DIVISION

Usign objects, diagrams and pictorial representations to solve problems involving **both** grouping **and** sharing

How many groups of 4 can be made with 3 circles

Grouping
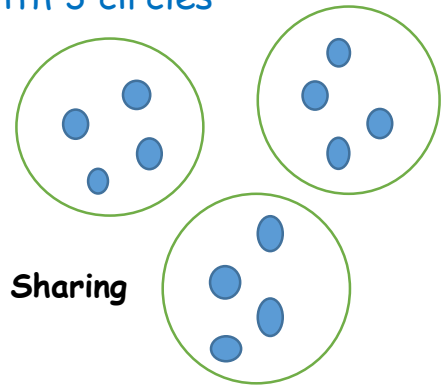
Sharing

Pupils should:

- Use lots of practical apparatus, arrays and picture representations.

- Be taught to understand the difference between "grouping" (how many groups of 2 can you make) and "sharing" (share these sweets between 2 people).

- Be able to count in multiples of 2s, 5s and 10s

- Find half of a group of objects by sharing into 2 equal groups.

Key Vocabulary: share, share equally, one each, two each.., group, groups, lots of, array

Key skills for multiplication at Yr 1:

- **Reasoning:** Solve one step problems involving multiplication and division, by calculating the answer using the concrete objects, pictures and arrays with the support of the teacher.
- Through grouping and sharing small quantities, pupils begin to understand division and finding simple fractions of objects, numbers and quantities.
- They make connections between arrays, number patterns and counting in twos, fives and tens.
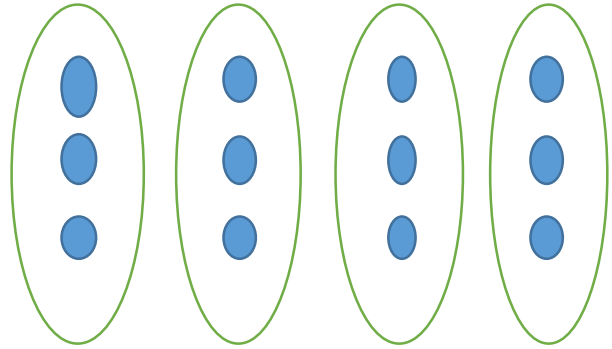
DIVISION

Use objects arrays, diagrams and pictorial representations and grouping on a number line.
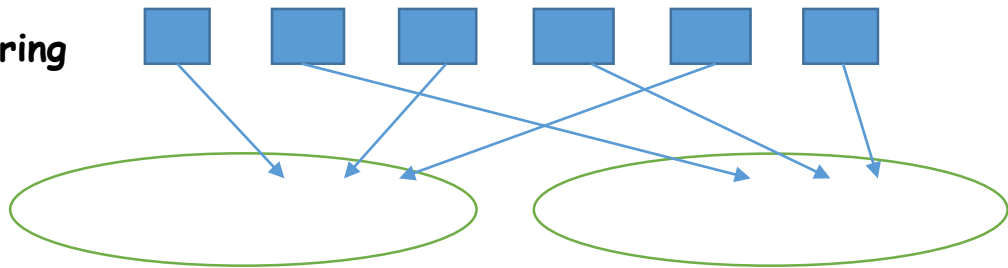
ARRAYS: 12 ÷ 3 = 4

How many groups of 3 are there in 12?

Pupils can also show that the same array can show 12 ÷ 4 if grouped horizontally.

Know and understand sharing and grouping

Sharing

Grouping: There are 6 sweets, how many people can have 2 sweets each?

Children should be taught to recognise whether problems require grouping or sharing

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Key Vocabulary: share, share equally, one each, two each.., group, groups, lots of, array, divide, divided by, divided into, division, grouping, numberline, left, left over

Key Skills for multiplication:
- Count on in steps of 2, 3 and 5 from 0.
- Recall and use multiplication facts for the 2, 5 and 10 times table, including recognition of odd and even numbers.
- Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the x, ÷, and = signs.
- Show can be done in any order whereas division can not.
- **Reasoning**: Solve problems involving multiplication and division using concrete materials, arrays and mental methods; include problems in different contexts.
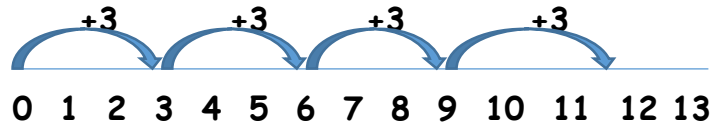
Year 3 Procedural Fluency Divide 2 digit number by a single digit number (where there is no remainder in the final answer

Grouping on a number line
$13 \div 3 = 4 \, r \, 1$

+3   +3   +3   +3

0 1 2 3 4 5 6 7 8 9 10 11 12 13

Step 1: Children continue to work out unknown division facts by grouping on a number line from 0. They are also taught concept of remainders. It should be taught **practically** and with arrays, as well as put onto a number line.

Expanded formal written method:

```
      2 4
  4 | 9 6
      8 0   ( 20 x 4 )
      1 6
      1 6   ( 4 x 4 )
        0
```

Grouping: Relate to repeated subtraction. Keep taking away chunks of 4 until reach 0. Encourage children to record useful "chunks" at the side: 1 / 2 / 5 / 10 / 20 / 50

Teach practically with unifix and arrays. Place value must be aligned when subtracting

Real Life contexts
Need to be used routinely to help pupils gain a full understanding and the ability to recognise the place of division and how to apply

SHORT DIVISION (sharing)

Limit numbers to NO remainders in the answer

```
      2 4
  4 | 9 ₁6
```

Once children are **secure** with division and grouping short division should be introduced. **Use practical equipment such as place value counters** to physically share.

Remind children of place value and that it is 90 and 6 being divided by 3. Build up to having to exchange in the tens column.

Physically exchange the 10 left over into 10 units using the **deinnes** or the **place value counters.**

Key Vocabulary: share, share equally, one each, two each.., group, groups, lots of, array, divide, divided by, divided into, division, grouping, numberline, left, left over, inverse, short division, exchange, multiple

Key Skills for multiplication:
- Recall multiplication facts 2, 3, 4, 5, 8 and 10.
- Write mathematical statements for multiplication and division using tables they know including for 2 digit numbers times 1 digit numbers, using mental and formal methods.
- **Reasoning:** Solve problems in contexts, and including missing number problems.
- Develop efficient methods: $30 \times 2 = 60$ so $60 \div 3 = 20$
- Pupils develop reliable formal written method for division and progress to formal method.

DIVISION

Year 4 Procedural Fluency Divide up to 3 digit numbers by a single digit (without remainders initially.

Formal methods should only be taught once secure with idea of remainders

```
          5   4
  9 | 4   8   6
      4   5   0    ( 50 x 9 )
          3   6
          3   6    ( 4 x 9 )
              0
```

Link with repeated subtraction and taking away chunks of 9. Keep going until reach 0.

Encourage children to write at the side useful "chunks" might use; 1 / 2 / 5 / 10 / 20 / 50

Encourage language of we are taking 50 lots of 9 so they don't mix the answer.

Always encourage to approximate first.

Formal Written method for short division

```
      2   1   8
  4 | 8   7  ₃2
```

```
      0   3   7
  5 | 1  ₁8  ₃5
```

Pupils must first be secure dividing a TU ÷ U and must understand how to exchange remainders **within** the calculation

It must be taught through **diennes or place value counters**. When dealing with HTU ÷ U, avoid a result that leaves a remainder.

When the answer in the first column is a 0, children can initially write a 0 above to acknowledge its place and must exchange the 100 for 10 tens in the tens column.

Key Vocabulary: share, share equally, one each, two each.., group, groups, lots of, array, divide, divided by, divided into, division, grouping, numberline, left, left over, inverse, short division, exchange, multiple divisible by, factor

Key Skills for multiplication:
- Recall all facts up to 12 x 12.
- Use place value and derived facts to multiply and divide mentally, including multiplying and dividing by 10, 100 and 1.
- Pupils become fluent in the formal written methods of short division.
- Pupils practise mental methods extending to 3 digits: 200 x 3 = 600 so 600 ÷ 3 = 200
- **Reasoning:** Solve division problems in context deciding which methods to use and why.

DIVISION

Year 5 Procedural Fluency Divide 4 digits by a single digit
(including those with remainders)

Expanded formal written method

```
        1  2  6  r 1
   6 │  7  5  7
        6  0  0    (100 x 6 )
        1  5  7
        1  2  0    (20 x 6 )
           3  7
           3  6    ( 6 x 6 )
```

In this example, subtracting chunks of 6; link with repeated subtraction. Continue to reach 0 or until there is a remainder.

Encourage children to write a list at the side of useful "chunks". For example, 1 / 2 / 5 / 10 / 20 / 50 / 100

As children get more confident, encourage the children to use more efficient chunks to get to the answer more quickly.

Formal written method for short division

```
         6   6   3    r5
   8 │  5  ₅3  ₅0  ₂9
```

To teach this level pupils must be secure with previous practical methods.

With remainders, pupils need this introduced in real life context so that the remainder can be expressed as a fraction, decimal or rounded.

In this example, there are 663 groups of 8 with 5 left over. Therefore it is 5 parts left of 8 equal parts; 5/8

For those who are confident with this teachers can introduce long division dividing by a 2 digit number. E.g 2678 ÷ 19 but it is a Yr 6 expectation.

Key Vocabulary: share, share equally, one each, two each.., group, groups, lots of, array, divide, divided by, divided into, division, grouping, numberline, left, left over, inverse, short division, exchange, multiple divisible by, factor, prime number and factors, composite

Key Skills for multiplication: Recall multiplication facts 12 x 12
- Identify factor pairs of a number and common factors of two digit number.
- Multiply and divide whole numbers by 10 / 100 / 1000
- Use vocabulary of prime numbers, prime factors and composite numbers
- Work out if number is prime up to 100 and know all prime up to 19
- Use multiplication and division as inverse
- Express remainders in different ways: 98 ÷ 4 = 24 r2   24 ½   24.25 or rounded in context.
- **Reasoning:** Solve problems involving combination of all operations .Put in context of money and measures.

DIVISION

Divide 4 digits by single and 2 digit numbers

Introduce long division by chunking for dividing 2 digits

```
              2 7
   36 │ 9 7 2
        7 2 0    ( 20 x 36 )
        2 5 2
        1 8 0    ( 5 x 36 )
          7 2
          7 2    ( 2 x 36 )
```

In this example, subtracting chunks of 36; link with repeated subtraction. Continue to reach 0 or until there is a remainder.

Encourage children to write a list at the side of useful "chunks". For example, 1 / 2 / 5 / 10 / 20 / 50 / 100

As children get more confident, encourage the children to use more efficient chunks to get to the answer more quickly.

Short division for dividing single digit.

```
      8 1 2 . 1 2 5
   8 │ 6 ₆4 9 ₁7 . ₁0 ₂0 ₄0
```

Pupils need to consider how best to express the remainder. This strategy shows how to express as a decimal. This short division method is for 4 digit numbers with single digit

When calculating decimal remainder, rather than say remainder 1, a decimal point is added after the units and the remainder is exchanged as 10 tenths. Keep dividing to an appropriate degree of accuracy for problem to be solved.

Key Vocabulary: share, share equally, one each, two each.., group, groups, lots of, array, divide, divided by, divided into, division, grouping, numberline, left, left over, inverse, short division, exchange, multiple divisible by, factor, prime number and factors, composite

Key Skills for multiplication: Recall multiplication facts 12 x 12
- Divide 4 digits with single or 2 digit numbers and express remainders as fraction / decimal
- Round up down in the context of the problem
- Perform mental calculations including mixed operations and larger numbers
- Identify common factors, common multiples and prime numbers
- Solve problems using all 4 operation
- **Reasoning:** Estimate and check answers for accuracy in the context of the problem
- Use written methods in cases where the answer has up to 2 decimal places.