

Maths Calculation Policy

Key Document details:

Author: **Rachael Cooper**

Owner: **Nick Capstick**

Date: **November 2022**

Ratified: **Sept 2023**

Approver: **Nick Capstick**

Version No.:

Next review **01/09/2023**

date:



Maths Calculation Policy

Intent

Pupils having an appreciation of number and number operations, which enable mental calculations and written procedures to be performed efficiently, fluently and accurately is key to children being successful in mathematics.

We aim for all children to be:

- able to recall rapidly and accurately basic number facts (e.g. number bonds, multiplication and division facts)
- fluent in applying quick, efficient mental and written methods of calculation.

Implementation

- Before doing a calculation, all teachers and pupils look at a calculation and ask themselves *'What do I notice?'* and *'Can I do this in my head, with jottings, pictorial representation or do I need to use a written method?'*
- All teachers use concrete and pictorial representations to teach conceptual understanding of mental and written calculation methods
- Drove's Mathematics Curriculum prioritises time for developing conceptual understanding of calculation methods and learning facts in daily Maths lessons and Maths on Track (MoT) sessions allow time for deliberate practice of calculation methods and recalling facts.

Impact

- All teachers are confident and skilled to teach mental methods (in your head or with jottings) and written calculation methods
- All children have a secure understanding of mental and written methods of calculation suitable for their stage of learning.
- All children choose appropriate calculation methods depending on the numbers.
- All children can recall, understand and make connections by using facts suitable for their stage of learning.

Appendix 1 - Age Related Expectations

Mental and Written Methods (Addition and Subtraction)

Year					
1	2	3	4	5	6
<p>Read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs</p> <p>Solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as $7 = \square - 9$</p>	<p><i>Add and subtract two two-digit numbers using concrete objects, pictorial representations progressing to formal written methods</i></p> <p>Add and subtract numbers using concrete objects, pictorial representations, and mentally, including:</p> <ul style="list-style-type: none"> * a two-digit number and ones * a two-digit number and tens * two two-digit numbers <p>adding three one-digit numbers</p>	<p>Add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction</p> <p>Add and subtract numbers mentally, including:</p> <ul style="list-style-type: none"> * a three-digit number and ones * a three-digit number and tens <p>a three-digit number and hundreds</p>	<p>Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition where appropriate signs</p> <p>Solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why</p>	<p>Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)</p> <p>Add and subtract numbers mentally with increasingly large numbers</p>	<p>Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why</p> <p>Perform mental calculations, including with mixed operations and large numbers</p>

Mental and Written Methods (Multiplication and Division)

Year					
1	2	3	4	5	6
<p>Solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher</p>	<p>Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (\times), division (\div) and equals (=) signs</p> <p>Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot</p> <p>Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts</p>	<p>Write and calculate mathematical statements for \div using the \times tables they know progressing to formal written methods.</p> <p>Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental methods</p> <p>Use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers</p> <p>Recognise and use factor pairs and commutativity in mental calculations</p>	<p>Multiply two-digit and three-digit numbers by a one-digit number using formal written layout</p>	<p>Multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers</p> <p>Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context</p> <p>Multiply and divide numbers mentally drawing upon known facts</p> <p>Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000</p>	<p>Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication</p> <p>Divide numbers up to 4-digits by a two-digit whole number using the formal written method of short division where appropriate for the context</p> <p>Divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context</p> <p>Perform mental calculations, including with mixed operations and large numbers</p>

Mental and Written Methods (Number Facts)

Year					
1	2	3	4	5	6
<p>Represent & use number bonds and related subtraction facts within 20</p> <p>Add and subtract one-digit and two-digit numbers to 20, including zero</p>	<p>Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100</p> <p>Recall and use \times and \div facts for the 2, 5 and 10 \times tables, including recognising odd and even numbers.</p>	<p>Recall and use \times and \div facts for the 3, 4 and 8 times tables.</p>	<p>Recall \times and \div facts for \times tables up to 12×12.</p>	<p>Recall prime numbers up to 19</p> <p>Know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers</p> <p>Recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3)</p>	<p>Recall \times and \div facts for \times tables up to 12×12 and use to find other related facts</p>

How shall I add?

4 + 1, 6 + 3, 10 + 4
Number facts
Single digit numbers
Doubles
Ten and single digits

3 + 7
Use known addition facts

7 + 8
Use near doubles

7 + 10
Add ten

7 = 3 + 4
Secure addition bonds of single digits and ten

12 + 4
Counting on in 1s

24 + 1
Find one more

7 + 4
Count all

Notice the relationships
24 + 1
1 more than 4 is 5
1 more than 14 is 15
1 more than 24 is 25

1

Can Do Maths

Licensed to and for the exclusive use for School organisation, Grove Primary School

© Liz Hopkins

How shall I subtract?

5 - 1, 7 - 3, 10 - 6
Number facts
Single digit numbers
Teens subtract single digits

3 + 7
Use known addition facts to derive subtraction facts

9 - 7
Find the difference between two numbers

7 - 3 = 4
Secure subtraction facts of single digits and ten

16 - 4
Counting back in 1s

23 - 1
Find one less

9 - 3
Take away

17 - 10
Take away ten

Notice the relationships
23 - 1
1 less than 4 is 3
1 less than 14 is 13
1 less than 24 is 23

1

Can Do Maths

Licensed to and for the exclusive use for School organisation, Grove Primary School

© Liz Hopkins

How shall I multiply?

Equal groups

3 people each have 4 cats. How many cats are there in total?

Count in ones
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

Repeated addition

Arrays

1

Can Do Maths

This product is licensed for the exclusive use of Grove Primary School - www.buzzanpublishing.com

© Liz Hopkins

How shall I divide?

Sharing
12 shared into 3 equal groups

Grouping
How many groups of 3 are there in 12?

12 ÷ 3 = 4

Bar model

12 can be described as 3 columns of 4 or 4 rows of three

1

Can Do Maths

This product is licensed for the exclusive use of Grove Primary School - www.buzzanpublishing.com

© Liz Hopkins

How shall I add?

8 + 7, 9 + 9, 14 + 3
Number facts
Single digit numbers
Doubles
Teens and single digits

I just knew it!

13 + 17
Use known facts
30 + 70

If I know 3 + 7 = 10 then I know 3 tens + 7 tens = 10 tens

If I know 3 + 7 = 10 then I know 13 + 17 is 2 tens more

35 + 20
Add multiples of ten

If I know 3 + 2 = 5 then I know 3 tens + 2 tens = 5 tens so 30 + 20 = 50

5 + 18
Greatest number first then bridge

37 + 19
Round then adjust

Add 20 then subtract 1

42 - 37
Find the difference between two numbers

42 is 5 more than 37, 37 is 5 less than 42 so the difference between 37 and 42 is 5

25 + 43
Partition and recombine

20 + 5 + 40 + 3 = 60 + 8 = 68

35 + 27
Count on in tens then ones

47 - 19
Round then adjust

Take away 20 then add 1

25 + 43
Partition and recombine

37 + 19
Round then adjust

47 - 19
Round then adjust

Licensed to and for the exclusive use for School/organisation, Dove Primary School © Liz Hopkins

How shall I subtract?

9 - 4, 13 - 5, 18 - 9
Number facts
Single digit numbers
Halves
Teens and single digits

I just knew it!

30 - 7
Use known facts
100 - 70

If I know 10 - 7 = 3 then I know 30 - 7 is 2 tens and 3

46 - 20
Count back: multiples of ten

If I know 4 - 2 = 2 then I know 4 tens - 2 tens = 2 tens so 40 - 20 = 20

23 - 5
Count back: bridge through a multiple of ten

55 - 24
Count back in tens then ones

42 - 37
Find the difference between two numbers

30 - 7
Use known facts
100 - 70

46 - 20
Count back: multiples of ten

47 - 19
Round then adjust

This product is licensed for the exclusive use of Dove Primary School - www.buzzzpublishing.com © Liz Hopkins

How shall I multiply?

Equal groups
There are 3 groups with 4 cats in each group

Four cats, multiplied by 3

4 x 3 = 12

3 people each have 4 cats. How many cats are there in total?

Recal of 2x, 5x and 10x tables

People	Cats
1	4
2	8
3	12

One to many correspondence
If each person has 4 cats, there are 4 times as many cats as people

Repeated addition

4 + 4 + 4 = 12

Count in ones
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

Arrays

4 x 3 = 12

3 x 4 = 4 x 3

Count in twos
2, 4, 6, 8, 10, 12

Use a known fact
If 2 x 3 is 6, then 4 x 3 is double 6.

Bar model

Licensed to and for the exclusive use for School/organisation, Dove Primary School © Liz Hopkins

How shall I divide?

Sharing
12 shared into 3 equal groups

There are 12 cats. Three people each have the same number of cats. How many do they have each?

1 for you, 1 for you, 1 for you...

12 ÷ 3 = 4

Recall and use 2x, 5x and 10x tables

Grab a group of 3, grab a group of 3...

Grouping
How many groups of 3 are there in 12?

There are 12 cats. Each person owns 3 cats. How many people are there?

Sharing
12 shared into 3 equal groups

Grouping
How many groups of 3 are there in 12?

Repeated addition

3 + 3 + 3 + 3 = 12

Count in ones
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

Arrays

4 x 3 = 12

3 x 4 = 4 x 3

Count in twos
2, 4, 6, 8, 10, 12

Use a known fact
If 2 x 3 is 6, then 4 x 3 is double 6.

Bar model

Link to fractions. One third of 12 is 4. This product is licensed for the exclusive use of Dove Primary School - www.buzzzpublishing.com © Liz Hopkins

How shall I add?

8 + 7, 9 + 9, 14 + 3
Number facts
Single digit numbers
Doubles
Tens to make 100
I just knew it!

243 + 7
Use known facts
300 + 700
If I know 3 + 7 = 10 then I know 243 + 7 makes the next multiple of 10
If I know 3 + 7 = 10 then I know 3 hundreds + 7 hundreds = 10 hundreds

325 + 200
Add multiples of ten and hundred
100s 10s 1s
0 325 525

150 + 80
Bridging boundaries
150 200 230

262 + 152
Formal written method
100s 10s 1s
262
+152
414

6 tens add 5 tens = 11 tens or 110

250 + 360
Partition and recombine
100s 10s 1s
200 + 50 + 300 + 60
500 + 110 = 610

237 + 199
Round then adjust
100s 10s 1s
Add 200 then subtract 1
0 237 436 437

235 + 250
Count on in hundreds then tens
0 235 335 435 485

This product is licensed for the exclusive use of Dove Primary School - www.buzzanpublishing.com

How shall I subtract?

15 - 8, 18 - 5
Number facts
Single digit numbers
Teens and single digits
I just knew it!

240 - 7
Use known facts
1000 - 700
If I know 10 - 7 = 3 then I know 10 hundreds - 7 hundreds = 3 hundreds
0 - 7 = 3
If I know 10 - 7 = 3 then I know any multiple of 10, take away 7 leaves 3 in the ones

525 - 300
Take away multiples of ten and a hundred
100s 10s 1s
225 525

230 - 80
Bridging boundaries by counting back in efficient steps
230 - 30 - 50 = 150

234 - 152
Formal written method
234
-152
82

234 = 100 + 130 + 4

335 - 326
Find the difference between two numbers
335 is 9 more than 326
326 is 9 less than 335
so the difference between them is 9

435 - 199
Round then adjust
100s 10s 1s
Take away 200 then add 1
0 235 436 435

This product is licensed for the exclusive use of Dove Primary School - www.buzzanpublishing.com

How shall I multiply?

Rapid recall of 2x, 5x, 10x (year 2) 3x, 4x, 8x (year 3) multiplication tables

6 x 4
Use known facts and place value
6 x 4 = 24
60 x 4 = 240
6 x 40 = 240
6 x 10 x 4 = 24 x 10 = 240

8 x 3
Repeated addition
8 + 8 + 8 = 24
3 + 3 + 3 + 3 + 3 + 3 + 3 = 21

Multiply by 10
100s 10s 1s
2
20
200
x10
x10

5 x 18
Double and halve
5 x 18 = 5 x 2 x 18 ÷ 2 = 10 x 9 = 90

17 x 4
Partition and recombine
10 x 4 + 7 x 4 = 40 + 28 = 68

Scaling
The red tower is 3 times taller than the grey tower
8cm 24cm

17 x 4
Formal written method
17
x 4
68

This product is licensed for the exclusive use of Dove Primary School - www.buzzanpublishing.com

How shall I divide?

24 ÷ 4
Use known facts and place value
240 is ten times greater than 24
24 biscuits shared between 4 people means they will get 6 biscuits each.
If there are 10 times as many people and 10 times as many biscuits, how many biscuits each now?
24 ÷ 4 = 6
240 ÷ 40 = 6
240 ÷ 4 = 60

240 ÷ 40
Repeated addition
How many 40s are there in 240?
240 ÷ 40 = 6
How many steps of 40 make 240?

200 ÷ 10
Divide by 10
200 ÷ 10 = 20 so 20 is ten times smaller than 200

42 ÷ 6
Double and halve
If there are half as many biscuits and half as many people.
42 ÷ 6 = 21 ÷ 3 = 7

52 ÷ 4
Partition and recombine
ten lots and the rest
52 ÷ 4 = 10 x 4 + 12 ÷ 4 = 40 + 3 = 43

45 ÷ 3
Sharing equally
Ten for you, ten for you, ten for you.

Link to fractions
A tenth of 10 is 1
A tenth of 1 is 1 tenth so 1 ÷ 10 = 1/10

This product is licensed for the exclusive use of Dove Primary School - www.buzzanpublishing.com

How shall I add?

0.9 + 0.9, 74 + 26
Number facts
Single digit decimals
Doubles
Bonds of 100
I just knew it!

7 + 8
Use known facts
70 + 80 = 150
700 + 800 = 1,500
If I know 7 + 8 = 15 then I know 0.7 + 0.8 = 1.5

2,403 + 3,020
Use place value to add
If I know 2 + 3 = 5 then I know 2000 + 3000 = 5000
I have noticed, one number has no hundreds or ones, the other has no tens.

16 + 0.7
Bridge through boundaries by counting in efficient steps

5,748 + 3,374
Formal written method
Exchange ten of these for one of those!
Regroup and rename

5,250 + 2,360
Partition and recombine
5000 + 200 + 50 + 2000 + 300 + 60
7000 + 500 + 110 = 7610

3,356 + 1,998
Round then adjust
Add 2,000 then take away 2

5,748 + 3,374
Formal written method
Exchange ten of these for one of those!
Regroup and rename

5,748
+ 3,374
9,122

5,352 - 2,136
Formal written method
Exchange ten of these for one of those!
Regroup and rename

5,352
- 2,136
2,916

4007 - 3998
Find the difference between two numbers
Take away 2 then add one hundredth

4,007
- 3,998
9

4.56 - 1.99
Round then adjust
Take away 2 then add one hundredth

4.56
- 1.99
2.57

How shall I subtract?

13 - 5, 18 - 0.8
Number facts
Single digit numbers
Halves
Wholes and tenths
I just knew it!

15 - 8 = 7
Use known facts
150 - 80 = 70
1500 - 800 = 700
If I know 15 - 8 = 7 then I know 1.5 - 0.8 = 0.7

6,342 - 3,020
Use place value to subtract

15 - 0.7
Bridge through boundaries by counting in efficient steps

5,352 - 2,136
Formal written method
Exchange ten of these for one of those!
Regroup and rename

4007 - 3998
Find the difference between two numbers
Take away 2 then add one hundredth

4.56 - 1.99
Round then adjust
Take away 2 then add one hundredth

4.56
- 1.99
2.57

How shall I multiply?

6 x 4
Use known facts and place value
40 is ten times greater than 4
0.6 is ten times smaller than 6
Use known facts and place value

6 x 4 = 24
60 x 4 = 240
60 x 40 = 2400

6 x 10 x 4 x 10
= 24 x 100

2.34 x 100
Multiply by 10, 100

234
x10
2340
x100
23400

6 x 4
Use known facts and place value
40 is ten times greater than 4
0.6 is ten times smaller than 6
Use known facts and place value

0.6 x 4 = 2.4
4 jumps of 0.6

0.6 x 4 = 24 tenths
0.6 x 4 = 24

7 x 36
Use the distributive law
7 x 36 = 7 x 30 + 7 x 6 = 210 + 42 = 252

36 x 7
Formal written method

45 x 6
Use factors and commutativity
Write as factors then re-order
2 x (5 x 6) = (2 x 5) x 6 = 10 x 6 = 60
45 x 6 = 5 x 9 x 6 = 5 x 6 x 9 = 30 x 9 = 270

236 x 7
200 x 7 = 1400
30 x 7 = 210
6 x 7 = 42
1400 + 210 + 42 = 1652

How shall I divide?

24 ÷ 4
Use known facts and place value
240 is ten times greater than 24
60 is ten times greater than 6
Use known facts and place value

24 ÷ 4 = 6
240 ÷ 40 = 6
2400 ÷ 400 = 6

2400 ÷ 60 = 40
How many steps of 60 make 2400?
10 x 60, 10 x 60, 10 x 60, 10 x 60

24 ÷ 100
Divide by 10, 100

2400 ÷ 400 = 24 x 100 / 4 x 100 = 24 / 4 = 6

732 ÷ 6
Formal written method

516 ÷ 12
Using factors

496 ÷ 8
Partition and recombine
480 ÷ 8 = 60
16 ÷ 8 = 2
60 + 2 = 62

516 ÷ 3 ÷ 4

516
172 x 3 = 516

How shall I multiply?

6 x 4
Use known facts and place value
40 is ten times greater than 4
0.6 is ten times smaller than 6
Use known facts and place value

6 x 4 = 24
60 x 4 = 240
60 x 40 = 2400

6 x 10 x 4 x 10
= 24 x 100

2.34 x 100
Multiply by 10, 100

234
x10
2340
x100
23400

6 x 4
Use known facts and place value
40 is ten times greater than 4
0.6 is ten times smaller than 6
Use known facts and place value

0.6 x 4 = 2.4
4 jumps of 0.6

0.6 x 4 = 24 tenths
0.6 x 4 = 24

7 x 36
Use the distributive law
7 x 36 = 7 x 30 + 7 x 6 = 210 + 42 = 252

36 x 7
Formal written method

45 x 6
Use factors and commutativity
Write as factors then re-order
2 x (5 x 6) = (2 x 5) x 6 = 10 x 6 = 60
45 x 6 = 5 x 9 x 6 = 5 x 6 x 9 = 30 x 9 = 270

236 x 7
200 x 7 = 1400
30 x 7 = 210
6 x 7 = 42
1400 + 210 + 42 = 1652

How shall I divide?

24 ÷ 4
Use known facts and place value
240 is ten times greater than 24
60 is ten times greater than 6
Use known facts and place value

24 ÷ 4 = 6
240 ÷ 40 = 6
2400 ÷ 400 = 6

2400 ÷ 60 = 40
How many steps of 60 make 2400?
10 x 60, 10 x 60, 10 x 60, 10 x 60

24 ÷ 100
Divide by 10, 100

2400 ÷ 400 = 24 x 100 / 4 x 100 = 24 / 4 = 6

732 ÷ 6
Formal written method

516 ÷ 12
Using factors

496 ÷ 8
Partition and recombine
480 ÷ 8 = 60
16 ÷ 8 = 2
60 + 2 = 62

516 ÷ 3 ÷ 4

516
172 x 3 = 516

How shall I multiply?

6 x 4
Use known facts and place value
40 is ten times greater than 4
0.6 is ten times smaller than 6
Use known facts and place value

6 x 4 = 24
60 x 4 = 240
60 x 40 = 2400

6 x 10 x 4 x 10
= 24 x 100

2.34 x 100
Multiply by 10, 100

234
x10
2340
x100
23400

6 x 4
Use known facts and place value
40 is ten times greater than 4
0.6 is ten times smaller than 6
Use known facts and place value

0.6 x 4 = 2.4
4 jumps of 0.6

0.6 x 4 = 24 tenths
0.6 x 4 = 24

7 x 36
Use the distributive law
7 x 36 = 7 x 30 + 7 x 6 = 210 + 42 = 252

36 x 7
Formal written method

45 x 6
Use factors and commutativity
Write as factors then re-order
2 x (5 x 6) = (2 x 5) x 6 = 10 x 6 = 60
45 x 6 = 5 x 9 x 6 = 5 x 6 x 9 = 30 x 9 = 270

236 x 7
200 x 7 = 1400
30 x 7 = 210
6 x 7 = 42
1400 + 210 + 42 = 1652

How shall I divide?

24 ÷ 4
Use known facts and place value
240 is ten times greater than 24
60 is ten times greater than 6
Use known facts and place value

24 ÷ 4 = 6
240 ÷ 40 = 6
2400 ÷ 400 = 6

2400 ÷ 60 = 40
How many steps of 60 make 2400?
10 x 60, 10 x 60, 10 x 60, 10 x 60

24 ÷ 100
Divide by 10, 100

2400 ÷ 400 = 24 x 100 / 4 x 100 = 24 / 4 = 6

732 ÷ 6
Formal written method

516 ÷ 12
Using factors

496 ÷ 8
Partition and recombine
480 ÷ 8 = 60
16 ÷ 8 = 2
60 + 2 = 62

516 ÷ 3 ÷ 4

516
172 x 3 = 516

How shall I divide?

24 ÷ 4
Use known facts and place value
240 is ten times greater than 24
60 is ten times greater than 6
Use known facts and place value

24 ÷ 4 = 6
240 ÷ 40 = 6
2400 ÷ 400 = 6

2400 ÷ 60 = 40
How many steps of 60 make 2400?
10 x 60, 10 x 60, 10 x 60, 10 x 60

24 ÷ 100
Divide by 10, 100

2400 ÷ 400 = 24 x 100 / 4 x 100 = 24 / 4 = 6

732 ÷ 6
Formal written method

516 ÷ 12
Using factors

496 ÷ 8
Partition and recombine
480 ÷ 8 = 60
16 ÷ 8 = 2
60 + 2 = 62

516 ÷ 3 ÷ 4

516
172 x 3 = 516

How shall I multiply?

6 x 4
Use known facts and place value
40 is ten times greater than 4
0.6 is ten times smaller than 6
Use known facts and place value

6 x 4 = 24
60 x 4 = 240
60 x 40 = 2400

6 x 10 x 4 x 10
= 24 x 100

2.34 x 100
Multiply by 10, 100

234
x10
2340
x100
23400

6 x 4
Use known facts and place value
40 is ten times greater than 4
0.6 is ten times smaller than 6
Use known facts and place value

0.6 x 4 = 2.4
4 jumps of 0.6

0.6 x 4 = 24 tenths
0.6 x 4 = 24

7 x 36
Use the distributive law
7 x 36 = 7 x 30 + 7 x 6 = 210 + 42 = 252

36 x 7
Formal written method

45 x 6
Use factors and commutativity
Write as factors then re-order
2 x (5 x 6) = (2 x 5) x 6 = 10 x 6 = 60
45 x 6 = 5 x 9 x 6 = 5 x 6 x 9 = 30 x 9 = 270

236 x 7
200 x 7 = 1400
30 x 7 = 210
6 x 7 = 42
1400 + 210 + 42 = 1652

How shall I divide?

24 ÷ 4
Use known facts and place value
240 is ten times greater than 24
60 is ten times greater than 6
Use known facts and place value

24 ÷ 4 = 6
240 ÷ 40 = 6
2400 ÷ 400 = 6

2400 ÷ 60 = 40
How many steps of 60 make 2400?
10 x 60, 10 x 60, 10 x 60, 10 x 60

24 ÷ 100
Divide by 10, 100

2400 ÷ 400 = 24 x 100 / 4 x 100 = 24 / 4 = 6

732 ÷ 6
Formal written method

516 ÷ 12
Using factors

496 ÷ 8
Partition and recombine
480 ÷ 8 = 60
16 ÷ 8 = 2
60 + 2 = 62

516 ÷ 3 ÷ 4

516
172 x 3 = 516

How shall I add?

0.8 + 0.7, 45 + 45
Number facts
Single digit decimals
Doubles
Bonds of 1 and 100
I just knew it!
Rapid fluency of 2 digit add 2 digit numbers

7 + 8
Use known facts
If I know 7 + 8 = 15 then I know 0.7 + 0.8 = 1.5

12,403 + 3,020
Use place value to add

7,000 + 8,000 = 15,000
70,000 + 80,000 = 150,000
700,000 + 800,000 = 1,500,000

0.016 + 0.007
Bridge through boundaries by counting in efficient steps

35,040 + 22,070
Partition and recombine
30,000 + 5,000 + 40 + 20,000 + 2,000 + 70
50,000 + 7,000 + 110 = 57,110

25,748 + 46,374
Formal written method
Regroup and rename

32,356 + 19,998
Round then adjust
Add 20,000 then subtract 2

25,748
+ 46,374

72,122
1 1 1 1

32,356 + 19,998

52,354
- 20,000

32,356

0.016 + 0.007

0.016 0.020 0.023
+0.004 +0.003

35,040 + 22,070

57,110
+20,000

32,356 + 19,998

52,354
- 20,000

32,356

10,000s 1000s 100s 10s 1s

© Liz Hopkins

How shall I subtract?

9 - 4, 13 - 5, 18 - 9
Number facts
Single digit decimals
Halves
Subtract from 1 and 100
I just knew it!
Rapid fluency of 2 digit subtract 2 digit numbers

15 - 8 = 7
Use known facts
If I know 15 - 8 = 7 then I know 1.5 - 0.8 = 0.7

40,012 - 3,005
Use place value to subtract
5 less than 12 is 7
Now it is easy to take away 3000
If I know 40 - 3 = 37 then I know that 40 thousand take away 3 thousand is 37 thousand

15,000 - 8,000 = 7,000
150,000 - 80,000 = 70,000
1,500,000 - 800,000 = 700,000

0.54 - 0.17
Bridge through boundaries by counting in efficient steps

40,000 = 4 tens of thousands or 40 thousands
12 = 1 ten and 2 ones or 12 ones
40,012 = 40 thousands and 12 ones
take away 3 thousands and 5 ones equals 37 thousands and 7 ones.

43,453 - 19,998
Round then adjust
Take away 20,000 then add 2

45,748 - 26,374
Formal written method
Regroup and rename

20,045 - 19,989
Find the difference between two numbers

43,453 - 19,998

23,453
- 20,000

3,453
+ 2

43,453

45,748
- 26,374

19,374

20,045
- 19,989

56

0.54 - 0.17

0.16 0.40 0.44 0.54
-0.03 -0.04 -0.1

43,453 - 19,998

23,453
- 20,000

3,453
+ 2

43,453

10,000s 1000s 100s 10s 1s

© Liz Hopkins

How shall I multiply?

Known facts:
Rapid recall of all multiplication tables up to 12 x 12

6 x 4
Use known facts and place value
40 is ten times greater than 4
0.6 is ten times smaller than 6
Use known facts and place value

2.34 x 1000
Multiply by 10, 100, 1000

15 x 42
Using factors and distributive law

423 x 4
Partition and recombine

15 x 14
= 15 x 10 + 15 x 4
= 150 + 60
= 210

427 x 38
Formal written method

2.34 x 1000

2340

15 x 42

60 8 720

423 x 4

1600 + 80 + 12 = 1692

15 x 14

210

427 x 38

16226

0.6 x 4 = 2.4
4 jumps of 0.6

0.6 x 0.4 = 0.24
0.6 x 0.4 = 0.24

423 x 4

1692

15 x 14

210

427 x 38

16226

10,000s 100s 10s 1s 1/10s 1/100s

© Liz Hopkins

How shall I divide?

Known facts:
Use recall of all multiplication tables up to 12 x 12 to derive division facts

24 ÷ 4
Use known facts and place value
24,000 is a thousand times greater than 24
0.6 is ten times smaller than 6

2.4 ÷ 0.6
Use known facts and place value

24 ÷ 1000
Divide by 10, 100, 1000

1512 ÷ 24
Using factors

5724 ÷ 4
Formal written method

496 ÷ 8
Partition and recombine

24 ÷ 4 = 6
240 ÷ 40 = 6
2400 ÷ 400 = 6
24,000 ÷ 4000 = 6

24,000 ÷ 400 = 24 x 1000 / 4 x 100
240 = 60 / 4

2.4 ÷ 0.6 = 4
How many steps of 0.6 make 2.4?

24 ÷ 1000

0.024

1512 ÷ 24

63

5724 ÷ 4

1431

496 ÷ 8

62

24 ÷ 4 = 6
240 ÷ 40 = 6
2400 ÷ 400 = 6
24,000 ÷ 4000 = 6

24,000 ÷ 400 = 24 x 1000 / 4 x 100
240 = 60 / 4

2.4 ÷ 0.6 = 4
How many steps of 0.6 make 2.4?

24 ÷ 1000

0.024

1512 ÷ 24

63

5724 ÷ 4

1431

496 ÷ 8

62

10,000s 100s 10s 1s 1/10s 1/100s

© Liz Hopkins

How shall I add?

- 44 + 56, 27 + 27**
Number facts
Single digit decimals
Doubles
Bonds of 1 and 100
I just knew it!
- 17 + 17**
Use known facts
If I know 17 + 17 = 34 then I know 17 + 17 = 34
- 1,102,403 + 50,020**
Use place value to add
I have noticed, one number has no hundreds or ones, the other has no tens
- 17,000 + 17,000 = 34,000**
170,000 + 170,000 = 340,000
1,700,000 + 1,700,000 = 3,400,000
- 0.028 + 0.015**
Bridge through boundaries
by counting in efficient steps
- 325,748 + 246,374**
Formal written method
Exchange ten of these for one of those! *Regroup and rename*
- 307,040 + 206,070**
Partition and recombine
 $300,000 + 7,000 + 40 + 200,000 + 6,000 + 70$
 $500,000 + 13,000 + 110 = 513,110$
- 432,356 + 99,000**
Round then adjust
Add 100,000 then take away 1,000

This product is licensed for the exclusive use of Dove Primary School - www.buzzardpublishing.com

How shall I subtract?

- 0.9 - 0.4, 100 - 65**
Number facts
Single digit decimals
Halves
Bonds of 1 and 100
I just knew it!
- 36 - 18 = 18**
Use known facts
If I know 36 - 18 = 18 then I know 36 - 18 = 18
- 400,032 - 30,005**
Use place value to subtract
5 less than 32 is 27
- 36,000 - 18,000 = 18,000**
360,000 - 180,000 = 180,000
3,600,000 - 1,800,000 = 1,800,000
- 0.054 - 0.017**
Bridge through boundaries
by counting in efficient steps
- 243,453 - 99,900**
Round then adjust
Take away 100,000 then add 100
- 445,748 - 126,374**
Formal written method
Exchange ten of these for one of those! *Regroup and rename*
- 200,450 - 199,989**
Find the difference between two numbers
Take away 100,000 then add 100

This product is licensed for the exclusive use of Dove Primary School - www.buzzardpublishing.com

How shall I multiply?

- Known facts:**
Rapid recall of all multiplication tables up to 12 x 12
- 6 x 4**
Use known facts and place value
40 is ten times greater than 4
- 0.6 x 4 = 2.4**
4 jumps of 0.06
- 6 x 4**
Use known facts and place value
0.6 is ten times smaller than 6
- 2.34 x 1000**
Multiply by 10, 100, 1000
- 15 x 42**
Using factors and distributive law
 $15 \times 48 = 15 \times 6 \times 8 = 90 \times 8 = 720$
- 2427 x 38**
Formal written method
- 4203 x 4**
Partition and recombine
 $4000 \times 4 = 16,000$
 $200 \times 4 = 800$
 $3 \times 4 = 12$
 $16,000 + 800 + 12 = 16,812$
- 15 x 14**
 $15 \times 14 = 15 \times 6 + 15 \times 8 = 90 + 120 = 210$

This product is licensed for the exclusive use of Dove Primary School - www.buzzardpublishing.com

How shall I divide?

- Known facts:**
Use recall of all multiplication tables up to 12 x 12 to derive division facts
- 24 ÷ 4**
Use known facts and place value
240 is ten times greater than 24
- 24 ÷ 0.6**
Use known facts and place value
0.6 is ten times smaller than 6
- 240 ÷ 40 = 6**
2400 ÷ 400 = 6
24,000 ÷ 4,000 = 6
2,400,000 ÷ 400,000 = 6
240,000 ÷ 400 = 24 x 10,000
2400 = 600
- 24 ÷ 1000**
Divide by 10, 100, 1000
- 7182 ÷ 21**
Formal written method
- 1512 ÷ 24**
Using factors
- 496 ÷ 8**
Partition and recombine
 $4800 \div 8 = 600$
 $160 \div 8 = 20$
 $600 + 20 = 620$
- 1512 ÷ 6 ÷ 4**

This product is licensed for the exclusive use of Dove Primary School - www.buzzardpublishing.com



Compact vertical

$$23454 + 596$$

$$\begin{array}{r} 23454 \\ + \quad 596 \\ \hline 24050 \\ \hline 111 \end{array}$$

$$23.7 + 48.56$$

$$\begin{array}{r} 23.70 \\ + 48.56 \\ \hline 72.26 \\ \hline 11 \end{array}$$



Decomposition

$$2748 - 364$$

$$\begin{array}{r} \overset{6}{2} \overset{1}{7} 48 \\ - \quad 364 \\ \hline 2384 \end{array}$$

$$72.5 - 45.73$$

$$\begin{array}{r} \overset{6}{7} \overset{1}{2} \overset{1}{5} 0 \\ - \overset{1}{4} \overset{1}{5} \overset{1}{7} 3 \\ \hline 26.77 \end{array}$$

Written Methods



Long multiplication

$$5172 \times 38$$

$$\begin{array}{r} 5172 \\ \times 38 \\ \hline 41376 \\ + 155160 \\ \hline 196536 \\ \hline 1 \end{array}$$



Short Division

$$559 \div 13$$

$$13 \overline{) 559}$$

$$562 \div 13$$

$$\begin{aligned} &= 43 \text{ r } 2 = 43 \frac{2}{13} \\ &= 43.2 \text{ (to 1 dp)} \end{aligned}$$

$$562 \div 13$$

$$13 \overline{) 562.30}$$

Using known multiplication facts

1	13
2	26
4	52
5	65
8	104
10	130