Planning Overview
Year 2 Multiplication and Division

Recall and use multiplication and division facts for the 2, 5 and 10 multiplication 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
Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot
Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.

2MD–1 Recognise repeated addition contexts, representing them with multiplication equations and calculating the product, within the 2, 5 and 10 multiplication tables.
2MD–2 Relate grouping problems where the number of groups is unknown to multiplication equations with a missing factor, and to division equations (quotative division).

Recall multiplication and division facts for 2, 5 and 10 and use them to solve simple problems, demonstrating an understanding of commutativity as necessary (TAF ARE)
Recall and use multiplication and division facts for 2, 5 and 10 and make deductions outside known multiplication facts (TAF GD)
Solve unfamiliar word problems that involve more than one step (e.g. 'which has the most biscuits, 4 packets of biscuits with 5 in each packet or 3 packets of biscuits with 10 in each packet?') (TAF GD)
Count in twos, fives and tens from 0 and use this to solve problems (TAF WT)

Children will have learnt to skip count in 2s, 5s and 10s in year 1 and as part of the Year 2 Place Value unit. Continue to practise this as you link it to multiplication and division and children begin to learn multiplication and division facts off by heart.

	Teaching and Learning
Understand and use the language of groups	Put sets of objects into groups and investigate unequal and equal groups. How many groups are there? How many objects are there? How many are in this group? Are the groups equal? Could we make them equal? Understand that the number of groups and the size of the groups both need to be defined when describing an image that represents equal groups. Use sets of counters with many factors (e.g. 12) and try to put them into equal groups and describe what you have created using key language structures e.g. There are 4 groups with 3 counters in each group.

Link equal groups to repeated addition	Recap the special addition situation of doubling. Why is it special? What if we extended the doubling so that we have three equal groups of the same number or four equal groups? What would that look like? Demonstrate how to use repeated addition alongside the language of groups in real life contexts e.g. There are 5 groups of 2 crayons. 2+2+2+2+2 What does the 2 represent? How many times do we need to write 2? How do you know? Solve picture word problems recording the answer as a repeated addition and skip counting in 2s 5s or 10s to calculate the answer. Children to explore numicon and use it to solve repeated addition calculations/write calculations to represent the numicon shown.
Link equal groups to multiplication sentences with x sign	Referring back to similar real-life contexts with pictures, now replace groups of term with multiplication symbol. 5 groups of 2 may be written 5 x 2 in year 2 where children link x symbol to repeated addition and language of groups *(Eventually when official term 'multiplied by' is used it needs to be 2 x 5 where x 5 is the number of groups.)* Children to record multiplication number sentences to represent a given picture or context. Understand that one side of the x symbol is the number of groups and the other side is the size of each group. Once they are secure where the pictures show all the individual objects in groups move onto recording calculations where the individual objects are not visible e.g. six 5p coins – 4 packs of 10 crayons Move onto fluency questions where a question is presented as 3 x 5 and they solve this by counting in 5s 3 times. This may be supported by apparatus such as numicon 5 plates or children may draw circles with 5 in to help them visualise the problem or a bar model with one bar spit into 3 with 5 in each piece. Ask the children to represent a range of multiplication questions in a range of ways. Include multiplying by zero and one.

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Mastery
What is 5 x 4? (5 times table)
What is 10 x 6? (10 times table)

Being able to answer such questions is, of course, important, but check pupils understand the meaning of them. For example, ask them to make 5 x 4 and 10 x 6 using concrete apparatus.

Mastery with Greater Depth
4 packets of biscuits with 5 in each packet, or
3 packets of biscuits with 10 in each packet?

Explain your reasoning.
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<td>Recall and use multiplication facts from the 2 x tables</td>
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Now children understand that skip counting in 2s can give the answer when solving a x2 problem and they should be taught how to keep a tally of how many twos using their fingers initially.

Can they start to recall some of those facts off by heart. Build the 2x tables using counters/2p coins and discussion. Which ones do you know off by heart? How can we work out the ones that we don't know? If I know 10 x 2 how can I work out 5 x 2? Use models to manipulate, separate, recombine and support their explanations.

<table>
<tr><td>Four 2s
Draw it</td><td>Draw it in a different way</td><td>Addition</td><td>Multiplication</td></tr>
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Challenge thinking by considering nearby facts eg. 4x2 can help to derive 5 x 2 and 3 x 2. Use stem sentence…If I know ____I can work out ____by____

Children to complete times table fact sheets and play games online to help memorise facts.
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<td>Recall and use multiplication facts from the 5 x tables</td>
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Build up the 5x table with a variety of resources to support e.g. print-outs of hands, numicon 5 plates or 5p coins.

Give children 5x table in this format and practice reading each one. What patterns are there? How can you use these?
5 x 1 =   5 x 6 =   5 x 11 =
5 x 2 =   5 x 7 =   5 x 12 =
5 x 3 =   5 x 8 =
5 x 4 =   5 x 9 =
5 x 5 =   5 x 10 =
Can they complete answers and make predictions using patterns?
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Can they predict whether 100 will be in the 5x tables?

Can they solve word problems involving the 5x table?

Greater Depth - What is the answer to 19 x 5 =
92, 95, 97

Do you know the answer without working it out? How?

GD – Ask children to generate multiplication facts from one given fact. E.g. if I know 2 x 5 I also know……

Recall and use multiplication facts from the 10 x tables

Build times table with counters/ten pin bowling images/money etc and complete fact sheet for 10s as for 5s

Top to bottom sheet – Mathsticks

Make a path from top to bottom

Multiples of 10

9	14	8	11	42	2	30	16
57	36	37	18	15	25	20	6
10	30	40	80	40	26	80	14
100	11	13	33	10	110	70	11
50	70	3	16	29	18	17	49
3	60	20	30	1	4	39	38
25	12	37	90	100	50	120	35
7	27	21	18	43	28	90	13

Can they solve word problems involving the 10x table?

Can they use patterns to predict whether 240 will be in the 10x table?

Use counters to show that every 10x table fact is equivalent to double the 5x table fact. Investigate the relationship between 2 and 10 in a similar way. Is there any link between the 2x table and the 5x table?

Mastery

Complete and compare the 5 and 10 times tables. What do you notice?

$5 \times 1 =$ $10 \times 1 =$

$5 \times 2 =$ $10 \times 2 =$

$5 \times 3 =$ $10 \times 3 =$

$5 \times 4 =$ $10 \times 4 =$

Recall and use facts from the 2x 5x and 10x tables to reason about patterns between times table facts and to problem solve

Counting in 2s, 5s and 10s (recap from place value unit and year 1)
Colour numbers on a 100 square
Play times tables aerobics
Children to raise your left hand when counting from 1-50 when a multiple of 2 is said.
*Children to raise your left hand when counting from 1-50 when a multiple of 2 is said **and** raise their right hand when a multiple of 5 is said.*
*Children to raise your left hand when counting from 1-50 when a multiple of 2 is said **and** raise their right hand when a multiple of 5 is said **and** stand up when a multiple of 10 is said.*
Was there a time when you just stood up? Was there a time when you just raised your left hand?

Fill in numbers on number track type questions
e.g.

2	4		8			14	16	18	
10		20	25			40	45		55
100	90	80		60			30	20	

Children to explore statements such as –
When I count up in 5s I will say 25
When I count up in 10s I will say 55
When I count up in 2s I will say the number 5
If I count in 5s I will always say the same numbers that I say when I count in 10s
Why are all multiples of 10 multiples of 2?
Are all multiples of 5 multiples of 10?
Multiples of 2 are always even numbers – why?
What do you notice about multiples of 5 in terms of odd and even numbers?

Children to explore the above statements using numicon, 100 squares, number tracks to aid in their reasoning explanations.

NRICH Biscuit Decorations Problem
These numbers have been adapted from the original problem to use 2, 5 and 10 in line with Y2. Jake decorated 20 biscuits to take to a party. He lined them up and put icing on every second biscuit. Then he put a cherry on every fifth biscuit. Then he put a chocolate button on every tenth biscuit. So there was nothing on the first biscuit. How many other biscuits had no decoration? Did any biscuits get all three decorations?

Extension – Greater Depth Can you explain what will be on other biscuits if we went beyond 20? Record.

Predict what will be on biscuit number 93, 95 etc?

Understand and write repeated addition sentences as multiplication sentences with x sign and vice versa

Reasoning Questions e.g. Sam says 5+5+5 = 3x5
Is Sam correct? Explain why. Draw an image to help you.

Using < > = to make statements correct

3x 5		5+5+5+5
2x2		2+2
10x2		5+5+5

Mastery

Write these addition sentences as multiplication sentences. The first one has been completed.

$5+5+5+5+5=5\times 5$

$2+2+2+2+2=$

$2+2+2=$

$10+10+10+10=$

Allow greater depth children to explore associative law through questions such as 2+2+2+4, is this still repeated addition? Encourage children to explore the 4 numicon tile as 2s.

Mastery with Greater Depth

Write these addition sentences as multiplication sentences.

$10+10+10+5+5=$

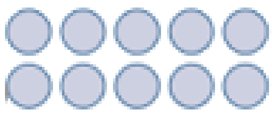
$2+2+2+4=$

$2+2+4+4=$

$5+5+5+2+3=$

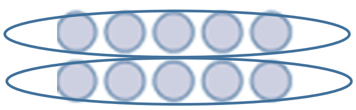
Use an array to show that multiplication can be done in any order (commutative law)

Arrange 10 counters into equal groups to form an array on a piece of card



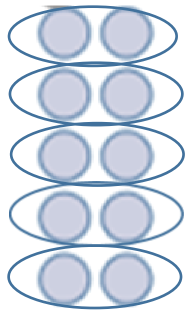
Encourage children to think about their previous learning and elicit what they think this represents. Circle multiplication facts/repeated addition facts

2 groups of 5
2 x 5
2 times 5



Now turn array 90 degrees
by rotating the card

5 groups of 2
5 x 2
5 times 2

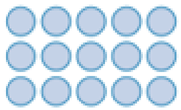


Give children another array e.g. two rows of 10
Can the children tell which multiplication facts that this shows? What is the other fact?

Introduce the term commutative. For a given array ask the children to write the 2 x sentences that it shows and the 2 repeated addition sentences it shows.

Mastery

This array represents $5 \times 3 = 15$.

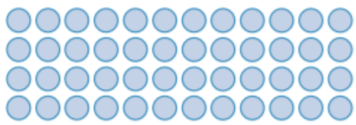


Write three other multiplication or addition facts that this array shows.

Show the HA children a large array, e.g. 15 x 5. How could we split this in different ways to help us calculate? Record together and then give the children chance to try their own. E.g. 17 x 5

Mastery with Greater Depth

Find different ways to find the answer to 12×4.



Children are expected to use their 2, 5 and 10 times tables to answer this question.

Use arrays to investigate whether these calculations are equivalent and explain reasoning.

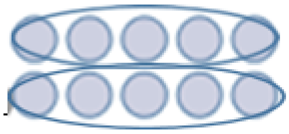
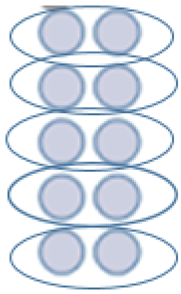
Mastery with Greater Depth

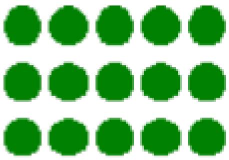
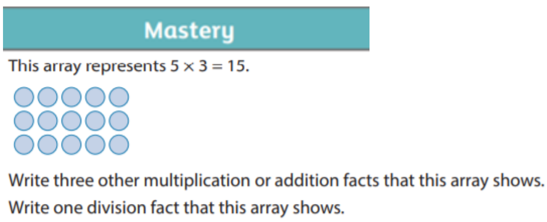
True or false?

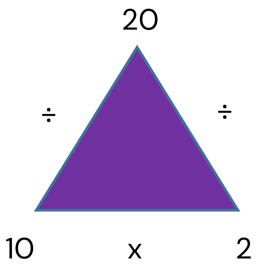
$5 \times 4 = 4 \times 5$

$5 \times 4 = 10 \times 2$

$5 \times 4 = 2 \times 10$

Derive Division facts using division by grouping and record using the ÷ sign	Make a direct link between the apparatus you used for arrays and multiplication to introduce division by grouping. If I had 10 counters and grouped them into rows of 2 how many rows would I have? What would this look like? What if we grouped them into rows of 5? Use contexts relevant to your children to give meaning to the calculations. Show children how to record these as division number sentences What groups can I see in this array?  10 divided into rows of 5 gives me 2 rows 10 ÷ 5 = 2 Rotate the array 10 divided into rows of 2 gives me 5 rows 10 ÷ 2 = 5  Provide the children with division calculations and allow them to become confident with using counters to make arrays or drawing arrays to help them solve the calculations. A common misconception here can be to not understand the need to put the biggest number first. Using numicon to investigate division by grouping can help with this. E.g. give them an 8 plate. Which pieces could we cover it with exactly? Record all the division number sentences for 8 beginning with the number 8.
Revise division by sharing from Y1 and compare to the grouping method.	Image taken from the NCETM Magazine  Look at the image above. We are going to share these characters between 5 people. Each person will get one of each character. How many does each person receive? What is the calculation for this problem? 20 ÷ 5 = 4 20 characters shared between 5 people. Each person gets 4 characters.

	Look again at the image. This time we are going to put the characters in groups of 5 so that all of the characters are in matching groups. How Many groups will we have? What is the calculation for this problem? 20 ÷ 5 = 4 20 characters shared into groups of 5. There are 4 groups. Repeat with the number sentence 15 ÷ 5 = Give the children a set of 15 objects. How could we solve this calculation using the objects? Can the children show the two ways of solving by sharing the objects out between 5 people and then putting the objects into groups of 5? Compare the answers. What does the 3 represent in each case? Are children linking division with known multiplication facts i.e. did they just know the answer was 3? Could they count in 5s quickly?  Arrange the objects in an array– modelling both types of language. 15 divided into groups of 5 gives us 3 in each group (row) – 15 shared between 5 (imagine each person gets a column) gives us 3 each Children to complete fluency questions involving sharing and grouping using concrete or pictorial representations.
When shown an array can record 2 repeated addition, 2 multiplication and 2 division facts **Can explain why a division calculation cannot be done in any *order e.g. Why is 2 ÷ 10 not 5?***	Encourage children to notice that the images being used for division match those they used for multiplication. Can they write division facts and multiplication facts for the same array? What about the repeated addition facts too? (Many children will need to build up to this gradually) Address misconceptions about the order of the numbers in the division calculation that will inevitably arise by referring back to initial input when we were sharing counters into groups. Can we share 2 counters between 10 people and give them 5 each?  Mastery This array represents 5 × 3 = 15. Write three other multiplication or addition facts that this array shows. Write one division fact that this array shows. For children who are secure with the related facts explore facts with the = in the non-standard position. 15 = 3 x 5 3 = 15 ÷ 5

Investigating the inverse	Children list some multiplication facts that they now know and have learned and developed through the unit so far. Take one fact and represent it with an array as the concrete representation. Link the array to creating a multiplication triangle as the pictorial representation and discuss with children the other calculations that can be derived from that known fact, e.g. 10 x 2 = 20  **Missing number style questions** How could we use a multiplication triangle to help us solve ? x 5 = 20? How does this link back to the use of an array? Extend to I think of a number or function machine problems, e.g. I think of a number and multiply it by 6, the answer is 30, What was my number?
Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts	You may decide to integrate word problems at appropriate points throughout the unit of work and then provide the children with a range of problems at this stage in the unit. This will enable you to assess how well the children have understood and retained the vocabulary and methods during the unit of work. Children should be using knowledge of times table facts or concrete/pictorial/abstract strategies from this unit to aid in calculating problems such as these: **Mastery** Sally buys 3 cinema tickets costing £5 each. How much does she spend? Write the multiplication number sentence and calculate the cost. If Sally paid with a £20 note, how much change would she get? Two friends share 12 sweets equally between them. How many do they each get? Write this as a division number sentence. Make up two more sharing stories like this one. Chocolate biscuits come in packs (groups) of 5. Sally wants to buy 20 biscuits in total. How many packs will she need to buy? Write this as a division number sentence. Make up two more grouping stories like this one.

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Children working at Greater Depth will need to solve multi-step problems in order to gain evidence of this TAF statement

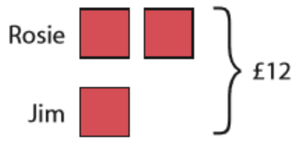
- solve unfamiliar word problems that involve more than one step (e.g. 'which has the most biscuits, 4 packets of biscuits with 5 in each packet or 3 packets of biscuits with 10 in each packet?')

Mastery with Greater Depth

Which has the most biscuits:
4 packets of biscuits with 5 in each packet, or
3 packets of biscuits with 10 in each packet?

Explain your reasoning.

Together Rosie and Jim have £12.
Rosie has twice as much as Jim.
How much does Jim have?
The bar model can be helpful in solving these types of problems.



$12 \div 3 = 4$
Jim has £4

Two friends want to buy some marbles and then share them out equally between them.
They could buy a bag of 13 marbles, a bag of 14 marbles or a bag of 19 marbles.
What size bag should they buy so that they can share them equally?

What other numbers of marbles could be shared equally?

Explain your reasoning.

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Consolidation and Problem Solving

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Problems such as Biscuit Decorations have been covered within the unit of work however it would be useful to consolidate children's understanding by tackling a range of substantial problems at this stage in the unit. e.g.
NRICH – Odd times Even
NRICH – Magic Plant
Maths Challenges for Able Pupils – Birds' Eggs
Maths Challenges for Able Pupils – Spaceship

Consider how to make these problems accessible for all children and how to challenge children further by probing their thinking and asking them to evaluate their methods once the problems have been solved.

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Odd Times Even

Age 5 to 7
Challenge Level ★★★

Choose any two numbers, such as 4 and 5. One must be even and the other odd.

Try multiplying them together. How could you show this?

Lewis used a number line:

Show

Morven used Multilink cubes:

Show

Athol used counters:

Show

What do you notice about the answer?

Look closely at one of these models.

Can you see anything in it that would work in exactly the same way if you used the same model with a different pair of even and odd numbers?

Can you use your one example to prove what will happen every time you multiply an even number and an odd number together?

See if you can explain this to someone else.

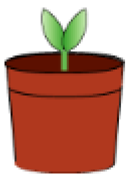
Are they convinced by your argument?

NRICH – Magic Plant

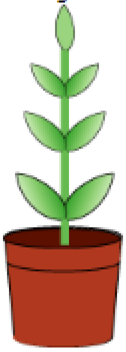
Magic Plant

Age 5 to 7
Challenge Level ★★

On Friday at 9 am, the magic plant was only 2 centimetres tall.



Every twenty four hours, it doubled its height.



How tall was it on Monday at 9 am?

Maths Challenges for Able Pupils

Birds' eggs

You may need 19 counters.

Three birds laid some eggs.
Each bird laid an odd number of eggs.
Altogether they laid 19 eggs.

How many eggs did each bird lay?
Find different ways to do it.

Spaceship

Some Tripods and Bipods flew from planet Zeno.
There were at least two of each of them.

Tripods have 3 legs.
Bipods have 2 legs.
There were 23 legs altogether.

How many Tripods were there?
How many Bipods?

Find two different answers.