Make your child a Maths Star!

A parents' guide to helping your child with Maths at home

DOVE BANK PRIMARY SCOOL

Booklet 2 of 2:

Key Stage 2 - Year 3 to Year 6

INTRODUCTION

The purpose of this booklet is to outline the various calculation methods that children are taught as they progress through the school, many of which look different to the methods that you may have been taught in your primary school days.

During Numeracy lessons (which are either undertaken on a daily basis or are blocked into two sessions on alternate days) children will be doing a mixture of counting, talking about numbers, mental calculations, standard written methods and using numbers to solve real life problems.

As they progress through the school, pupils build up a bank of strategies, from early mental calculation skills to formal written recordings that can be applied when appropriate. Each strategy can be refined or extended to suit the calculation needed.

This booklet shows the range of different methods that we are now teaching. We hope the explanations and examples of strategies will help you to assist your child at home.

Also included in the booklet are various ideas and suggestions for maths activities that you can enjoy doing with your child in the world away from school. It is not an exhaustive list and you will doubtless have many more ideas of your own.

MENTAL CALCULATIONS

It is important to recognise that the ability to calculate mentally lies at the heart of the new 2014 National Curriculum. Mental calculation methods will therefore be taught systematically from Reception onwards and pupils will be given regular opportunities to develop the necessary skills.

Children are introduced to the processes of calculations through practical, oral and mental activities. Through these activities, they consolidate their understanding of number facts and begin to develop ways of recording to support their thinking and calculation methods. As children progress through the school and are taught more formal written methods, they are <u>still</u> encouraged to think about mental strategies they could use first and only use written methods for those calculations they cannot solve in their heads.

When faced with a calculation problem, encourage your child to ask:

- Can I do this in my head?
- Could I do this in my head using drawings or jottings to help me?
- Do I need to use a written method?
- Should I use a calculator?

Also help your child to estimate and then check the answer. Encourage them to ask:

- Is the answer sensible?

WHAT BASIC MATHEMATICAL FACTS WILL MY CHILD BE TAUGHT?

Practice is crucial and skills are built on throughout the school right from the foundation years.

Year 3

- Count from 0 in multiples/groups of 4, 8, 50 and 100.
- Count in ones, tens and hundreds.
- Find 10 or 100 more or less than a given number.
- Compare and order numbers up to 1000. Read and write numbers up to 1000 in numerals and in words.
- Derive and recall all addition and subtraction facts for each number to 20, sums and differences of multiples of 10 and number pairs that total 100 and 1000 e.g. 300 + 700, or 600 + * = 1000
- Number bonds to 100 for multiples of 5. E.g. 45 + * = 100
- Pairs of two-digit numbers with a total of 100, e.g. 32 + 68, or 32 + * = 100
- Addition doubles for multiples of 10 to 100, e.g. 90 + 90
- Add and subtract mentally including: three-digit number and ones; three-digit number and tens; - three-digit number and hundreds
- Derive and recall multiplication facts for the 2, 3, 4, 5, 8 and 10 times-tables and the corresponding division facts; recognise multiples of 2, 5 or 10 up to 1000
- Multiples of 10 x a single digit. E.g. 30 x 2 = 60, and corresponding division facts.
- Doubles of multiples of 10 to 100. E.g. double 90, and corresponding halves.
- Find simple fractions, such as 1/2, 1/3, 1/4, 1/5, 1/10 (up to 7/10 and 9/10), of shapes and numbers. Use pictures to find equivalent fractions.
- Read the time on a 12 hour digital clock and tell the time to the nearest 5 minutes on an analogue clock.
- Read scales with numbered and unnumbered divisions. Know the relationship between km and m, m and cm, kg and g, l and ml.
- Solve simple number problems and explain how to work them out.
- Draw/complete shapes with reflective symmetry; draw the reflection of a shape in a mirror.
- Use Venn and Carroll diagrams to sort data and objects.

Year 4

- Count in multiples of 6, 7, 9, 25 and 1000. Count in tens and hundreds beyond 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.
- Use knowledge of +/- facts and place value to derive sums and differences of pairs of multiples of 10, 100 or 1000.
- What must be added to any 3-digit number to make the next multiple of 100? E.g. 521 + * = 600.
- Recall and use multiplication facts to 12 × 12 and the corresponding division facts.
- Multiples of 100 x a single digit. E.g. 300 x 2 = 600, and corresponding division facts.
- Multiply 3 numbers. E.g. 2 x 4 x 5
- Doubles of numbers 1 to 100. E.g. double 58, and corresponding halves.
- Doubles of multiples of 10 and 100 and corresponding halves.
- Recognise factor pairs for known multiplication facts. E.g. 15 = 1 x 15, 3 x 5
- Divide a one- or two-digit number by 10 and 100, identifying the value of the digits.
- Use standard metric units of measurement. Use decimal notation to record measurements e.g. 1.3m
- Tell the time to the nearest minute and use a simple timetable. Calculate time intervals.
- Organise, present, analyse and interpret data in tables, diagrams, tally charts pictograms and bar charts.
- Recognise the 8 compass points, horizontal and vertical lines. Know that angles are measured in degrees, 360º = 1 whole turn and compare and order angles less than 180º.
- Work out that a simple fraction like 2/6 is equivalent to 1/3. Put mixed numbers (e.g. 3 ½ , 4 ¼) correctly onto a number line.
- Find fraction of numbers, quantities or shapes (e.g. 1/5 of 30 plums, 3/8 of a 6 by 4 rectangle).

Year 5

- Count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000
- 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.
- Use knowledge of place value and addition and subtraction of two-digit numbers to derive sums and differences, doubles and halves of decimals. E.g. 6.5 + 2.7, 7.8 –1.3; half of 5.6, double 3.4.
- What must be added to a 4-digit number to make the next multiple of 1000? E.g. 4087 + * = 5000.
- What must be added to a decimal to make the next whole number? E.g. 7.2 + * = 8
- Square numbers to 10 × 10
- Identify multiples and factors, including finding all factor pairs of a number to 100, and common factors of two numbers.
- Establish whether a number up to 100 is prime and recall prime numbers up to 19.
- Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000.
- Division facts corresponding to tables up to 12 × 12, and the related unit fractions, e.g. 7 × 9 = 63 so one-ninth of 63 is 7 and one-seventh of 63 is 9
- Use division to find a fraction of a number, e.g. find one fifth by dividing by 5; and percentages of numbers and quantities (e.g. 10%, 5% and 15% of £80).
- Use knowledge of place value and + and – to work out sums, differences, halves and doubles of decimals (e.g. 6.5 + 2.7, half of 5.6, double 0.34).
- Find equivalent fractions and relate to their decimal representation (e.g. ¼ = 0.25, 7/10 = 0.7).
- Draw and measure lines to the nearest millimetre. Work out the perimeter of regular shapes and the area of a rectangle, e.g. the perimeter and area of a book cover measuring 25cm by 20cm.
- Read and plot co-ordinates in the first quadrant. Recognise parallel and perpendicular lines.
- Estimate draw and measure acute and obtuse angles using an angle measurer or protractor; calculate angels in a straight line
- Construct frequency tables, pictograms, and bar and line graphs to represent frequencies of events over time.
- Solve word problems and explain their method. Use a calculator and correctly interpret the display.
- Convert larger to smaller units of measurements using decimals to one place (e.g. change 2.6kg to 2600g).

Year 6

- Read, write, order and compare numbers up to 10 000 000.
- Addition and subtraction facts for multiples of 10 to 1000 and decimal numbers with one decimal place. E.g. 650 + * = 930, * – 1.4 = 2.5
- What must be added to a decimal with units, tenths and hundredths to make the next whole number? E.g. 7.26 + * = 8.
- Use knowledge of multiplication facts to derive quickly squares of numbers to 12 × 12 and the corresponding squares of multiples of 10.
- Identify common factors, common multiples and prime numbers.
- Use knowledge of place value and multiplication facts to 12 × 12 to derive related multiplication and division facts involving decimals, e.g. 0.8 × 7, 4.8 ÷ 6
- Use approximations, inverse operations and tests of divisibility to estimate and check results. By the end of year 6, children will have a range of calculation methods, mental and written.
- Find fractions and percentages of whole numbers quantities, (e.g. 5/8 of 96, 65% of £260 etc). Express remainders as decimals or fractions.
- Estimate angles and use a protractor to measure them.
- Order a set of fractions by converting them to fractions with a common denominator; simplify fractions by cancelling common factors.
- Select and use units of measure and convert between units using decimals to two places (e.g. 2.75kg to 2750g) and vice versa.
- Solve word problems, continue sequences (including negative numbers) and explain their methods and reasoning.

- Visualise and draw shapes with reflections, translations and rotations through 90º and 180º.
- Solve problems by collecting, selecting, processing, presenting and interpreting data; drawing conclusions and identifying further questions to ask.

However, mental calculation is not at the exclusion of written recording and should be seen as complementary to and not as separate from it. It is important that children do not abandon jottings and mental methods once pencil and paper procedures are introduced. During their time at this school, children will therefore be encouraged to see mathematics as both a written and spoken language.

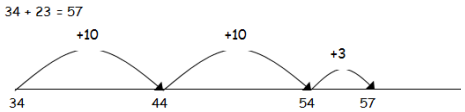
Teachers and other adults working with children in supporting mathematics will support and guide children in learning through the following important stages:

- Developing the use of pictures and a mixture of words and symbols to represent numerical activities
- Using standard symbols and conventions
- Use of jottings to aid a mental strategy
- Use of pencil and paper procedures
- Use of a calculator

ADDITION GUIDELINES

Year 3

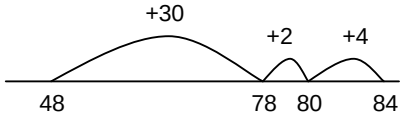
Partition into tens and ones -Partition both numbers and recombine. (In the example below, 23 is split into 10, 10 and 3).



Count on by partitioning the second number only e.g.

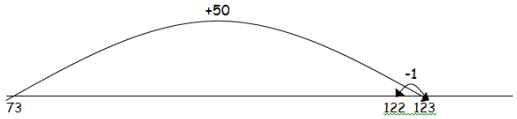
36 + 53 = 53 + 30 + 6 = 83 + 6 = 89

48 + 36 = 84



Count on from the largest number irrespective of the order of the calculation e.g. 38 + 86 = 124

Compensation e.g. 49 + 73 = 122



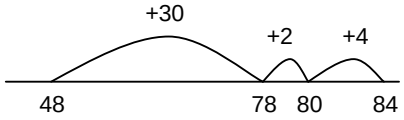
Add a near multiple of 10 to a two-digit number

Secure mental methods by using a number line to model the method. Continue as in Year 2 but with

Year Four

Partition into tens and ones and recombine

48 + 36 = 84



Add the nearest multiple of 10, then adjust

Continue as in Year 2 and 3 but with appropriate numbers e.g. 63 + 29 is the same as 63 + 30 - 1

Pencil and paper procedures

As for Y3 extending to 3 digit numbers

367 + 185 = 431 (break into hundreds, tens and units)

300 + 60 + 7
100 + 80 + 5
400 +140+12 = 552

Once children demonstrate a secure understanding of place value, they may move to the more familiar calculation.

```
  367
+185
  552
  11
```

Extend to decimals **in the context of money and measurement.**

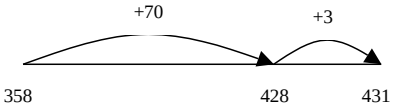
Add numbers **with up to 4 digits** using the formal written methods of columnar addition

Solve word problems using a standard written method. There are 437 girls and 657 boys in a school. How many children are there altogether?

Year Five

Partition into hundreds, tens and ones and recombine

Either partition both numbers and recombine or partition the second number only e.g.
358 + 73 = 358 + 70 + 3
= 428 + 3
= 431



Add or subtract the nearest multiple of 10 or 100, then adjust

Continue as in Year 2, 3 and 4 but with appropriate numbers e.g. 458 + 79 = is the same as 458 + 80 - 1

Pencil and paper procedures

Extend to numbers with more than four digits

31587 + 11675 = 43262

```
  31587
+ 11675
  432262
  111
```

Extend to up to two places of decimals (same number of decimals places) and adding several numbers (with different numbers of digits).

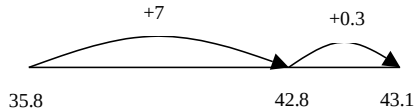
```
  72.8
+54.6
127.4
 1  1
```

Solve word problems using a standard written method. There are 1267 football fans from Liverpool and 1456 fans from Man City in a stadium. How many football fans are there altogether?

Year Six

Partition into hundreds, tens, ones and decimal fractions and recombine

Either partition both numbers and recombine or partition the second number only e.g.
35.8 + 7.3 = 35.8 + 7 + 0.3
= 42.8 + 0.3
= 43.1



Add the nearest multiple of 10, 100 or 1000, then adjust

Continue as in Year 2, 3, 4 and 5 but with appropriate numbers including extending to adding 0.9, 1.9, 2.9 etc

Pencil and paper procedures

Pupils practise addition for larger numbers, using the formal written methods of columnar addition.

Extend to numbers with any number of digits and decimals with 1, 2 and/or 3 decimal places. E.g. 13.86 + 9.481 = 23.341

```
  13.860
+ 9.481
  23.341
 1 1 1
```

Solve word problems using a standard written method. E.g. 12 786 people visited the museum last year. The numbers increased by 2568 this year. How many people visited altogether this year?

appropriate numbers e.g. 35 + 19 is the same as 35 + 20 – 1. **<u>Pencil and paper procedures (partitioning = break the number up into its tens and units)</u>** 67 + 24 = 80 (60 + 20) + 11 (7 + 4) = 91 267 + 85 = 200 + 140 (60 + 80) + 12 (7 + 5) = 352 **<u>Add numbers with up to 3 digits, using formal written methods.</u>** $\begin{array}{r} 625 \\ +\ 48 \\ \hline 673 \\ \hline 1 \end{array}$ $\quad$ $\begin{array}{r} 783 \\ +\ 142 \\ \hline 925 \\ \hline 1 \end{array}$ Using similar methods, children will: • add several numbers with different numbers of digits; • begin to add two or more three-digit sums of money, with or without adjustment from the pence to the pounds; • know that the decimal points should line up under each other, particularly when adding or subtracting mixed amounts, e.g. £3.59 + 78p. • solve word problems. E.g. My sunflower is 123cm tall in May. By June it has grown another 56cm. How tall is the sunflower now?			

SUBTRACTION GUIDELINES

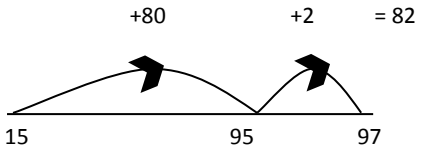
Year 3

Find a small difference by counting up E.g. 102 – 97 = 5 (count on from 97 up to 102)

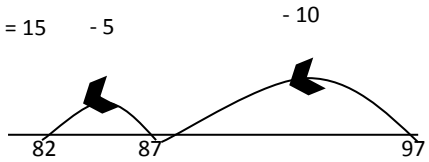
Subtract mentally a 'near multiple of 10' to or from a two-digit number E.g. 78 – 49 is the same as 78 – 50 + 1

Use known number facts and place value to subtract E.g. 97 – 15 = 82 (count on from the lower number up to the larger number OR back from the larger number to the smaller).

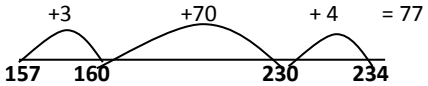
Counting on method



Counting back



E.g. 234-157



Subtract numbers with up to 3 digits, using formal written/column methods.

```
  567        614 1
- 341        7 5 4
  226      - 286
           468
```

Year Four

Find a small difference by counting up

e.g. 5003 – 4996 = 7

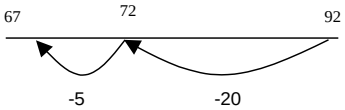
This can be modelled on an empty number.

Subtract the nearest multiple of 10, then adjust.

E.g. 124 – 99 = 124-100+1

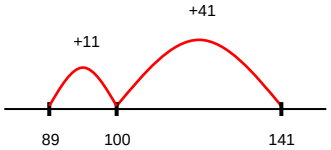
Use known number facts and place value to subtract (counting back)

92 – 25 = 67



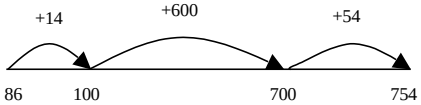
Number line – counting on

141 - 89 = 52



Pencil and paper procedures

754 – 86 = 668



Subtract numbers with up to 4 digits, using formal written/column methods (see Year 3). Extend to decimals in the context of money.

Year Five

Find a difference by counting up

e.g. 8006 – 2993 = 5013
This can be modelled on an empty number line.

Subtract the nearest multiple of 10 or 100, then adjust.

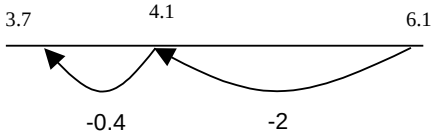
E.g.1124 – 999 = 1124-1000+1

Pencil and paper procedures

ThHTU – HTU E.g. 1245 - 358

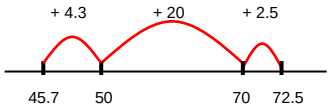
Use known number facts and place value to subtract using a number line

6.1 – 2.4 = 3.7



Number lines – counting on

72.5 – 45.7 = 26.8



Subtract numbers with **more than 4 digits**, with and without decomposition using a formal written method. Extend to **decimals up to 1 decimal place.**

```
  5 13 1
  6467
- 2684
  3783
```

Year Six

Find a difference by counting up

e.g. 8000 – 2785 = 5215

To make this method more efficient, the number of steps should be reduced to a minimum through children knowing:

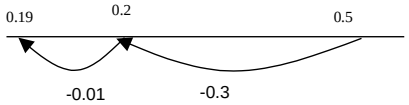
- Complements to 1, involving decimals to two decimal places (0.16 + 0.84)
- Complements to 10, 100 and 100

Subtract the nearest multiple of 10, 100 or 1000, then adjust

Continue as in Year 2, 3, 4 and 5 but with appropriate numbers.

Use known number facts and place value to subtract (counting back)

0.5 – 0.31 = 0.19



Number lines – counting on (as in Y5 but with more challenging numbers)

176.7 – 59.3

Pencil and paper procedures

Pupils practise subtraction for **larger numbers**, using the formal written methods of columnar subtraction. **Extend to 2 places of decimals. (See Y5)**

MULTIPLICATION GUIDELINES

Year 3

x = signs and missing numbers and arrays and repeated addition - as in Year 2 but with appropriate numbers. E.g. 7 x 4 = □ □ = 8 x 5

Use known facts and place value to carry out multiplications using the grid method

To calculate 13 x 7 using the grid method, the numbers are partitioned into parts (10's and 1's) and each of these is multiplied by 7. The two answers are then added together.

There are 13 biscuits in a packet. How many biscuits in 7 packets?

X	10	3	
7	70	21	91

Partition 32 x 3 = 96

x	30	2	
3	90	6	=96

Using an informal jotting using partitioning

30 x 5 = (30 x 5) + (8 x 5) = 150 + 40 = 190

Expanded Column Multiplication – teacher modelled - The first step in 38 × 7 is '30 multiplied by 7', not '3 times 7', although the relationship 3 × 7 should be stressed.

```
  38
x  7
 56   (8 x 7 = 56)
210   (30 x 7 = 210)
266   (56 + 210 = 266)
```

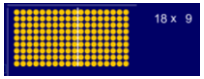
Formal Written Method (only when place value is secure)

```
  38
x  7
 266
   5
```

Year Four

Partition

Continue to use arrays:
18 x 9 = (10 x 9) + (8 x 9) = 162



OR… Use the grid method of multiplication

x	20	3	
7	140	21	= 161

Extend to HTU x U

E.g. 346 x 9

x	300	40	6		
9	2700	360	54		2700
					+ 360
					+ 54
					3114

Expanded Column Multiplication

```
  38
x  7
 56   (8 x 7 = 56)
210   (30 x 7 = 210)
266   (56 + 210 = 266)
```

```
  38
x  7
 266
   5
```

```
 138
x  7
 966
 25
```

Formal Written Method: Develop reliable written methods for multiplication, starting with calculations of two-digit numbers by one-digit numbers and **progressing to the formal written methods of short multiplication.**

Multiply **2 digit and 3 digit** numbers by a 1 digit number using formal written layout.

Year Five

Partition

47 x 6 = 282 47 x 6 = (40 x 6) + (7 x 6) = 282

OR… **Use the grid method of multiplication (as below)**

72 x 38 is approximately 70 x 40 = 2800

x	70	2	
30	2100	60	2100 + 60 = 2160
8	560	16	560 + 16 = 576
			2160 + 560 = 2736

Extend to simple decimals with 1 decimal place.

Expanded Column Multiplication

```
  38
x  7
 56   (8 x 7 = 56)
210   (30 x 7 = 210)
266   (56 + 210 = 266)
```

Multiply numbers up to 4 digits by a 1 or 2 digit number using a formal written method, including long multiplication.

```
1358
x   5
6790
 124
```

```
  56
x 27
  42 (6 x 7)
 350 (50 x 7)
 120 (6 x 20)
1000 (50 x 20)
1512
```
Total

Year Six

Partition

87 x 6 = 522 87 x 6 = (80 x 6) + (7 x 6) = 522
OR … Use the grid method of multiplication

Pencil and paper procedures

Grid method: 372 x 24 is approximately 400 x 20 = 8000

x	300	70	2	
20	6000	1400	40	= 7440
4	1200	280	8	= 1488
				= 8928

Extend to decimals with up to two decimal places.

Short Column Multiplication

The recording is reduced further, with carry digits recorded below the line.

```
  38
x  7
 266
   5
```

```
  56
x 27
  42 (6 x 7)
 350 (50 x 7)
 120 (6 x 20)
1000 (50 x 20)
1512
```

Children who are already secure with multiplication for TU × U and TU × TU can use the same method for HTU × TU, THHTU x U or applying decimals (up to 2dp).

```
 286
x 29
2574   (9 x 286 = 2574)
5720   (20 x 286 = 5720)
8294
 1
```

DIVISION GUIDELINES

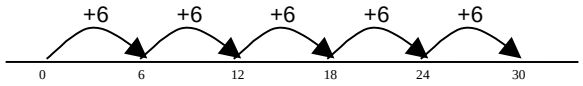
Year 3

÷ = signs and missing numbers - Continue using a range of equations as in Year 2 but with appropriate numbers.

26 ÷ 2 = ☐ 24 ÷ △ = 12 ☐ ÷ 10 = 8

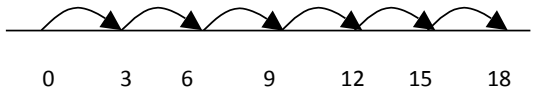
Sharing and Grouping - 30 ÷ 6 can be modelled as:

Grouping – groups of 6 placed on no. line and the number of groups counted e.g.

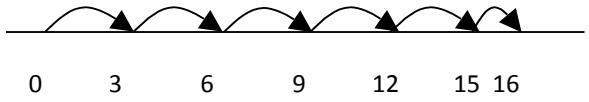


Sharing – sharing among 6, the number given to each person

Grouping - How many 3's make 18?



Remainders: - 16 ÷ 3 = 5 r1 How many 3's make 16, how many left over?



Extension for more able Y3s:E.g 84 ÷ 6

I need 6 drawing pins to put up a picture. How many pictures can I put up with 84 pins?

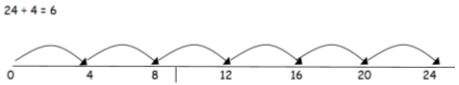
It would take a long time to jump in 6s to 84 so children can jump in bigger 'chunks'. A jump of 10 groups of 6 takes you to 60. Then you need another 4 lots of 6 to reach 84. Altogether, that is 14 jumps of 6

Year Four

÷ = signs and missing numbers

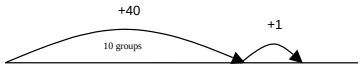
Continue using a range of equations as in Year 2 but with appropriate numbers.

Emphasis on Ggrouping



Remainders

41 ÷ 4 = 10 r1



41 = (10 x 4) + 1

Pupils practise mental methods and extend this to three-digit numbers to derive facts, for example, 600 ÷ 3 = 200.

2 digit number divided by a single digit number

I need 6 drawing pins to put up a picture. How many pictures can I put up with 84 pins? (see Y3)

84÷6=

84
- 60 (this is 10 groups of6)
24 (left over)
- 24 (this is 4 groups of 6)
0 (left over)

Children will begin to record their chunking vertically.

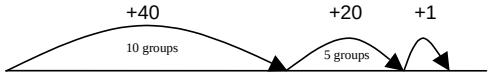
Year Five

Chunking Method - Use chunking as an informal method for dividing a 2 digit number by a 1 digit number until understanding of place value is secure. See Y3/4.

Then move onto a compact method.

Remainders

Quotients expressed as fractions or decimal fractions. E.g. 61 ÷ 4 = 15 ¼ or 15.25



Chunking Method for dividing a 3 digit number by a 2 digit number

946÷35=

946
- 700 (20 lots of 35)
246
- 175 (5 lots of 35)
71
-70 (2 lots of 35)
1 (remainder)

Children need to think……. Can I make 10 groups of 35? Can I make 20 groups of 35?20 groups of 24 = 700. Subtract the 700 from 946 and you are left with 246. Group 35 into 5 lots = 175 then subtract from 246 etc.

The answer to this calculation is 27 (20+5+2) with a remainder of 1.

Year Six

Sharing, grouping and remainders as Year Five

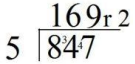
Pencil and paper procedures- Chunking for long division (as in Y5)

946÷35=

946
- 700 (20 lots of 35)
246
- 175 (5 lots of 35)
71
-70 (2 lots of 35)
1 (remainder)

Pencil and Paper procedures- Short Division Method

Write down how many times your divisor goes into the first number of the dividend. If there is a remainder, that's okay.
Write down your remainder to the left of the next digit in the dividend. Continue. Repeat steps 1-3 until you are done.



Both methods above are necessary at this stage, to deal with the wide range of problems experienced at Year Six.

Helping your child learn at home in Key Stage 2

Number and Place Value

- Ask the question: 'The answer is 10 (or any number), what's the question?' Possible responses: 8 plus 2; 1 million divided by one hundred thousand; 5 x 2 ; 25 – 15; 2.5 times 4; the number before 11; 9999 subtract 9989 ; the square root of 100 etc. This is a great activity because: there's no failure; it stimulates thinking about and stretching knowledge of numbers and mathematical relationships; it's good fun.

- Look out for car number plates. What is the number on the plate? What is this to the nearest 10 or 100 or 1000? How many more would you need to reach the next multiple of 10, 100 or 1000?

- Decimal number plates - Each choose a car number plate with three digits. E.g. P645 CJM
  Choose two of the digits, e.g. 4 and 6. Make the smallest and largest numbers you can, each with 1 decimal place, e.g. 4.6 and 6.4. Now find the difference between the two decimal numbers, e.g. 6.4 – 4.6 = 1.8. Whoever makes the biggest difference scores 10 points. The person with the most points wins. Play the game again, but this time score 10 points for the smallest difference, or 10 points for the biggest total.

- A good knowledge and quick recall of times tables is essential to children's mathematical progress. The children are taught up to 12 x 12. The target is for all children to know their tables by the end of year four. It is very important that children practice their times tables daily at home. When learning their tables, children are taught to look for patterns such as odd and even number answers, or patterns made by adding together the separate digits in the answers. Children are also taught to recognise the reversible effect so that they know 6 x 2 is the same as 2 x 6. They are also taught the relationship with division so that knowing 6 x 2 = 12 means they also know that 12 ÷ 2 = 6 and 12 ÷ 6 = 2. For each known times table fact, they also know three others: 6 x 7 = 42 so they know that 7 x 6 = 42; 42 ÷ 6 = 7 ; 42 ÷ 7 = 6 .

- Times tables - Say together the six times table forwards, then backwards. Ask your child questions, such as: Nine sixes? How many sixes in 42? Six times four? Forty-eight divided by six? Three multiplied by six? Six times what equals sixty? Repeat with other times tables.

- To help children with their multiplication, one of the ways we use is to find all the factors that are used to make up a number. For example the factors of 18 are 1, 18, 2, 9, 6, and 3 because 18 x 1, 1 x 18, 3 x 6, 6 x 3, 9 x 2, 2 x 9 all equal 18.

- Ask 'progressive' calculations, e.g. 7 + 6, 17 + 6, 27 + 6, 47 + 6, 147 + 6; 5 x 2, 50 x 2, 500 x 2, 500 x 20.

- Working out 2-digit additions and subtractions, multiplying and dividing 2-digit numbers by 1 digit numbers mentally. Talk about how to make it easier, e.g. for 28 + 15, call it 30 add 13 and that's easy; for 16 x 4, double 16, then double 32.

- Open- ended activities, e.g. the answer's 25, what's the question? How can you use combinations of 3 and 6 to make different numbers? (Use each number as many times as you like with addition, subtraction, multiplication or division.)

- Four in a line - Draw a 6 x 7 grid. Fill it with numbers under 100. Take turns. Roll three dice, or roll one dice three times. Use all three numbers to make a number on the grid. You can add, subtract, multiply or divide the numbers, e.g. if you roll 3, 4 and 5, you could make 3 x 4 – 5 = 7, 54 ÷ 3 = 18, (4 + 5) x 3 = 27, and so on. Cover the number you make with a coin or counter. The first to get four of their counters in a straight line wins

- Rhymes - Make up rhyme together to help your child to remember the harder times-tables facts, e.g. 6 x 7 = 42 phew! 7 x 7 = 49 fine! 6 x 8 = 48 great!

- Card game. Use a pack of playing cards. Take out the jacks, queens and kings. Take turns. Take a card and roll a dice. Multiply the two numbers. Write down the answer. Keep a running total. The first to go over 301 wins!

- Remainders. Draw a 6 x 6 grid like this. Choose the 7, 8 or 9 times table. Take turns. Roll a dice. Choose a number on the board, e.g. 59. Divide it by the tables number, e.g. 7. If the remainder for 59 ÷ 7 is the same as the dice number, you can cover the board number with a counter or coin. The first to get four of their counters in a straight line wins!

- Doubles and trebles. Roll two dice. Multiply the two numbers to get your score. Roll one of the dice again. If it is an even number, double your score. If it is an odd number, treble your score. Keep a running total of your score. The first to get over 301 wins.

- Flowers. Take turns to think of a flower. Use an alphabet code, A = 1, B = 2, C = 3... up to Z = 26. Find the numbers for the first and last letters of your flower, e.g. for a ROSE, R = 18, and E = 5. Multiply the two numbers together, e.g. 18 x 5 = 90. The person with the biggest answer scores a point. The winner is the first to get 5 points. When you play again you could think of animals, or countries.

- Telephone challenges - Challenge your child to find numbers in the telephone directory where the digits add up to 42. Find as many as possible in 10 minutes. On another day, see if they can beat their previous total.

- Target 1000. Roll a dice 6 times. Use the six digits to make two three-digit numbers. Add the two numbers together. How close to 1000 can you get?

- Guess my number. Choose a number between 0 and 1 with one decimal place, e.g. 0.6. Challenge your child to ask you questions to guess your number. You may only answer 'Yes' or 'No'. For example, he/she could ask questions like 'Is it less than a half?' See if he/she can guess your number in fewer than 5 questions. Now let your child choose a mystery number for you to guess. Extend the game by choosing a number with one decimal place between 1 and 10, e.g. 3.6.

- Dicey division. For this game you need a 1–100 board (a snakes and ladders board will do), a dice and 20 coins or counters. Take turns. Choose a two-digit number. Roll a dice. If you roll 1, roll again. If your two-digit number divides exactly by the dice number, put a coin on your chosen two-digit number. Otherwise, miss that turn. The first to get 10 counters on the board wins.

- Line it up. You need a ruler marked in centimetres and millimetres. Use the ruler to draw 10 different straight lines on a piece of paper. Ask your child to estimate the length of each line and write the estimate on the line. Now give them the ruler and ask them to measure each line to the nearest millimetre. Ask them to write the measurement next to the estimate, and work out the difference. A difference of 5 millimetres or less scores 10 points. A difference of 1 centimetre or less scores 5 points. How close to 100 points can she get?

- Number game 1. You need about 20 counters or coins. Take turns. Roll two dice to make a two-digit number, e.g. if you roll a 4 and 1, this could be 41 or 14. Add these two numbers in your head. If you are right, you win a counter. Tell your partner how you worked out the sum. The first to get 10 counters wins. Now try subtracting the smaller number from the larger one.

- Number game 2. Put some dominoes face down. Shuffle them. Each choose a domino. Multiply the two numbers on your domino. Whoever has the biggest answer keeps the two dominoes. The winner is the person with the most dominoes when they have all been used.

- Number game 3. Use three dice. If you have only one dice, roll it 3 times. Make three-digit numbers, e.g. if you roll 2, 4 and 6, you could make 246, 264, 426, 462, 624 and 642. Ask your child to round the three-digit number to the nearest multiple of 10. Check whether it is correct, e.g. 76 to the nearest multiple of 10 is 80.

134 to the nearest multiple of 10 is 130. (A number ending in a 5 always rounds up.) Roll again. This time round three-digit numbers to the nearest 100.

- Dicey division (easier). You each need a piece of paper. Each of you should choose five numbers from the list and write them on your paper: 5 6 8 9 12 15 20 30 40 50
  Take turns to roll a dice. If the number you roll divides exactly into one of your numbers, then cross it out, e.g. you roll a 4, it goes into 8, cross out 8. If you roll a 1, miss that go. If you roll a 6 have an extra go. The first to cross out all five of their numbers wins.

- Sum it up. Each player needs a dice. Say: Go! Then each rolls a dice at the same time. Add up all the numbers showing on your own dice, at the sides as well as at the top. Whoever has the highest total scores 1 point. The first to get 10 points wins.

- Out and about. Choose a three-digit car number, e.g. 569. Make a subtraction from this, e.g. 56 – 9. Work it out in your head. Say the answer. If you are right, score a point. The first to get 10 points wins.

- Pairs to 100. This is a game for two players. Each draw 10 circles. Write a different two-digit number in each circle – but not a 'tens' number (10, 20, 30, 40…). In turn, choose one of the other player's numbers. The other player must then say what to add to that number to make 100, e.g. choose 64, add 36. If the other player is right, she crosses out the chosen number.
  The first to cross out 6 numbers wins.

- Dicey tens. For this game you need a 1–100 square (print one off the internet), 20 counters or coins, and a dice. Take turns. Choose a two-digit number on the board e.g. 24. Roll the dice. If you roll a 6, miss that turn. Multiply the dice number by 10, e.g. if you roll a 4, it becomes 40. Either add or subtract this number to or from your two-digit number on the board, e.g. 24 + 40 = 64. If you are right, put a coin on the answer. The first to get 10 coins on the board wins.

- Left overs. Take turns to choose a two-digit number less than 50. Write it down. Now count up to it in fours. What number is left over? The number left is the number of points you score, e.g. Choose 27. Count: 4, 8, 12, 16, 20, 24. 3 left over to get to 27. So you score 3 points. The first person to get 12 or more points wins. Now try the same game counting in threes, or in fives. Can you spot which numbers will score you points?

Everyday situations

- How much? While shopping, point out an item costing less than £1. Ask your child to work out in their head the cost of 3 items. Ask them to guess first. See how close they come. If you see any items labelled, for example, '2 for £3.50', ask them to work out the cost of 1 item for you, and to explain how they got the answer.

- Weighing, measuring capacity and timing when cooking. Converting a recipe for 4 people to one for 6 people. (Scale a recipe up or down to feed the right amount of people.)

- Being involved with measuring and calculating how much curtain fabric is needed, how much wood for shelves, how many wall or floor tiles are needed, how much carpet etc.

- Mugs. You need a 1 litre measuring jug and a selection of different mugs, cups or beakers. Ask your child to fill a mug with water. Pour the water carefully into the jug. Read the measurement to the nearest 10 millilitres. Write the measurement on a piece of paper. Do this for each mug or cup. Now ask your child to write all the measurements in order.

- Talking about time, e.g. How long is it until lunch time? The journey takes 2½ hours, when will we arrive? We need to be there at 2.00 pm, when do we need to leave home? Many children will still need practice with reading clock times, particularly minutes past and minutes to the hour.

- Car numbers. Try reading a car number as a measurement in centimetres, then converting it to metres, e.g. 456cm, which is 4.56m, or 4m and 56cm. Try this with car numbers that have zeros in them, e.g. 307cm, which is 3.07m or 3m and 7cm; 370cm, which is 3.7m, or 3m and 70cm.

- Choose a car number. You may add or subtract 10, 20, 30, 40, 50, 60, 70, 80 or 90. Try to get as close as possible to 555. Who can get closest during a week?

- Handling amounts of money when shopping, working out total costs, working out change, checking receipts. Working out prices of sale items, e.g. 20% off. Managing pocket money and saving for things.

- Working out distances and directions from maps.

- Use a bus or train timetable. Ask your child to work out how long a journey between two places should take. Go on the journey. Do you arrive earlier/later than expected? By how much?

- Choose a shape of the week. Look for this shape in the environment. Ask your child to describe the shape to you. Play 'guess my shape'. You think of shape. Your child asks questions to try to identify it but you can only answer 'yes' or 'no'. Hunt for right angles around your home. Can your child spot angles that are bigger or smaller than a right angle? Look for symmetrical objects. Help your child to paint or draw symmetrical pictures/patterns.

- Make a model using different boxes/containers of different sizes. Ask your child to describe their model.

- Practise measuring the lengths and heights of objects in metric measurements. Help your child use different rulers or tape measures correctly. Encourage them to estimate before measuring. Compare measurements in metric and imperial. Let your child help with the cooking. Help them to measure ingredients accurately. Talk about what each division on a scale represents.

- Choose some food items out of the cupboard. Try to put the objects in order of weight by feel alone. Then check by looking at the weights on the packets.

- Practise telling the time with your child. Use both digital and analogue clocks. Ask your child to be a 'timekeeper' – e.g. tell me when it is half past four because we are going swimming. Use a stop clock to time how long it takes to do everyday tasks –e.g. how long does it take to get dressed? Encourage your child to estimate first.

- Beat the calculator. In pairs, one with a calculator, one without, each works out the answer to a calculation aiming for the one without the calculator to say the answer first. Favourite food

- Ask your child the cost of a favourite item of food. Ask them to work out what 7 of them would cost, or 8, or 9. How much change would there be from £50? Repeat with his / her least favourite food. What is the difference in cost between the two?

- Sale of the century. When you go shopping, or see a shop with a sale on, ask your child to work out what some items would cost with: 50% off; 25% off; 10% off; 5% off. Ask your child to explain how they worked it out.

- TV addicts - Use a TV guide. Ask your child to work out the length of their favourite programmes. Can they calculate how long they spend watching TV each day/week? Work out the average watching time for a day (that is, the total time divided by 7). Instead of watching TV, you could ask them to keep a record of time spent eating meals, or playing outdoors, or anything else they do each day. Then work out the daily average.

- Journeys. Use the chart in the front of a road atlas that tells you the distance between places. Find the nearest place to you. Ask your child to work out how long it would take to travel to some places in England if you travelled at an average of 60 miles per hour, i.e. 1 mile per minute, e.g. York to Preston: 90 miles 1 hour 30 minutes; York to Dover: 280 miles 4 hours 40 minutes. Encourage your child to count in 60s to work out the answers mentally.

- One million pounds. Assume you have £1 000 000 to spend or give away. Plan with your child what to do with it, down to the last penny.

- Recipes. Find a recipe for 4 people and rewrite it for 8 people,

e.g. 4 people	8 people
125g flour	250g flour
50g butter	100g butter
75g sugar	150g sugar
30ml treacle	60ml treacle
1 teaspoon ginger	2 teaspoons ginger

  Can you rewrite it for 3 people? Or 5 people?

- Use a tape measure that shows centimetres. Take turns measuring lengths of different objects, e.g. the length of a sofa, the width of a table, the length of the bath, the height of a door. Record the measurement in centimetres, or metres and centimetres if it is more than a metre, e.g. if the bath is 165 cm long, you could say it is 1m 65cm (or 1.65m). Write all the measurements in order.

Other ideas …

Reading Numbers - Children need to be able to read and write whole numbers going into thousands. They also have to round numbers to the nearest 10, 100 or decimal place. Children also have to be able to read and interpret tables and charts. Newspaper and BBC Sport web pages are a good source of tables and charts. There is also plenty of sport on the telly.

- How many people watched Forest play Leicester?
- Where was the biggest crowd in League 1?
- How many goals were scored in the premiership altogether/before half time/in the second half?
- Wales beat England at rugby 42 – 17(honest). How many tries do you think were scored?
- For cricket fans, how many runs did the top 3 run scorers score? How much did the rest score?
- In darts, a player has 116 left. How will he score this to win with 3 darts?
- Snooker has a whole set of possibilities. After a break of 50, guess how many balls were potted? What is the most or least it could have been?
- In athletics/motor racing/skiing you have to read time to the decimal places. Good for ordering numbers!
- At the Olympics or at the athletics, how much higher and further did someone throw/jump than their nearest rival?

Playing Cards - There are many ways to use playing cards to help children to use their maths skills.

- Ordinary Playing Cards - Take out the picture cards. Play snap but you only have a snap if the total of the cards is 10. For older children, the number on the cards stands for how many tens there are in the number. Play snap but you only have a snap if the total of the cards is 100.
- You can also play a points game. When 2 cards of the same suit are put down, multiply/add the cards together (depending on their age). If you are correct, you score the number of points in the answer you gave. Choose a target e.g. 100 points. The first past the total is the winner. (This also involves addition and subtraction. How many more do we need to win? Which cards do you think would help?)

- Top Trumps - These are great games on their own and can support reading from a chart. They usually have a range of large and small numbers and a range of areas of interest.

Other Good Games to Play

- Uno – good game for recognising and matching numbers
- Dominoes – supports counting and associating patterns with numbers
- Snakes and Ladders – counting numbers up to 100/
- Scrabble – adding, multiplying (doubling, trebling) and good for vocabulary development and spelling.
- Monopoly – good for handling money, paying using notes, giving change.
- Yahtzee – a good game for adding, multiplying and probability.
- Chess/draughts; Darts; Bowling

Useful Websites

http://www.primarygames.com/math.htm

http://www.crickweb.co.uk/ks2numeracy.html

http://www.crickweb.co.uk/games.html

http://www.primaryinteractive.co.uk/maths.htm

http://www.woodlands-junior.kent.sch.uk/maths/

http://www.netrover.com/~kingskid/Math/math.htm

http://www.amblesideprimary.com/ambleweb/numeracy.htm

http://primarygamesarena.com/yourpga.php

http://www.schooljotter.com/showpage.php?id=35518

http://www.bbc.co.uk/schools/websites/4_11/site/numeracy.shtml

http://www.counton.org/

http://www.funbrain.com/brain/MathBrain/MathBrain.html

http://www.bbc.co.uk/schools/ks2bitesize/maths/

http://www.bbc.co.uk/education/mathsfile/gameswheel.html

http://www.multiplication.com/interactive_games.htm

http://www.dositey.com/2008/Topics/mindtwisters.php?page=free_activities&sub=aa&subsub=&sub_3=MindTwisters

http://members.learningplanet.com/act/mayhem/free.asp

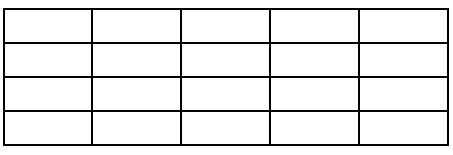
http://www.oswego.org/ocsd-web/games/Mathmagician/cathymath.html

Year 6 – preparing your child for their SATs

The next two sections show some of the key assessment criteria for **level 4 and 5** in the area of '**number**', along with examples of questions your child may be expected to answer in this area when they sit their 'SATs' in May. You could discuss the questions with your child at home, and help them to understand and practise similar questions in any areas where they have difficulty. However, we would stress the following points:

- Children develop at different speeds. Making steady progress is more important than achieving a particular level by a certain age.
- This is only a sample of the skills children are assessed on.
- We want children to enjoy maths. Practising regularly for short periods may be better than one long session. Often maths skills can be developed effectively through games, or involvement in real life situations like shopping.

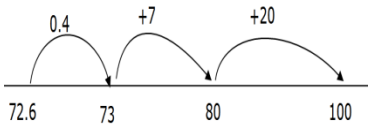
Level 4 Maths

Skills	Examples of how the skill may be assessed	Answers/Tips
I can recognise and describe number patterns.	Fill in the missing numbers in this sequence. __, 2.1, 2.3, 2.5, 2.7, __, __ How did you work it out? If you continue, will 22.4 be in the sequence? How do you know? Here is a sequence where every number is double the previous number. What are the missing numbers? __, __, 6, 12, 24, 48, __	**1.9**, 2.1, 2.3, 2.5, 2.7, **2.9**, **3.1** Encourage your child to describe how they know by discussing the rule for the sequence (e.g. This sequence increases in steps of 0.2). They can also notice patterns such as the tenths digit always being odd, which means that 22.4 will not be in the sequence. **1.5**, **3**, 6, 12, 24, 48, **96**
I can recognise and describe number relationships including multiple, factor and square.	Here are 4 digits. **3 6 1 5** Can you use them to make the following 2 digit numbers? A multiple of 7 A square number A factor of 32	**Possible answers could be:** A multiple of 7: **35, 56 or 63** A square number: **16 or 36** A factor of 32: **16** *Children may find it helpful to make lists of, for example, the multiples of 7, to help them see the possibilities. They should be encouraged to describe how they recognised the answers.*
I can use place value to multiply and divide whole numbers by 10 or 100.	1. Write in the missing numbers: 2700 ÷ 100 = □ 340 = □ x 10 2. Write what the missing digits could be: □□□ ÷ 10 = 4□	1. 2700 ÷ 100 = 27 340 = 34 x 10 2. There are several possible answers, e.g. 400 ÷ 10 = 40 410 ÷ 10 = 41
I can recognise approximate proportions of a whole and use simple fractions and percentages to describe these.	Shade 10% of this grid 	10% of the grid can be worked out by finding 1/10 of the grid, or 20 ÷ 10. Therefore two parts should be shaded.
I can order decimals to three decimal places.	Order these decimals from smallest to largest. **2.134 2.119 1.897 2.008 2.576**	**1.897 2.008 2.119 2.134 2.576** Encourage your child to look at the most significant digits first, ie. Units, then tenths, then hundredths etc
I can use inverse operations.	Use a calculator to find the missing number. 23.6 x □ = 295 Find the missing number. 16 + □ = 100 ÷ 5	23.6 x 12.5 = 295 This can be found by using the inverse operation, 295 ÷ 23.6 16 + 4 = 100 ÷ 5

I can use a range of mental methods of computation with all operations.	Quickly work out complements to 1000, e.g. 887 + □ = 1000 Mentally work out calculations such as: 0.4 x 8 3.6 ÷ 6 6 – 0.25	The numbers in these calculations are carefully chosen so as to be easy to work with mentally. e.g. If you know 4 x 8 = 32 it may be easy to work out that 0.4 x 8 = 3.2 36 ÷ 6 = 6, and so 3.6 ÷ 6 = 0.6
I can recall multiplication facts up to 12 x 12 and quickly derive corresponding division facts.	Use the knowledge of these tables facts and place value to solve calculations with multiples of 10, such as: 40 x 7 50 x 4 120 ÷ 3 270 ÷ 9	4 x 7 = 28, **so** 40 x 7 = 280 5 x 4 = 20, **so** 50 x 4 = 200 12 ÷ 3 = 4, **so** 120 ÷ 3 = 40 27 ÷ 9 = 3, **so** 270 ÷ 9 = 30
I can use efficient methods of addition and subtraction and of multiplication and division.	1203 + 55 + 367 1025 – 345	For information about calculation methods, do an internet search for 'MathsWeb'. Then navigate via 'Primary Teachers' to the Leicestershire Calculation Policy. Look at the policy for Years 5 and 6. MathsWeb also has a 'Parents' section with other helpful advice.
I can multiply a simple decimal by a single digit.	35.6 x 8	<table><tr><th>x</th><th>30</th><th>5</th><th>0.6</th></tr><tr><td>8</td><td>240</td><td>40</td><td>4.8</td></tr></table> Then mentally add, 240 + 40 + 4.8 = 284.8

Level 5 Maths

Skill	Examples of how the skill may be assessed	Answers/Tips
I can round decimals to the nearest decimal place	Round these decimals to the nearest tenth. **1.21 3.39 2.091** Circle the number closest in value to 0.2 **0.9 0.3 0.21 0.02 1.2**	The decimals rounded to the nearest tenth are: **1.2 3.4 2.1** The number closest in value to 0.2 is **0.21**. *(Note: 0.19 would also round to 0.2 and would be equally close)*
I can recognise and use number patterns and relationships	The rule for this sequence of numbers is 'add 4 each time'. **1, 5, 9, 13, 17, 21,** Sophie says, "If you continue the sequence long enough, you will eventually come to a multiple of 4." Is she correct? Explain how you know. **A similar question about the same sequence might be, "Will the number 401 be in the sequence? How do you know?"** How many prime numbers can you find with 2-digits? Write the 3 prime numbers which multiply to make 231 __ x __ x __ = 231	**Sophie is not correct.** The explanation should be along these lines. *Because the sequence starts at 1, rather than 0, each number in the sequence is **one more than** a multiple of 4. If you keep adding 4, this will always be the case.* Prime numbers are only divisible by 1 and themselves. There are 21 with 2 digits. The first of these are 11 and 13. **3 x 7 x 11 = 231**. It would be good to discuss with your child how this puzzle can be solved, e.g. using estimation and 'trial and improvement'.
I can order fractions and decimals	Put these decimals in order: **4.213 4.2 4.08 4 4.12** Order these fractions from smallest to largest. **½ ¼ 6/10 2/5 4/5** Which is larger, 1/3 or 2/5? Explain how you know.	4 4.08 4.12 4.2 4.213 **When ordering decimals, look first at the whole numbers, then the tenths, then hundreds, etc** **¼ 2/5 ½ 6/10 4/5** **When ordering fractions with different denominators, try to convert them to**

		fractions with a common denominator (e.g. this set could be converted into 5/20, 8/20 etc)
I can use known facts, place value and knowledge of operations to calculate	Calculating decimal complements to 10 or 100, for example: 72.6 + □ = 100 Calculating simple fractions or percentages of a quantity, for example: Find 3/8 of 400g Find 60% of £300	 The number line shows that 72.6 + 27.4 = 100 1/8 of 400 = 50, so 3/8 of 400g = 150g 10% of 300 = 30. 30 x 6 = 180, so 60% of £300 = £180
I can apply inverse operations	1. 4 times a number is 2000. What is the number? 2. 100 ÷ □ = 2.5	**Answers** 1. 500 2. 40 For both of these questions it helps to know that multiplication is the inverse of division. For example, for number 2, children can apply the fact: 2.5 x 40 = 100. They may work this out by trial and improvement, or by working out that 2.5 x 10 = 25, and so 2.5 x 40 = 100.
I can add and subtract negative numbers in context	***1. The temperature is 7 degrees Celsius. It then falls by 21 degrees. What is the temperature now?*** 2. Mr Smith, the teacher, gives his class a number sequence that starts at 100 and decreases by 35 each time. What are the first 2 numbers in the sequence which are lower than zero?	**Answers:** – 14 degrees - 5 and – 40 **Tips:** It can be helpful to represent the numbers on a number line if children are struggling with the concept of negative numbers. Can you discuss other real life contexts where negative numbers are used?
I can use all four operations with decimals to two places	Add and subtract numbers that do not have the same number of decimal places. e.g. 235.34 + 354.9 Multiply or divide decimal numbers by a single digit. e.g. 31.63 x 6	For information about calculation methods, do an internet search for 'MathsWeb'. Then navigate via 'Primary Teachers' to the Leicestershire Calculation Policy. Look at the policy for Years 6 and 7. MathsWeb also has a 'Parents' section with other helpful advice.

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