



How we teach it.

Written and mental calculations in Year 5.



Written Addition in Year 5

Method:

Column Addition.

At the beginning of Year 5, children will continue using column addition to add 4 digit numbers and several numbers with different numbers of digits at the same time. Place value counters and mats will be used for support where necessary.

$$\begin{array}{r} \text{Th H T O} \\ 5678 \\ + \quad 468 \\ + \quad \quad 72 \\ \hline 6218 \\ \hline 121 \end{array}$$

Ensure that the digits are lined up correctly.

Carry below the line.

Leading to:

Column Addition with decimals

By the end of Year 5, children will be comfortable using column addition to add large and small numbers and will be able to add **decimals** using column addition. Place value counters and mats will be used for support where necessary.

$$\begin{array}{r} \text{TO} \cdot \frac{1}{10} \\ 35.2 \\ + 16.0 \\ \hline 51.2 \end{array}$$

Carry below the line.

Add '0' as a place holder

Strategies to support:

$$\begin{array}{r} 123 = 100 + 20 + 3 \\ + 45 = \quad \quad 40 + 5 \\ \hline 168 = 100 + 60 + 8 \end{array}$$

Is the same as:

$$\begin{array}{r} \text{HTO} \\ 123 \\ + 45 \\ \hline 168 \end{array}$$

Next Steps:

Children will be comfortable using column addition with numbers of all sizes and will be able to explain their method using appropriate mathematical vocabulary.

$$\begin{array}{r} \text{Th H T O} \\ 587 \\ + 475 \\ \hline 1062 \end{array}$$

500 + 400 + 100 = 1000. Carry the 1000 into the Thousands column.

As 80 + 70 + 10 = 160, carry the 100 into the hundreds column.

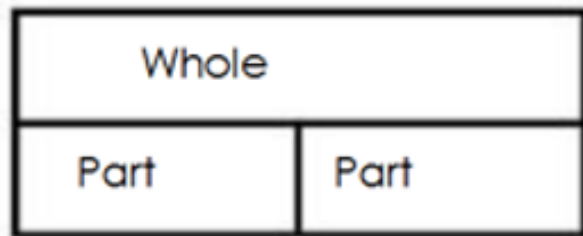
As 7 + 5 = 12, carry the ten into the next column.

line up the H, T & U

Start adding at the units.

A Deeper Look:

Children use a bar to find missing digits. It is important for children to use the bar in this way to aid with problem solving.

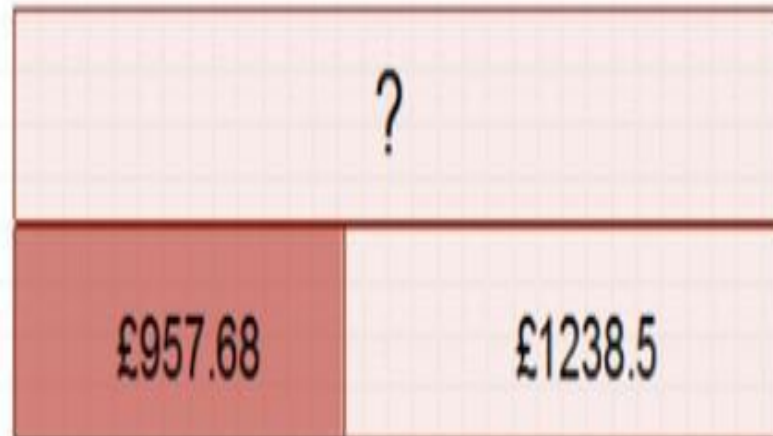


Children understand that addition and subtraction are a whole part relationship. They look for wholes and parts in the question and use the information they have to determine what operation to use.

Ex) $\text{Whole} - \text{Part} = \text{Part}$

$\text{Part} + \text{Part} = \text{Whole}$

MacDonalds sold £9957.68 worth of hamburgers and £1238.5 worth of chicken nuggets. How much money did they take altogether?





Mental Addition in Year 5

Children should be able to recall:

- Sums of decimals.
E.g. $6.5 + 2.7$
- Doubles of decimals.
E.g. Double 3.4

- What must be added to any four digit number to make the next multiple of 1000.
E.g. $4087 + n = 5000$

- What must be added to a decimal with units and tenths to make the next whole number.
E.g. $7.2 + n = 8$

Working mentally, children should be able to:

- Add a pair of two digit numbers or three-digit multiples of 10.
E.g. $38 + 86$, $620 + 380$

- Add a near multiple of 10 or 100 to any two-digit or three digit number.
E.g. $235 + 198$

- Add any pair of decimal fractions each with units and tenths.
E.g. $5.7 + 2.5$

Children should know when to:

- Count on in hundreds tens, ones and tenths.
- Partition: Add hundreds, tens or ones separately, then recombine.

- Add a multiple of 10 or 100 and adjust.
E.g. $235 + 198 = 235 + 200 - 2$
- Partition: Double and adjust.

- Use knowledge of place value and related calculations.
E.g. $6.3 + 4.8$ using $63 + 48$
- Partition: Count on in minutes and hours, bridging through 60.



Written Subtraction in Year 5

Method:

Column Subtraction.

Children will move on to using column subtraction on its own and with larger numbers. Place value counters and mats will be used for support where necessary.

$$\begin{array}{r}
 415 \\
 357 \\
 \hline
 363 \\
 3194 \\
 \hline
 \end{array}$$

Exchange with the next digit.

3000 - 0

150 - 60 = 90

Start subtracting from the units

Leading to:

Column Subtraction.

Subtracting **decimals** using column subtraction. Place value counters and mats will be used for support where necessary.

$$\begin{array}{r}
 2 \\
 316.5 \\
 - 17.0 \\
 \hline
 19.5 \\
 \hline
 \end{array}$$

Exchange with the next digit.

2 - 1

16 - 9

Line up the H, T & $\frac{1}{10}$

Add '0' as a place holder.

Strategies to support:

The Expanded Method of Subtraction and Column Subtraction.

The expanded method of subtraction will continue to be taught alongside the column method to ensure children see their relationship.

$$\begin{array}{r}
 362 = 300 + 50 + 12 \\
 245 = 200 + 40 + 5 \\
 \hline
 117 = 100 + 10 + 7
 \end{array}$$

Because you can't 'do' 2-5, exchange a ten for ten units.

Exchange with the next digit.

50 + 12

512

362

245

117

Recombine to get the answer.

50 - 40

12 - 5

Next Steps:

Children will be comfortable using column subtraction with numbers of all sizes and will be able to explain their method using appropriate mathematical vocabulary.

$$\begin{array}{r}
 415 \\
 357 \\
 \hline
 363 \\
 3194 \\
 \hline
 \end{array}$$

Exchange with the next digit.

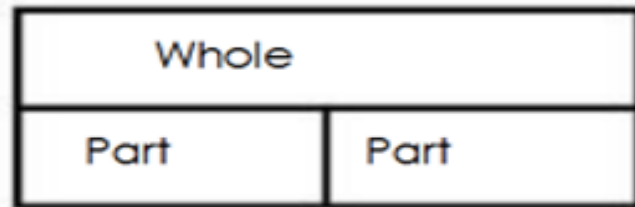
3000 - 0

150 - 60 = 90

Start subtracting from the units

A Deeper Look:

Children use a bar to find missing digits. It is important for children to use the bar in this way to aid with problem solving.



A whole to Lapland costs £5005 for a family of four, the Smith's have only saved £3787.75, how much money do they still need to find?

£5005	
?	£3787.75

Children understand that addition and subtraction are a whole part relationship. They look for wholes and parts in the question and use the information they have to determine what operation to use.

Ex) $\text{Whole} - \text{Part} = \text{Part}$

$\text{Part} + \text{Part} = \text{Whole}$



Mental Subtraction in Year 5

Children should be able to recall:

- Differences of decimals.
E.g. $7.8 - 1.3$
- Halves of decimals.
E.g. Half of 5.6

- What must be added to any four digit number to make the next multiple of 1000.
E.g. $5000 - 4087 = n$

- What must be added to a decimal with units and tenths to make the next whole number.
E.g. $8 - 7.2 = n$

Working mentally, children should be able to:

- Subtract pair of two digit numbers or three-digit multiples of 10.
E.g. $620 - 380$, $62 - 38$

- Subtract a near multiple of 10 or 100 to any two-digit or three digit number.
E.g. $235 - 198$
- Find the difference between near multiples of 100 or 1000.
E.g. $607 - 588$, $6070 - 4087$

- Subtract any pair of decimal fractions each with units and tenths.
E.g. $5.7 - 2.5$

Children should know when to:

- Count back in hundreds tens, ones and tenths.
- Subtract by counting up from the smaller to the larger number.

- Subtract a multiple of 10 or 100 and adjust.
E.g. $280 - 98 = 280 - 100 + 2$

- Use knowledge of place value and related calculations.
E.g. $6.3 - 4.8$ using $63 - 48$
- Partition: Count back in minutes and hours, bridging through 60.



Written Multiplication in Year 5

Method:

Multiplying numbers using Column Multiplication.

Children will be introduced to column multiplication. They will multiply numbers in the same way as in grid method but record it in columns according to place value. Place value counters and mats will be used for support where necessary.

Th H T O

$$\begin{array}{r} 324 \\ \times 23 \\ \hline 972 \\ 6480 \\ \hline 7452 \end{array}$$

Multiply the top number by the units of the bottom. $(3 \times 4) + (3 \times 20) + (3 \times 300)$

Multiply the top number by the tens of the second number. $(20 \times 4) + (20 \times 20) + (20 \times 300)$

Add to get the answer.

Leading to:

The Column Method of Multiplication.

Children will continue to use column multiplication, adding each multiplication in the same row as they multiply the digits of the numbers. Children will solve missing number problems to develop mastery.

Th H T O

$$\begin{array}{r} 324 \\ \times 23 \\ \hline 972 \\ 6480 \\ \hline 7452 \end{array}$$

Multiply the top number by the units of the bottom. $(3 \times 4) + (3 \times 20) + (3 \times 300)$

Multiply the top number by the tens of the second number. $(20 \times 4) + (20 \times 20) + (20 \times 300)$

Add to get the answer.

Strategies to support:

The Ladder Method of Multiplication.

Ladder method to be used with children multiplying both two and three digits by a one digit number. Dienes are used alongside to promote mastery of what is occurring at a place value level.

$$\begin{array}{r} 43 \\ \times 56 \\ \hline 258 \\ 2580 \\ \hline 2408 \end{array}$$

Use column addition to find answer

6×3

6×40

50×3

50×40

Next Steps:

Multiplying **decimal numbers** using the grid method and/or estimation.

$$\begin{array}{r|l} \times & 5 + 0.2 \\ \hline 6 & 30 + 1.2 = 31.20 \\ 0.3 & 1.5 + 0.06 = 1.56 \\ \hline & 32.76 \end{array}$$

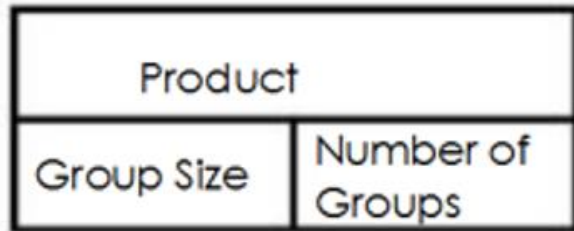
0.3×0.2

Take care to line up the digits. Adding a place holder will help.

Ex) $6.3 \times 5.2 = n$. Estimates to 6×5 (the answer should be close to 20). Multiply without decimals and add them in at the end.

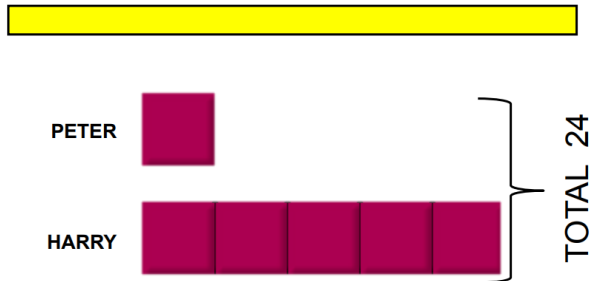
A Deeper Look:

Children use a bar model to support multiplication.



Peter has 4 books.

Harry has five times as many books as Peter.



Children should determine if they are working with a comparison model or Product, Number of Groups and Size of Groups Model.

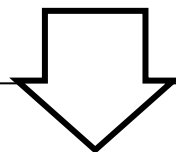
In a comparison model, they must find the total number of groups and solve for one group.

In a Product, Number of Groups and Size of Groups Model, they use the information provided to determine what operation to use.

Ex)

Product divided by Group Size = Number of Groups

Group Size X Number of Groups = Product





Mental Multiplication in Year 5

Children should be able to recall:

- Squares to 10×10 .

- Factor Pairs to 100.
E.g. 30 has the factor pairs 1×30 , 2×15 , 3×10 and 5×6

Working mentally, children should be able to:

- Multiply two-digit numbers by 4 or 8.
E.g. 26×4
- Multiply two-digit numbers by 5 or 20.
- Multiply by 25 or 50.

- Double three-digit multiples of 10 to 500.
- Multiply whole numbers and decimals by 10, 100 or 1000.
E.g. 4.3×10 , 0.75×100

- Multiply pairs of multiples of 10 and a multiple of 100 by a single-digit number.
E.g. 60×30 , 900×8

Children should know when to:

- Multiply by 4 or 8 by repeated doubling.
- Form an equivalent calculation.
E.g. To multiply by 5, multiply by 10 then halve. To multiply by 20, double and then multiply by 10.

- Use knowledge of doubles and halves and understanding of place value.
E.g. When multiplying by 50, multiply by 100 then divide by 2.
- Use knowledge of multiplication and place value when calculating with multiples of 10.
E.g. 60×7 using 6×7

- Use understanding that when a number is multiplied by 10 or 100 its digits move one or two places relative to the decimal point and zero is used as a place holder.



Written Division in Year 5

Long Division

Children will use their understanding of short division to learn long division. Short division will initially be taught alongside long division to enable an understanding of the process to be gained. Place value counters and mats will be used for support where necessary.

$$\begin{array}{r} 025 \\ 5 \overline{) 125} \\ \underline{10} \\ 25 \\ \underline{25} \\ 0 \end{array}$$

Handwritten notes:
1 ÷ 5 = 0
12 ÷ 5 = 2 r 2
25 ÷ 5 = 5
Carry the remainder

Leading to:

Long Division.

Children will gain fluency in long division.

$$\begin{array}{r} 626r8 \\ 11 \overline{) 6894} \\ \underline{66} \\ 29 \\ \underline{22} \\ 74 \\ \underline{66} \\ 8 \end{array}$$

Strategy to Support:

Short Division with and without remainders.

Children will continue to explore short division. They will use their increasing knowledge of times tables to solve. Dines are used to support understanding.

$$\begin{array}{r} 025 \\ 5 \overline{) 125} \\ \underline{10} \\ 25 \\ \underline{25} \\ 0 \end{array}$$

Handwritten notes:
1 ÷ 5 = 0
12 ÷ 5 = 2 r 2
25 ÷ 5 = 5
Carry the remainder

Next Steps:

Children will use estimation to solve division problems involving decimals numbers. They round to estimate their answers.

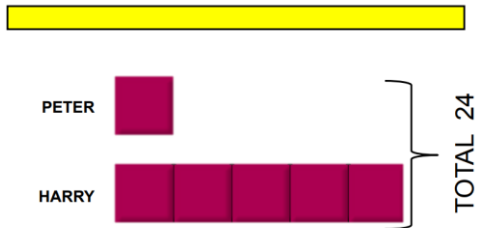
$$\begin{array}{r} 3. \\ 2 \overline{) 73.59} \\ \underline{-6} \\ 1 \end{array} \quad \begin{array}{r} 36. \\ 2 \overline{) 73.59} \\ \underline{-6} \\ 13 \\ \underline{-12} \\ 1 \end{array} \quad \begin{array}{r} 36.7 \\ 2 \overline{) 73.59} \\ \underline{-6} \\ 13 \\ \underline{-12} \\ 15 \\ \underline{-14} \\ 1 \end{array}$$

A Deeper Look:

Children use a bar to support division problems.

Peter has 4 books.

Harry has five times as many books as Peter.



Product	
Group Size	Number of Groups

Children should determine if they are working with a comparison model or Product, Number of Groups and Size of Groups Model.

In a comparison model they must find the total number of groups and solve for one group.

In a Product, Number of Groups and Size of Groups Model, they use the information provided to determine what operation to use.

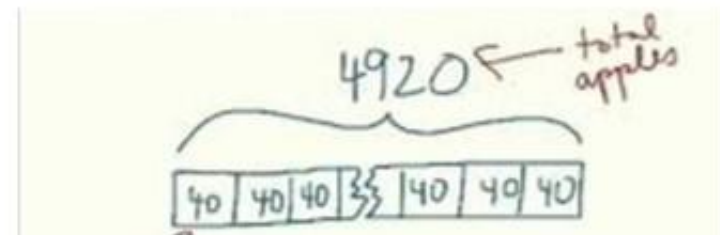
Ex)

Product divided by Group Size = Number of Groups

Group Size X Number of Groups = Product

Bar Model to support understanding of problem solving:

Frank has 4920 apples. He needs to put them into baskets of 40. How many baskets does he need?





Mental Division in Year 5

Children should be able to recall:

- Division facts corresponding to tables up to 10×10 and the related unit fractions.
E.g. $7 \times 9 = 63$ so one-ninth of 63 is 7 and one-seventh of 63 is 9.

- Percentage equivalents of one-half, one-quarter, three quarters, tenths and hundredths.

- Factor Pairs to 100 and corresponding division facts.
E.g. $30 \div 5 = 6$, $30 \div 6 = 5$ using $5 \times 6 = 30$

Working mentally, children should be able to:

- Divide two-digit numbers by 4 or 8.
- Halve three-digit multiples of 10 to 1000.
E.g. $760 \div 2$

- Find the remainder after dividing a two-digit number by a single-digit number.
E.g. $27 \div 4 = 6 \text{ r } 3$
- Divide whole numbers and decimals by 10, 100 or 1000.
- Divide a multiple of 10 by a single-digit number (whole number answers)
E.g. $270 \div 3$

- Find fractions of whole numbers or quantities.
E.g. $\frac{2}{3}$ of 27, $\frac{4}{5}$ of 70 kg
- Find 50%, 25% or 10% of whole numbers or quantities.
E.g. 25% of 20 kg, 10% of £10

Children should know when to:

- Divide by 4 or 8 by repeated halving.
- Use knowledge of division facts.
E.g. when carrying out a division to find a remainder.

- Use understanding that when a number is divided by 10 or 100, its digits move one or two places to the right relative to the decimal point and zero is used as a place holder.

- Use knowledge of equivalence between fractions and percentages.
E.g. To find 50%, 25% and 10%
- Use knowledge of division facts and understanding of place value.
E.g. When calculating with multiples of 10.

Year 5 Problems

- 1. Every day for 4 days Helen scored 7.5 in a test. On the fifth day she scored 8. What was her total score?
- 2. I cut 60 cm from 3.3m of string and shared the rest between 3 friends. How much string did they get each?
- 3. How many jugs with a capacity of 250ml could you fill with 10 litres of water?
- 4. All the children in the school are going on a residential trip to the outdoor activity centre. They will be divided into 6 equal groups. If there are 246 children in the school how many will be in each group?
- 5. Robert calculated 25% of 600. What answer does he get?
- 6. Sam calculated 40% of 120. What answer does he get?
- 7. Rita worked out that one sixth of a number was 12. What was the number she started with?