National Curriculum Aims: Fluency Reasoning Problem-Solving

Medium Term Planning Year 2 Theme 5: Solving problems involving multiplication and division

Approximately 4 weeks

KEY THEMATIC IDEAS: connecting the strands and meeting National Curriculum aims

The main focus of this theme is to introduce pupils to multiplication tables, and then use them to solve both multiplication and division problems. Children will already have experience of doubling and halving (& quartering in fractional contexts), and counting in different steps. They will now take this a step further by representing multiplication tables as patterns, both practically and visually. Children will explore patterns found in repeated addition *4 x 3 = 3 + 3 + 3 + 3 …. 3, 6, 9, 12 …* and record by highlighting multiples on a number line, in a hundred square: *can you describe the pattern?* and on a clock face: *is 43 a multiple of 5? How do you know?* They count forwards and backwards to answer multiplication and division questions. Using counters and other objects to make arrays will support the commutative aspect of multiplication 3 x 4 = 4 x 3 which will reinforce a clear understanding of the equals sign e.g. as a balance, either side has the same value as or 'the same value, but different appearance', leading on to solving missing number (empty box) puzzles. Multiplication and division facts (and doubling/halving) are explored alongside each other *2 x 5 = 10, 10 ÷ 5 = 2 , 1/2 of 10 = 5, 1/5 of 10 = 2* as 'fact families'. Children develop mental strategies to work out unknown facts, for example, *8 x 4 = 8 x 2 x 2.* Finding fractions of a quantity is explicitly related to division *1/4 of 40 = 40 ÷ 4* though practical exploration building on Theme 4. Regular opportunities to practise and learn multiplication and division facts support their use to solve word problems and problems involving fractions *I know 1/2 of 8 is 4 because I can double 4 to get 8.* **Refer to calculation policy for modelling of mathematical language and concepts.**

SIMMERING SKILLS AND ACTIVITIES within and beyond the daily maths lesson

- Tell and write the time to five minutes, including quarter to/past the hour and draw hands on a clock face to show these times
- Interpret and construct simple pictograms, tally charts, block diagrams, and simple tables
- Ask and answer simple questions about totalling categorical data by counting the number of objects
- Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts to 100
- Recognise and use symbols for pounds (£) and pence (p); combine amounts to make a particular value
- Describe position, direction and movement, including whole, half, quarter and three-quarter turns (from Year 1)

N.C.	Number - Multiplication and Division	Number - Fractions	Number - Place value
STATUTORY	Recall and use multiplication and division facts for the 2, 5 and 10 multiplication, 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.	Recognise, find, name and write fractions, 1/3, 1/4, 2/4 and 3/4 and 3/4 of a length, shape, set of objects or quantity Write simple fractions for example, 1/2 of 6 = 3	Count in steps of 2, 3, and 5 from 0, and in tens from any number, forward and backward Identify, represent and estimate numbers using different representations, including the number line
NON-STATUTORY	Pupils use a variety of language to describe multiplication and division. Pupils are introduced to the multiplication tables. They practise to become fluent in the 2, 5 and 10 multiplication tables and connect them to each other. They connect the 10 multiplication table to place value, and the 5 multiplication table to the divisions on the clock face. They begin to use other multiplication tables and recall multiplication facts, including using related division facts to perform written and mental calculations. Pupils work with a range of materials and contexts in which multiplication and division relate to grouping and sharing discrete and continuous quantities, to arrays and to repeated addition. They begin to relate these to fractions and measures (for example, 40 ÷ 2 = 20, 20 is a half of 40). They use commutativity and inverse relations to develop multiplicative reasoning (for example, 4 × 5 = 20 and 20 ÷ 5 = 4).	Pupils connect unit fractions to equal sharing and grouping, to numbers when they can be calculated, and to measures, finding fractions of lengths, quantities, sets of objects or shapes. They meet 2/4 and 3/4 as the first examples of non-unit fractions.	Using materials and a range of representations, pupils practise counting, reading, writing and comparing numbers to at least 100 and solving a variety of related problems to develop fluency. They count in multiples of three to support their later understanding of a third. As they become more confident with numbers up to 100, pupils are introduced to larger numbers to develop further their recognition of patterns within the number system and represent them in different ways, including spatial representations

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EXEMPLAR QUESTIONS AND ACTIVITIES: connecting the strands and meeting National Curriculum aims

KEY QUESTION ROOTS to be used and adapted in different contexts

True or false? When you count up in tens starting at 5 there will always be 5 units. How do you know?

Making links with fact families: 6 x 4 = 24, what else do I know? (4 x 6, 24 ÷ 6, 24 ÷ 4, 1/4 of 24, 1/6 of 24)

Missing numbers 10 = 5 x ☐ What number could be written in the box?

Prove It: Which four number sentences link these numbers? 3, 5, 15?

Use the inverse to check if the following calculations are correct: 12 ÷ 3 = 4, 3 x 5 = 14

What do you notice? ¼ of 4 = 1, ¼ of 8 = 2, ¼ of 12 = 3 Continue the pattern. What do you notice?

Show that 8 x 4 = 4 x 8

See Wandsworth LA Calculation Policy for more detail on developing mental and written procedures!

Can some of the key thematic ideas be delivered as part of a mathematically-rich, creative topic? Suggested ideas: Jurassic Park

Dinosaur travel in herds of 8. How many dinosaurs are there in 4 herds?

Iguanodon have three toes on each of its four feet. How many toes does an Iguanodon have in total?

Fossils are packed in boxes, 6 rows with five in each row. How many in one box? Two boxes?

Triceratops means 'three-horned face'. How many triceratops are in the herd if you can count 21 horns?

Dinosaur footprint investigations (see below)

A dinosaur eats ¼ of 20 ferns. How many ferns does he get?

A velociraptor is about 2m long. If 10 velociraptors marched nose to tail how long would the line be?

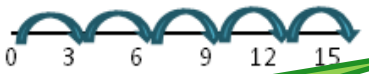
Jurassic Park tickets cost £5. How many friends can you take for £40?

Non routine investigation: Jurassic Park has Coelophysis (which move on 2 legs), Diplodocus (4 legs) and Triceratops (4 legs). The park keeper counts 48 legs. How many of each dinosaurs could there be? What if there were 28 legs?

Models for multiplication:

3 multiplied by 5 → 3 x 5

3 + 3 + 3 + 3 + 3 =

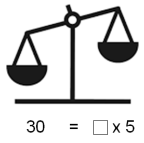


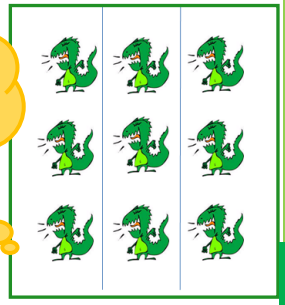
We have 15 counters each. I have 5 groups of 3 counters, '3 five times'. You have 3 groups of 5 counters.

I know a row ⅓ is of the counters because it is one row out of 3 rows

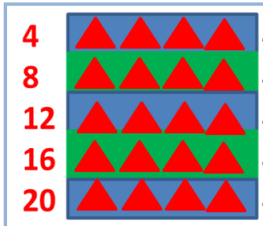
3 x 3 = 9
9 ÷ 3 = 3
1/3 of 9 = 3

The equals sign as a balance





⅓ of 9 = 9 ÷ 3 = 3



4 x 1 = 4 ➡ 1/5 of 20 = 4

4 x 2 = 8

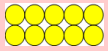
4 x 3 = 12

4 x 4 = 16

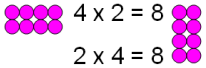
4 x 5 = 20

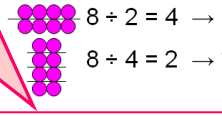
(This diagram demonstrates each row as a fifth of the whole)

What fact families can you find using this array? How



Fact families





Times tables: the 21 facts*

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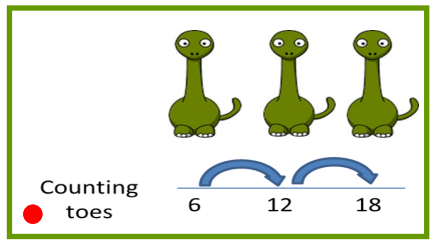

4 groups of 10 Dienes rods make 40. How many rods will I need to make 90?

Arrange 10 counters into an array (e.g. 2 x 5) and then turn the array 90° to reveal its commutative partner (e.g. 5 x 2). Explain that 2 x 5 has the same value as 5 x 2, both with a total of 10. Children can explore the multiplication sentences made with 20 counters (2x10, 10x2, 4x5, 5x4). Draw out the division facts: 20 = 4 x 5 so 20 ÷ 4 = 5 etc

Dinosaur Footprints

To work out a dinosaur's height up to its hip, measure the length of the footprint and multiply it by 4.

How tall was this dinosaur?

My dinosaur is 24cm tall to its hip. How long are his footprints?