Overview of Strategies and Methods (Multiplication)

Stage 1 - Mental Multiplication

**Counting in steps** (‘clever’ counting)

- Count in 2s
  - 2 2 2 2 2 2 2 2
  - 0 10 20

- Count in 10s
  - 1 2 3 4 5 6 7 8 9 10
  - 11 12 13 14 15 16 17 18 19 20
  - 21 22 23 24 25 26 27 28 29 30
  - 31 32 33 34 35 36 37 38 39 40
  - 41 42 43 44 45 46 47 48 49 50
  - 51 52 53 54 55 56 57 58 59 60
  - 61 62 63 64 65 66 67 68 69 70
  - 71 72 73 74 75 76 77 78 79 80
  - 81 82 83 84 85 86 87 88 89 90
  - 91 92 93 94 95 96 97 98 99 100

**Doubling and halving**

- Find doubles to double 5 using fingers
  - *e.g.* double 3

**Grouping**

- Begin to use visual and concrete arrays and sets of objects to find the answers to ‘three lots of four’ or ‘two lots of five’
  - *e.g.* three lots of four
Overview of Strategies and Methods (Multiplication)

**Stage 2-Mental Multiplication**

**Counting in steps (‘clever’ counting)**
Count in 2s, 5s and 10s

![Diagram of counting in 2s, 5s, and 10s]

Begin to count in 3s

**Doubling and halving**
Begin to know doubles of multiples of 5 to 100
* e.g. double 35 is 70

![Diagram of doubling and halving]

Begin to double 2-digit numbers less than 50 with 1s digits of 1, 2, 3, 4 or 5

**Stage 2-Mental Multiplication**

**Grouping**
Use arrays to find answers to multiplication and relate to ‘clever’ counting
* e.g. 3 × 4 as three lots of four things
* e.g. 6 × 5 as six steps in the 5s count as well as six lots of five

![Diagram of grouping]

Understand that 5 × 3 can be worked out as three 5s or five 3s
Stage 2-Mental Multiplication

Using number facts
Know doubles to double 20
e.g. double 7 is 14

Start learning ×2, ×5, ×10 tables, relating these to ‘clever’ counting in 2s, 5s, and 10s
e.g. 5 × 10 = 50, and five steps in the 10s count = 10, 20, 30, 40, 50
Overview of Strategies and Methods (Multiplication)

**Stage 3-Mental Multiplication**

### Counting in steps (‘clever’ counting)
Count in 2s, 3s, 4s, 5s, 8s and 10s

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### Doubling and halving
Find doubles of numbers to 50 using partitioning

**Example:**

```
double 48
```

Use doubling as a strategy in multiplying by 2

**Example:**

```
18 × 2 is double 18 = 36
```

### Grouping
Recognise that multiplication is commutative

**Example:**

```
4 × 8 = 8 × 4
```

Multiply multiples of 10 by 1-digit numbers

**Example:**

```
30 × 8 = 240
```

Multiply ‘friendly’ 2-digit numbers by 1-digit numbers

**Example:**

```
13 × 4
```

### Using number facts
Know doubles to double 20

**Example:**

```
double 15 is 30
```

Know doubles of multiples of 5 to 100

**Example:**

```
double 85 is 170
```

Know ×2, ×3, ×4, ×5, ×8, ×10 tables facts
Overview of Strategies and Methods (Multiplication)

Stage 4-Mental Multiplication

**Counting in steps (sequences)**

Count in 2s, 3s, 4s, 5s, 6s, 7s, 8s, 9s, 10s, 11s, 12s, 25s, 50s, 100s and 1000s

**Doubling and halving**

Find doubles to double 100 and beyond using partitioning e.g. *double 126*

![Diagram showing doubling and halving]

Begin to double amounts of money e.g. **£3·50 doubled is £7**

Use doubling as a strategy in multiplying by 2, 4 and 8 e.g. **34 × 4 is double 34 (68) doubled again = 136**

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Stage 4-Mental Multiplication

**Grouping**

Use partitioning to multiply 2-digit numbers by 1-digit numbers e.g. **24 × 5**

- \(20 × 5 = 100\)
- \(4 × 5 = 20\)
- \(24 × 5 = 120\)

or

![Diagram showing grouping]

Multiply multiples of 100 and 1000 by 1-digit numbers using tables facts e.g. **400 × 8 = 3200**

Multiply near multiples by rounding e.g. **24 × 19 as (24 × 20) – 24 = 456**

**Using number facts**

Know times-tables up to **12 × 12**

```
   1  2  3  4  5  6  7  8  9 10 11 12
1   1  2  3  4  5  6  7  8  9 10 11 12
2   2  4  6  8 10 12 14 16 18 20 22 24
3   3  6  9 12 15 18 21 24 27 30 33 36
4   4  8 12 16 20 24 28 32 36 40 44 48
5   5 10 15 20 25 30 35 40 45 50 55 60
6   6 12 18 24 30 36 42 48 54 60 66 72
7   7 14 21 28 35 42 49 56 63 70 77 84
8   8 16 24 32 40 48 56 64 72 80 88 96
9   9 18 27 36 45 54 63 72 81 90 99 108
10 10 20 30 40 50 60 70 80 90 100 110 120
11 11 22 33 44 55 66 77 88 99 110 121 132
12 12 24 36 48 60 72 84 96 108 120 132 144
```
### Stage 5-Mental Multiplication

#### Doubling and halving
Double amounts of money using partitioning

\[
\text{\text{"6.73"} $ightarrow$ \text{"12"} $\rightarrow$ \text{"1.46"} $\rightarrow$ \text{"13.46"}}
\]

Use doubling and halving as a strategy in multiplying by 2, 4, 8, 5 and 20

\[58 \times 5 \text{ is half of } 58 \times 10 (580) = 290\]

#### Grouping
Multiply whole numbers and decimals by 10, 100, 1000

\[3.4 \times 100 = 340\]

Use partitioning to multiply ‘friendly’ 2- and 3-digit numbers by 1-digit numbers e.g. \(402 \times 6 \text{ as } 400 \times 6 (2400) \text{ and } 2 \times 6 (12) = 2412\)

Use partitioning to multiply decimal numbers by 1-digit numbers e.g. \(4.5 \times 3 \text{ as } 4 \times 3 (12) \text{ and } 0.5 \times 3 (1.5) = 13.5\)

Multiply near multiples by rounding

\[32 \times 29 \text{ as } (32 \times 30) - 32 = 928\]

### Stage 5-Mental Multiplication

#### Using number facts
Use times-tables facts up to 12 \(\times\) 12 to multiply multiples of 10/100 of the multiplier

\[4 \times 6 = 24 \text{ so } 40 \times 6 = 240 \text{ and } 400 \times 6 = 2400\]

Use knowledge of factors and multiples in multiplication

\[43 \times 6 \text{ is double } 43 \times 3\]

\[28 \times 50 \text{ is half of } 28 \times 100 (2800) = 1400\]

Know square numbers and cube numbers
### Stage 6-Mental Multiplication

**Doubling and halving**

Double decimal numbers with up to 2 places using partitioning

*Example: double 36.73*

![Diagram](36.73 -> 72.146 -> 73.46)

Use doubling and halving as strategies in mental multiplication

**Grouping**

Use partitioning as a strategy in mental multiplication, as appropriate

*Example: 3060 × 4 as 3000 × 4 (12 000) and 60 × 4 (240) = 12 240*

*Example: 8.4 × 8 as 8 × 8 (64) and 0.4 × 8 (3.2) = 67.2*

Use factors in mental multiplication

*Example: 421 × 6 as 421 × 3 (1263) doubled = 2526*

*Example: 3.42 × 5 as half of 3.42 × 10 = 17.1*

Multiply decimal numbers using near multiples by rounding

*Example: 6 × 6 e.g. 4.3 × 19 as (4.3 × 20) – 4.3 = 81.7*

---

### Stage 6-Mental Multiplication

**Using number facts**

Use times-tables facts up to 12 × 12 in mental multiplication of large numbers or numbers with up to 2 decimal places

*Example: 6 × 4 = 24 and 0.06 × 4 = 0.24*
### Overview of Strategies and Methods (Multiplication)

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<thead>
<tr>
<th>Stage 1 – Written Multiplication</th>
<th>Stage 2 – Written Multiplication</th>
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<tbody>
<tr>
<td>Build on partitioning to develop grid multiplication e.g. 23 × 4</td>
<td>Use grid multiplication to multiply 3-digit numbers by 1-digit numbers e.g. 253 × 6</td>
</tr>
<tr>
<td><img src="23x4.png" alt="Multiplication Grid Example" /></td>
<td><img src="253x6.png" alt="Multiplication Grid Example" /></td>
</tr>
</tbody>
</table>

Use a vertical written algorithm (ladder) to multiply 3-digit numbers by 1-digit numbers e.g. 253 × 6

![Vertical Algorithm Example](253x6_vertical.png)

Use grid multiplication to multiply 2-digit numbers by 2-digit numbers e.g. 16 × 48

![Multiplication Grid Example](16x48.png)
### Overview of Strategies and Methods (Multiplication)

#### Stage 3 – Written Multiplication

**Short multiplication of 2-, 3- and 4-digit numbers by 1-digit numbers**  
*e.g. 435 × 8*

\[
\begin{array}{c}
\phantom{0}435 \\
\times \quad 8 \\
\hline
\phantom{0}3480 \\
\phantom{0}24 \\
\end{array}
\]

**Long multiplication of 2-, 3- and 4-digit numbers by ‘teen’ numbers**  
*e.g. 48 × 16*

\[
\begin{array}{c}
\phantom{0}48 \\
\times \quad 16 \\
\hline
\phantom{0}288 \\
\phantom{0}480 \\
\hline
\phantom{0}768 \\
\end{array}
\]

#### Stage 3 – Written Multiplication

**Grid multiplication of numbers with up to 2 decimal places by 1-digit numbers**  
*e.g. 1.34 × 6*

\[
\begin{array}{c|c|c|c}
\times & 0.3 & 0.04 \\
\hline
6 & 1.8 & 0.24 \\
\hline
\end{array}
\]

\[= 8.04\]

Multiply fractions by 1-digit numbers  
*e.g. \(\frac{3}{4} \times 6 = \frac{18}{4} = 4\frac{1}{2} = 4\frac{1}{2}\)*

#### NB

*Grid multiplication provides a default method for ALL children*
### Overview of Strategies and Methods (Multiplication)

#### Stage 4 – Written Multiplication

**Short multiplication of 2-, 3- and 4-digit numbers by 1-digit numbers**

e.g. \(3743 \times 6\)

\[
\begin{array}{c}
3 \ 7 \ 4 \ 3 \\
\times \quad 6 \\
\hline
2 \ 2 \ 4 \ 5 \ 8 \\
\hline
4 \ 2 \ 1
\end{array}
\]

**Long multiplication of 2-, 3- and 4-digit numbers by 2-digit numbers**

e.g. \(456 \times 38\)

\[
\begin{array}{c}
4 \ 5 \ 6 \\
\times \quad 3 \ 8 \\
\hline
3 \ 6 \ 4 \ 8 \\
\hline
1 \ 3 \ 6 \ 8 \ 0
\end{array}
\]

#### Stage 4 – Written Multiplication

**Short multiplication of decimal numbers using \(\times\) 100 and \(\div\) 100**

e.g. \(13.72 \times 6\) as \((1372 \times 6) \div 100 = 82.32\)

**Short multiplication of money**

e.g. \(£13.72 \times 6\)

\[
\begin{array}{c}
£ \ 1 \ 3.7 \ 2 \\
\times \quad 6 \\
\hline
£ \ 8 \ 2.3 \ 2 \\
\hline
2 \ 4 \ 1
\end{array}
\]

**Grid multiplication of numbers with up to 2 decimal places by 1-digit numbers**

e.g. \(6.76 \times 4\)

\[
\begin{array}{cccc}
\times & 6 & 0.7 & 0.06 \\
4 & 24 & 2.8 & 0.24 \\
\hline
\end{array}
\]

Multiply simple pairs of proper fractions

e.g. \(\frac{1}{2} \times \frac{1}{4} = \frac{1}{8}\)

**NB Grid multiplication provides a default method for ALL children**