Can I use an appropriate non-calculator method for dividing a three-digit integer by a two-digit integer?

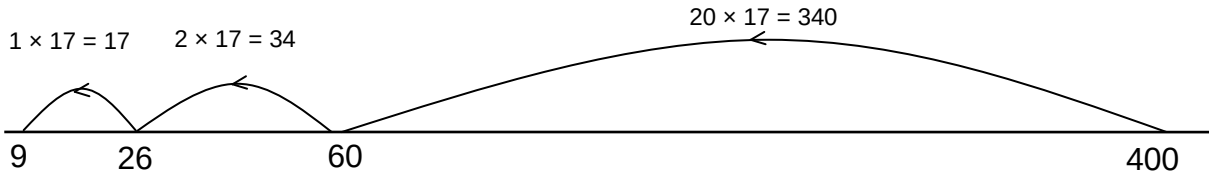
Teaching guidance

Key vocabulary

place value, digit, column, partition, integer, method, strategy, remainder, quotient, round

Models and images and resources

Number lines



400 ÷ 17 = 23 r 9

Number lines provide a visual image for division as counting back in ‘chunks’.

Chunking

Ensure that children have a clear layout and that they understand the process for using chunking to divide by a single-digit number before moving into dividing by a two-digit number.

$$\begin{array}{r|l} 17 & 400 \\ -340 & \quad 17 \times 20 = 340 \\ \hline 60 & \\ -51 & \quad 17 \times \ \ 3 = \ \ 51 \\ \hline 9 & \end{array}$$

Factorising

480 ÷ 15

= 480 ÷ 5 ÷ 3

Teach children to split the divisor into factors, where possible, to make division by a two-digit number easier.
For example to divide by 15, you can divide by five and then three.

Teaching tips

- Ensure that children are able to divide by a single digit number before moving into 'long division' of a three-digit number by a two-digit number. Make sure that they are able to explain each step of their calculation showing understanding of the process. They should refer to the value of each digit as they explain their method.
- Teach children how you can use factors of the divisor to split a division into more manageable calculations. For example:

$$480 \div 15$$
$$= 480 \div 5 \div 3$$
$$= \quad 96 \div 3$$
$$= \quad 32$$

- Written methods of division involve multiplication and subtraction, so ensure that children have good mental and written methods for these operations as well as good knowledge of multiplication and division facts.
- Ensure that children are able to 'read' a division calculation as 'How many xx can we get from xxx?' Remind them that to solve long division questions, we use the inverse operation of multiplication.
- In order to be efficient at long division, children need to be good at estimating, for example, 'How many 17s make 51? Teach children how to make approximations:
  - Use rounding: to find an approximate answer to 51 ÷ 17, round the numbers to give 50 ÷ 20. This tells you that the answer is likely to be two or three 17s.
  - Use activities such as 'Call my bluff' where you give children three possible answers to a calculation and give them 20 seconds to decide which they think is correct. Ask children to explain the reason behind their answer.
- Before starting a division calculation ask children to jot down key multiplication facts for the divisor, such as 10 × ... and 20 × ... . This gives them sensible chunks that they can use in their calculation and helps them to make a sensible estimate for the answer before they start the calculation. For example:

$400 \div 17$

Useful facts: 10 × 17 = 170, 20 × 17 = 340, 30 × 17 = 510
so a sensible estimate for the answer is between 20 and 30

$$\begin{array}{rl} 17\overline{)400} & \\ -\underline{340} & 17 \times 20 \\ 60 & \\ -\underline{51} & 17 \times 3 \\ 9 & \end{array}$$

So the answer to 400 ÷ 17 is 23 r 9

- Children sometimes struggle to give the answer to a calculation once they have completed the written method. Remind them that they are answering the question 'How many xx can we get from xxx?' It may help to suggest that they underline how many lots of the divisor they have taken out in each chunk.
- Remind children that when they have completed a division calculation they should always check that the answer looks sensible. They should also look at the original context if solving a problem so that they can decide whether their answer needs to be rounded up or down.