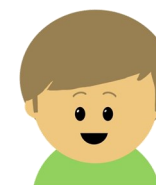# YR5 Knowledge Organiser - Multiplication & Division (Written Methods)

## Key Concepts

- Multiply numbers up to 4 digits by a one-digit or two-digit number using a formal written method, including long multiplication for two-digit numbers.

- Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context.

## Key Vocabulary

- multiply
- divide
- product
- method
- partition
- exchange
- placeholder

## Multiply by a 1-Digit Number

We can use a written column method to multiply numbers up to 4-digits by a 1-digit number. It is important to ensure that each digit is placed in the place value column and that 0 is used as a placeholder where appropriate.

We work from right to left to multiply each digit in the 4-digit number by the 1-digit number, using exchanging where needed.

| | 2 | 6 | 0 | 7 |
|---|---|---|---|---|
| × | | | | 3 |
| | 7 | 8 | 2 | 1 |
| | | 1 | | 2 |

## Multiply 2-Digits by 2-Digits

When multiplying 2-digit numbers by 2-digit numbers, we can partition each number and place them in a grid. With this method, we can multiply the tens and ones separately.

$$58 \times 24$$

"First, we partition 58 into 50 and 8 Then, we partition 24 into 20 and 4 Now, we multiply them in a grid."

| × | 50 | 8 |
|---|---|---|
| 20 | 1,000 | 160 |
| 4 | 200 | 32 |

"Finally, we add the totals to find the product."

$$1,000 + 200 + 160 + 32 = 1,392$$

$$58 \times 24 = 1,392$$

## Multiply up to 4-Digits by 2-Digits

The written column method is an efficient way to multiply 2-digit, 3-digit and 4-digit numbers by a 2-digit number.

We complete the calculation in two steps. First, we multiply the number by the ones as we did when multiplying by a 1-digit number.

| | 1 | 9 | 3 | 6 |
|---|---|---|---|---|
| × | | | 4 | 5 |
| | 9 | 6 | 8 | 0 |
| | | 4 | 1 | 3 |
| | | | | |
| | | | | |

$1,936 \times 5$

Now, we multiply the number by the tens.

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Before we begin calculating this part, we need to place a 0 in the column furthest to the right as we are multiplying by a multiple of 10

|   | 1 | 9 | 3 | 6 |
|---|---|---|---|---|
| × |   |   | 4 | 5 |
|   | 9 $_4$ | 6 $_1$ | 8 $_3$ | 0 |
| 7 $_3$ | 7 $_1$ | 4 $_2$ | 4 | **0** |
|   |   |   |   |   |

← 1,936 × 4**0**

Finally, we add the totals to find the product.

|   | 1 | 9 | 3 | 6 |
|---|---|---|---|---|
| × |   |   | 4 | 5 |
|   | 9 $_4$ | 6 $_1$ | 8 $_3$ | 0 |
| 7 $_3$ | 7 $_1$ | 4 $_2$ | 4 | **0** |
| 8 | 7 | 1 | 2 | 0 |
|   | 1 | 1 | 1 |   |

## Divide 4-Digits by 1-Digit

In Year 4, we learned to divide 3-digit numbers by a 1-digit number. We can now build on this knowledge to divide 4-digit numbers by a 1-digit number using the short division written method.

We work from left to right, dividing each digit by the 1-digit number. If there are any remainders, we need to include them in the next place value column.

|   | 2 |   |   |   |
|---|---|---|---|---|
| 4 | 8 | 6 | 9 | 2 |

8 thousands ÷ 4 = 2 thousands

|   | 2 | 1 |   |   |
|---|---|---|---|---|
| 4 | 8 | 6 | $^2$ 9 | 2 |

6 hundreds ÷ 4 = 1 hundred with 2 hundreds remaining

|   | 2 | 1 | 7 |   |
|---|---|---|---|---|
| 4 | 8 | 6 | $^2$ 9 | $^1$ 2 |

29 tens ÷ 4 = 7 tens with 1 ten remaining

|   | 2 | 1 | 7 | 3 |
|---|---|---|---|---|
| 4 | 8 | 6 | $^2$ 9 | $^1$ 2 |

12 ones ÷ 4 = 3 ones

## Division with Remainders

Sometimes, when we divide the ones, we have some ones remaining. We use the letter 'r' before the remaining number to record this.

|   |   | 4 | 5 | 1 | r 2 |
|---|---|---|---|---|---|
| 7 | 3 | $^3$ 1 | $^3$ 5 | 9 |   |

$$3{,}159 \div 7 = 451 \; r2$$

## Interpreting Remainders

Now, we can apply this skill to interpreting remainders in context.

|   |   | 6 | 6 | 7 | r 3 |
|---|---|---|---|---|---|
| 6 | 4 | $^4$ 0 | $^4$ 0 | $^4$ 5 |   |

Eggs are sold in cartons of 6. If there are 4,005 eggs to be packed, how many cartons are needed?

As there is a remainder, we need to round to the next whole number, which is 668

How many cartons can be sold?

As eggs are sold in cartons of 6, we need to round to the previous whole number, which is 667