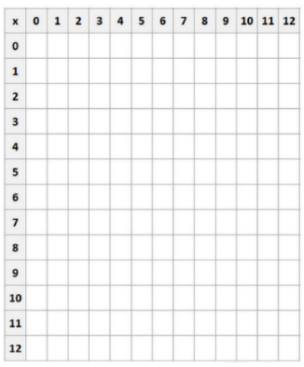
Planning Overview
Year 4 Multiplication and Division

Recall multiplication and division facts for multiplication tables up to 12 × 12
Use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers
Recognise and use factor pairs and commutativity in mental calculations
Multiply two-digit and three-digit numbers by a one-digit number using formal written layout
Solve problems involving multiplying and adding, including using the distributive law to multiply two-digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects.

4NF–1 Recall multiplication and division facts up to 12x12 and recognise products in multiplication tables as multiples of the corresponding number.
4NF–2 Solve division problems, with two-digit dividends and one-digit divisors, that involve remainders.
4NF–3 Apply place-value knowledge to known additive and multiplicative number facts (scaling facts by 100).
4MD–1 Multiply and divide whole numbers by 10 and 100 (keeping to whole number quotients); understand this as equivalent to making a number 10 or 100 times the size.
4MD–2 Manipulate multiplication and division equations, and understand and apply the commutative property of multiplication.
4MD–3 Understand and apply the distributive property of multiplication.

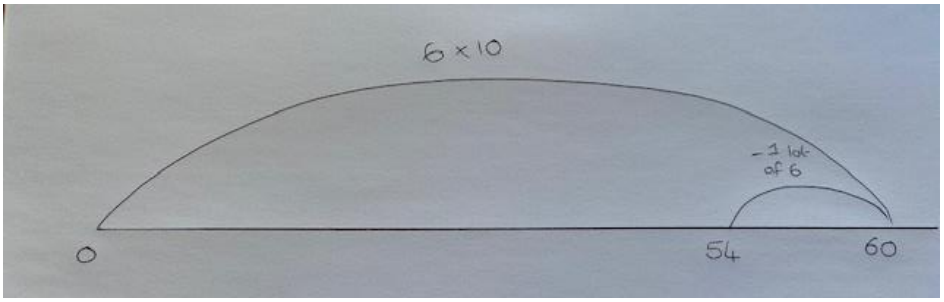
Begin to build up a multiplication grid on your working wall
Encourage the children to think about the facts that they know and to recognise the ones that have a clear pattern (2s, 5s, 10s).



Discuss multiplication by zero.
2 x 0 = 0, 5 x 0 = 0, 10 x 0 = 0 What do you notice? What do you think the other times tables are going to have in this column and row? Can we complete these sections?

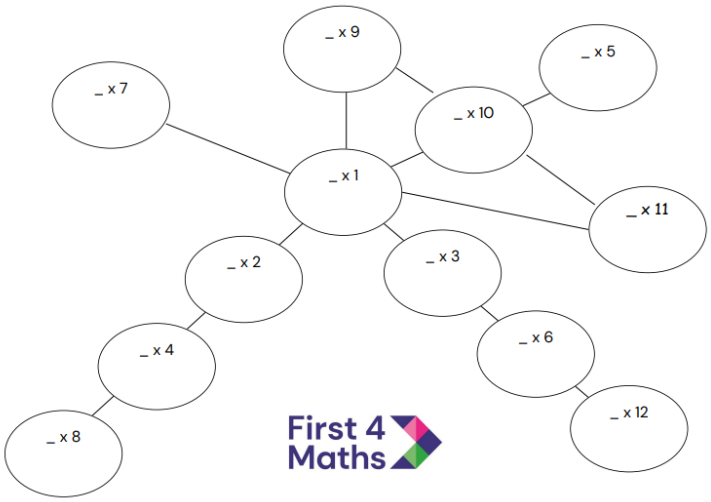
Discuss the commutative law and find other facts that they know based on the easier ones that you have filled out. What does that leave us to learn? With each fact we are able to fill in 2 boxes on the times table chart. Leave the remaining facts in the 6x, 7x, 9x, 11x and 12x tables and complete these after the explicit teaching of those tables.

Mr DeMaio – times tables songs
Top to bottom – Mathsticks
Dice tag multiplication – Mathsticks
Times tables tickets – Mathsticks
Times tables Dominoes – Mathsticks
Times tables battleships – Mathsticks
Times tables top trumps – Mathsticks
Times tables aerobics

Objective	Teaching and Learning
Introduction/ recap on multiplication facts	Practical session – range of calculations and resources on each table. Choose a calculation and represent it in different ways. Y2 – 2x, 5x and 10x Y3 – 3x, 4x and 8x What's the same, what's different? How could you represent this using the bar model or other image?
6x tables	Build the 6x tables. Which ones do you know through your other times tables? Circle the known facts in red.  Discuss how you could work out a fact that you didn't know. If I know 10 x 6 how can I work out 9 x 6? Children to use Numicon, a blank number line or an array of counters to support their explanations. 

Children to complete times table fact sheet using these relationships.

Times Table Facts



Give children the sentence below.
If I know ____I can work out ____by____
Can children solve word problems linked to the 6x table?

Sam says 'if I multiply 6 by 0, I will get 6, is he correct? Explain your reasoning'

Challenge thinking by considering how to compensate when working out other facts e.g. to calculate 7 x 6, would I do 6 x 6 + 7 or 6 x 6 + 6?

Missing-number/symbol problems:

- *'Fill in the missing numbers.'*

$7 \times 6 = 6 \times \square + 6$ $\quad 9 \times \square = 10 \times 6 - 6$

$6 \times 9 - 6 = \square \times 6$ $\quad \square \times 6 + 6 = 10 \times 6$

From NCETM PD materials for Year 3

Children may need to use counters or numicon to support their explanations.

Mastery

Three children calculated 7 × 6 in different ways.
Identify each strategy and complete the calculations.

Annie	Bertie	Cara used the commutative law
$7 \times 6 = 7 \times 5 + \square$ $= \square$	$7 \times 6 = 7 \times 7 - \square$ $= \square$	$7 \times 6 = \square \times \square$ $= \square$

Now find the answer to 6 × 9 in three different ways.

<table>
<tr><td>12x tables</td><td>Look at the relationship between the multiples of 6 and the multiples of 12.

<table>
<tr><th></th><th>x6</th><th>x12</th></tr>
<tr><td>1</td><td>6</td><td>12</td></tr>
<tr><td>2</td><td>12</td><td>24</td></tr>
<tr><td>3</td><td>18</td><td>36</td></tr>
<tr><td>4</td><td>24</td><td>48</td></tr>
<tr><td>5</td><td>30</td><td>60</td></tr>
<tr><td>6</td><td>36</td><td>72</td></tr>
<tr><td>7</td><td>42</td><td>84</td></tr>
<tr><td>8</td><td>48</td><td>96</td></tr>
<tr><td>9</td><td>54</td><td>108</td></tr>
<tr><td>10</td><td>60</td><td>120</td></tr>
<tr><td>11</td><td>66</td><td>132</td></tr>
<tr><td>12</td><td>72</td><td>144</td></tr>
</table>

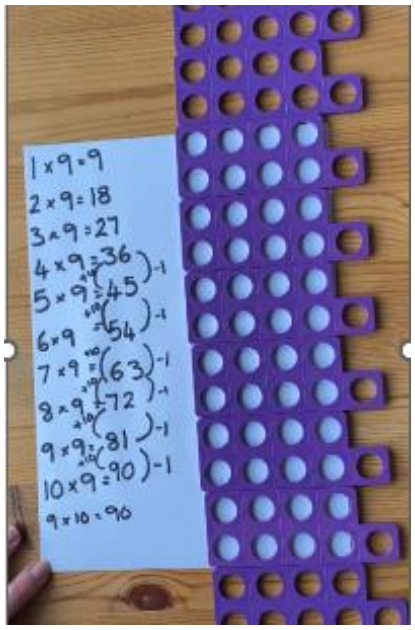
Can children see that multiples of 12 are double the multiples of 6?

Complete the times tables facts sheet using a range of strategies to elicit unknown facts.</td></tr>
<tr><td>9x tables</td><td>There are lots of tricks for remembering the facts for the nine times table but make sure children understand why they work.

Use the strategy of compensating. Instead of finding 9 lots of the number, find 10 lots instead and take one lot off.

Complete the times tables facts sheet as you have for 6 and 12 times tables using a range of strategies.

Can children use apparatus like Numicon to explain the pattern in the 9 times table and not just the trick? We always add one ten to tens column and then subtract one from the ones column.

 
</td></tr>
</table>

Look at all the multiples of 9. What do these have in common?

Number	Sum of the Digits
9	9
18	9
27	9
36	9
45	9
54	9
63	9
72	9
81	9
90	9
99	9
108	9

Can children see that if you add up the digits of the multiples of 9 that you always equal 9?

Find the multiples of 9. How do you know these are multiples of 9?

9	108	63
19	118	263
29	168	563
99	198	963

Word problems.

Top to bottom – Mathsticks

Multiples of 9

14	33	11	35	54	1	3	15
24	18	27	90	99	12	40	16
34	36	11	104	58	53	28	115
23	108	48	81	27	81	9	54
17	45	9	63	25	51	8	108
1	35	93	86	33	9	45	72
30	4	55	4	30	90	47	49
41	10	7	39	21	36	22	32

<table>
<tr><td>11x tables</td><td>Which facts can the children work out for the 11x table? What patterns can they spot?

Tell the children that 11 x 11 is the most difficult fact to remember as it doesn't follow the same pattern as the previous facts. How can they help you work this out? You could use compensation 11 x 10 = 110 then add 11 to get 121. If you look at 11 and 11 side by side a trick can be to add the two middle 1s together to get 121. Can all of the children wear a sticker for the day to help you remember this fact?</td></tr>
<tr><td>7x tables</td><td>Ask children to fill in a multiplication grid for all of the facts that they know so far. As they are completing the grid can they talk about what they know with regards to each times table.

'I know my 2 times table is doubling, they have a pattern of 2, 4, 6, 8, 0'
'I know my 4 times table because I can double my 2 times table or I can double and double again'
Once the children have filled in the grid, can they see that they only have 2 facts left to fill in now – 7x7 and 1x7?

 
<table><tr><th>X</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th><th>8</th><th>9</th><th>10</th><th>11</th><th>12</th></tr><tr><td>1</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td></tr><tr><td>2</td><td>2</td><td>4</td><td>6</td><td>8</td><td>10</td><td>12</td><td>14</td><td>16</td><td>18</td><td>20</td><td>22</td><td>24</td></tr><tr><td>3</td><td>3</td><td>6</td><td>9</td><td>12</td><td>15</td><td>18</td><td>21</td><td>24</td><td>27</td><td>30</td><td>33</td><td>36</td></tr><tr><td>4</td><td>4</td><td>8</td><td>12</td><td>16</td><td>20</td><td>24</td><td>28</td><td>32</td><td>36</td><td>40</td><td>44</td><td>48</td></tr><tr><td>5</td><td>5</td><td>10</td><td>15</td><td>20</td><td>25</td><td>30</td><td>35</td><td>40</td><td>45</td><td>50</td><td>55</td><td>60</td></tr><tr><td>6</td><td>6</td><td>12</td><td>18</td><td>24</td><td>30</td><td>36</td><td>42</td><td>48</td><td>54</td><td>60</td><td>66</td><td>72</td></tr><tr><td>7</td><td>7</td><td>14</td><td>21</td><td>28</td><td>35</td><td>42</td><td>49</td><td>56</td><td>63</td><td>70</td><td>77</td><td>84</td></tr><tr><td>8</td><td>8</td><td>16</td><td>24</td><td>32</td><td>40</td><td>48</td><td>56</td><td>64</td><td>72</td><td>80</td><td>88</td><td>96</td></tr><tr><td>9</td><td>9</td><td>18</td><td>27</td><td>36</td><td>45</td><td>54</td><td>63</td><td>72</td><td>81</td><td>90</td><td>99</td><td>108</td></tr><tr><td>10</td><td>10</td><td>20</td><td>30</td><td>40</td><td>50</td><td>60</td><td>70</td><td>80</td><td>90</td><td>100</td><td>110</td><td>120</td></tr><tr><td>11</td><td>11</td><td>22</td><td>33</td><td>44</td><td>55</td><td>66</td><td>77</td><td>88</td><td>99</td><td>110</td><td>121</td><td>132</td></tr><tr><td>12</td><td>12</td><td>24</td><td>36</td><td>48</td><td>60</td><td>72</td><td>84</td><td>96</td><td>108</td><td>120</td><td>132</td><td>144</td></tr></table>
Ask children to chant the 7x table and complete a times table fact sheet to help them with their recall of the more difficult facts.
We looked at 11 x 11 being a tricky fact to remember, which other facts do we find hard? Can we come up with strategies to help us remember these? E.g. 7 x 8 = 56 is often a tricky one. Try this – "Five, six, seven, eight, fifty six is seven times eight." 5678 - 56 = 7 x 8

Provide the children with a range of word problems to consolidate the full range of times table facts.</td></tr>
<tr><td>Links and development of multiplication</td><td>Play multiple aerobics as a starter. Count to 30. In the first round raise your left hand for multiples of 3. In the second round continue with the left hand but also raise your right hand for multiples of 6. In the final round keep the left and right hands going but now also stand up for multiples of 9. When are you completing all 3 actions? No actions? What do you notice?</td></tr>
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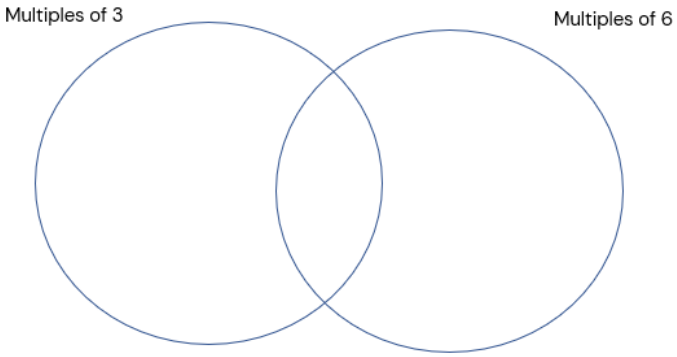
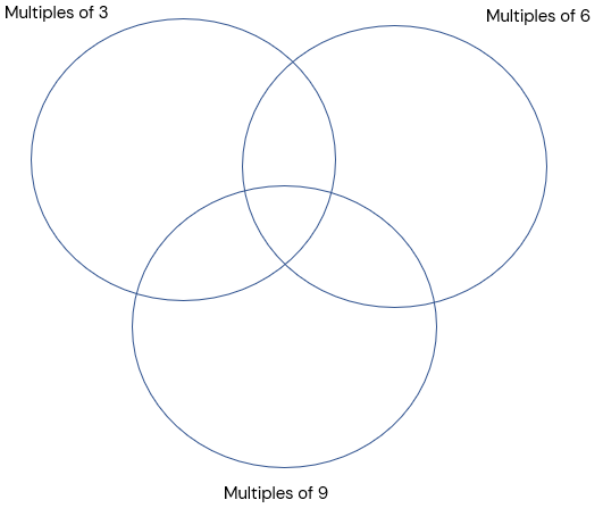
	Complete Venn diagrams e.g. 3x and 6x. What do you notice?  Which area contains no numbers? Why?  Write the numbers 1 to 30 into the Venn diagram. Where should a number go if it is a multiple of both 3 **and** 6? What if it is a multiple of 6 **and** 9? What do you notice about the sections of the Venn Diagram? Can you explain why that happens? Captain Conjecture says "All multiples of 6 are multiples of 3 so all multiples of 3 are multiples of 6" Sometimes/Always/Never x6 are even x3 are odd Multiples of 6 are multiples of 3 Multiples of 3 are multiples of 6 Give children one statement at a time and ask them to find true and false examples of each statement. Does this help them to decide if it is Sometimes, Always or Never true? Use these examples to explain why.

<table>
<tr>
<td>x by 10 and 100</td>
<td>Show children, using practical resources and a place value chart, the effect of a number becoming 10 x bigger and 100 x bigger. What do you notice?

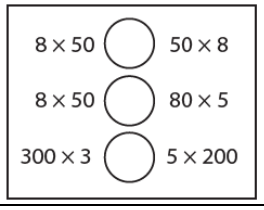
Ensure that they understand that the numbers are becoming 10 x or 100 x bigger as they move to the left.

Look at related calculations with numbers that are 10x or 100x bigger. Can the children say what is the same and what is different about the calculations? Can they discuss what has happened to the original calculation in each case to support them with their reasoning?

Mastery
What do you notice about the following calculations? Can you use one calculation to work out the answer to other calculations?
$2 \times 3 =$ $6 \times 7 =$ $9 \times 8 =$
$2 \times 30 =$ $6 \times 70 =$ $9 \times 80 =$
$2 \times 300 =$ $6 \times 700 =$ $9 \times 800 =$
$20 \times 3 =$ $60 \times 7 =$ $90 \times 8 =$
$200 \times 3 =$ $600 \times 7 =$ $900 \times 8 =$

Greater Depth – ask children to predict/explain which symbols are used without calculating first.

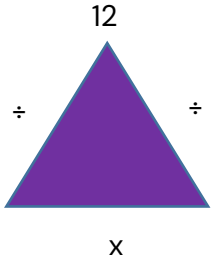
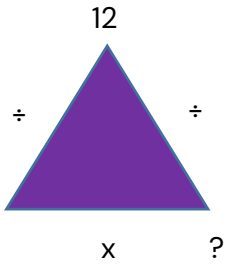
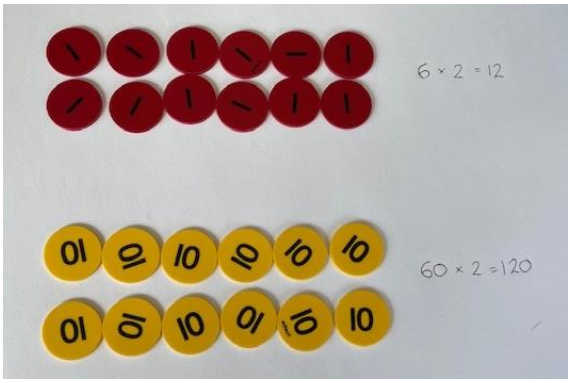
Mastery with Greater Depth
Place one of these symbols in the circle to make the number sentence correct: >, < or =.

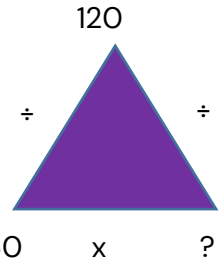
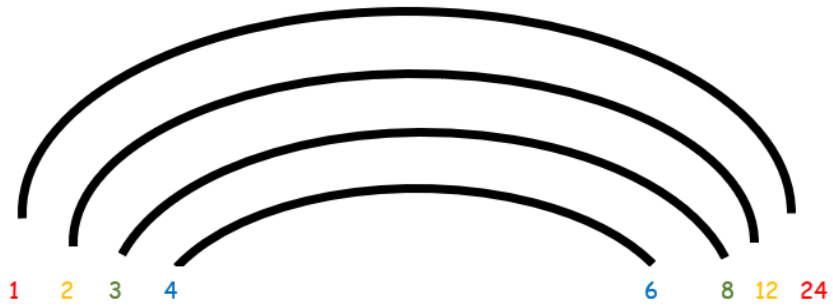
Explain your reasoning.
 
</td>
</tr>
<tr>
<td>Divide by 1, 10, 100</td>
<td>Discuss what happens when you divide by 1, 10, 100. Show this on a place value chart.

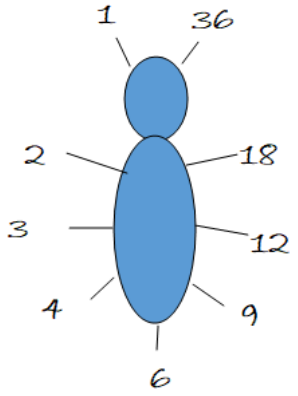
Exemplify dividing by 1 with a context relevant to your class e.g. You have 6 footballs, you share them into 1 bag, how many are in the bag?

Complete fluency questions including the use of missing number questions.

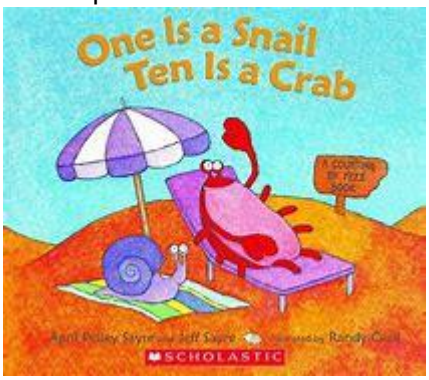
The answer is 36 what was the division calculation?</td>
</tr>
</table>

Arrays and the link to division	How many arrays can you make with 12 counters? Can you work systematically? 12 x 1, 6 x 2, 3 x 4 (half one side double other) What sentences can you make from what you have just done? 12 counters shared into rows of 3 gave me 4 rows. 12 ÷ 3 = 4 12 counters shared into rows of ___ gave me __ rows. 12 ÷ __=__ Show this on a multiplication triangle and ask children to record the calculations  Complete a range of these questions to ensure that the children are confident and then extend to missing number questions. 3 x ? = 12 Where would the ? be on the multiplication triangle, how would we work it out?  6 x ? = 42 56 ÷ ? = 8 Use 10s counters to show the link to multiples of 10. How many ways could this multiplication triangle be completed and what are the related facts? 

	Model the language of scaling ' Each of the yellow counters are worth 10 times more so the number I am multiplying is worth 10 times more. As a result of this, my answer is worth 10 times more' How can children apply this skill to solving unknown facts? 40 x 5 = ? I can make 40 ten times smaller to use my known fact of 4 x 5 = 20. I need to make this answer 10 times bigger to answer my original question. Apply this scaling understanding to multiplication triangles. Apply to missing number questions. 60 x ? = 120 120 ÷ ? = 60 
Factors	Link to division Give definition of a factor – A **factor** is a number that divides into another number exactly, without leaving a remainder. Use counters if needed but encourage children to work systematically and use factor rainbows or bugs to support this. The outside arch of the rainbow is always 1 and itself. Then encourage the children to think about the next arch and whether 2 will be a factor, then the number 3 and so on. Children can see when they have found all the factors as the numbers running along the bottom of the rainbow should be in order. Factors of 24 

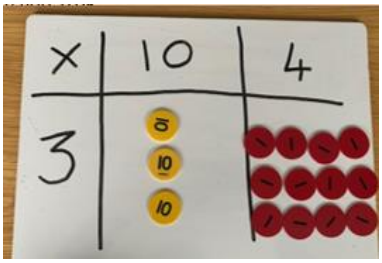
	If it is a square number, that number is the pot of gold under the rainbow. Factor bugs have the number and itself on the antennae and then the factors are the pairs of legs. If it is a square number the tail is that number. Captain conjecture says "The bigger the number, the more factors it has." Is this true? 
Multiplying 3 numbers	5 x 3 x 2 = 5 x 2 x 3 = 3 x 5 x 2 = 3 x 2 x 5 = 2 x 5 x 3 = 2 x 3 x 5 = What's the same and what's different about the calculations above? Do children get the same answer whichever way they multiply these 3 nubmers together? Can you explain the patterns you have spotted? Can you show why this works using an array? Which order would you prefer to multiply 6, 3 and 2? Is it easier to have the 2 at the beginning or the end? Why? 2 x 6 x 4 4 x 6 x 2 **Mastery** Use your knowledge of multiplication tables to complete these calculations. $7 \times 6 =$ $7 \times 2 \times 3 =$ $8 \times 7 =$ $2 \times 4 \times 7 =$ $2 \times 2 \times 2 \times 7 =$ $12 \times 6 =$ $13 \times 6 =$ $12 \times 12 =$ $12 \times 13 =$ $12 \times 0 =$ Which calculations have the same answer? Can you explain why? *By the end of the year pupils should be fluent with all table facts up to 12 × 12 and also be able to apply these to calculate unknown facts, such as 12 × 13.*

	Mastery with Greater Depth True or false? $7 \times 6 = 7 \times 3 \times 2$ $7 \times 6 = 7 \times 3 + 3$ Explain your reasoning. Can you write the number 30 as the product of 3 numbers? Can you do it in different ways? Greater Depth Ask children to think about how they can factorise a number in a multiplication calculation to make it easier to attempt mentally. 6 x 24 = What factor pairs of 24 are easier numbers to work with? Show children using how we can make this into 6 x 2 x 12 and then rearrange this to 6 x 12 x 2
Correspondence and scaling	Children to have towers 1 – 10 in front of them, choose 2 towers where one is twice as big as the other. Three times as big, four times as big. Take children's answers and represent them with a bar model. Tackle a range of word problems using this type of language. E.g. I am baking cakes. I need 3 times as much flour as sugar. If I have 200g of sugar, how much sugar do I need? **Mastery** Tom ate 9 grapes at the picnic. Sam ate 3 times as many grapes as Tom. How many grapes did they eat altogether? *The bar model is a useful scaffold to develop fluency in this type of question.* **Mastery with Greater Depth** Sally has 9 times as many football cards as Sam. Together they have 150 cards. How many more cards does Sally have than Sam? *The bar model is a useful scaffold to develop fluency in this type of question.*

	Problem solving for all children Use specific animals from 'One is a snail, ten is a crab' as a way to practise correspondence problems.  If I can see 40 legs and there are just dogs and spiders what could I see?
Mental strategies	How would you multiply 18 x 5? Double one side, half the other Show using an array that if you spilt the counters halfway along the 18 side and slide those below to double to double the other side, the number of counters remains the same but the calculation now becomes 9 x 10. Partitioning Show using the same array that you can split the counters along the 18 side to make 10 and 8. This gives you 10 x 5 and 8 x 5 Compensating Thinking of the calculation as 20 x 5 and then subtracting 2 lots of 5 from our answer. Which of the methods above would work for 19 x 5? Why wouldn't half and double work well with this calculation? Give children a range of calculations to sort into ones that they might solve using doubling and halving, using partitioning or using compensating.
Consolidation and Problem Solving	Range of word problems linked to multiplication and division – can children decide whether it is multiplication or division based on the language used? Can they choose an appropriate method to solve their calculations?

<table>
<tr>
<td>Written multiplication</td>
<td>
Secure children's understanding of partitioning using resources such as Place Value Counters.

Using your school's progression in calculation document, slowly build up children's ability to solve TO x O and HTO x O. Depending on their confidence and retention from Y3, this may include the partitioning method, grid method, expanded compact method and then compact method. You may need to use Place Value counters and other resources to support understanding.

Grid - concrete


Grid – abstract
<table>
<tr><td>x</td><td>10</td><td>4</td></tr>
<tr><td>7</td><td>70</td><td>28</td></tr>
</table>

Expanded short
14
x 7
70 (10x7)
28 (4x7)
98

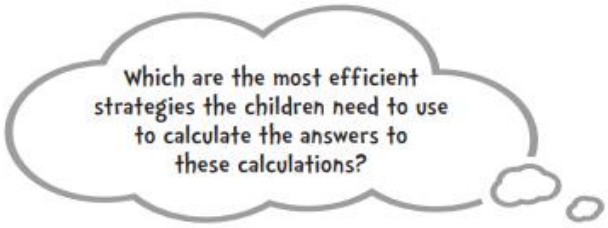
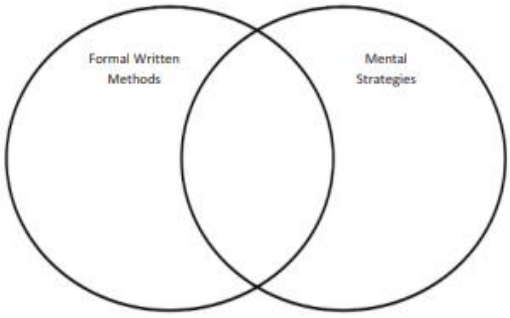
Short
14
x 7
98
2

Use a column method to calculate the following:
324 x 4 234 x 8 123 x 3

Extend to missing number questions.
</td>
</tr>
</table>

<table>
<tr><td>Written division</td><td>No specific objective for written division in Y4 but please refer to your school progression in calculation document for confirmation of this.</td></tr>
<tr><td>Consolidation and problem solving</td><td>Do children understand when to use a mental method or a written method for multiplication and division?

Give the children a selection of problems that require a mix of the 4 operations. Can they identify which operations are needed for each problem? Have they retained their addition and subtraction strategies?

First4Maths Digging deeper problem
A class of children are given these problems. Can you solve them? What do you think they noticed?
<table><tr><td>3x3x3x3=</td><td>3x3x9=</td><td>9x9x9=</td><td>154x8=</td></tr><tr><td>16x2=</td><td>8x4=</td><td>6x6x6=</td><td>12x6x3=</td></tr></table> 
EXPLORE
Discuss with the children the strategies they used to solve the calculations. Can the children identify where the calculations would go in the Venn diagram below? How do they categorise them between mental, written method or mental with jottings?
 

Solve word problems for a range of multiplication and division questions.

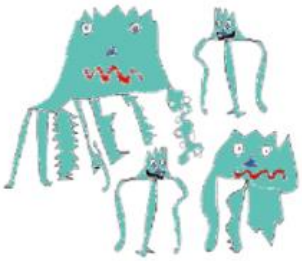
If children are struggling to unpick the calculation, can they use a bar model to support them in developing their understanding of what information they have and where the answer would be in their bar?</td></tr>
</table>

NRICH – Zios and Zepts

Zios and Zepts

Age 7 to 11
Challenge Level ★

On the planet Vuv there are two sorts of creatures. The Zios have 3 legs and the Zepts have 7 legs.



The great planetary explorer Nico, who first discovered the planet, saw a crowd of Zios and Zepts. He managed to see that there was more than one of each kind of creature before they saw him. Suddenly they all rolled over onto their backs and put their legs in the air.

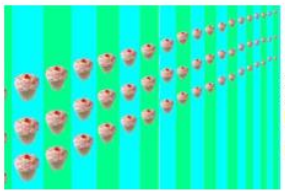
He counted 52 legs. How many Zios and how many Zepts were there?
Do you think there are any different answers?

NRICH – Let us Divide

Let Us Divide!

Age 7 to 11
Challenge Level ★

Show us how you could answer the questions using
- words?
- pictures?
- numbers?
- objects?
- other ways?



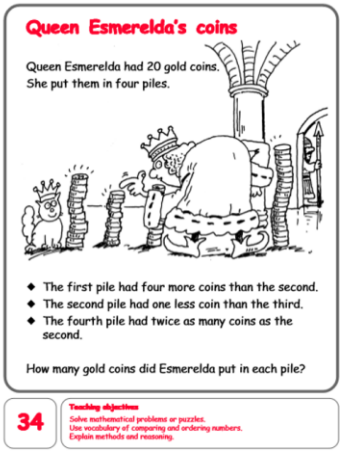
It's Jola's birthday and she is having a party. She has 24 cup cakes to share equally between 3 plates for the party.

How many cakes will go on each plate?

There are 8 children coming to the party. They are all going to the cinema.

How many cars will they need to take them there? Each car will hold 4 children and they will each need a driver too.

Jola is going to give everyone some chocolate eggs to take home at the end of the party. They fit into egg boxes which hold 6 eggs each. Will 50 eggs be enough for each of the 8 visitors to have a box to take home?



Queen Esmerelda's coins

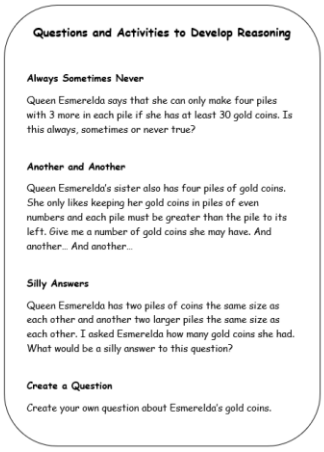
Queen Esmerelda had 20 gold coins.
She put them in four piles.

- The first pile had four more coins than the second.
- The second pile had one less coin than the third.
- The fourth pile had twice as many coins as the second.

How many gold coins did Esmerelda put in each pile?

34

Teaching objectives
Solve mathematical problems or puzzles.
Use vocabulary of comparing and ordering numbers.
Explain methods and reasoning.



Questions and Activities to Develop Reasoning

Always Sometimes Never

Queen Esmerelda says that she can only make four piles with 3 more in each pile if she has at least 30 gold coins. Is this always, sometimes or never true?

Another and Another

Queen Esmerelda's sister also has four piles of gold coins. She only likes keeping her gold coins in piles of even numbers and each pile must be greater than the pile to its left. Give me a number of gold coins she may have. And another... And another...

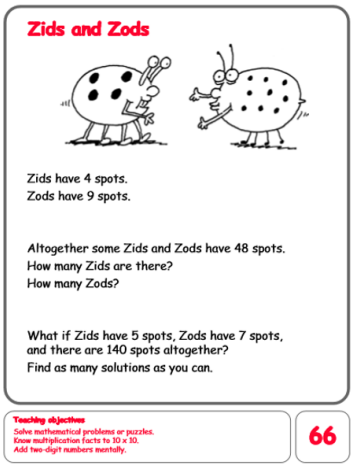
Silly Answers

Queen Esmerelda has two piles of coins the same size as each other and another two larger piles the same size as each other. I asked Esmerelda how many gold coins she had. What would be a silly answer to this question?

Create a Question

Create your own question about Esmerelda's gold coins.

https://www.first4maths.co.uk/product/maths-challenges-with-reasoning/



Zids and Zods

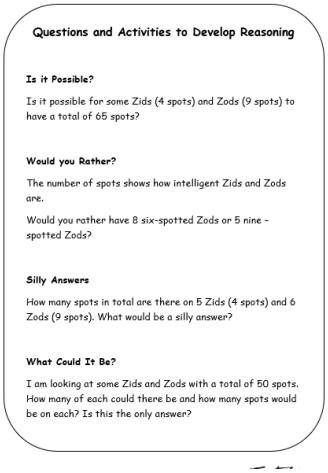
Zids have 4 spots.
Zods have 9 spots.

Altogether some Zids and Zods have 48 spots.
How many Zids are there?
How many Zods?

What if Zids have 5 spots, Zods have 7 spots, and there are 140 spots altogether?
Find as many solutions as you can.

Teaching objectives
Solve mathematical problems or puzzles.
Know multiplication facts to 10 x 10.
Add two-digit numbers mentally.

66



Questions and Activities to Develop Reasoning

Is it Possible?

Is it possible for some Zids (4 spots) and Zods (9 spots) to have a total of 65 spots?

Would you Rather?

The number of spots shows how intelligent Zids and Zods are.

Would you rather have 8 six-spotted Zods or 5 nine-spotted Zods?

Silly Answers

How many spots in total are there on 5 Zids (4 spots) and 6 Zods (9 spots). What would be a silly answer?

What Could It Be?

I am looking at some Zids and Zods with a total of 50 spots. How many of each could there be and how many spots would be on each? Is this the only answer?

https://www.first4maths.co.uk/product/maths-challenges-with-reasoning/

Problem solving with addition and multiplication using a 100 square. This problem has been taken from the First4Maths Digging Deeper Year 4 Book.

51	52	53

How many different ways can you find the total of these 3 numbers?

Suggested answers

51+52+53=
52x3=
51x3+3=
53x3-3=

Can children say which they think is most efficient?

Explore further examples of adding 3 consecutive numbers and discuss methods.

What if it we were finding the total of 3 vertical numbers on a 100 square?

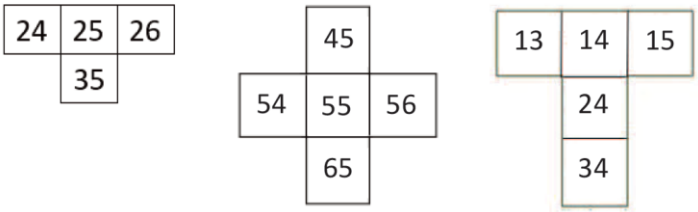
41
51
61

Suggested answers

41+51+61=
51x3=
41x3+30=
61x3-30=

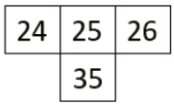
TAKING IT FURTHER

Display the shapes below to the children.



How would they work out the total of the numbers in these shapes?

Suggested answer



Because of the numbers in this diagram I am going to choose to multiply the top middle number (25) by 4 and add 10. I chose this number because it was easier than multiplying the top left number (24) by 4 and adding 14

Do children understand that each rule will work wherever they place their shape on the 100 square, but the most efficient method may change depending on the numbers used?