Dawley C of E Primary Academy

'Enriching learning, enriching life'

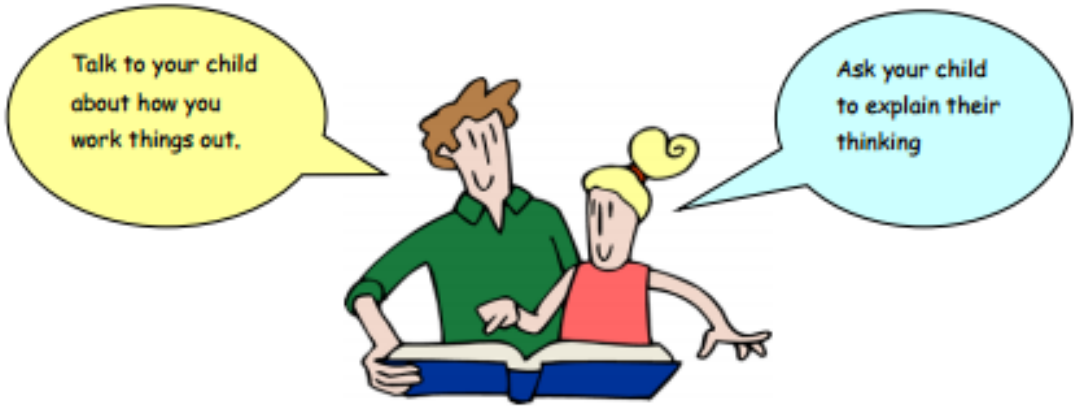
Calculation Strategies Unveiled

A parent handbook

Years 4, 5 & 6

CALCULATIONS

The maths work your child is doing at school may look very different to the kind of 'sums' you remember. This is because children are encouraged to use more formal written methods to explain their mathematical thinking and systematic approach to word problems and problem solving tasks.



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?
- Also help your child to estimate and then check the answer.
- Encourage them to ask… Is the answer sensible?

Parent Activities To Do At Home		
Year 4	Year 5	Year 6
Play fun board games with your children like • Dominoes • Snakes and Ladders • Snap • Connect 4 • Uno • Battleships. **Play computer games with your children. Look at** • http://www.coolmath4kids.com/ • http://www.bbc.co.uk/schools/ks2bitesize/maths/ for ideas. **Practice multiplication tables** or play multiplication songs (2, 3, 4, 5, 6, 7, 10 multiplication table). **Encourage your child to handle money.** Ask questions... • How much more do we need? • How much change will we get? • How many of these can we afford? **Discuss how you might work out the cost of a week's food for the family.** Encourage your child to estimate the shopping bill by keeping a running total while you shop **Try to find examples of numbers that contain fractions or decimals** • In a daily newspaper, a magazine • On food containers	**Play fun board games with your children like** • Dominoes • Connect 4 • Uno • Battleships • Cranium • Guess Who? **Play computer games with your children. Look at** • http://www.coolmath4kids.com/ • http://www.bbc.co.uk/schools/ks2bitesize/maths/for ideas. • http://www.mathplayground.co.uk **Practice all the multiplication tables** or play multiplication songs (up to 12 times table) **If you are following recipe, ask...** • If this recipe is for 4 people • How much ingredients do we need for 8? **Encourage your child to handle money. Ask questions...** • If there is 10% off, how much is the new price? • Compare money off deals e.g. buy one get one half price and ask... • How much cheaper is the deal? **Encourage children to have savings and to manage their own money.** **When planning DIY ask...** • How many tins of paint will we need? • How long/wide do the new curtains need to be? **Time questions...** • If the film starts at 7.45pm and is 120 minutes long, when will it finish? Explore metro times. • What metro do you need to get to arrive at the mall on time?	

Use pieces of card to make a three dimensional model of a room to a sensible scale

Work out how much time, on average, different people spend doing different things at home, for example:

- eating,
- tidying up,
- cooking,
- playing,
- watching television,
- using a computer,
- sleeping

Measure ingredients when cooking

Take opportunities to discuss weights written on packets of food and what they mean in terms of grams and kilograms

Look at maps of different scales of your local area, for example, a road atlas and a web map, and discuss how far it is from your home city, town or village
to other nearby places.

Look at the weather page in a local newspaper or website and find out what all the different sets of numbers/pieces of information mean

Look for and discuss the use of percentages in articles in a newspaper or on the television or discuss the per cent (%) interest on a savings account

Talk about supermarket offers, for example,

- 3 for the price of 2
- Buy 1 get 1 free
- Buy one get one half price
- Work out together which is the cheapest or best value

Calculate percentage sales discounts

Consider the probabilities of certain events happening when playing simple games with dice, for example, the chance of gaining a particular total when two dice are thrown

Read timetables and maps when planning a journey

	Bus 1	Bus 2	Bus 3	Bus 4	Bus 5	Bus 6
BLACKPOOL (dep)	06 00	06 40	07 10	07 50	08 30	08 45
LYTHAM	06 20	07 00	07 30		08 50	09 05
PRESTON	06 35	07 10	07 45	08 20	09 05	09 20
LEYLAND	06 45		07 55	08 30		09 30
CHORLEY	06 55	07 25	08 05	08 40	09 20	09 40
WIGAN	07 15	07 45		09 05	09 40	
MANCHESTER (Arr)	07 45	08 15	08 40	09 30	10 10	10 25

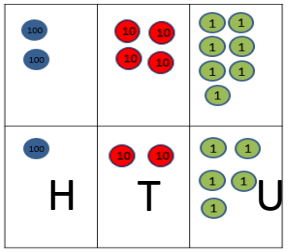
Addition

Year 4

Mental methods Children should continue to count regularly, on and back, now including multiples of 6, 7, 9, 25 and 1000, and steps of 1/100.

Written methods (progressing to 4-digits)

Column addition charts modelled with place value counters, progressing to calculations with 4-digit numbers. (This diagram shows the column method using counters.)

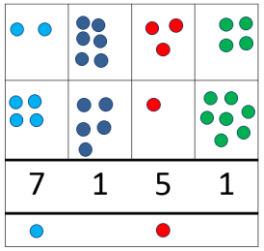


200 + 40 + 7
100 + 20 + 5
300 + 60 +12 = 372

247
+125
12
60
300
372

Compact written method

Extend to numbers with at least four digits.



2634
+4517
7151
1 1

Children should be able to make the choice of reverting to expanded methods if experiencing any difficulty.

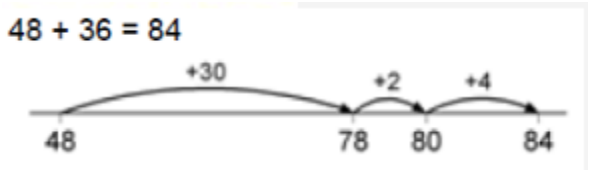
Extend to up to two places of decimals (same number of decimals places) and adding several numbers (with different numbers of digits).

72.8
+ 54.6
127.4
1 1

Year 5

Mental methods Children should continue to count regularly, on and back from increasingly larger numbers They should be encouraged to choose from a range of strategies:

- Counting forwards and backwards in tenths and hundredths: 1.7 + 0.55
- Reordering: 4.7 + 5.6 – 0.7, 4.7 – 0.7 + 5.6 = 4 + 5.6
- Partitioning: counting on or back - 540 + 280, 540 + 200 + 80
- Partitioning: bridging through multiples of 10: (See diagram below)



- Partitioning: compensating: 5.7 + 3.9, 5.7 + 4.0 – 0.1 (Here 3.9 is rounded up to 4.0, 0.1 is subtracted in the last step.)
- Partitioning: using 'near' double: 2.5 + 2.6 is double 2.5 and add 0.1 or double 2.6 and subtract 0.1
- Partitioning: bridging through 60 to calculate a time interval: It is 11.45. How many hours and minutes is it to 15.20?

Written methods (progressing to more than 5+digits)

Formal column method of addition with 5 or more digit numbers and decimals. See below:

172.83
+ 54.68
227.51
1 1 1

Place value counters can be used alongside the column method to develop understanding of addition with decimal numbers.

Year 6

Subtraction

Year 4

Mental methods

Missing number/digit problems: 456 + □ = 710; 1□7 + 6□ = 200; 60 + 99 + □ = 340; 200 – 90 – 80 = □; 225 - □ = 150; □ – 25 = 67; 3450 – 1000 = □; □ - 2000 = 900

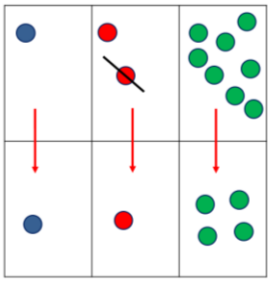
Recall and use addition and subtraction facts for 100

Recall and use addition and subtraction facts for multiples of 100 totalling 1000

Find and use addition and subtraction facts for 1 and 10 (with decimal numbers to one decimal place)

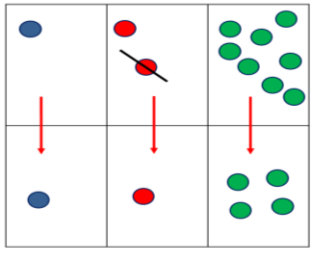
Written methods (progressing to 4-digits)

Expanded column subtraction chart with place value counters, progressing to calculations with 4-digit numbers.



$$\begin{array}{r} 200\ \ \overset{20}{\cancel{30}}\ \ \overset{1}{2} \\ -\ 100\ \ 10\ \ 4 \\ \hline 100\ \ 10\ \ 8 \end{array}$$

Can move onto formal subtraction:



$$\begin{array}{r} \overset{2}{2}\overset{1}{3}2 \\ -\ 114 \\ \hline 118 \end{array}$$

Year 5

Mental methods

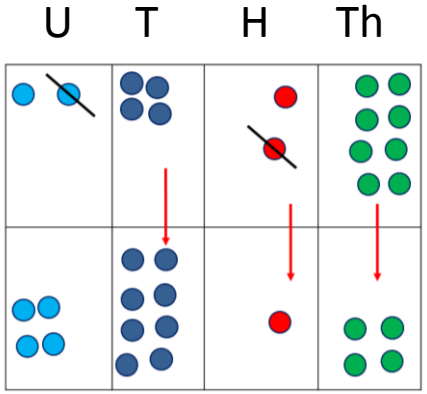
Missing number/digit problems: 6.45 = 6 + 0.4 + □; 119 - □ = 86; 1 000 000 - □ = 999 000; 600 000 + □ + 1000 = 671 000; 12 462 – 2 300 = □

Recall and use addition and subtraction facts for 1 and 10 (with decimal numbers to one decimal place)

Find and use addition and subtraction facts for 1 (with decimal numbers to two decimal places)

Written methods (progressing to more than 4-digits)

When understanding of the expanded method is secure, children will move on to the formal method of subtraction (see below)



$$\begin{array}{r} \overset{5}{\cancel{6}}\overset{1}{2}\overset{2}{\cancel{3}}\overset{1}{2} \\ -\ 4814 \\ \hline 1418 \end{array}$$

Progress to calculating with decimals, including those with different numbers of decimal places.

16.34 – 3.18

$$\begin{array}{r} 16.34 \\ -\ 3.18 \\ \hline \end{array}$$

Line up the decimal points... borrow (regroup) if you need to!

$$\begin{array}{r} 16.\overset{2}{\cancel{3}}4 \\ -\ 3.18 \\ \hline 13.16 \end{array}$$

Year 6

Mental methods

Missing number/digit problems: □ and # each stand for a different number. # = 34. # + # = □ + □ + #. What is the value of □? What if # = 28? What if # = 21

10 000 000 = 9 000 100 + □

7 – 2 x 3 = □; (7 – 2) x 3 = □; (□ - 2) x 3 = 15

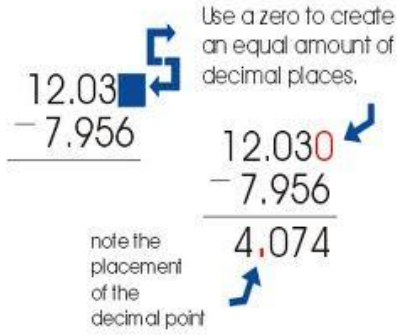
Recall and use addition and subtraction facts for 1 (with decimal numbers to two decimal places)

Written methods

As year 5, progressing to larger numbers using For example:

$$\begin{array}{r} 7\ 9\ 9\ 1 \\ \cancel{8}\ \cancel{0}\ \cancel{0}\ 0\ - \\ 6\ 7\ 3 \\ \hline 7\ 3\ 2\ 7 \end{array}$$

Continue calculating with decimals, including those with different numbers of decimal places.



Multiplication

Year 4

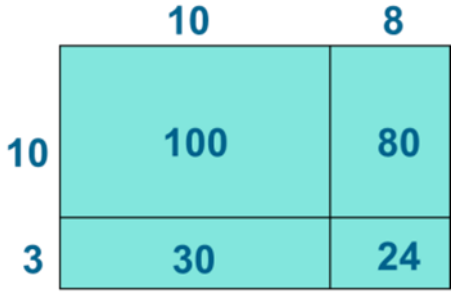
Mental methods

Counting in multiples of 6, 7, 9, 25 and 1000, and steps of 1/100.
Recall all times tables to 12
Multiply 3 numbers together
Doubling to solve x2, x4, x8
Solving practical problems where children need to scale up. Relate to known number facts. (e.g. how tall would a 25cm sunflower be if it grew 6 times taller?)

Written methods

Using grid method of multiplication:
Tens Units x Tens Units
Partition numbers into tens and units in the multiplication grid (see below).

18 x 13 = 234



Multiply the numbers together and add the totals in each column eg:
100 + 80 = 180
30 + 24 = 54
234

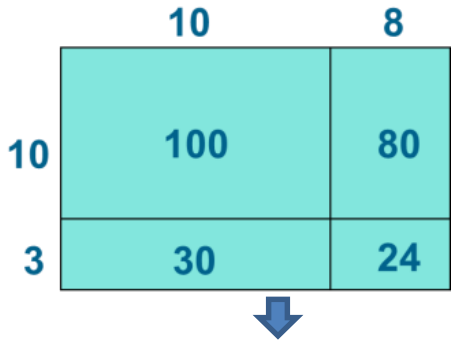
Year 5

Mental methods

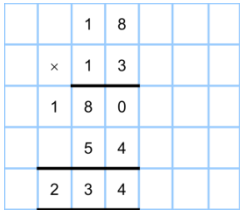
X by 10, 100, 1000 including decimals
Use practical resources and jottings to explore equivalent statements (e.g. 4 x 35 = 2 x 2 x 35)
Recall of prime numbers up 19 and identify prime numbers up to 100
Know square numbers, factors and multiples.
If children know the times table facts to 12 x 12. Can they use this to recite other times tables (e.g. the 13 times tables or the 24 times table)

Written methods

Children to explore how the grid method supports an understanding of long multiplication



Multiply the numbers together and add the totals in each column eg:
100 + 80 = 180
30 + 24 = 54
234



Year 6

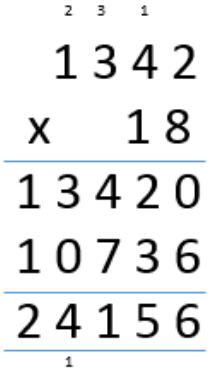
Mental methods

Identifying common factors and multiples of given numbers
X by 10, 100, 1000 including decimals
Solving practical problems where children need to scale up. Relate to known number facts.
Children should experiment with order of operations, investigating the effect of positioning the brackets in different places, e.g. 20 – 5 x 3 = 5; (20 – 5) x 3 = 45

Written methods

Moving from grid method to long multiplication.

X	**1000**	**300**	**40**	**2**
10	10000	3000	400	20
8	8000	2400	320	16



Division

Year 4

Mental methods

Recall multiplication and division facts for multiplication tables up to 12 × 12

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

Know and use the vocabulary of prime numbers, prime factors

Establish whether a number up to 100 is prime and recall prime numbers up to 19

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

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

Division on a number line (see diagram)

Formal Written Methods

Formal short division should only be introduced once children have a good understanding of division, its links with multiplication and the idea of 'chunking up' to find a target number.

Chunking method of division

73 ÷ 5 How many 5s make 73?

73

- 50 (10 x 5)

23

- 20 (4 x 5)

3

How many 5s have been subtracted?
14 sets of 5, with 3 left over.

73 ÷ 5 = 14 r3

Year 5

Formal Written Methods

Continued as shown in Year 4, leading to the use of the formal method.

E.g. 2548 divided by 7

$$7 \overline{)\, 2^2\, 5^4\, 4^2\, 8} = 0\ 3\ 6\ 4$$

Children begin to practically develop their understanding of how to express the remainder as a decimal or a fraction.

Year 6

Mental Methods

Continue to develop methods from Years 4 and 5. Children will continue to explore division as sharing and grouping, and to represent calculations on a number line as appropriate.

Quotients should be expressed as decimals and fractions

Formal Written Methods – long and short division

Short Division

E.g. 2548 divided by 7

$$7 \overline{)\, 2^2\, 5^4\, 4^2\, 8} = 0\ 3\ 6\ 4$$

Long Division

E.g. 2461 divided by 14