

BENTHAL PRIMARY SCHOOL

Addition

Multiplication

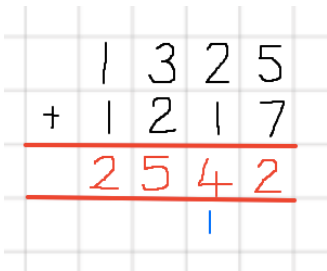
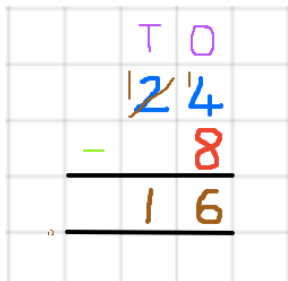
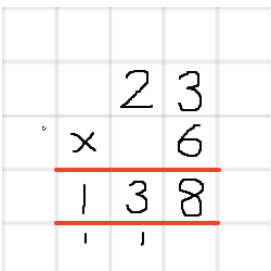
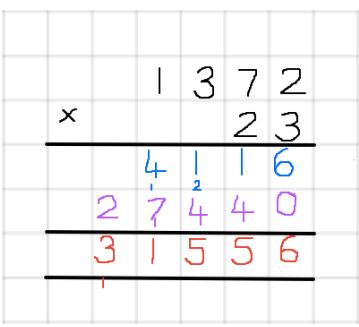
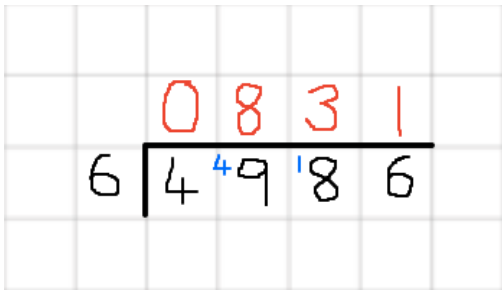
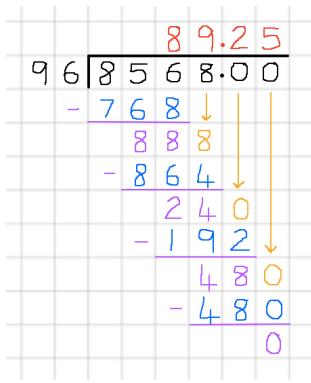


Subtraction

Division

CALCULATION GUIDE FOR PARENTS: YEARS 1-6

Overview of Formal Written Methods

<p><u>Column Addition</u></p> 	<p><u>Column Subtraction</u></p> 
<p><u>Short Multiplication</u></p> 	<p><u>Long Multiplication</u></p> 
<p><u>Short Division</u></p> 	<p><u>Long Division</u></p> 

The table above shows the six formal written methods that are taught across Key Stage 1 (ages 5-7) and Key Stage 2 (ages 7-11). A formal written method refers to the strategy pupils should use in calculations for either addition, subtraction, multiplication or division (also known as ‘the four operations’). These are specified in the National Curriculum, which we follow at Benthall Primary School. Not every method shown above will be expected for each year group and the methods will vary according to the number of digits involved in calculations.

Expectations of Formal Methods Across Year Groups

Formal Written Method	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Column Addition			√	√	√	√	√
Column Subtraction			√	√	√	√	√
Short Multiplication				√	√	√	√
Long Multiplication						√	√
Short Division						√	√
Long Division							√

The above table shows whether children are expected to use a particular formal written method. These written methods correspond with those shown on the previous page. In cases where pupils are not expected to use a formal written method, they will use other methods and strategies to add, subtract, multiply and divide. Pupils will build on knowledge from previous years.

In school, the period of time spent learning these methods will vary, depending on whether the method is new or known from previous years. This will take place in a block of teaching during Autumn term 2 (after October half-term break) and is revisited across the academic year. If you are supporting with calculation before October half-term break, please revise methods from the previous year.

This guide is to be used when supporting pupils at home with methods they are being taught in school. For each method, you will be able to see whether the method is used in your child's year group. Please support your child with only the methods relevant for their year group as progressing unnecessarily through more complex strategies may cause confusion and misunderstanding if the child has not been taught that method in school.

Column Addition

Key Vocab:

addend: a number that is added to another to produce the sum

sum: result of adding two or more addends

partitioning: separating a number into place value representations eg. $47 = 40 + 7$ (tens and ones).

regrouping (to make 10): recognising that multiples of ones can be grouped in different ways (eg. 12 ones are regrouped to make 1 ten and 2 ones).

Year Group	Expectation of Method
1	N/A
2	Adding two two-digit numbers
3	Adding numbers with up to 3 digits
4	Adding numbers with up to 4 digits
5	Adding numbers with more than 5 digits
6	Deciding the appropriate use of mental vs written strategies

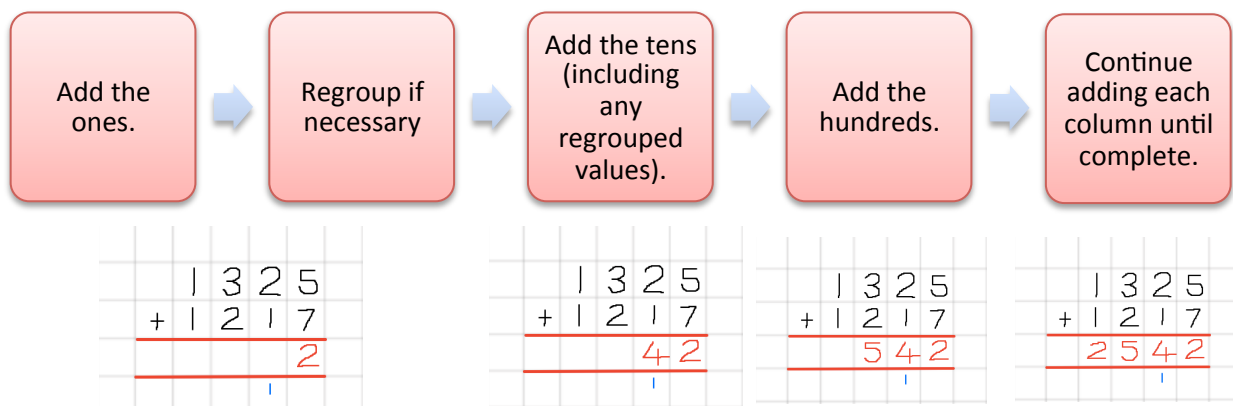
addends

+

sum

regrouped values

Steps for Column Addition

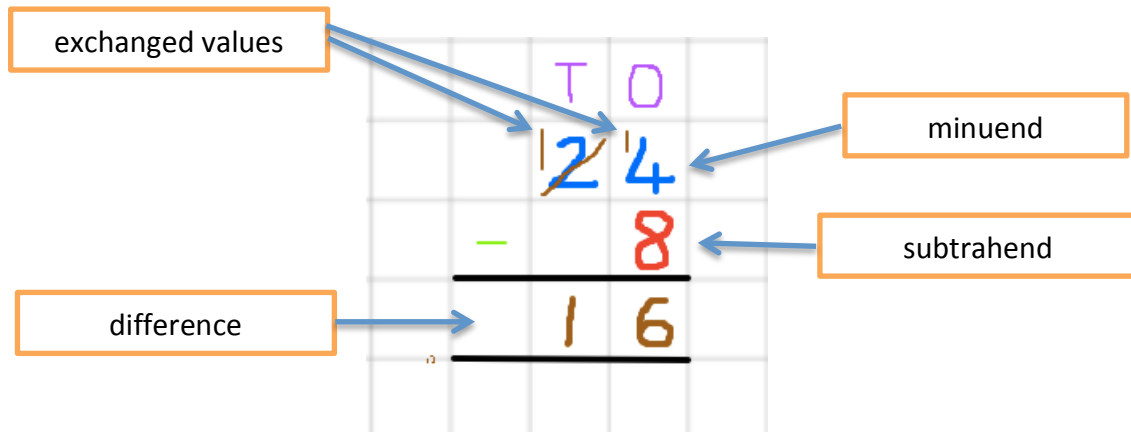


Column Subtraction

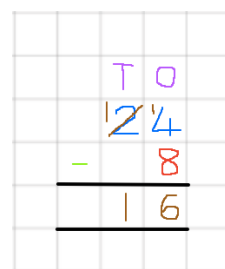
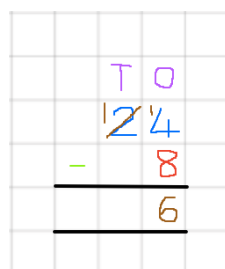
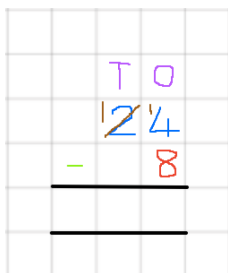
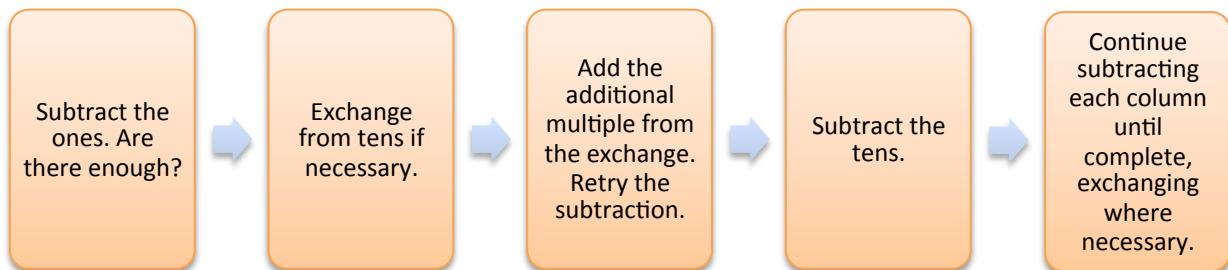
Key Vocab:

minuend: starting number in a subtraction calculation ie. the larger number
subtrahend: number you subtract from the minuend (smaller than minuend)
difference: the result of subtracting the subtrahend from the minuend.
exchanging: recognising that multiples of tens can be regrouped as multiples of one (eg. 1 ten = 10 ones). A process used if the value is not sufficient for subtraction.

Year Group	Expectation of Method
1	N/A
2	Subtracting two two-digit numbers
3	Subtracting two-digit numbers and three-digit numbers from three-digit numbers
4	Subtracting numbers with up to four digits from four-digit numbers
5	Subtracting numbers with more than four digits from numbers with more than four digits
6	Deciding the appropriate use of mental vs written strategies



Steps for Column Subtraction



Short Multiplication

Note on short multiplication: whilst the name of the method does partially refer to the visual length of the method, it predominantly specifies that the second factor has only one digit. Short multiplication **cannot** be used to multiply two two-digit factors.

Key Vocab:

factor: a whole number which multiplies with another to create a product

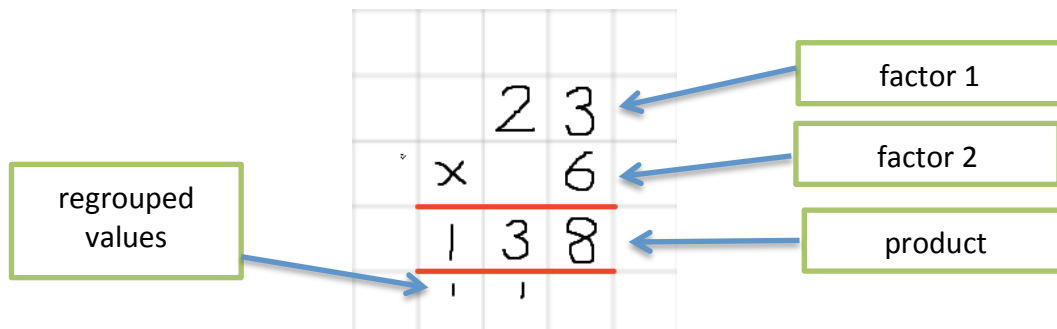
product: result of multiplying two factors

array: a visual representation of multiplication, using columns and rows of symbols that correspond with factors

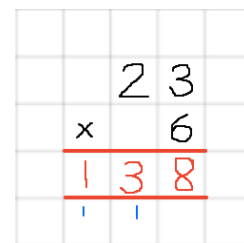
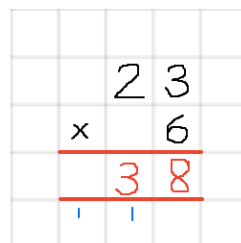
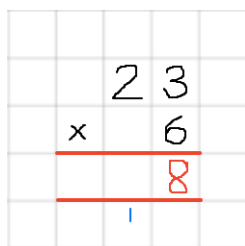
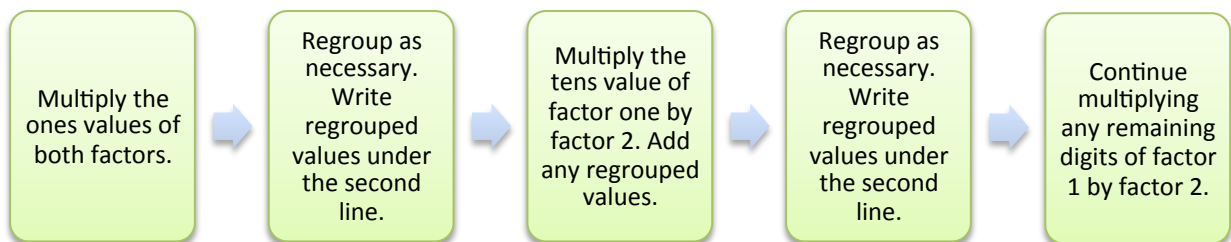
multiplication facts: times tables learnt up to 12 x 12

commutative law: principle that factors can be multiplied in any order

Year Group	Expectation of Method
1	N/A
2	N/A
3	Multiply two-digit numbers by one-digit numbers
4	Multiply three-digit and two-digit numbers by one-digit numbers
5	Multiply numbers with up to four digits by one-digit numbers
6	Multiply numbers with at least four digits by one-digit numbers



Steps for Short Multiplication



Long Multiplication

Note on short multiplication: whilst the name of the method does partially refer to the visual length of the method, it predominantly specifies that both factors have more than one digit. Long multiplication **cannot** be used to multiply by a one-digit factor.

Key Vocab:

factor: a whole number which multiplies with another to create a product

product: result of multiplying two factors

array: a visual representation of multiplication, using columns and rows of symbols that correspond with factors

multiplication facts: times tables learnt up to 12×12

commutative law: principle that factors can be multiplied in any order

Year Group	Expectation of Method
1	N/A
2	N/A
3	N/A
4	N/A
5	Multiply numbers with up to four digits by a two-digit number
6	Multiply numbers with up to four digits by a two-digit number

factor 1

factor 2

product of 1372×3

product of 1372×20

total product

regrouped values

Steps for Long Multiplication

Multiply the **ones** values of both factors. Regroup as necessary.

Multiply the **tens** value of factor 1 by the **ones** value of factor 2. Add any regrouped values and regroup as necessary.

Multiply the **hundreds** value of factor 1 by the **ones** value of factor 2. Add any regrouped values and regroup as necessary.

Multiply any remaining digits of factor 1 by the **ones** value of factor 2. Add any regrouped values and regroup as necessary.

Progress to the second row. Add a place holder in preparation for multiplying by the tens digit of factor 2.

Multiply the **ones** value of factor 1 with the **tens** value of factor 2.

Multiply the **tens** values of both factors. Regroup as necessary.

Multiply the **hundreds** value of factor 1 by the **tens** value of factor 2. Add any regrouped values and regroup as necessary.

Multiply any remaining digits of factor 1 by the **tens** value of factor 2. Add any regrouped values and regroup as necessary.

Add the two products (following the column addition process) to find the total product.

Short Division

Note on short division: this method is generally preferred for **one-digit divisors**. When used for two-digit divisors, the numbers will be smaller. However, as a general rule, short division is better for one-digit divisors whereas long division is better for two-digit divisors.

Key Vocab:

dividend: the starting number (usually the largest) in a division calculation.

divisor: the number you are dividing by in a division calculation.

quotient: the result of dividing the dividend by the divisor; the answer to a division calculation

remainder: the portion 'left over' after the division is complete; represented by decimals or whole numbers

multiple: the result of multiplying by an integer

Year Group	Expectation of Method
1	N/A
2	N/A
3	N/A
4	Divide numbers with up to four digits by a one-digit number (with no remainders).
5	Divide numbers with up to four digits by a one-digit number
6	Divide numbers with up to four digits by a one-digit or two-digit number

Diagram illustrating short division on a grid. The first example shows $6 \overline{) 6498} = 0831$ with a remainder of 6. The second example shows $8 \overline{) 1268} = 158$ with a remainder of 4. Labels with arrows identify the divisor, dividend, quotient, remainder, and regrouping steps.

Steps for Short Division

Take the first (from the left) digit of the dividend. Can it be divided? If not, regroup to the next digit. Divide it by the divisor.

Write the number of whole multiples above the line. Regroup any remainders.

Move to the next digit. Divide it by the divisor. Write whole multiples above the line and regroup.

Continue with any remaining digits of the dividend, regrouping when necessary.

If there are any remainders after the last digit, represent this by a small 'r' and the remaining value.

$$8 \overline{) 1268}$$

$$8 \overline{) 1268} \begin{array}{c} 1 \\ \hline \end{array}$$

$$8 \overline{) 1268} \begin{array}{c} 15 \\ \hline \end{array}$$

$$8 \overline{) 1268} \begin{array}{c} 158 \\ \hline \end{array} r4$$

Long Division

Note on long division: this method is only used for **two-digit divisors**. You should use short division when dividing by one-digit divisors. **Long division is only taught in Year 6** and should not be taught in younger year groups as it may conflict with methods taught in school.

Key Vocab:

dividend: the starting number (usually the largest) in a division calculation.

divisor: the number you are dividing by in a division calculation.

quotient: the result of dividing the dividend by the divisor; the answer to a division calculation

remainder: the portion 'left over' after the division is complete; represented by decimals or whole numbers

multiple: the result of multiplying by an integer

Year Group	Expectation of Method
1	N/A
2	N/A
3	N/A
4	N/A
5	N/A
6	Divide numbers with up to four digits by a two-digit number

DMS = DIVISION, MULTIPLICATION, SUBTRACTION

DMS = DIVISION, MULTIPLICATION, SUBTRACTION

Sometimes, long division is called the 'DMS method' which stands for 'Division, Multiplication, Subtraction.' This is because all three operations are performed in a repetitive cycle throughout the method. As the name of the method suggests, it can be a long process but all steps are necessary to avoid simple errors and ultimately arrive at the correct answer. In test contexts, long division (as well as long multiplication) will always have 2 marks attached as opposed to 1 for all other methods.

① $(856 \div 96 = 8)$

② $(8 \times 96 = 768)$

③ $(856 - 768 = 88)$
 $(888 \div 96 = 9)$

④ $(9 \times 96 = 864)$

⑤ $(888 - 864 = 24)$
 $(240 \div 96 = 2)$

⑥ $(2 \times 96 = 192)$

⑦ $(240 - 192 = 48)$
 $(480 \div 96 = 5)$

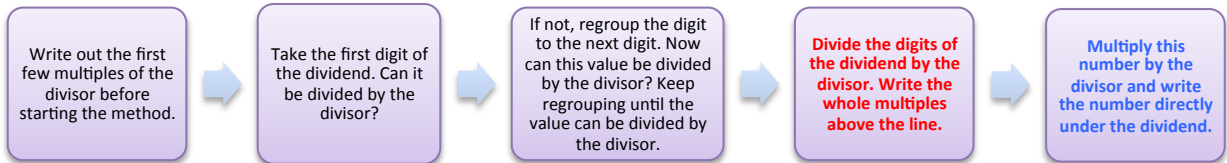
⑧ $(5 \times 96 = 480)$

⑨ $(480 - 480 = 0)$

Long Division

DMS = DIVISION, MULTIPLICATION, SUBTRACTION

Steps for Long Division

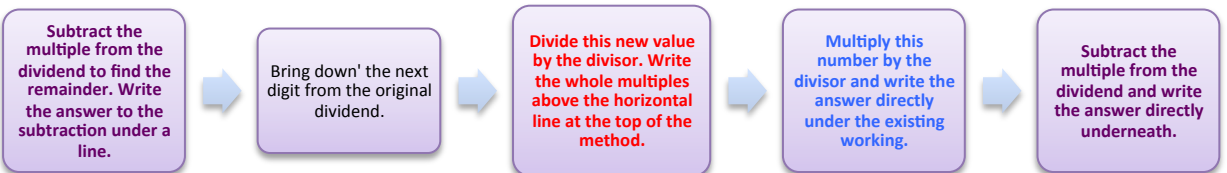


1.	9	6	
2.	1	9	2
3.	2	8	8
4.	3	8	4
5.	4	8	0
6.	5	7	6

$$96 \overline{) 8568.00}$$

$$96 \overline{) 8568.00}$$

$$96 \overline{) 8568.00}$$



$$96 \overline{) 8568.00}$$

$$\begin{array}{r} 89 \\ -768 \\ \hline 88 \end{array}$$

$$96 \overline{) 8568.00}$$

$$\begin{array}{r} 89 \\ -768 \\ \hline 888 \end{array}$$

$$96 \overline{) 8568.00}$$

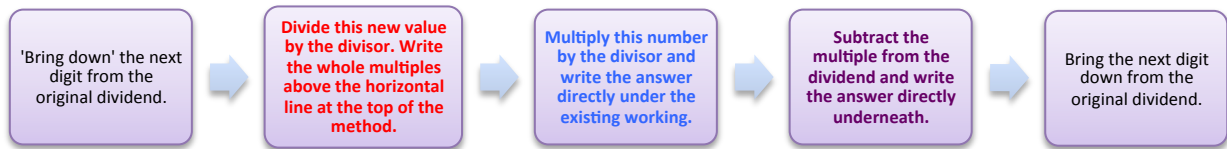
$$\begin{array}{r} 89 \\ -768 \\ \hline 888 \end{array}$$

$$96 \overline{) 8568.00}$$

$$\begin{array}{r} 89 \\ -768 \\ \hline 888 \\ 864 \\ \hline \end{array}$$

$$96 \overline{) 8568.00}$$

$$\begin{array}{r} 89 \\ -768 \\ \hline 888 \\ -864 \\ \hline 24 \end{array}$$



$$96 \overline{) 8568.00}$$

$$\begin{array}{r} 89 \\ -768 \\ \hline 888 \\ -864 \\ \hline 240 \end{array}$$

$$96 \overline{) 8568.00}$$

$$\begin{array}{r} 89.2 \\ -768 \\ \hline 888 \\ -864 \\ \hline 240 \end{array}$$

$$96 \overline{) 8568.00}$$

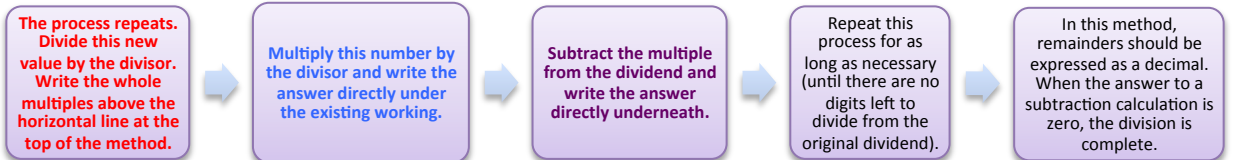
$$\begin{array}{r} 89.2 \\ -768 \\ \hline 888 \\ -864 \\ \hline 240 \\ 192 \end{array}$$

$$96 \overline{) 8568.00}$$

$$\begin{array}{r} 89.2 \\ -768 \\ \hline 888 \\ -864 \\ \hline 240 \\ -192 \\ \hline 48 \end{array}$$

$$96 \overline{) 8568.00}$$

$$\begin{array}{r} 89.2 \\ -768 \\ \hline 888 \\ -864 \\ \hline 240 \\ -192 \\ \hline 480 \end{array}$$



$$96 \overline{) 8568.00}$$

$$\begin{array}{r} 89.25 \\ -768 \\ \hline 888 \\ -864 \\ \hline 240 \\ -192 \\ \hline 480 \\ -480 \\ \hline \end{array}$$

$$96 \overline{) 8568.00}$$

$$\begin{array}{r} 89.25 \\ -768 \\ \hline 888 \\ -864 \\ \hline 240 \\ -192 \\ \hline 480 \\ -480 \\ \hline \end{array}$$

$$96 \overline{) 8568.00}$$

$$\begin{array}{r} 89.25 \\ -768 \\ \hline 888 \\ -864 \\ \hline 240 \\ -192 \\ \hline 480 \\ -480 \\ \hline \end{array}$$

$$96 \overline{) 8568.00}$$

$$\begin{array}{r} 89.25 \\ -768 \\ \hline 888 \\ -864 \\ \hline 240 \\ -192 \\ \hline 480 \\ -480 \\ \hline \end{array}$$

- ① (856 ÷ 96 = 8)
- ② (8 × 96 = 768)
- ③ (856 - 768 = 88)
- ④ (88 × 96 = 8448)
- ⑤ (888 - 8448 = 48)
- ⑥ (2 × 96 = 192)
- ⑦ (240 - 192 = 48)
- ⑧ (480 ÷ 96 = 5)
- ⑨ (480 - 480 = 0)