



How we teach it.

Written and mental calculations in Year 6.



Written Addition in Year 6

Method:

Column Addition.

Children will practise using column addition to add numbers of all sizes. Secure knowledge of place value is essential.

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

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

line up the H, T & U
 Start adding at the units.
 As $80 + 70 + 10 = 160$, carry the 100 into the hundreds column.
 As $7 + 5 = 12$ carry the ten into the next column.

Common Mistakes to look out for:

- Make sure that the digits are lined up correctly in columns of thousands, hundreds, tens and units.
- Check that carrying is done correctly. The digit that needs to be carried must be placed in the correct column and then added in the next step.

Alternative Methods:

By the end of Year 6 children will need to be secure in their knowledge of an efficient method of addition. The following methods may be of help along with place value counters and mats.

The Expanded Method of Addition.

Partition both numbers. line up the H, T & U

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

Recombine to get the answer.
 $100 + 0$ $20 + 40$ $3 + 5$

Adding several decimals.

$14.5 + 0.71 + 26.85$

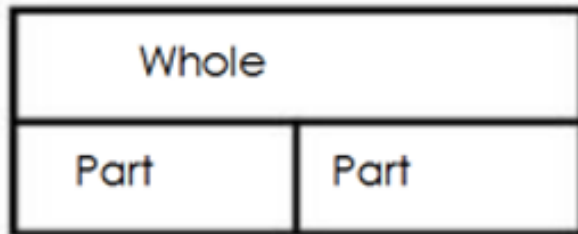
Line up the digits with the longest number first.

T O $\frac{1}{10}$ $\frac{1}{100}$
 $\begin{array}{r} 26.85 \\ 14.50 \\ + 0.71 \\ \hline 42.06 \end{array}$

Add zero as a place holder.
 Carry below the line.
 Start adding from the right

A Deeper Look:

Children use a bar to find missing digits and to assist 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) $\text{Whole} - \text{Part} = \text{Part}$

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

Jack went on holiday. His flight cost £70.50, the hotel £1295 and spending money £427.89. How much did Jack spend on his holiday?

?		
£70.50	£427.89	£1295



Mental Addition in Year 6

Children should be able to recall:

- Addition facts for multiples of 10 to 1000.
E.g. $650 + n = 930$

- Addition facts for decimal numbers with one decimal place.
E.g. $1.4 + n = 2.5$

- What must be added to a decimal with units, tenths and hundredths to make the next whole number,
E.g. $7.26 + n = 8$

Working mentally, children should be able to:

- Add pairs of decimals with units, tenths or hundredths.
E.g. $0.7 + 3.38$

- Find doubles of decimals each with units and tenths.
E.g. $1.6 + 1.6$
- Add near doubles of decimals.
E.g. $2.5 + 2.6 = 2.5 + 2.5 + 0.1$

- Add a decimal with units and tenths that is nearly a whole number.
E.g. $4.3 + 2.9$

Children should know when to:

- Count on in hundreds tens, ones and tenths and hundredths.
- Use knowledge of place value and related calculations.
E.g. $6.8 + 4.3$ using $68 + 43$

- Use knowledge of place value and of doubles of two-digit numbers.
- Partition: Double and adjust.
E.g. $1.6 + 1.7 = 1.6 + 1.6 + 0.1$

- Partition: add a whole number and adjust.
E.g. $4.3 + 2.9 = 4.3 + 3 - 0.1$
- Partition: Count on in minutes and hours, bridging through 60 (analogue and digital times, 12-hour and 24-hour clock)



Written Subtraction in Year 6

Method:

Column Subtraction.

Children will practise using the column method to subtract numbers of increasing size. Secure knowledge of place value is essential.

$$\begin{array}{r} 3607 - 489 \\ \hline 3118 \end{array}$$

Exchange 1 hundred for 10 tens then 1 ten for 10 units.

Start subtracting from the right.

Common Mistakes to look out for.

- Children must ensure that the bottom number is subtracted from the top. If the top digit is smaller than the top digit children must exchange with the next digit.
- In some calculations, e.g. $305 - 58$, children will need to exchange more than once to subtract successfully.

Alternative Methods.

By the end of Year 6 children will need to be secure in their knowledge of an efficient method of subtraction. The following methods may be of help along with place value counters and mats.

The Expanded Method of Subtraction.

$$\begin{array}{r} 263 = 200 + 50 + 3 \\ 46 = 40 + 6 \\ \hline 217 = 200 + 10 + 7 \end{array}$$

Recombine to get the answer.

We exchange 1 ten for 10 units.

$50 - 40 = 10$
 $13 - 6 = 7$

Subtraction decimals with a different number of digits.

$$\begin{array}{r} 324.9 - 7.25 \\ \hline 317.65 \end{array}$$

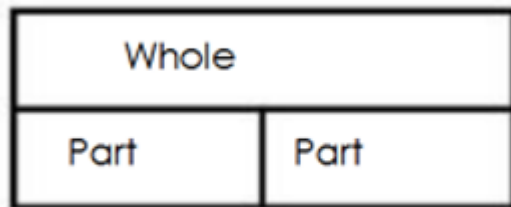
Line up the digits.

Exchange with the next digit

Add zero as a place holder.

A Deeper Look:

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



Chloe wants to buy a new car for £6450. She has £4885.87 in her savings account. Her Dad gives her £150 for her birthday. How much more money does she need to save?

£6450		
£4885.87	£150	?

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 6

Children should be able to recall:

- Subtraction facts for multiples of 10 to 1000.
E.g. $n - 250 = 540$

- Subtraction facts for decimal numbers with one decimal place.
E.g. $n - 1.4 = 2.5$

- What must be subtracted from a decimal with units, tenths and hundredths to make the previous whole number,
E.g. $7.26 - n = 7$

Working mentally, children should be able to:

- Subtract pairs of decimals with units, tenths or hundredths.
E.g. $4.54 - 0.84$

- Subtract a decimal with units and tenths, that is nearly a whole number.
E.g. $6.5 - 3.8 = 6.5 - 4 + 0.2$

Children should know when to:

- Count back in hundreds tens, ones and tenths and hundredths.
- Use knowledge of place value and related calculations.
E.g. $6.8 - 4.3$ using $68 - 43$

- Partition: subtract a whole number and adjust.
 $6.5 - 3.8 = 6.5 - 4 + 0.2$

- Partition: Count back in minutes and hours, bridging through 60 (analogue and digital times, 12-hour and 24-hour clock)



Written Multiplication in Year 6

Method:

The Column Method of Multiplication.

Children will begin to use column multiplication, adding each multiplication in the same row as they multiply the digits of the numbers.

Th H T O

Multiply the top number by the units of the bottom.

Multiply the top number by the tens of the second number.

Add to get the answer.

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

$(3 \times 4) + (3 \times 20) + (3 \times 300)$

$(20 \times 4) + (20 \times 20) + (20 \times 300)$

Common Mistakes to look out for.

- Check multiplication of multiples of 10 and 100 as calculations are often wrong by a factor of 10.
- Ensure that after recombining, the digits are lined up to enable column addition to proceed effectively.
- Children may need to carry when adding.

Alternative Methods.

By the end of Year 6, children will need to be secure in their knowledge of an efficient method of multiplication. The following methods may be of help along with place value counters and mats.

Grid method of multiplication.

	4
100	400
20	80
3	12
	492

Ladder Multiplication.

Children can use an expanded method of column multiplication if there are difficulties in multiplying and adding in the same step.

Use column addition to find answer

$$\begin{array}{r} 43 \\ \times 56 \\ \hline 18 \\ 240 \\ 150 \\ 2000 \\ \hline 2408 \end{array}$$

6×3

6×40

50×3

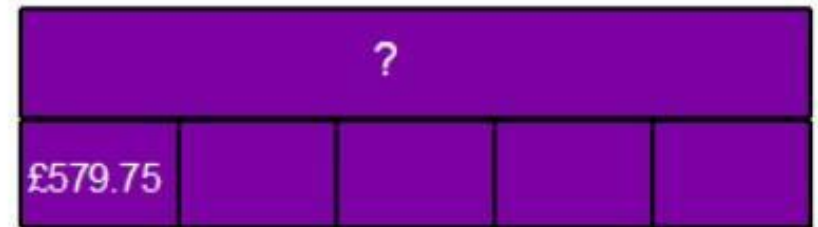
50×40

A Deeper Look:

Children use a bar to support multiplication.

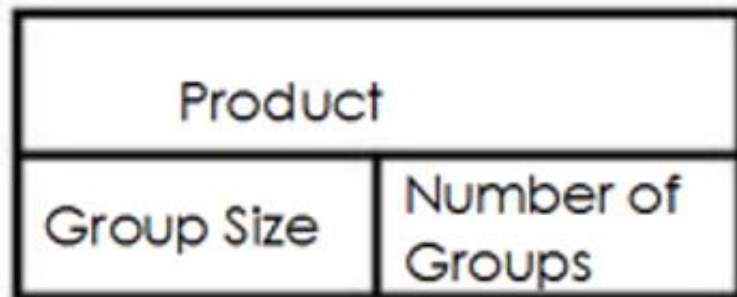
If 5 friends went on holiday and each paid £579.75 what was the total cost of the holiday?

Cost of the holiday



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 the 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 6

Children should be able to recall:

- Squares to 12×12

- Squares of the corresponding multiples of 10

- Prime numbers less than 100.

Working mentally, children should be able to:

- Multiply pairs of two-digit and single-digit numbers.
E.g. 28×3
- Double decimals with units and tenths.

- Multiply pairs of multiples of 10 and 100.
E.g. 50×30 , 600×20
- Multiply two-digit decimals
E.g. 0.8×7

- Identify numbers with odd and even numbers of factors and no factor pairs other than 1 and themselves.

Children should know when to:

- Partition: Double the units and tenths separately and recombine.

- Use knowledge of multiplication and place value when calculating with multiples of 10 and 100.
E.g. 60×70 using 6×7

- Use knowledge of multiplication facts to identify factor pairs and numbers with only two factors.



Written Division in Year 6

Method:

Long Division

Children will consolidate their knowledge of long division to solve problems. They should use dienes and manipulatives to consolidate their understanding.

$$\begin{array}{r} 626r8 \\ 11 \overline{) 6894} \\ \underline{66} \\ 294 \\ \underline{22} \\ 74 \\ \underline{66} \\ 8 \end{array}$$

long division

Common Mistakes to look out for.

- When subtracting children will need to ensure they have lined up the digits to allow accurate subtraction.
- Children may need to exchange when subtracting and can forget to do this.

Alternative Methods.

By the end of Year 6 the children will need to be secure in their knowledge of an efficient method of division. The following methods may be used to help along with use of place value counters and mats.

Short division.

Children can use short division to divide by a digit less than 13.

$$\begin{array}{r} 17r7 \\ 14 \overline{) 245} \end{array}$$

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

Combine
 $1 \div 5 = 0$
 $12 \div 5 = 2r2$
 $25 \div 5 = 5$
Carry the remainder

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



Mental Division in Year 6

Children should be able to recall:

- Prime numbers less than 100.

- Equivalent fractions, decimals and percentages for hundredths.
E.g. 35% is equivalent to 0.35 or $\frac{35}{100}$

Working mentally, children should be able to:

- Divide a two-digit number by a single-digit number.
E.g. $68 \div 4$
- Divide by 25 or 50.
E.g. $480 \div 25$

- Halve decimals with units and tenths.
E.g. Half of 15.2
- Divide multiples of 100 by a multiple of 10 or 100 (Whole number answers).
E.g. $600 \div 20$, $800 \div 400$
- Divide two-digit decimals.
E.g. $4.8 \div 6$

- Find 10% or multiples of 10% of whole numbers and quantities.
E.g. 30% of 50 ml
- Simplify fractions by cancelling.
- Scale up and down using known facts.
E.g. Given that three oranges cost 24p, find the cost of four oranges.

Children should know when to:

- Partition: Use partitioning and the distributive law to divide tens and ones separately.
 $92 \div 4 = (80 + 12) \div 4$
- Form an equivalent calculation.
E.g. To divide by 25 divide by 100 then 4.

- Use knowledge of equivalence between fractions and percentages and the relationship between fractions and division.

- Recognise how to scale up or down using multiplication and division.
E.g. If three oranges cost 24p, one orange costs $24 \div 3 = 8\text{p}$

Year 6 Problems

- 1. Three quarters of a number is 54. What is the number?
- 2. Which is more; five ninths of 252 or four sevenths of 238?
- 3. There are 36 packets of biscuits. One half are chocolate, a ninth are digestive and a third are wafer biscuits. The rest are ginger nuts. How many biscuits are ginger nuts?
- 4. There is 20% off in a sale. How much would a track suit cost, if the normal price was £44.50?
- 5. There is 20% off in a sale. The reduced price of the jeans is £36. What was the original price?
- 6. At a dance there are 4 girls to every 3 boys. There are 63 children altogether? How many girls are there?
- 7. Seven in every nine packets of crisps in a box are salt and vinegar. The rest are plain. There are 63 packets of salt and vinegar crisps. How many packets of plain crisps are there?