

## Progression for Division

### Written methods for Division of whole numbers

The aim is that children use mental methods when appropriate, but for calculations that they cannot do in their heads they use an efficient written method accurately and with confidence. Children are entitled to be taught and to acquire secure mental methods of calculation and one efficient written method of calculation for division which they know they can rely on when mental methods are not appropriate.

#### **To divide successfully in their heads, children need to be able to:**

Understand division as sharing or grouping (repeated subtraction)

understand and use the vocabulary of division for example in  $18 \div 3 = 6$ , the 18 is the *dividend*, the 3 is the *divisor* and the 6 is the *quotient*

partition two-digit and three-digit numbers into multiples of 100, 10 and 1 in different ways

recall multiplication and division facts to  $10 \times 10$ , recognise multiples of one-digit numbers and divide multiples of 10 or 100 by a single-digit number using their knowledge of division facts and place value

know how to find a remainder working mentally for example, find the remainder when 48 is divided by 5

add two or more single digit numbers mentally

understand and use multiplication and division as inverse operations.

#### **To carry out written methods of division efficiently, children also need to be able to:**

understand division as repeated subtraction

estimate how many times one number divides into another - for example, how many sixes there are in 47, or how many 23s there are in 92

multiply a two-digit number by a single-digit number mentally

subtract numbers using the column method

**Note:** It is important that children's mental methods of calculation are practiced and secured alongside their learning and use of an efficient written method for division. Mental methods may be supported by jottings. **These jottings are part of the calculating process and must not be erased or written in a different place to the calculation.**

#### **Level 3**

Derive associated division facts of the 2, 3, 4, 5 and 10 multiplication tables.

Solve whole number problems involving division, including those that give rise to remainders.

#### **Level 4**

Uses understanding of place value to divide whole numbers by 10 or 100.

Uses a range of mental methods of computation with the four operations.

Derive quickly division facts corresponding to multiplication tables up to  $10 \times 10$ .

Uses efficient written methods of short division.

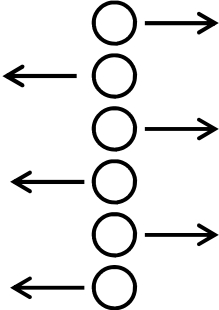
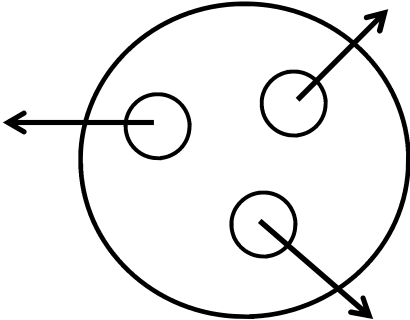
Recognises and describes number patterns and relationships including factor.

#### **Level 5**

Uses understanding of place value to divide whole numbers and decimals by 10, 100 and 1000.

Use division with decimals to 2 places.

Understand and use an appropriate non-calculator method for solving problems that involve dividing any three-digit number by any two-digit number (long division).

| Stage | Progression for Division   |
|-------|--|
| 1     | <p>Use developing mathematical ideas and methods to solve practical problems in a real or role-play context. For example,</p> <ul style="list-style-type: none"> <li>Share objects into equal groups and count how many in each group.</li> <li>Respond in practical situations to questions such as:<br/><i>How should we plant the daffodil bulbs in these three pots? Find a way of doing it so that they all have the same number.</i></li> </ul>  |
| 2     | <p><b>DEVELOPING UNDERSTANDING:</b></p> <ul style="list-style-type: none"> <li>Use related vocabulary and symbols to describe and record division number sentences.</li> <li>Recognise and represent <b>sharing</b> as division. Develop and support understanding through images such as:           <div style="text-align: center; margin: 10px 0;">  </div> </li> <li>Recognise and represent repeated subtraction (<b>grouping</b>) as division. Develop and support understanding through images such as:           <div style="text-align: center; margin: 10px 0;">  </div> </li> <li>Interpret situations as division calculations and explain reasoning.<br/>For example:           <ul style="list-style-type: none"> <li><i>6 sweets are shared equally between 2 people. How many sweets does each one get?</i></li> <li><i>There are 18 apples in a box. How many bags of 3 apples can be filled?</i></li> </ul> </li> </ul> |

FS/  
Y1

Y2

**DEVELOPING MENTAL CALCULATION METHODS**

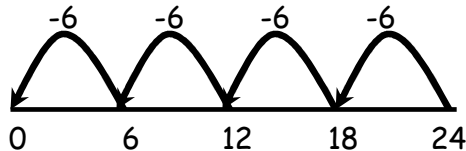
- Derive and recall division facts corresponding to the 10x10 multiplication tables.

**NB:** Children should develop and use a 'toolbox' of mental calculation strategies from which they can choose the most efficient strategy to solve a calculation depending on the numbers involved in it.

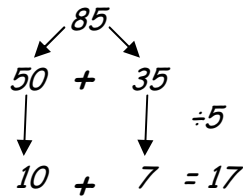
**GENERAL STRATEGY**

- Partitioning

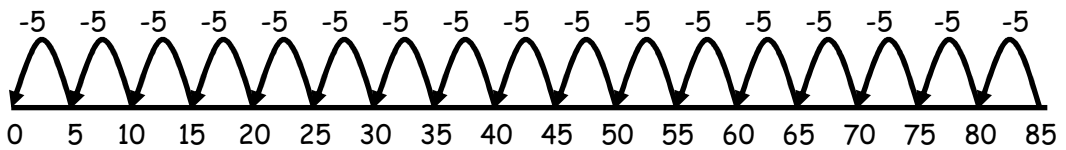
$24 \div 6$  (How many 6s in 24?)



$85 \div 5$  (How many 5s in 85?)

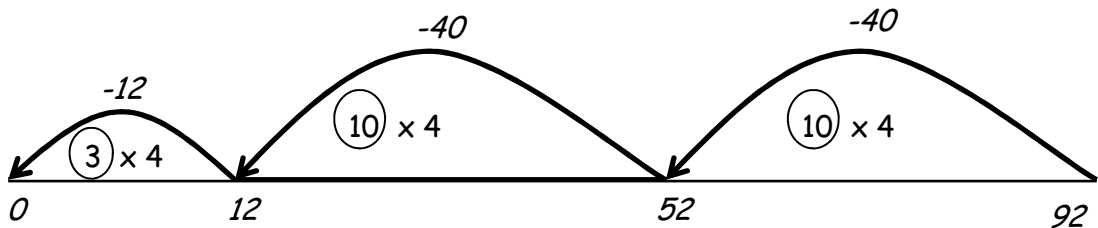


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Initially children should subtract several groups (see above) but should quickly recognise that the method is inefficient and with practice should look for chunks of the divisor to subtract...

$92 \div 4$  (How many 4s in 92?)



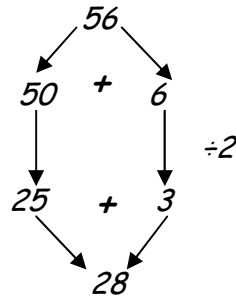
DEVELOPING MENTAL CALCULATION METHODS Contd.

Y3-  
Y6

SPECIAL CASE STRATEGIES

- Dividing whole numbers, then decimals by 10, 100 or 1000.
- Halving and doubling (dividing by 2, 4, 8, 25 or 50)

$$56 \div 2$$



- Factorising

$$\begin{aligned} 72 \div 6 &= 72 \div 2 \div 3 \\ &= 36 \div 3 \\ &= 12 \end{aligned}$$

$$\begin{aligned} 600 \div 15 &= 600 \div 3 \div 5 \\ &= 200 \div 5 \\ &= 40 \end{aligned}$$

3

Y5-  
Y6

**DEVELOPING WRITTEN METHODS:**

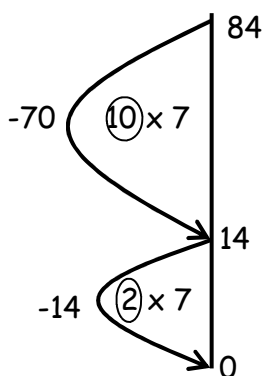
Children should be encouraged to select an appropriate calculation method, be it mental or written, dependent on the numbers involved in a calculation. To develop this skill children should be taught to ask themselves, 'Can I do this mentally?' Therefore, it is important that children's mental methods of calculation are practised and secured alongside their learning and development towards a compact written method.

**EXPANDED WRITTEN METHOD:** This leads the children to the more compact standard written method, developing an understanding of its structure and efficiency.

This expanded method, called chunking, links to the number line being used as a calculating tool as in the previous stage. Turning the number line vertically can help children develop their understanding towards vertical written methods.

- Short Division:  $TU \div U$ ,  $HTU \div U$ , number with up to 2dp  $\div U$

$84 \div 7$



becomes  $\rightarrow$

$$\begin{array}{r} 12 \\ 7 \overline{) 84} \\ \underline{- 70} \quad ((10) \times 7) \\ 14 \\ \underline{- 14} \quad ((2) \times 7) \\ 0 \end{array}$$

4

Children need to recognise that chunking is inefficient if too many subtractions have to be carried out. Encourage them to reduce the number of steps by finding the largest possible multiples to subtract. Producing a 'FACTS LIST' using knowledge of place value and related facts then looking for the two multiples that 'trap' the dividend will support this step.

$292 \div 8$

- $10 \times 8 = 80$
  - $20 \times 8 = 160$
  - $30 \times 8 = 240$
  - $40 \times 8 = 320$
- ← 292

$$\begin{array}{r} 36 \text{ r } 4 \text{ (or } 36\frac{1}{2}) \\ 8 \overline{) 292} \\ \underline{- 240} \quad ((30) \times 8) \\ 52 \\ \underline{- 48} \quad ((6) \times 8) \\ 4 \end{array}$$

|          |  |
|----------|--|
| <p>4</p> | <p>EXPANDED WRITTEN METHOD (continued)</p> <ul style="list-style-type: none"> <li>Long Division: HTU ÷ TU</li> </ul> <p>558 ÷ 24</p> <p>10 × 24 = 240<br/>         20 × 24 = 480<br/>         30 × 24 = 720</p> <p>← 558</p> $\begin{array}{r} 23 \text{ r } 6 \text{ (or } 23\frac{1}{4}\text{)} \\ 24 \overline{) 558} \\ \underline{- 480} \quad ((20) \times 24) \\ 78 \\ \underline{- 72} \quad ((3) \times 24) \\ 6 \end{array}$ |
|----------|--|

|          |   |
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| <p>5</p> | <p>COMPACT WRITTEN METHOD</p> <p>This method should be introduced to children who are confident with multiplication and division facts and with subtracting multiples of 10 mentally, and whose understanding of partitioning and place value is sound. For most children this will be at the end of Y5 or the beginning of Y6</p> <p>76 ÷ 4</p> $\begin{array}{r} 19 \\ 4 \overline{) 736} \end{array}$ <p>291 ÷ 3</p> $\begin{array}{r} 97 \\ 3 \overline{) 291} \end{array}$ |
|----------|---|