LONGFORD
CHURCH OF ENGLAND
PRIMARY SCHOOL

Key Stage Two Calculation Guidance

Addition and Subtraction

Year 3

Add numbers with up to three digits, using formal written methods of columnar subtraction (beginning with two digits and progressing to three).	
Where no 'carrying' is required	
Where 'carrying' is required	
Subtract numbers with up to three digits, using formal written methods of columnar subtraction (beginning with two digits and progressing to three).	
Where no 'borrowing' is required	
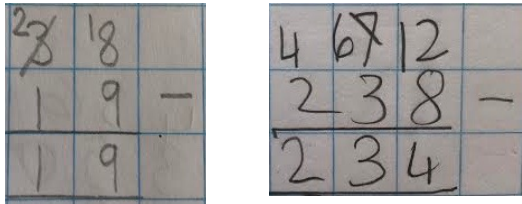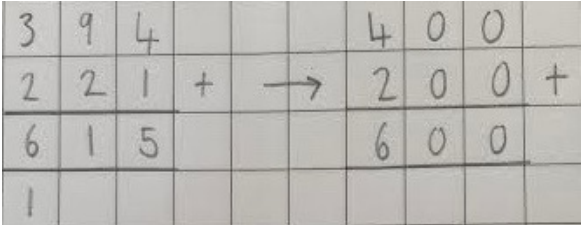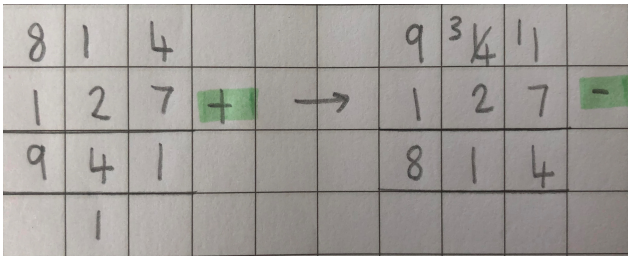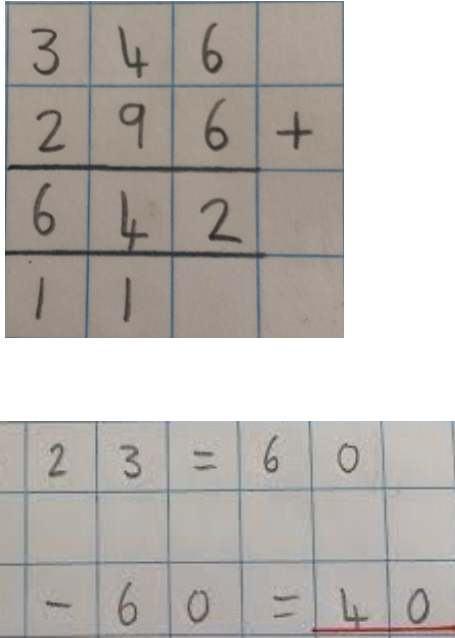
Where 'borrowing' is required	$\begin{array}{ccc} \cancel{2}8 & 8 \\ 1 & 9 & - \\ 1 & 9 \end{array}$ $\begin{array}{ccc} 4 & \cancel{6}7 & \cancel{}12 \\ 2 & 3 & 8 & - \\ 2 & 3 & 4 \end{array}$

Estimate the answer to a calculation and use inverse operations to check answers

Estimation	$\begin{array}{ccc} 3 & 9 & 4 \\ 2 & 2 & 1 & + \\ 6 & 1 & 5 \\ 1 \end{array}$ $\rightarrow$ $\begin{array}{ccc} 4 & 0 & 0 \\ 2 & 0 & 0 & + \\ 6 & 0 & 0 \end{array}$
Use of the inverse to check answers i.e. using addition to check subtraction (and visa versa), as well as multiplication to check division (and visa versa)	$\begin{array}{ccc} 8 & 1 & 4 \\ 1 & 2 & 7 & + \\ 9 & 4 & 1 \\ 1 \end{array}$ $\rightarrow$ $\begin{array}{ccc} 9 & {}^3\cancel{4} & {}^1 1 \\ 1 & 2 & 7 & - \\ 8 & 1 & 4 \end{array}$

Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction.

There are 346 books in one classroom and 296 in another classroom. How many are there altogether?

$$\begin{array}{ccc} 3 & 4 & 6 \\ 2 & 9 & 6 & + \\ 6 & 4 & 2 \\ 1 & 1 \end{array}$$

$$37 + \boxed{} + 23 = 100$$

3	7	+	2	3	=	6	0
1	0	0	-	6	0	=	4	0

418 - ☐ = 213	

Add and subtract fractions with the same denominator within one whole

Addition	$\dfrac{3}{6} + \dfrac{2}{6} = \dfrac{5}{6}$
Subtraction	$\dfrac{5}{8} - \dfrac{2}{8} = \dfrac{3}{8}$

Mental Strategies
➢ Add and subtract numbers mentally, including:
  • A three-digit number and ones
  • A three-digit number and tens
  • A three-digit number and hundreds
➢ Count from 0 in multiples of 4, 8, 50 and 100
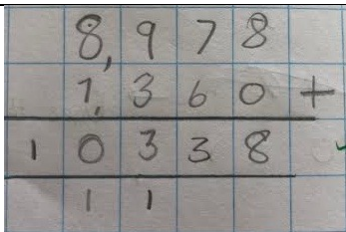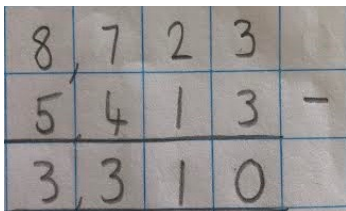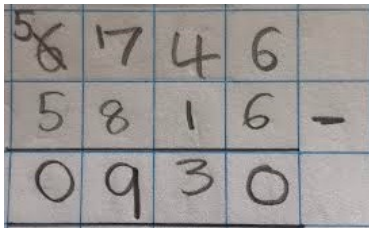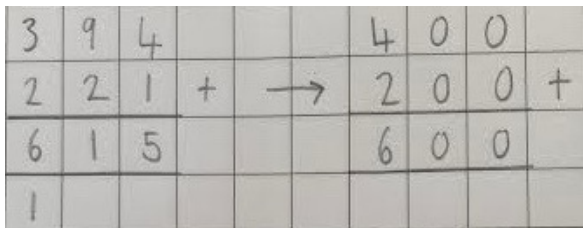➢ Find 10 or 100 more or less than a given number

Year 4

Add numbers with up to 4 digits using the formal written methods of columnar addition *where appropriate*	
Where no 'carrying' is required	
Where 'carrying' is required	

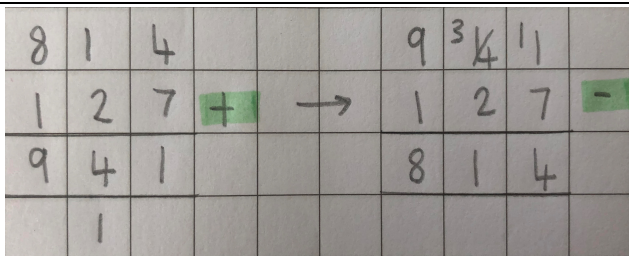| | 8,978 |
	1,360 +
	1 0 3 3 8 ✓
	1 1

Subtract numbers with up to 4 digits using the formal written methods of columnar subtraction *where appropriate*

Where no 'borrowing' is required	8,7 2 3
	5 4 1 3 −
	3,3 1 0

Where 'borrowing' is required	⁵8̸ ⁷4̸ 4 6
	5 8 1 6 −
	0 9 3 0

Estimate and use inverse operations to check answers to a calculation

Estimation (using rounding)	3 9 4		4 0 0
	2 2 1 + → 2 0 0 +
	6 1 5 6 0 0
	1

Use of the inverse to check answers	8 1 4		9 ³4̸ ¹1
	1 2 7 + → 1 2 7 −
	9 4 1 8 1 4
	1

Solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.

3. Danielle scored 138 on level 1 of her computer game. She scored 197 on level 2. However, she lost 72 points. What is her total score?

1	3	8	
1	9	7	
3	3	5	+
ꞁ	ꞁ		
²8̸	¹3	5	
	7	2	−
2	6	3	

Add and subtract fractions with the same denominator

Addition	

$$\frac{6}{12} + \frac{4}{12} = \frac{10}{12}$$

$$\frac{7}{8} + \frac{4}{8} = 1\frac{3}{8}$$

$$= \frac{11}{8}$$

Subtraction	

$$\frac{11}{12} - \frac{9}{12} = \frac{2}{12}$$

Mental Strategies
  ➢ Count in multiples of 6, 7, 9, 25 and 1000
  ➢ Find 1000 more or less than a given number
  ➢ Count backwards through zero to include negative numbers
  ➢ Round any number to the nearest 10, 100 or 1000

Year 5

Add whole numbers with more than 4 digits, including using the formal written method (i.e.	
Where no 'carrying' is required	4 3,7 2 4 2 4,1 7 2 + 6 7,8 9 6
Where 'carrying' is required	3 3 6 7 2 3 6 8 2 0 + 7 0 4 9 2 1 1

Subtract whole numbers with more than 4 digits, including using the formal written method (i.e. columnar subtraction)	
Where no 'borrowing' is required	9 6,2 3 1 8 4,2 1 0 – 1 2,0 2 1
Where 'borrowing' is required	2 8 2 4 1 2 1 8 3 6 2 – 1 4 0 5 0

Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy	

2,5 0 0 + 2,6 0 0 = 5,1 0 0
2,4 7 8 + 2,5 9 1 = 5,0 6 9

2 4 7 8
2 5 9 1 +
5,0 6 9
1 1

Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.

$$9\,8\,5\,2\,5$$
$$2\,3\,2\,9\;-$$
$$7\,5\,2\,3\,5$$

$$7\,5\,2\,3\,0$$
$$3\,6\,5\,0\;+$$
$$1\,1\,1\,7\,3$$

Add and subtract fractions with the same denominator and multiples of the same number

Addition – same denominator	$\dfrac{9}{27} + \dfrac{14}{27} = \dfrac{23}{27}$

Addition – multiples of the same	$\dfrac{5}{18} + \dfrac{7}{9} = 1\frac{1}{18}$ $\downarrow \frac{14}{18}$ $\dfrac{7}{10} + \dfrac{19}{20} = 1\frac{13}{20}$ $\downarrow \frac{14}{20}$

Subtraction – same denominator	$\dfrac{20}{36} - \dfrac{13}{36} = \dfrac{7}{36}$

Subtraction – multiples of the same	$\dfrac{2}{4} - \dfrac{2}{8} =$ $\dfrac{4}{8} - \dfrac{2}{8} = \dfrac{2}{8}$ $\dfrac{6}{27} - \dfrac{1}{9} =$ $\dfrac{6}{27} - \dfrac{3}{27} = \dfrac{3}{27}$

<u>Mental Strategies</u>
  ➢ Add and subtract numbers mentally with increasingly large numbers
  ➢ Count forwards or backwards in steps of powers of 10 for any given number up to 1, 000 000
  ➢ Interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers through zero
  ➢ Round any number up to 1,000 000 to the nearest 10, 100, 1000, 10 000 and 100 000

Year 6 – revise and apply all strategies taught throughout KS2

Solve problems involving addition and subtraction		
Addition	Katy has 352 Pokemon cards. Tom has half as many as Katy. Ren has 100 more than Tom. How many do they have altogether?	3 5 2 1 7 6 2 7 6 + 8 0 4 2 1
Subtraction	Yasmin has £1,126.50 in her bank account. She spends £525 on a new phone and £43.25 on books. How much does she have left?	⁰1̶ ¹1 2 6 . 5 0 5 2 5 . 0 0 − 6 0 1 . 5 0 ⁵6̶ ⁹1̶0̶ ¹1 . ⁴8̶ ¹0 − 4 3 . 2 5 5 5 8 . 2 5

Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why

A toy shop makes 6735 toys on Monday, 8364 toys on Tuesday and 6253 toys on Wednesday. It needs to make 25000 toys for the week. How many more toys does it need to make?

Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.

5 6,4 2 1 + 3 8,4 6 7 =

Estimation =						Answer =				
5 6,0 0 0						5 6,4 2 1				
3 8,0 0 0 +						3 8,4 6 7 +				
9 4,0 0 0						9 4,8 8 8				

Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions	
Addition	$2.\ 3\frac{1}{2} + 1\frac{1}{4} = 4\frac{3}{4}$ $\frac{2}{4} + \frac{1}{4} = 4\frac{3}{4}$
Subtraction	$5\frac{5}{8} - 3\frac{2}{4}$ $= 2\frac{1}{8}$ $\frac{5}{8} - \frac{4}{8}$ $2\frac{1}{8}$

Mental Strategies
- ➢ Perform mental calculations, including with mixed operations and large numbers.
- ➢ Round any whole number to a required degree of accuracy
- ➢ Use negative numbers in context, and calculate intervals across zero

<u>Multiplication and Division</u> – **Please note that knowledge of all times tables (and corresponding division facts) up to 12x12 is expected by the end of Year 4.**

Year 3

Write and calculate mathematical statements for multiplication using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods.	
Use of column multiplication (formal written method)	

Write and calculate mathematical statements for division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods.	
Use of 'the bus stop method' (formal written method)	

Solve problems, including missing number problems, involving multiplication and division.

<u>Mental Strategies</u>
- ➢ Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables
- ➢ Count from 0 in multiples of 50 and 100

Year 4

Multiply two and three-digit numbers by a one-digit number using the formal written method/layout

Divide two and three-digit numbers by a one-digit number using the formal written method/layout

The 'bus stop' method – no remainders	
The 'bus stop' method – remainders	

Solve problems involving multiplying and dividing (including using the distributive law to multiply two digit numbers by one digit).

A banana weighs 140 g

A pineapple weighs 345 g

140 g   345 g
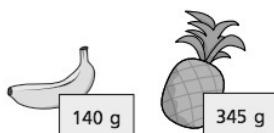
Bag **A** contains 8 bananas and bag **B** contains 3 pineapples.

Which bag weighs more and by how much?

Show your working.

Mental Strategies
  ➢ Recall and use multiplication and division facts for the multiplication tables up to 12x12
  ➢ Count in multiples of 6, 7, 9, 25 and 1000
  ➢ 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
  ➢ Recognise and use factor pairs and commutatively in mental calculations

Year 5

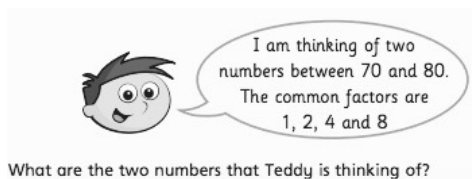**Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers.**

Factor pairs of a number	
	Factor pairs of 56 = 1, 2, 4, 7, 8, 14, 28, 56 1 × 56 2 × 28 4 × 14 7 × 8

Common factors of two numbers	
	18 = 1, 2, 3, 6, 9, 18 24 = 1, 2, 3, 4, 6, 8, 12, 24

Solve problems involving multiplication and division where larger numbers are used by decomposing them into their factors

I am thinking of two numbers between 70 and 80. The common factors are 1, 2, 4 and 8.

What are the two numbers that Teddy is thinking of?

Children will identify that the numbers must be even and then use their multiplication knowledge to identify that 72 and 80 are the two possible answers

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
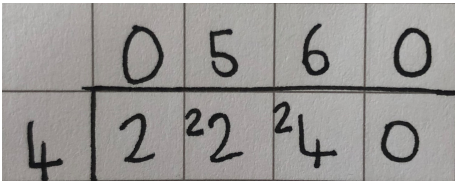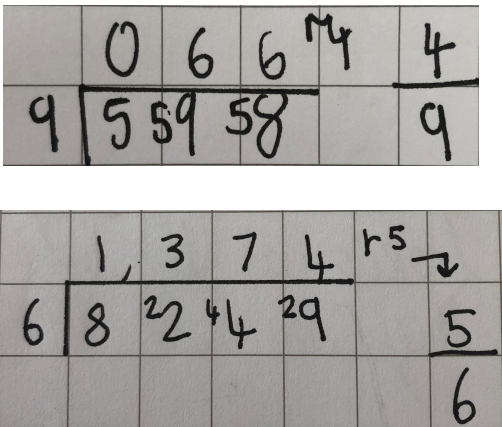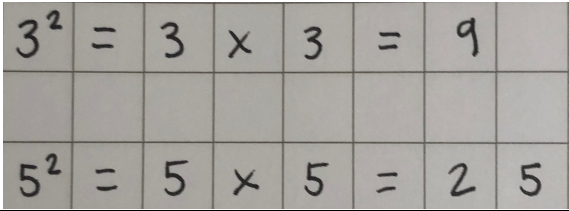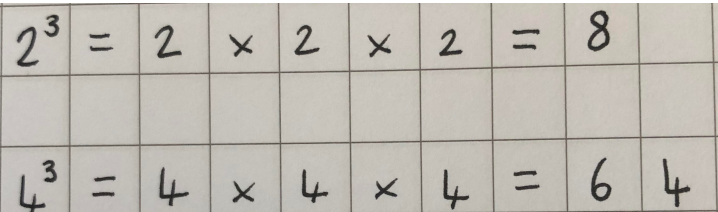
One-digit number	
	6,792 7 × 47,544

Two-digit number	
	2)5738 17 × 40166 + 5738 0 = 97546
NB: 0 is inserted as a place value holder	

Divide numbers up to 4 digits by a one-digit number using the formal written method of short division ('bus-stop method') and interpret remainders appropriately for the context

No-remainder	
	$$\begin{array}{c|cccc} & 0 & 5 & 6 & 0 \\ \hline 4 & 2 & {}^22 & {}^24 & 0 \end{array}$$

Remainder	
	$$\begin{array}{c|cccc} & 0 & 6 & 6 & {}^{r4} \\ \hline 9 & 5 & 5{}^59 & 5{}^58 & \quad\dfrac{4}{9} \end{array}$$
	$$\begin{array}{c|cccc} & 1, & 3 & 7 & 4 \;{}^{r5} \\ \hline 6 & 8 & {}^22 & {}^44 & {}^29 \end{array} \quad \dfrac{5}{6}$$

Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000

3,654 x 10 = 36,540   0.54 x 10 = 5.4
3,654 x 100 = 365,400   0.54 x 100 = 54
3,654 x 1000 = 3,654,000   0.54 x 1000 = 540

24 ÷ 10 = 2.4   13.6 ÷ 10 = 1.36
24 ÷ 100 = 0.24   13.6 ÷ 100 = 0.136
24 ÷ 1000 = 0.024   13.6 ÷ 1000 = 0.0136

Recognise and use square numbers and cube numbers, and the notation for squared (^{2}) and cubed (^{3})

Squared (^{2})	
	$3^2 = 3 \times 3 = 9$ $5^2 = 5 \times 5 = 25$

Cubed (^{3})	
	$2^3 = 2 \times 2 \times 2 = 8$ $4^3 = 4 \times 4 \times 4 = 64$

Solve problems involving addition, subtraction, multiplication & division and a combination of these.

Tom has 67 football stickers.

Max has 3 times as many stickers as Tom.

How many stickers do they have altogether?

$$\begin{array}{r} 67 \\ 3\times \\ \hline 201 \\ _2 \end{array} \qquad \begin{array}{r} 67 \\ 201+ \\ \hline 268 \end{array}$$

| 268 |

Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams

| $\frac{2}{15}$ | X | 7 | = | $\frac{14}{15}$ |

3	$\times$	$8\frac{2}{7}$	$=$	$24\frac{6}{7}$
3	$\times$	8	$= 24$	
3	$\times$	$\frac{2}{7}$	$= \frac{6}{7}$	

Mental Strategies
  ➢ Multiply and divide numbers mentally drawing upon known facts
  ➢ Know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers
  ➢ Establish whether a number up to 100 is prime and recall prime numbers up to 19

Year 6 - revise and apply all strategies taught throughout KS2

Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication

$$\begin{array}{r} 2. \quad 5\ 7\ 3\ 8 \\ \times \quad 1\ 7 \\ \hline 4\ 0_5\ 1_2\ 6_5\ 6 = 97{,}546 \\ +\ 5\ 7\ 3\ 8\ 0 \\ \hline 9\ 7\ 5\ 4\ 6 \end{array}$$

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).

Without remainder	
With remainder	

Solve problems involving addition, subtraction, multiplication and division

potatoes
£1.50 per kg

carrots
£1.80 per kg

Jack buys $1\frac{1}{2}$ kg of potatoes and $\frac{1}{2}$ kg of carrots.

How much **change** does he get from £5?

Step 1
£1.50 ÷ 2 = 75p
£1.50 +
£2.25

Step 2
£1.80 ÷ 2 = 90p

Step 3
£2.25 +
90p
£3.15

Step 4
£5.00 -
£3.15
£1.85

£ 1.85

Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.

5 . 1	×	3 . 8			
	↓				
1 5	×	4	=	6 0	

Multiply simple pairs of proper fractions, writing the answer in its simplest form (e.g. $\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$)

$$\frac{4}{6} \times \frac{6}{8} = \frac{24}{48} = \frac{1}{2} \quad \text{simplified} =$$

Divide proper fractions by whole numbers (e.g. $\frac{1}{3} \div 2 = \frac{1}{6}$)

$$\frac{3}{4} \div 2 = \frac{3}{4} \div \frac{2}{1} \quad \text{flip}$$

$$\frac{3}{4} \times \frac{1}{2} = \frac{3}{8}$$

Multiply one-digit numbers with up to two decimal places by whole numbers

$$
\begin{array}{ccc}
 & 8.4 & 3 \\
 & & 8 \times \\
\hline
6 \; 7.4 & 4 \\
3 & 2 \\
\end{array}
$$

Use written division methods in cases where the answer has up to two decimal places

$$6 \overline{\smash{)}7^{1}2.3^{3}0} = 12.05$$

Mental Strategies
- Multiply and divide numbers mentally drawing upon known facts
- Perform mental calculations, including with mixed operations and large numbers.
- Identify common factors, common multiples and prime numbers

Suggested Vocabulary

Addition & Subtraction

Years 3 and 4: add, addition, more, plus, increase, sum, total, altogether, double, near double, subtract, subtraction, take (away), minus, decrease, difference between, half, halve, more & fewer, equal to, is the same as, ones tens, hundreds, thousands, tenths and inverse

Years 5 and 6: add, addition, more, plus, increase, sum, total, altogether, double, near double, subtract, subtraction, take (away), minus, decrease, difference between, half, halve, equal to, is the same as, tens through to millions, tenths, hundredths & thousands and inverse

Multiplication & Division

Year 3 and 4: lots of, groups of, times, multiply, multiplication, multiplied by, multiple of, product, times, repeated addition, array, row, column, double, halve, share, share equally, equal groups, double, halve, divide, division, divided by, divided into, remainder, tens, hundreds, thousands, tenths factor, quotient, divisible by and inverse

Years 5 and 6: lots of, groups of, times, multiply, multiplication, multiplied by, multiple of, product, repeated addition array, row, column, double, halve, share, share equally, equal groups, divide, division, divided by, divided into, dividend, divisor, remainder, factor, quotient, divisible by, inverse, tens through to millions, tenths, hundredths & thousandths, fraction & integer