>
<th>2</th>
<th>4</th>
<th>8</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>16</td>
<td>18</td>
<td>24</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>6</td>
<td>8</td>
</tr>
</tbody>
</table>

How many wheels are there on five bicycles?

If there are 14 wheels, how many bicycles are there?
### The 2 Times-Table

#### Reasoning and Problem Solving

**Fill in the blanks.**

| 3 \times ____ = 6 | 2 |
| ____ \times 2 = 20 | 10 |
| ____ = 8 \times 2 | 16 |

**Tommy says that 10 \times 2 = 22**

**Is he correct?**

**Explain how you know.**

No Tommy is wrong because 10 \times 2 = 20

Children could draw an array or a picture to explain their answer.

**Eva says,**

Every number in the 2 times-table is even.

**Is she correct? Explain your answer.**

Yes, because 2 is even, and the 2 times-table is going up in 2s. When you add two even numbers the answer is always even.

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©White Rose Maths
Children use knowledge of known multiplication tables (2, 3, 5 and 10 times tables) and understanding of key concepts of multiplication to develop knowledge of the 4 times table.

Children who have learnt $3 \times 4 = 12$ can use understanding of commutativity to know that $4 \times 3 = 12$.

- Use the pictorial representations to complete the calculations.
  
  $1 \times 4 = ____$
  
  $2 \times 4 = ____$
  
  $3 \times 4 = ____$

  Continue the pattern.

  - 2 cars have eight wheels. How many wheels do four cars have?  
    $2 \times 4 = 8$  
    $4 \times 4 = ____$

  - Three cows have 12 legs. How many legs do six cows have?  
    $3 \times ____ = 12$  
    $6 \times ____ = ____$

  Colour in the multiples of 4
  What pattern do you notice?
Reasoning and Problem Solving

Jack says, “The answer is more than $3 \times 4$”

Complete the calculation to prove this. $4 \times 4 = 3 \times 4 + ___$

Mo says, “The answer is 4 less than $5 \times 4$”

Complete the calculation to prove this. $4 \times 4 = ___ \times 4 - ___$

Teddy says, “The answer is double $2 \times 4$”

Complete the calculation to prove this. $4 \times 4 = ___ \times 4 \times ___$

Whose idea do you prefer? Why?

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**Which part below does not show counting in fours?**

- $4 + 4 + 4 + 4$
- $1 \ 1 \ 1 \ 1$
- $1 \ 1 \ 1 \ 1$
- $4 \ 4 \ 4$

Explain why.

The place value counters do not show counting in fours because each part has 3 in so it is counting in threes.
Notes and Guidance

Children use prior knowledge of multiplication facts for 2, 3, 4 and 5 times tables along with the distributive law in order to calculate unknown multiplication facts.

Mathematical Talk

Why is it helpful to partition the number you are multiplying by?

Can you use concrete or pictorial representations to help you?

What other facts can you link to this one?

What other times tables will help you with this times table?

Varied Fluency

Complete the diagram using known facts.

$$6 \times 8$$

$$5 \times 8 = \square$$

$$\text{altogether} \, \square$$

Complete the bar model.

Complete the table.

Can you spot a pattern in the numbers?
**The 8 Times Table**

**Reasoning and Problem Solving**

On a blank hundred square, colour multiples of 8 red and multiples of 4 blue.

**Always, Sometimes, Never**

- Multiples of 4 are also multiples of 8
- Multiples of 8 are also multiples of 4

When you add an even number to an even number you always make an even number.

The 8 times table is repeated addition so keeps adding an even number each time.

1) Sometimes, every other multiple of 4 is also a multiple of 8
   The ones in between aren't because the jumps are smaller than 8
2) Always – 8 is a multiple of 4 therefore all multiples of 8 will be multiples of 4

Rosie has some packs of cola which are in a box.

Some packs have 4 cans in them, and some packs have 8 cans in them.

Rosie's box contains 64 cans of pop.

How many packs of 4 cans and how many packs of 8 cans could there be?

Find all the possibilities.

Possible answers:
- 2 packs of 4, 7 packs of 8
- 4 packs of 4, 6 packs of 8
- 6 packs of 4, 5 packs of 8
- 8 packs of 4, 4 packs of 8
- 10 packs of 4, 3 packs of 8
- 12 packs of 4, 2 packs of 8
- 14 packs of 4, 1 pack of 8
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 your 4 times-table, how can you use this to work out your 8 times-table?

What’s the same and what’s different about $8 \times 3$ and $7 \times 4$?

Varied Fluency

Use the array to complete the number sentences.

$3 \times 4 = \square$

$4 \times 3 = \square$

$\square \div 3 = \square$

$\square \div 4 = \square$

Use $<$, $>$ or $=$ to compare.

$8 \times 3 \quad 7 \times 4$

$36 \div 6 \quad 36 \div 4$

Complete the number sentences.

$5 \times 1 < \square \times \square$

$4 \times 3 = \square \div 3$
Comparing Statements

Reasoning and Problem Solving

Whitney says,
8 \times 8 \text{ is greater than two lots of } 4 \times 8

Do you agree?
Can you prove your answer?

Possible answer:
She is wrong because they are equal.

Can you find three different ways to complete each number sentence?

\[ ___ \times 3 + ___ \times 3 < ___ \div 3 \]
\[ ___ \div 4 < ___ \times 4 < ___ \times 4 \]
\[ ___ \times 8 > ___ \div 8 > ___ \times 8 \]

Possible answers include:
1 \times 3 + 1 \times 3 < 21 \div 3
1 \times 3 + 1 \times 3 < 24 \div 3
1 \times 3 + 1 \times 3 < 27 \div 3
24 \div 4 < 8 \times 4 < 12 \times 4
16 \div 4 < 5 \times 4 < 7 \times 4
8 \div 4 < 3 \times 4 < 4 \times 4
4 \times 8 > 88 \div 8 > 1 \times 8
2 \times 8 > 80 \div 8 > 1 \times 8
6 \times 8 > 96 \div 8 > 1 \times 8

True or false?

\[ 6 \times 7 < 6 + 6 + 6 + 6 + 6 + 6 \]
False

\[ 7 \times 6 = 7 \times 3 + 7 \times 3 \]
True

\[ 2 \times 3 + 3 > 5 \times 3 \]
False
Children use known multiplication facts to solve other multiplication problems. They understand that because one of the numbers in the calculation is ten times bigger, then the answer will also be ten times bigger. It is important that children develop their conceptual understanding through the use of concrete manipulatives.

What is the same and what is different about the place value counters?

How does this fact help us solve this problem?

If we know these facts, what other facts do we know?

Can you prove your answer using manipulatives?

Complete the multiplication facts.

The number pieces represent 5 × ___ = ____

If each hole is worth ten, what do the pieces represent?

If we know 2 × 6 = 12, we also know 2 × 60 = 120

Use this to complete the fact family.

Complete the fact families for the calculations.

3 × 30 = ___

4 × 80 = ___

160 ÷ 2 = ___
Is Mo correct?
Explain your answer.

Mo is correct. I know $3 \times 4 = 12$, so if he has $3 \times 40$ then his answer will be ten times bigger because 4 has become ten times bigger.

Rosie has 240 cakes to sell. She puts the same number of cakes in each box and has no cakes left over. Which of these boxes could she use?

- 10
- 20
- 30
- 40
- 50
- 60
- 80
- 100

She could use 10, 20, 30, 40, 60, 80 because 240 is a multiple of all of these numbers.

- $10 \times 24 = 240$
- $20 \times 12 = 240$
- $30 \times 8 = 240$
- $40 \times 6 = 240$
- $60 \times 4 = 240$
- $80 \times 3 = 240$

True or false?

$5 \times 30 = 3 \times 50$

Prove it.

Possible response:

Children may represent it with place value counters.

True because they are equal.

Children may explore the problem in a context.

e.g. 5 lots of 30 apples compared to 3 lots of 50 apples.
Children use their understanding of repeated addition to represent a two-digit number multiplied by a one-digit number with concrete manipulatives. They use the formal method of column multiplication alongside the concrete representation. They also apply their understanding of partitioning to represent and solve calculations.

In this step, children explore multiplication with no exchange.

**How does multiplication link to addition?**

**How does partitioning help you to multiply 2-digits by a 1-digit number?**

**How does the written method match the concrete representation?**

**There are 21 coloured balls on a snooker table. How many coloured balls are there on 3 snooker tables?**

Use Base 10 to calculate: 

\[21 \times 4 \text{ and } 33 \times 3\]

Complete the calculations to match the place value counters.

**Annie uses place value counters to work out 34 \times 2**

Use Annie’s method to solve:

\[23 \times 3\]

\[32 \times 3\]

\[42 \times 2\]
Alex completes the calculation:

43 × 2

Can you spot her mistake?

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Alex has multiplied 4 by 2 rather than 40 by 2.

Teddy completes the same calculation as Alex. Can you spot and explain his mistake?

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Teddy has written 80 where he should have just put an 8 because he is multiplying 4 tens by 2 which is 8 tens. The answer should be 86.

Dexter says,

4 × 21 = 2 × 42

Is Dexter correct?

True. Both multiplications are equal to 84.

Children may explore that one number has halved and the other has doubled.
Children continue to use their understanding of repeated addition to represent a two-digit number multiplied by a one-digit number with concrete manipulatives. They move on to explore multiplication with exchange. Each question in this step builds in difficulty.

What happens when we have ten or more ones in a column? What happens when we have twenty or more ones in a column?

How do we record our exchange?

Do you prefer Jack’s method or Amir’s method? Can you use either method for all the calculations?
Always, Sometimes, Never?

A two-digit number multiplied by a one-digit number has a two-digit product.

Sometimes.

E.g.

13 × 5 = 65
31 × 5 = 155

Explain the mistake.

They have not performed the exchange correctly.
6 tens and 2 tens should be added together to make 8 tens so the correct answer is 81.

Reasoning and Problem Solving

How close can you get to 100?
Use each digit card once in the multiplication.

You can get within 8 of 100

23 × 4 = 92 this is the closest answer.
24 × 3 = 72
32 × 4 = 128
34 × 2 = 68
Children divide 2-digit numbers by a 1-digit number by partitioning into tens and ones and sharing into equal groups.

They divide numbers that do not involve exchange or remainders.

It is important that children divide the tens first and then the ones.

**Notes and Guidance**

**Mathematical Talk**

- How can we partition the number?
- How many tens are there?
- How many ones are there?
- What could we use to represent this number?
- How many equal groups do I need?

- How many rows will my place value chart have?
- How does this link to the number I am dividing by?

**Varied Fluency**

- Ron uses place value counters to solve $84 \div 2$

  - $10 + 10 + 10 + 10 + 10 + 10 + 10 + 10$ and $10 + 10 + 10 + 10 + 10 + 10 + 10 + 10$.

  - I made 84 using place value counters and divided them between 2 equal groups.

  - Use Ron’s method to calculate:
    - $84 \div 4$
    - $66 \div 2$
    - $66 \div 3$

- Eva uses a place value grid and part-whole model to solve $66 \div 3$

  - $60$ and $6$.

  - Use Eva’s method to calculate:
    - $69 \div 3$
    - $96 \div 3$
    - $86 \div 2$
Reasoning and Problem Solving

Teddy answers the question $44 \div 4$ using place value counters.

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<tr>
<td>10</td>
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Is he correct? Explain your reasoning.

Teddy is incorrect. He has divided 44 by 2 instead of by 4.

Dora thinks that 88 sweets can be shared equally between eight people.

Is she correct?

Dora is correct because 88 divided by 8 is equal to 11.

Alex uses place value counters to help her calculate $63 \div 3$.

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</tr>
<tr>
<td>10</td>
<td>1</td>
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She gets an answer of 12. Is she correct?

Alex is incorrect because she has not placed counters in the correct columns.

The correct answer is 21.

Divide 2-digits by 1-digit (1)
**Divide 2-digits by 1-digit (2)**

**Notes and Guidance**

Children divide 2-digit numbers by a 1-digit number by partitioning into tens and ones and sharing into equal groups.

They divide numbers that involve exchanging between the tens and ones. The answers do not have remainders.

Children use their times-tables to partition the number into multiples of the divisor.

**Mathematical Talk**

Why have we partitioned 42 into 30 and 12 instead of 40 and 2?

What do you notice about the partitioned numbers and the divisor?

Why do we partition 96 in different ways depending on the divisor?

**Varied Fluency**

Ron uses place value counters to divide 42 into three equal groups.

He shares the tens first and exchanges the remaining ten for ones.

Then he shares the ones.

\[42 \div 3 = 14\]

Use Ron’s method to calculate \(48 \div 3\), \(52 \div 4\) and \(92 \div 8\).

Annie uses a similar method to divide 42 by 3.

Use Annie’s method to calculate:

\[96 \div 8 \quad 96 \div 4 \quad 96 \div 3 \quad 96 \div 6\]
Reasoning and Problem Solving

Compare the statements using <, > or =

- $48 \div 4 \quad \bigcirc \quad 36 \div 3 =$
- $52 \div 4 \quad \bigcirc \quad 42 \div 3 <$
- $60 \div 3 \quad \bigcirc \quad 60 \div 4 >$

Amir partitioned a number to help him divide by 8

Some of his working out has been covered with paint.

What number could Amir have started with?

The answer could be 56 or 96
Children move onto solving division problems with a remainder. Links are made between division and repeated subtraction, which builds on learning in Year 2. Children record the remainders as shown in Tommy’s method. This notation is new to Year 3 so will need a clear explanation.

**Mathematical Talk**

How do we know 13 divided by 4 will have a remainder?

Can a remainder ever be more than the divisor?

Which is your favourite method?

Which methods are most efficient with larger two digit numbers?

**Notes and Guidance**

**Varied Fluency**

- How many squares can you make with 13 lollipop sticks?
  - There are ___ lollipop sticks.
  - There are ___ groups of 4
  - There is ___ lollipop stick remaining.
  - $13 \div 4 = ___$ remainder ___

- Use this method to see how many triangles you can make with 38 lollipop sticks.

- Tommy uses repeated subtraction to solve $31 \div 4$
  - $31 \div 4 = 7$ remainder $3$

- Use Tommy’s method to solve 38 divided by 3

- Use place value counters to work out $94 \div 4$
  - Did you need to exchange any tens for ones?
  - Is there a remainder?
### Divide 2-digits by 1-digit (3)

#### Reasoning and Problem Solving

<table>
<thead>
<tr>
<th>Which calculation is the odd one out? Explain your thinking.</th>
<th>64 ÷ 8 could be the odd one out as it is the only calculation without a remainder. Make sure other answers are considered such as 65 ÷ 3 because it is the only one being divided by an odd number.</th>
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<tbody>
<tr>
<td>64 ÷ 8</td>
<td>77 ÷ 4</td>
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<tr>
<td>49 ÷ 6</td>
<td>65 ÷ 3</td>
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</tbody>
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**Jack has 15 stickers.**

He sorts his stickers into equal groups but has some stickers remaining. How many stickers could be in each group and how many stickers would be remaining?

**Dora and Eva are planting bulbs.**

They have 76 bulbs altogether. Dora plants her bulbs in rows of 8 and has 4 left over. Eva plants her bulbs in rows of 10 and has 2 left over. How many bulbs do they each have?

**There are many solutions, encourage a systematic approach. e.g. 2 groups of 7, remainder 1 3 groups of 4, remainder 3 2 groups of 6, remainder 3**

Dora has 44 bulbs. Eva has 32 bulbs.
It is important that children are exposed to problems involving scaling from an early age. Children should be able to answer questions that use the vocabulary “times as many”. Bar models are particularly useful here to help children visualise the concept. Examples and non-examples should be used to ensure depth of understanding.

Why might someone draw the first bar model? What have they misunderstood?

What is the value of Amir’s counters? How do you know?

How many adults are at the concert? How will you work out the total?

In a playground there are 3 times as many girls as boys.

Which bar model represents the number of boys and girls? Explain your choice.

Draw a bar model to represent this situation.

In a car park there are 5 times as many blue cars as red cars.

Eva has these counters

Amir has 4 times as many counters. How many counters does Amir have?

There are 35 children at a concert. 3 times as many adults are at the concert. How many people are at the concert in total?
Reasoning and Problem Solving

Dora says Mo's tower is 3 times taller than her tower. Mo says his tower is 12 times taller than Dora's tower. Who do you agree with? Explain why?

I agree with Dora. Her tower is 4 cubes tall. Mo's tower is 12 cubes tall. 12 is 3 times as big as 4. Mo has just counted his cubes and not compared them to Dora's tower.

In a playground there are 3 times as many girls as boys. There are 30 girls. Label and complete the bar model to help you work out how many boys there are in the playground.

A box contains some counters. There are twice as many green counters as pink counters. There are 18 counters in total. How many pink counters are there?

There are 10 boys in the playground.

There are 6 pink counters.
Notes and Guidance

Children list systematically the possible combinations resulting from two groups of objects. Encourage the use of practical equipment and ensure that children take a systematic approach to each problem. Children should be encouraged to calculate the total number of ways without listing all the possibilities. e.g. Each T-shirt can be matched with 4 pairs of trousers so altogether $3 \times 4 = 12$ outfits.

Mathematical Talk

What are the names of the shapes on the shape cards? How do you know you have found all of the ways? Would making a table help?

Without listing, can you tell me how many possibilities there would be if there are 5 different shape cards and 4 different number cards?

Varied Fluency

Jack has 3 T-shirts and 4 pairs of trousers. Complete the table to show how many different outfits he can make.

<table>
<thead>
<tr>
<th>T-shirt</th>
<th>Trousers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue</td>
<td>Blue</td>
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<tr>
<td>Blue</td>
<td>Dark blue</td>
</tr>
<tr>
<td>Blue</td>
<td>Orange</td>
</tr>
<tr>
<td>Blue</td>
<td>Green</td>
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</tbody>
</table>

Alex has 4 shape cards and 3 number cards. She chooses a shape card and a number card. List all the possible ways she could do this.
Reasoning and Problem Solving

How Many Ways?

Eva chooses a snack and a drink.

What could she have chosen?
How many different possibilities are there?

___ × ___ = ___

There are ____ possibilities.

How many of the ways contain an apple?

3 ways contain an apple.

There are 15 possibilities.
AW
AC
AO
PW
PC
PO
SW
SC
SO
DW
DC
DO
BW
BC
BO

Jack has some jumpers and pairs of trousers.
He can make 15 different outfits.
How many jumpers could he have and how many pairs of trousers could he have?

He could have:
1 jumper and 15 pairs of trousers.
3 jumpers and 5 pairs of trousers.
15 jumpers and 1 pair of trousers.
5 jumpers and 3 pairs of trousers.