The Stour Academy Trust Mathematics Calculation Policy

Addition	Subtraction	Multiplication	Division

Y5

Addition

To add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)

Children should extend the compact method to numbers with at least four digits.

```
  3587
+  675
  4262
  1 1 1
```

Manipulatives will be used, including Singapore Place Value counters.
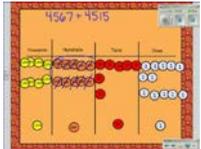
The formal method of addition will also be applied to money, measures and numbers with differing numbers of decimal places and will, at times, include more than two values. Children will be taught to carefully align place value columns.

```
 £23.59        1 9 . 0 1
+ £7.55          3 . 6 5
 £31.14        + 0 . 7
              2 3 . 3 6
```

Using similar methods, children will:
- ✓ *add several numbers with different numbers of digits;*
- ✓ *begin to add two or more decimal fractions with up to three digits and the same number or different numbers of decimal places;*
- ✓ *know that decimal points should line up under each other, particularly when adding or subtracting mixed amounts, e.g. 3.2 m – 280 cm.*

Key vocabulary add, more, plus, and, make, altogether, total, equal to, equals, most, count on, number line, sum, tens, units, partition, addition, column, tens boundary, hundreds, boundary, increase, vertical, 'carry', expanded, compact, thousands, hundreds, digits, inverse, decimal places, decimal point, tenths, hundredths, thousandths.

Subtraction

To add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)

Children should continue to develop their fluency with decomposition involving numbers with at least 4 digits.

Decomposition

Dienes/Base 10 equipment, place value counters may be used to support.

Children will use this method to subtract decimal values, including mixtures of integers and decimals, aligning the decimal point.
e.g. 7169 – 372.5

Children should:
- ✓ be able to subtract numbers with different numbers of digits;
- ✓ begin to find the difference between two decimal fractions with up to three digits and the same number of decimal places;
- ✓ know that decimal points should line up under each other

Where the numbers involved in the calculation are close together or near to multiples of 10, 100 etc counting on using a number line should be used. Eventually, this should be performed mentally.

1209 – 388 = 821
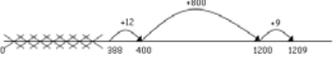
Key vocabulary equal to, take, take-away, less, minus, subtract, leaves, distance, between, how many more, how many fewer/less than, most, least count, back, how many left, how much less is…, difference, count on, strategy, partition,
tens units, take and make, exchange, digit, value, hundreds, inverse, tenths, hundredths, decimal point, decimal

Multiplication

To 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

Short multiplication:
Children should use a compact method of multiplication when multiplying numbers up to 4 digits by a one digit number:

24 × 6 becomes — Answer: 144
342 × 7 becomes — Answer: 2394
2741 × 6 becomes — Answer: 16 446

Long Multiplication (TU x TU):

STEP 1: Children should then be reintroduced to the grid method initially, approximating first
e.g. 72 x 38
72 x 38 is approximately 70 x 40 = 2800


```
        2100
      +  560
      +   60
      +   16
        2736
```

STEP 2: Still estimating first, revisit the expanded vertical method from Year 4, applying it to 2 digit numbers.

```
     625
  ×   16
      30  (5 × 6)
     120  (20 × 6)
    3600  (600 × 6)
    6250  (625 × 10)
   10000
```

STEP 3: Children should be encouraged to estimate first and to consider place value when multiplying by the 10s place, rather than remembering the rule 'add a zero'.
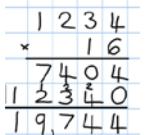
```
     625          1 2 3 4
  ×   16        ×    1 6
    3750 (625 × 6)  7 4 0 4
    6250 (625 × 10) 1 2 3 4 0
   10000          1 9 , 7 4 4
```

Key vocabulary groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, sets of, equal groups, times as, big as, partition, grid method, multiple, product, tens, units, value, inverse, square, factor, integer, decimal, short/long multiplication, 'carry'

Division

Divide up to 4 digits by a single digit, including those with remainders.

Children will continue to use written methods to solve short division HTU ÷ U

STEP 1: Initially they will use the expanded method, using know number facts (e.g. 6 × 8 = 48; 60 × 8 = 480; 600 × 8 = 4800)

```
8 ) 5309
  -4800 (600 × 8)
    509
  - 480 (60×8)
     29
    -24 (3×8)
      5
```

STEP 2: Children will then use the formal short method of division for HTU ÷U


```
   0 6 6 3 r 5
8 ) 5 3 ⁵0 ⁷9
```

STEP 3: Children will then begin to record any remainders as fractions.
e.g. 32 ÷ 10 = 3 r 2
so the answer is $3 \frac{2}{10}$ which could then be written as $3 \frac{1}{5}$ in its simplest terms.

Children should apply short division to dividends that have up to two decimal places, recording their answers as decimals.
e.g.
```
    1 5.4
6 ) 9³2.²4
```

When solving worded problems, children need to be able to decide whether to round up or down accordingly.

Key vocabulary share, share equally, one each, two each…, group, equal groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, inverse, short division, 'carry', remainder, multiple, divisible by, factor, quotient, prime number, prime factors, composite number (non-prime)

The Bar Model (Singapore maths)
Throughout year 5, as an aid to problem solving, the bar method will be used to support children in creating a visual representation of the problem which they are solving.
These problems will, at times, be multistep problems and the children will apply their understanding of the model to them.
e.g. A farmer has 42 animals. There are twice as many ducks as cows and three times as many sheep as cows. How many sheep, cows and ducks?

The Stour Academy Trust Mathematics Calculation Policy

Addition	Subtraction	Multiplication	Division

Y6

Addition

To add several numbers of increasing complexity

Children should extend the formal method of addition to any numbers, with any number of digits (more than 4).

7648	6584	42
+ 1486	+ 5848	6432
9134	12432	786
1 11	1 11	3
		+ 4681
		11944
		1 2 1

Dienes rods and place value counters should be used to support.

Children will apply their understanding of addition to several numbers with different numbers of decimal places (including in the context of money and measures):

```
  2 3 · 3 6 1
      9 · 0 8
  5 9 · 7 7
+     1 · 3
  9 3 · 5 1 1
  2 1
```

NB: commas should not be used within the method.

Using similar methods, children will
- ✓ add several numbers with different numbers of digits;
- ✓ begin to add two or more decimal fractions with up to four digits and either one or two decimal places;
- ✓ know that decimal points should line up under each other, particularly when adding or subtracting mixed amounts, e.g. 401.2 + 26.85 + 0.71.

Key vocabulary add, more, plus, and, make, altogether, total, equal to, equals, most, count on, number line, sum, tens, units, partition, addition, column, tens boundary, hundreds, boundary, increase, vertical, 'carry', expanded, compact, thousands, hundreds, digits, inverse, decimal places, decimal point, tenths, hundredths, thousandths.

Subtraction

To subtracting with increasingly large and more complex numbers and decimal values.

Children should extend the formal method of subtraction to any numbers, with any number of digits (more than 4).

```
  ⁹1⁴150,⁶699
-   89,949
    60,750
```

(NB: no commas should be used within the method)

Using the compact column method to subtract, children should apply their understanding to money and measures, including decimals with different numbers of decimal places.

```
  ⁹10⁵5·⁴1⁹9 kg
-   36·08 kg
    69·339 kg
```

Children should:
- ✓ be able to subtract numbers with different numbers of digits;
- ✓ be able to subtract two or more decimal fractions with up to three digits and either one or two decimal places;
- ✓ know that decimal points should line up under each other.

Where the numbers involved in the calculation are close together or near to multiples of 10, 100 etc counting on mentally, referring back to using a number line, should be used.

Key vocabulary equal to, take, take-away, less, minus, subtract, leaves, distance, between, how many more, how many fewer/less than, most, least count, back, how many left, how much less is…, difference, count on, strategy, partition, tens units, take and make, exchange, digit, value, hundreds, inverse, tenths, hundredths, decimal point, decimal

Multiplication

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

Children should continue to use short and long multiplication to multiply numbers by one and two digit numbers (link to grid method).

24 × 16 becomes
```
    2
  2 4
× 1 6
2 4 0
1 4 4
3 8 4
```
Answer: 384

124 × 26 becomes
```
    1 2
  1 2 4
×   2 6
2 4 8 0
  7 4 4
3 2 2 4
  1 1
```
Answer: 3224

124 × 26 becomes
```
    1 2
  1 2 4
×   2 6
  7 4 4
2 4 8 0
3 2 2 4
  1 1
```
Answer: 3224

When multiplying decimals, children will using estimation of the whole numbers to support understanding of any resulting decimal numbers before using a formal method to calculate the answer.
e.g. 32.17 x 4.5 '30 x 4 = 120' so my answer will be somewhat bigger.

Children will then apply this method to the multiplication of numbers involving decimals.

```
  4·62
×    3
13·86
  1
```

```
  32.17
X    4.5
  16085
128680
144.765
```

Dienes/base 10 equipment, bead strings, place value counters may be used to support.

Key vocabulary groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, sets of, equal groups, times as, big as, partition, grid method, multiple, product, tens, units, value, inverse, square, factor, integer, decimal, short/long multiplication, 'carry', tenths, hundredths, decimal

Division

Divide at least 4 digits by both single-digit and 2-digit numbers (including decimal numbers and quantities)

Children should continue to use short division divide numbers with up to 4 digits by a single digit, giving their answers as remainders, fractions or fraction decimals. Use place value counters to support.

432 ÷ 5 becomes
```
    8 6 r2
5 ) 4 3 32
```
Answer: 86 remainder 2

496 ÷ 11 becomes
```
      4 5 r1
1 1 ) 4 9 56
```
Answer: 45 1/11

```
  0 8 1 2 · 1 2 5
8 ) 6⁶4 9⁵7·⁵0⁵0⁴0
```

Children should be introduced to long division for 2 digit divisors that cannot be dealt with by mental 'chunking up' or portioning methods (again, answers should be given as either remainders, decimal fractions or fractions).

432 ÷ 15 becomes
```
        2 8 r12
1 5 ) 4 3 2
      3 0 0
      1 3 2
      1 2 0
      1 2
```
12/15 = 4/5

Answer: 28 remainder 12

432 ÷ 15 becomes
```
        2 8
1 5 ) 4 3 2
      3 0 0    15×20
      1 3 2
      1 2 0    15×8
      1 2
```
Answer: 28 4/5

432 ÷ 15 becomes
```
        2 8 · 8
1 5 ) 4 3 2 · 0
      3 0 0 ↓
      1 3 2
      1 2 0 ↓
      1 2 0
      1 2 0
            0
```
Answer: 28·8

Manipulatives will be used, such as bead strings, unifix (to support remainders), place value counters.

To divide decimals, children should use long division and record jottings down the side:

```
        2 8 · 8
1 5 ) 4 3 2 · 0
      3 0 0 · 0   (15 × 20)
      1 3 2 · 0
      1 2 0 · 0   (15 × 8)
      1 2 · 0
      1 2 · 0     (15 × 0.8)
            0
```

Children should continue to use mental methods to solve problems and to help with estimations.

Key vocabulary share, share equally, one each, two each…, group, equal groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, inverse, short division, 'carry', remainder, multiple, divisible by, factor, quotient, prime number, prime factors, composite number (non-prime), common factor

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The Bar Model (Singapore maths)
In order to support problem solving, children in year 6 will continue to develop their use of the Bar Method to tackle multistep problems with increasing complexity alongside formal written or mental methods. e.g. Frankie had 7 times as many football stickers as Amy. If he gives 54 stickers to Amy, they will have the same number. How many more stickers did Frankie have before giving some to Amy?
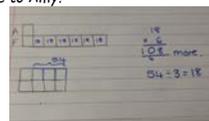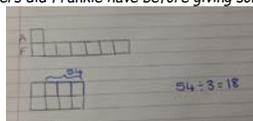
By the end of year 6, children will have a range of calculation methods, mental and written. Selection will depend upon the numbers involved.
Children should not be made to go onto the next stage if:
- they are not ready.
- they are not confident.

Children should be encouraged to approximate their answers before calculating.
Children should be encouraged to consider if a mental calculation would be appropriate before using written methods as they must identify the most efficient method.