How do we do it?

Teaching Calculation at Bidford on Avon C. of E. Primary School

This document outlines the progressive steps for teaching calculation methods on a year by year basis. Each page displays the teaching sequence that leads children into using a standard calculation method.

Reception: Addition

PRACTICAL

In Reception to help us with our addition

we:

- •Use small equipment to add, such as
- Skittles
- Large Dominoes
- Counters
- •Fingers
- •Multilink
- Number lines
- Number Fan
- •Numicon



MENTAL (Jottings)

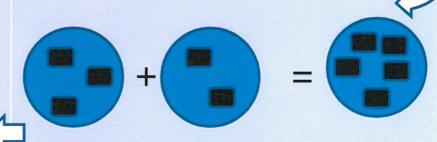
- Counting on in our heads
- •Counting in 1s, 2s, and 10s
- One more

STANDARD

- Number sentences using the + and = symbols and _____ to represent a missing number:
- Numbers to 10

INFORMAL (Workings Out)

Using bowls and small equipment



$$3 + 2 = 5$$

Reception: Subtraction

PRACTICAL

MENTAL

In Reception to help us with our subtraction we:

- •Use small equipment to add, such as
- •Skittles
- Large Dominoes
- Counters
- Fingers
- Multilink
- Number lines
- Number Fan
- Numicon



Counting on and back

- •Counting in 1s, 2s, and 10s
- •Finding one less

STANDARD

- Number sentences using the -and = symbols and _____ to represent a missing number:
- Numbers to 10

Key Objective

To begin to relate subtraction to taking away

INFORMAL (Workings Out)

Using bowls and small equipment



3 flowers take away one = 2

At this stage it is about the physical process of taking things away

Reception: Multiplication

PRACTICAL

MENTAL

Repeated Addition





- Counting on
- •Counting in 1s, 2s, and 10s
- Counting 1 more
- Counting 5 more

Doubling numbers to 5 using fingers and mental recall

STANDARD

- Number sentences using the X and = symbols and ____ to represent a missing number:
- Numbers to 10

• 3 x 2=



1 set of 3 is 3

INFORMAL (Workings Out)

Using setting circles to make groups of small equipment







How many altogether?

 $3 \times 2 = 6$

3 sets of 2 altogether is ..

Reception: Division

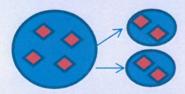
PRACTICAL

Practically sharing objects/ small equipment.

Not only in maths lessons but also during continuous provision.







MENTAL

- Counting on
- •Counting in 1s, 2s, and 10s
- Counting 1 more
- Counting 5 more

Halving numbers to 10 using fingers and mental recall

STANDARD

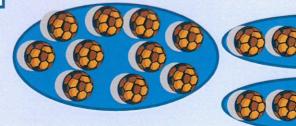
- Number sentences using the ÷
 and = symbols and _____ to
 represent a missing number:
- $10 \div 2 = 5$
- $6 \div 2 = 3$

8 sweets shared by 4 children is 2 sweets each.

INFORMAL (Workings Out)

Using small equipment in bowls during snack time – practical activities.

10 balls; share between 2 children equally. One for you, one for me, etc.







Year 1: Addition

PRACTICAL

Use of number lines, 100 square, fingers, number fans, counters and small equipment.

$$5+4=9$$



MENTAL

- Number bonds to 20
- Counting in steps of 1s, 2s, 5s, and 10s
- Recall doubles of all numbers to al least 20
- Addition facts for totals to at least 20
- Addition can be done in any order
- Multiples of 1s, 2s, 5s, 10s
- Find the difference (the gap between the numbers)
- Solve practical word problems, involving additions to 10 and then 20.

STANDARD

Number sentences to 20





Find the missing numbers

INFORMAL

Jane had 3 balls. She was given 2 more. How many balls does she have now?





3 + 2 = 5





Year 1: Subtraction

PRACTICAL

Use of Number Lines; 100 square, fingers, number fans, counters and small equipment.

Using Fingers



ers _

Use a hundred Square to make •1 less

•10 less

MENTAL

- Halve numbers to 20
- Subtraction of a one digit number or two digit number and a multiple of 10 from a two digit number
- Number facts subtraction to at least 5
- Count back in 1s, 2s, 5s, and 10s
- Number bonds to 10

STANDARD

Number sentences using - and = signs



INFORMAL

 There are 20 children in our class. Three are away today. How many are here?

$$20 - 3 = 17$$

Year 1: Multiplication

PRACTICAL MENTAL Setting hoops Use of 100 square, Chanting in steps of 1s, 2s, 3s, Number 5sx, and 10s fans. Counters Quick recall of all doubles to and small equipment 20 Repeated Addition Unifix towers - make a double Use fingers **STANDARD INFORMAL** There are three ducks in three different ponds. 0, 5, __, __, 20 How many ducks altogether? double 2 = 42 + 2 = 4= 10p

Year 1: Division

PRACTICAL

MENTAL

·Setting hoops

- Sharing out counters, cubes and other small equipment
- •Equal amounts in each group
- •Use a scarf, fold it in half, then in quarters

 Halving numbers up to 20 (the opposite of doubling)

STANDARD

INFORMAL

Key Objective

To begin to share objects into equal groups and count how many in each group

Find half of 8

0000

0000

 Share 10 strawberries between 2 children











Year 2: Addition



Use of number lines, 100 square, fingers, fans counters and small equipment.

Use 100 square to add 10; add 9 and add 11quickly.

MENTAL

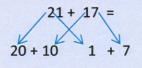
- Number bonds to 20
- Number bonds to 50 (more able)
- Counting in 2s, 5s and 10s
- Doubles to 20 (then to 50 for more able)
- Number bonds of multiples of 10
- Knowing to put the largest number first in addition

STANDARD

Number sentences to 100 using the + and = signs

+ 7 = 28

21



INFORMAL

Year 2: Subtraction

PRACTICAL

counters and small equipment. Quick ways to ·Subtract 10

Use of number lines, 100 square, fingers, fans

- ·Subtract 9
- Subtract 11

Using a 100 square

MENTAL

- Counting backwards in 1s, 2s, 5s, and 10s
- Subtraction facts within 10
- Subtraction facts within 20 (within 50 for more able children)
- Halving to 20
- Subtraction facts of multiples of 10

STANDARD

-7 = 14

Number sentences within 100 using the - and = signs



21

INFORMAL

Example shows use of arrow cards to aid with 35 12 subtraction calculations

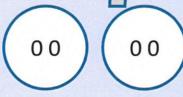


$$20 + 3 = 23$$

Year 2: Multiplication

PRACTICAL

2 sets of 2 = 4



- Making sets
- Using equipment to multiply

MENTAL

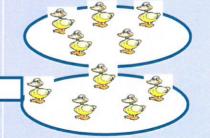
- Counting in 2s, 5s and 10s
- Doubling to 20 (to 50 for more able)
- Multiples of 2s, 5s and 10s (and for 3s for more able)
- Knowing that multiplication is the reverse of division

STANDARD

- $-2 \times 3 = 6$
- •10 + 10 is the same as 2 x 10
- •2x, 5x, and 10x tables (plus 3x for more able)

INFORMAL

There are 4 ponds and each pond has 5 ducks. How many ducks altogether?







Children physically do the problem and then draw it out.

Year 2: Division

PRACTICAL

Practical dividing using equipment 4 dived by 2













MENTAL

- Counting in 2s, 5s, and 10s
- Halving
- Knowing that division is the reverse of multiplication.

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INFORMAL

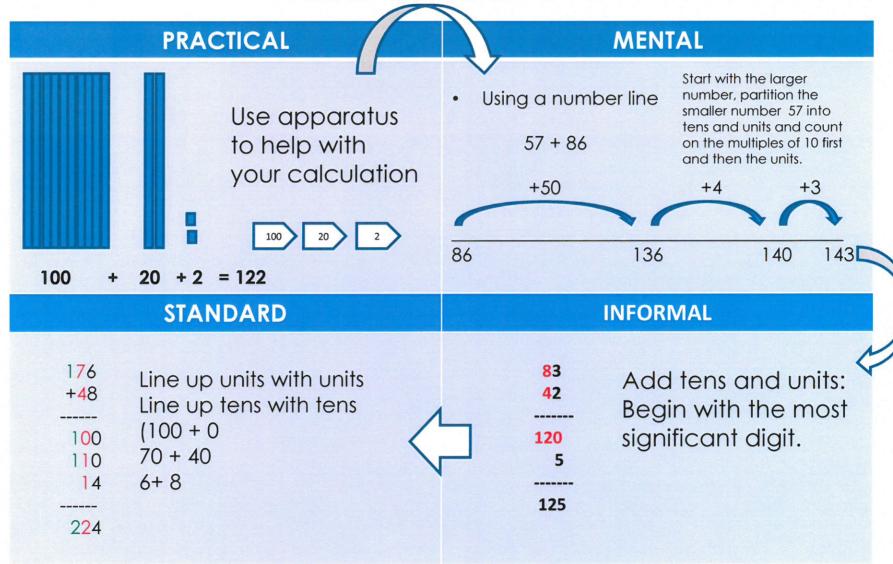
There are 25 pencils in each class shared equally between 5 pots.



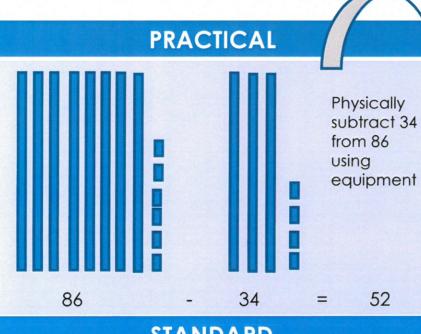


Children physically do the problem, then draw it out.

Year 3: Addition



Year 3: Subtraction

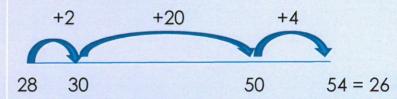


MENTAL

Using a number line

54 - 28

Count forward on a number line from the smaller number to find the difference



STANDARD

54 – 28 Decomposition

$$50$$

$$54 = 40 + 14$$

$$-28 = 20 + 8$$

$$20 + 6 = 26$$

INFORMAL

54 - 28

Compensation

Round 28 to the nearest 10 which is 30

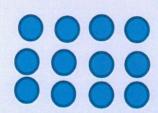
Year 3: Multiplication

PRACTICAL

3 x 4

Sets of numbers using multilink or counters Multiplication arrays, eg, 3 rows of of 4 squares (or counters)





 $3 \times 4 = 12$

MENTAL

- Quick recall of multiples 2s, 3s, 4s, 5s,,
 6s, 7s, 8s, 9s and 10s
- Halving and doubling of numbers up to 1000
- Quick recall of 2x, 3x, 4x, 5x, 6x, 7x, 8s, 9s and 10s tables

STANDARD

Standard working out is recorded vertically

4
X3

3 X4

INFORMAL

Repeated addition = $4 \times 3 = 12$, 4 + 4 + 4 = 12

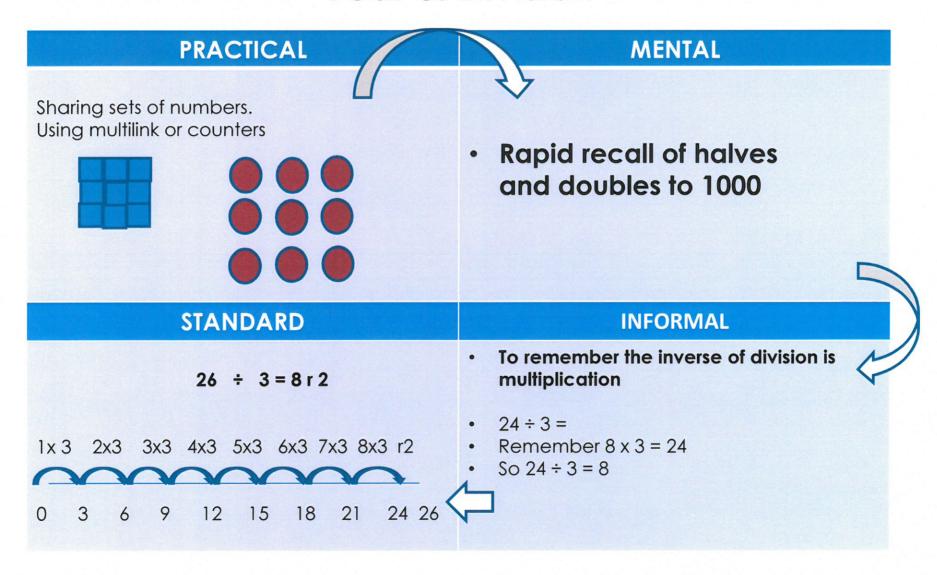
Recall multiplication fact to answer questions, eg, 6 x 24 =

Fill in the missing number 8 x

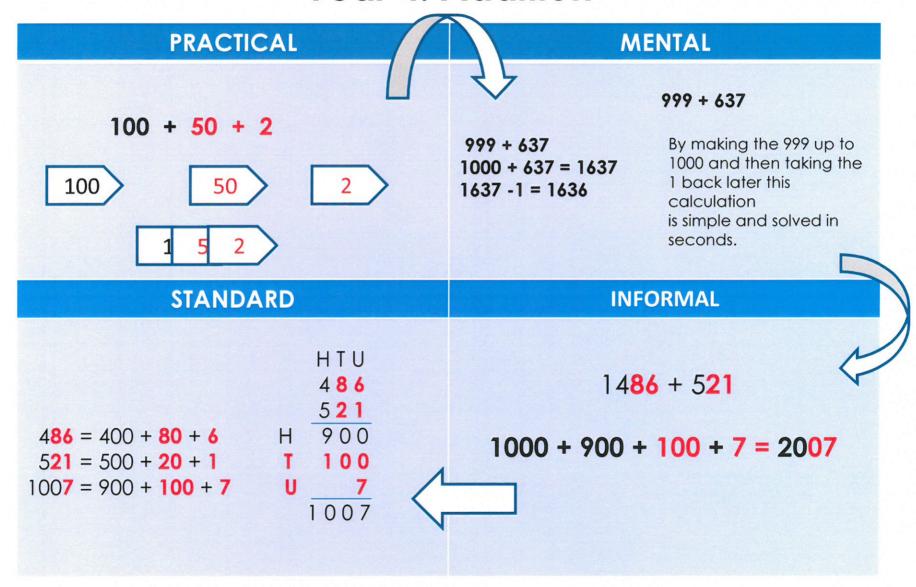


To know that division is the inverse of multiplication

Year 3: Division



Year 4: Addition

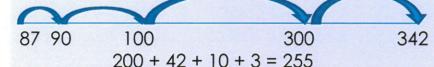


Year 4: Subtraction

PRACTICAL

Interactive whiteboard and pupil 342 - 87whiteboards

+200



Count forward on a number line from the smaller number to find the difference, from 87 In this example.

MENTAL

$$342 - 87 =$$

$$342 - 40 = 302$$
 $342 - 90 = 252$

$$342 - 90 = 252$$

$$302 - 40 = 262$$
 $252 + 3 = 255$

$$252 + 3 = 255$$

$$262 - 7 = 255$$

INFORMAL



$$342 - 87$$

$$200 + 50 + 5$$

Compensation

$$7000 - 500 = 6500$$

$$6500 + 30 = 6530$$

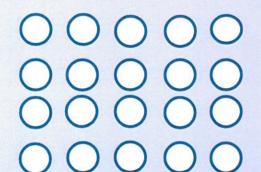
It is more reliable and efficient to take away the 500, then add the 30 back on after.

Year 4: Multiplication

PRACTICAL

MENTAL

Interactive whiteboard programme of array boards and using multilink blocks.



4 rows of 5 = 20 A Tyrannosaurus Rex was approximately 15 times as long as the largest lizard. A lizard's tail is 60cm long. How long was the tail of the Tyrannosaurus Rex?

Repeated addition

STANDARD

INFORMAL

Using a 2-digitnumber

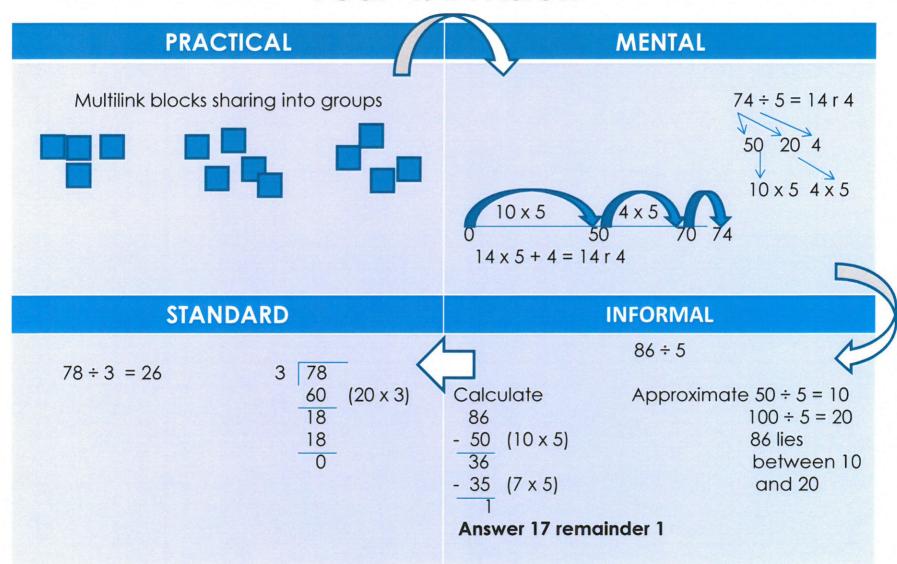
Using a single digit number

X 10cm

60

= 900cm

Year 4: Division



Year 5: Addition

PRACTICAL

The train left the station at 12.40pm and arrived at its destination at 4.38pm. How long did the journey take?

$$(38 - 4 = 34 \text{ min})$$

56 + 4 = 1 hour; 3hrs + 1 hr = 4 hrs.

Total Journey time = 4 hours 34 mins

MENTAL

$$126 + 93$$

$$100 + 90 + 20 + 6 + 3$$

$$100 + 110 + 9$$

$$= 219$$

STANDARD

7 + 6 = 13, place the 3 in the units column and carry the ten forward to the tens column.

50 + 20 + 70 +the carried forward 10 = 80

Place the 80 in the tens column. 400 + 900 = 1300, place the 3 in the hundreds column and carry the thousands.

1 (1000) add the carried thousand = 2000

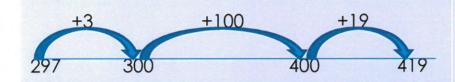
INFORMAL

Add the most significant digits first: In this example, thousands

Year 5: Subtraction

PRACTICAL

Use of interactive whiteboard and number lines on whiteboards



MENTAL

Find the difference between 296 and 854

$$296 + 4 = 300$$

$$300 + 500 = 800$$

 $800 + 54 = 854$

$$300 + 500 = 800$$
 $4 + 500 + 54 = 558$

STANDARD

INFORMAL

$$1000 + 900 + 20 + 8 = 192$$

$$1000 + 900 + 20 + 8 = 1928$$

Year 5: Multiplication

PRACTICAL

All tables must be known by heart, and children should respond instantaneously when asked any table fact.

They should use these facts to work out other multiplication facts:

9 x 7

i.e. Find 10 x then take off one group of 7.

i.e. The inverse of $6 \times 8 + 48$ is $48 \div 8 = 6$

MENTAL

The class wants to make 275 spiders for a display.

How many legs do they need to make?

 $275 \times 10 = 2750$

or

 $300 \times 8 = 2400$

 $275 \times 2 = 550$

 $25 \times 8 = 200$

2750 -550 = 2200

2400 -200 =2200

Or 275 doubled is 550 550 doubled is 1100 1100 doubled is 2200

STANDARD

INFORMAL

Leading to

A grid method might be used which emphasises the number as a whole rather than individual digits.

X 200 70 5 8 200 70 5

Year 5: Division

MENTAL

Estimate $234 \div 9 =$

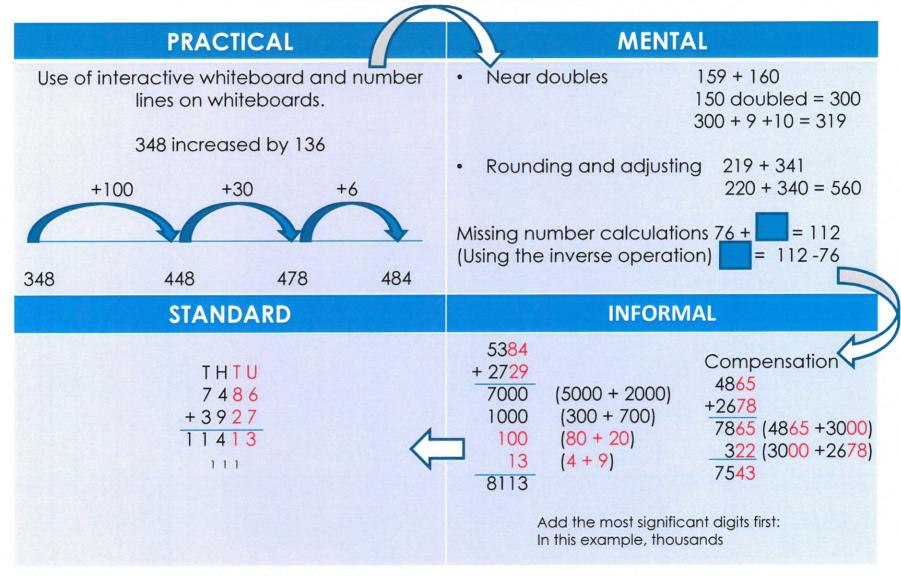
My estimation is 25 because I rounded up 234 to 250 and 9 to 10 $250 \div 10 = 25$

MENTAL & JOTTINGS

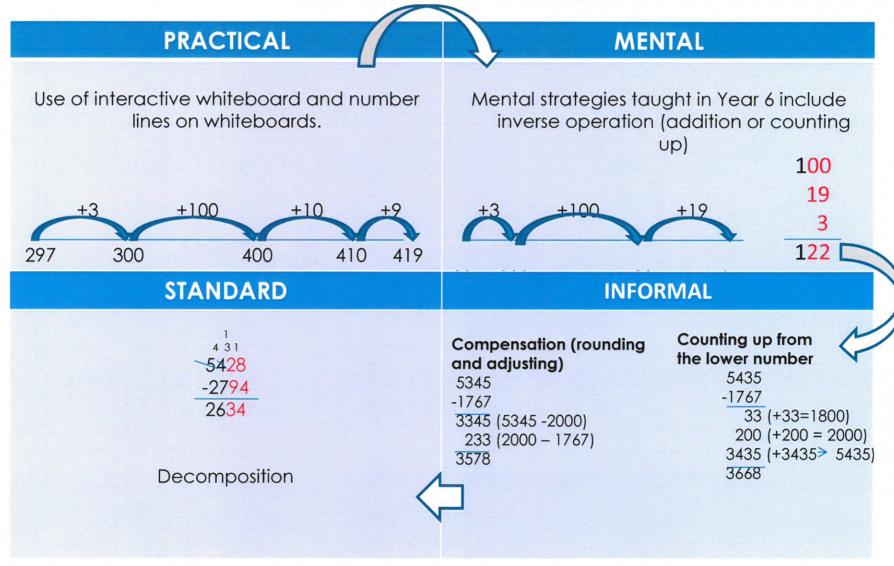
Partition then recombine

STA	ANDARD	INFORMAL
28 15482 300 x 132 120 x 12 20 ÷ 8 =	28 15432 300 132 120	432 school children are going on an outing. If each bus takes 15 passengers. How many buses will be needed? Estimate first! 432 Since $400 \div 10 = 40$ And $400 \div 20 = 20$ The answer lies between 20 and 40 150 – 10 buses 150 – 10 buses 132 120 – 8 buses 12 Therefore the answer is 28 with a remainder of 12. So 29 buses are needed.

Year 6: Addition



Year 6: Subtraction



Year 6: Multiplication

PRACTICAL

New strategies are introduced, such as •To 'x25', divide by 4 then multiply by 100 •36 x 25 = $(36\div4)$ x 100 = 9 x 100 = 900•FACTORISE a multiplication, eg 36 x 42 = 36 x 6 x 7

 $= 216 \times 7 = 1512$

MENTAL

Partitioning

$$24 \times 10 = 240$$

$$4 \times 16 = 64$$

$$320 + 64 = 384$$

	STANDARD				ı	NFOR	MAL	
To multiply large numbers by single digit:	To multiply decimals: 2.57 x 4 2.0 x 4 = 8.0	Long multiplication 246 x 35		id Meth	od			
8	$0.5 \times 4 = 2.0$	7000 (200 x 35)	X	300	50	6		7120
34184 2 5 2	$0.07 \times 4 = 0.28$ 10.28	1400 (40 x 35) 210 (6 x 35)	20	6000	1000	120		+1424 8544
Work from the right and carry.		8610	6	1200	200	24		
		1						

Year 6: Division

PRACTICAL

MENTAL & JOTTINGS

Estimation

$$23.4 \div 9 =$$

My estimation is 2.5 because I rounded up 23.4 to 25 and 9 to 10 $25 \div 10 = 2.5$

Use doubling and halving eg, to x by 50, multiply by 100 then halve 26×50 $26 \times 100 = 2600$ $2600 \div 1300$

STANDARD			INFORMAL			
32 r 9 6 196 - 180 (30 x 6) 16 12 (2 x 6)	Long Division 34 26 884 780 (30×26) 104 104 (4 × 26) 0	Division of Decimals 12.5 787.5 70.0 (10 x7) 17.5 14.0 (2 x 7) 3.5 3.5 (0.5 x 7)	 Repeated Subtraction 128 ÷ 16 128 32 (2 x 16) 96 32 (2 x 16) 64 32 (2 x 16) 32 32 (2 x 16) 32 32 (2 x 16) 	4		