Mathematics Appendix 1: Examples of formal written methods for addition, subtraction, multiplication and division

This appendix sets out some examples of formal written methods for all four operations to illustrate the range of methods that could be taught. It is not intended to be an exhaustive list, nor is it intended to show progression in formal written methods. For example, the exact position of intermediate calculations (superscript and subscript digits) will vary depending on the method and format used.

For multiplication, some pupils may include an addition symbol when adding partial products. For division, some pupils may include a subtraction symbol when subtracting multiples of the divisor.

Addition and subtraction

789 + 642 becomes

$$\begin{array}{r} {\scriptstyle 1\ 1\ \ } \\ 7\ 8\ 9 \\ +\ 6\ 4\ 2 \\ \hline 1\ 4\ 3\ 1 \end{array}$$

Answer: 1431

874 – 523 becomes

$$\begin{array}{r} \\ 8\ 7\ 4 \\ -\ 5\ 2\ 3 \\ \hline 3\ 5\ 1 \end{array}$$

Answer: 351

932 – 457 becomes

$$\begin{array}{r} {\scriptstyle 8\ \ 12\ 1\ } \\ \not{9}\ \not{3}\ 2 \\ -\ 4\ 5\ 7 \\ \hline 4\ 7\ 5 \end{array}$$

Answer: 475

932 – 457 becomes

$$\begin{array}{r} {\scriptstyle \ \ 1\ \ 1\ } \\ 9\ 3\ 2 \\ -\ \not{4}\ \not{5}\ 7 \\ {\scriptstyle \ \ 5\ \ 6\ } \\ \hline 4\ 7\ 5 \end{array}$$

Answer: 475

Short multiplication

24 × 6 becomes

$$\begin{array}{r} \\ 2\ 4 \\ \times\ \ \ 6 \\ \hline 1\ 4\ 4 \\ {\scriptstyle \ \ 2\ \ } \end{array}$$

Answer: 144

342 × 7 becomes

$$\begin{array}{r} \\ 3\ 4\ 2 \\ \times\ \ \ \ 7 \\ \hline 2\ 3\ 9\ 4 \\ {\scriptstyle \ \ 2\ 1\ } \end{array}$$

Answer: 2394

2741 × 6 becomes

$$\begin{array}{r} \\ 2\ 7\ 4\ 1 \\ \times\ \ \ \ \ \ 6 \\ \hline 1\ 6\ 4\ 4\ 6 \\ {\scriptstyle \ \ 4\ 2\ \ \ } \end{array}$$

Answer: 16 446

Long multiplication

24 × 16 becomes

		^{2}	
		2	**4**
×		**1**	**6**
	2	**4**	**0**
	1	**4**	**4**
	3	**8**	**4**

Answer: 384

124 × 26 becomes

		^{1}	^{2}	
		1	**2**	**4**
×			**2**	**6**
	2	**4**	**8**	**0**
		7	**4**	**4**
	3	**2**	**2**	**4**
	$_{1}$	$_{1}$		

Answer: 3224

124 × 26 becomes

		^{1}	^{2}	
		1	**2**	**4**
×			**2**	**6**
		7	**4**	**4**
	2	**4**	**8**	**0**
	3	**2**	**2**	**4**
	$_{1}$	$_{1}$		

Answer: 3224

Short division

98 ÷ 7 becomes

	1	**4**
7	**9**	^{2}**8**

Answer: 14

432 ÷ 5 becomes

		8	**6**	**r 2**
5	**4**	**3**	^{3}**2**	

Answer: 86 remainder 2

496 ÷ 11 becomes

			4	**5**	**r 1**
1	**1**	**4**	**9**	^{5}**6**	

Answer: $45\frac{1}{11}$

Long division

432 ÷ 15 becomes

			2	**8**	**r 12**
1	**5**	**4**	**3**	**2**	
		3	**0**	**0**	
		1	**3**	**2**	
		1	**2**	**0**	
			1	**2**	

Answer: 28 remainder 12

432 ÷ 15 becomes

			2	**8**	
1	**5**	**4**	**3**	**2**	
		3	**0**	**0**	15×20
		1	**3**	**2**	
		1	**2**	**0**	15×8
			1	**2**	

$\frac{12}{15} = \frac{4}{5}$ (with 12 and 15 crossed out)

Answer: $28\frac{4}{5}$

432 ÷ 15 becomes

			2	**8** ·	**8**
1	**5**	**4**	**3**	**2** ·	**0**
		3	**0**	↓	↓
		1	**3**	**2**	
		1	**2**	**0**	↓
			1	**2**	**0**
			1	**2**	**0**
					0

Answer: 28·8