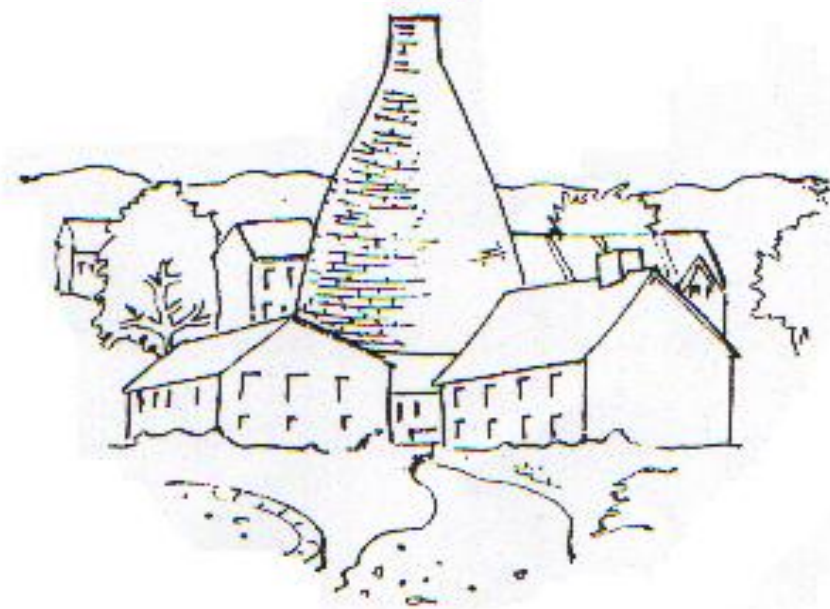# Amblecote Primary School
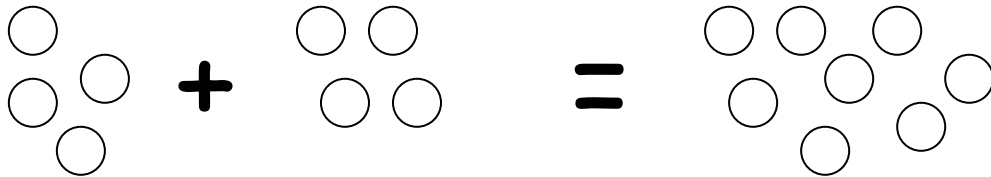# Written Calculation Policy

Stages in Addition

Stage 1 & 2
Counting songs and rhymes.
Practical addition using objects, Interactive Whiteboard (IWB) games and activities
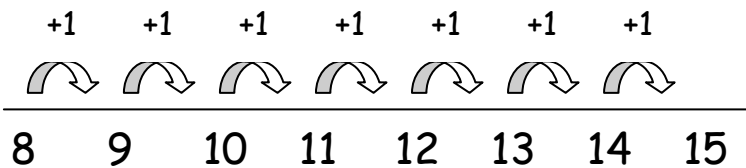
Stage 3
Pictorial addition

$4 + 4 = 8$

Stage 4
Use of both numbered and blank number lines
$8 + 7 = 15$

```
   +1     +1     +1     +1     +1     +1     +1
  ⌢      ⌢      ⌢      ⌢      ⌢      ⌢      ⌢
_____
 8    9    10    11    12    13    14    15
```

Stage 5

If the children can flexibly partition the number
(Do not prevent children who struggle with this method from moving onto Stage 6)

$$8 + 7 = 15$$

```
        +2              +5

8        10                      15
```

Stage 6

$$48 + 36 = 84$$

```
      +10         +10         +10      +1   +1   +1   +1   +1   +1

48            58          68        78  79   80   81   82   83   84
```
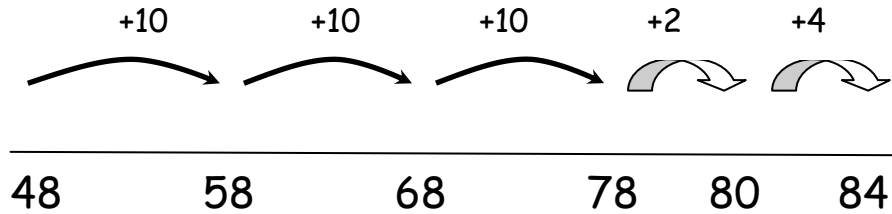
Stage 7

If the children can flexibly partition the number
(Do not prevent children who struggle with this method from moving onto Stage 8)

48 + 36 = 84

| +10 | +10 | +10 | +2 | +4 |

48   58   68   78   80   84

Stage 8

48 + 36 = 84

| +10 | +10 | +10 | +6 |

48   58   68   78   84

Stage 9

48 + 36 = 84

```
        +30              +6
48                    78    84
```

Stage 10

```
    7 6              7 0 +  6
+   4 7              4 0 +  7
                    _____
                     1 1 0  + 1 3  = 1 2 3
                    _____
```
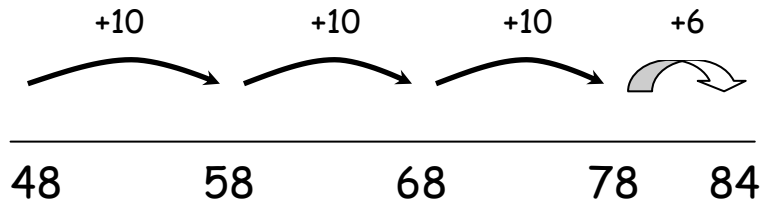
Stage 11

Begin with no carrying, then carrying of the Tens, then Hundreds, then Tens _and_ Hundreds etc.
Using numbers with different numbers of digits

```
      7 6
+     4 7
_____

    1 2 3
      1
```

Progress to larger numbers and decimals (with differing number of digits)
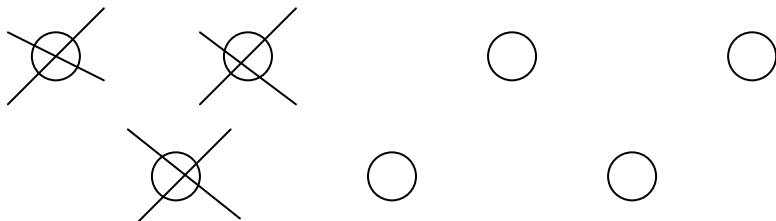
Stages in Subtraction

Stage 1 & 2
Counting songs and rhymes.
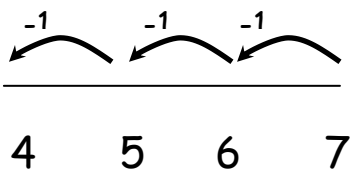Practical addition using objects, Interactive Whiteboard (IWB) games and activities

Stage 3
Pictorial subtraction

7 – 3 =

7 – 3 = 4

-1   -1   -1

4   5   6   7

Show this practical process of counting back, on a number line, but do not place too much emphasis on counting backwards, so to avoid confusion when using agreed methods for subtraction later on.
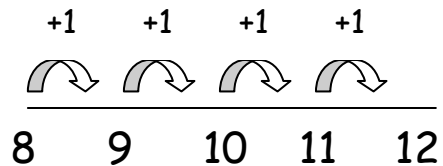
Stage 4

Here the children will be introduced to complementary addition for subtraction.
This model / image is an important method to help the children understand the concept of 'difference'.
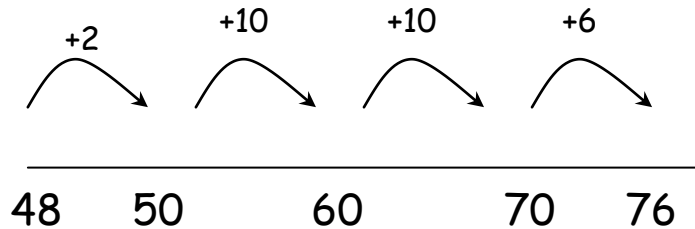
Use of both numbered and blank number lines (counting the jumps)

12 – 8 = 4

```
  +1     +1     +1     +1
 ⌒      ⌒      ⌒      ⌒
8     9     10    11    12
```
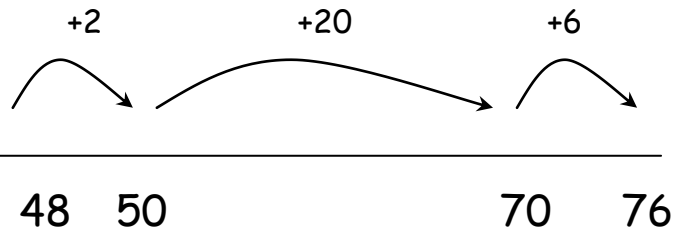
Stage 5

76 – 48 = 28

```
        +10         +10          +6
  +2
 ⌒         ⌒          ⌒           ⌒

48     50        60        70    76
```

Stage 6

76 – 48

```
      +2           +20            +6

48   50                    70    76
```

Stage 7
The use of deines will visually support the children's understanding of exchange.
E.g. exchange from tens to units.
Expanded Subtraction

```
                    60        16
    7 6    ──►     7̶0        6̶
-     4 8  ──►     4 0        8
                   2 0   +    8    = 2 8
```

<u>Stage 8</u>

Begin with no exchange, then exchange of the Tens, then Hundreds, then Tens and Hundreds etc.
Include numbers with a zero as a place holder (e.g 206 – 174=)
Use numbers with different numbers of digits

$$
\begin{array}{r}
{}^{6}\!\!\not{7}\,6 \\
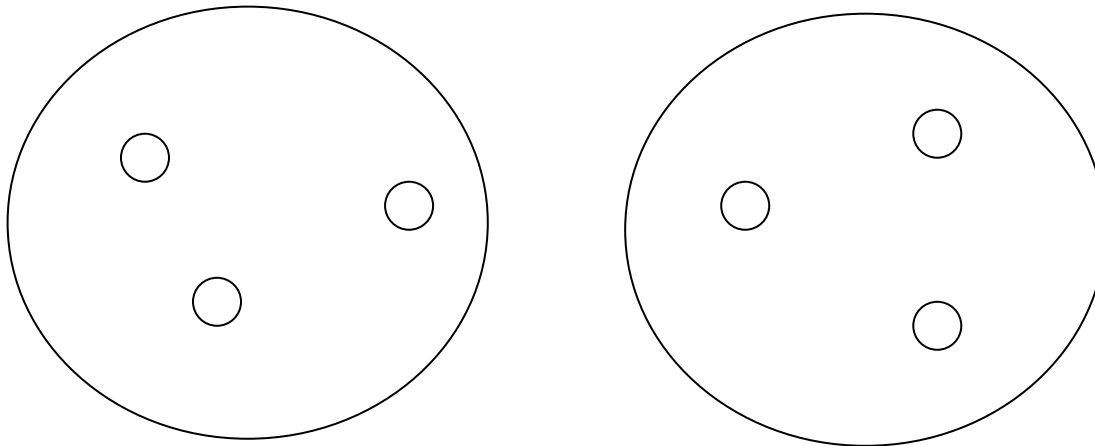-\ \ 4\,8 \\
\hline
2\,8 \\
\hline
\end{array}
$$

Progress to larger numbers and decimals (with differing number of digits)

Stages in Multiplication
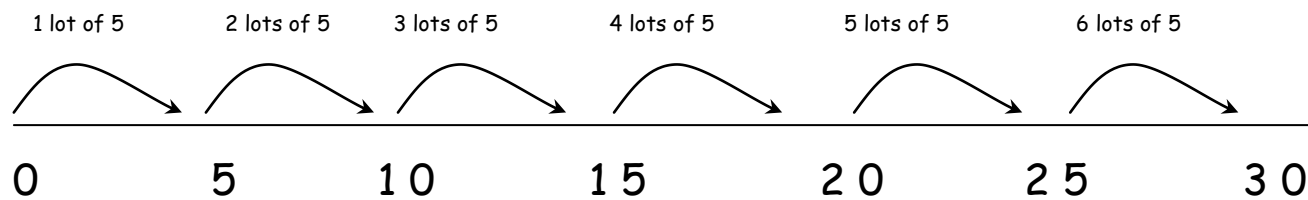
Stage 1
Pictorial multiplication

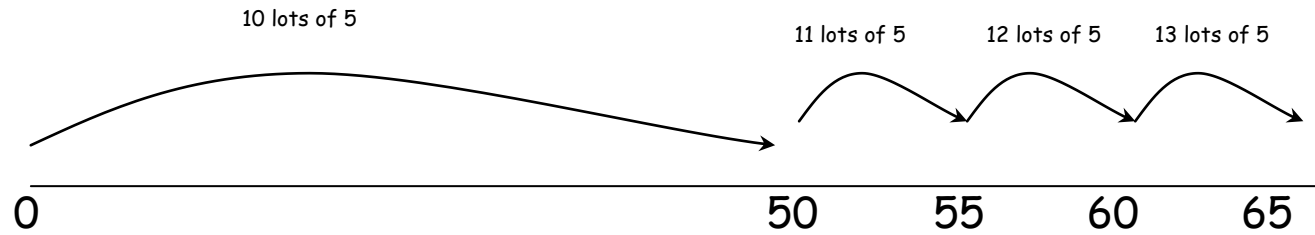   1 x 3 = 6   (show sign, but use a range of language: lots of, groups of etc)

Stage 2

$6 \times 5 = 30$

Using both numbered and blank number lines

| 1 lot of 5 | 2 lots of 5 | 3 lots of 5 | 4 lots of 5 | 5 lots of 5 | 6 lots of 5 |

0   5   10   15   20   25   30

Stage 3

1 3 x 5 =

10 lots of 5   11 lots of 5   12 lots of 5   13 lots of 5

0   50   55   60   65

Stage 4
Check that children are secure in partitioning two digit numbers.

The Grid Method

X	1 0	3
7	7 0	2 1

```
    7 0
+   2 1
    ___
    9 1
    ___
```

Stage 5

Vertical compact method

```
    2 7
×     5
  1 3 5
     3
```

Stage 6

Extend Grid Method to larger numbers and decimals.

- HTU x U
- TU x TU
- HTU x TU

X	2 0	3
1 0	2 0 0	3 0
3	6 0	9

```
  2 0 0
    3 0
    6 0
+    9
  2 9 9
```

Stage 7

Children who are proficient in the grid method, can be introduced to long multiplication. However, the children should still be given the choice regarding which method then wish to use.

Vertical format, expanded working

$$
\begin{array}{r}
56 \\
\text{X } 27 \\
\hline
42 \\
350 \\
120 \\
+1000 \\
\hline
1512 \\
\hline
1
\end{array}
\qquad
\begin{array}{l}
\\
\\
(6{\times}7) \\
(50{\times}7) \\
(6{\times}20) \\
(50{\times}20)
\end{array}
$$

Vertical Format, compact working

$$
\begin{array}{r}
56 \\
\times\ 27 \\
\hline
39^{4}2 \\
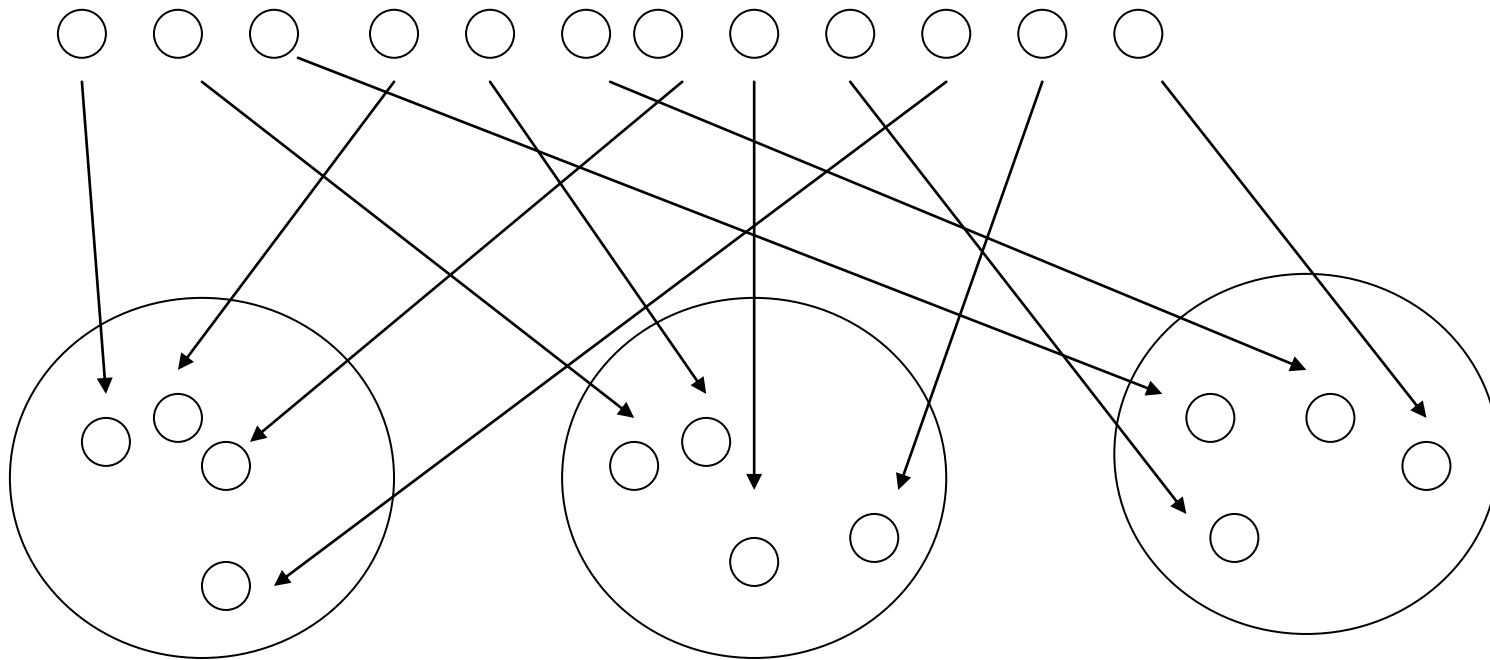+\ 11_{1}20 \\
\hline
1512 \\
\hline
\end{array}
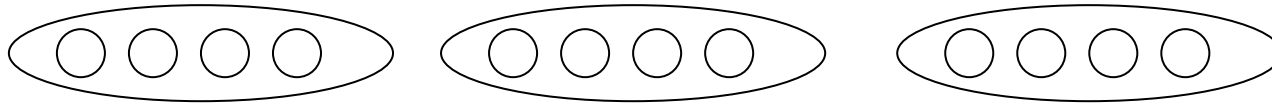$$

Stages in Division

Stage 1
Sharing
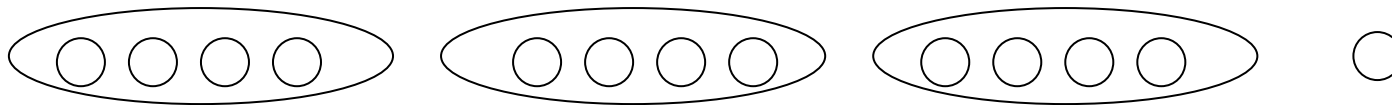12 ÷ 3 =
(Carried out practically)

Stage 2

Grouping

$12 \div 3 = 4$

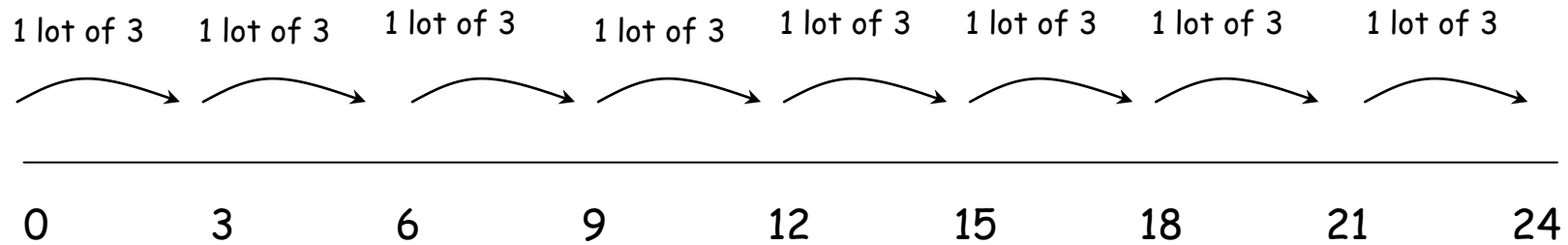## Stage 3

Grouping with a remainder

$13 \div 3 = 4^{r1}$

Stage 4

On numbered or blank number lines

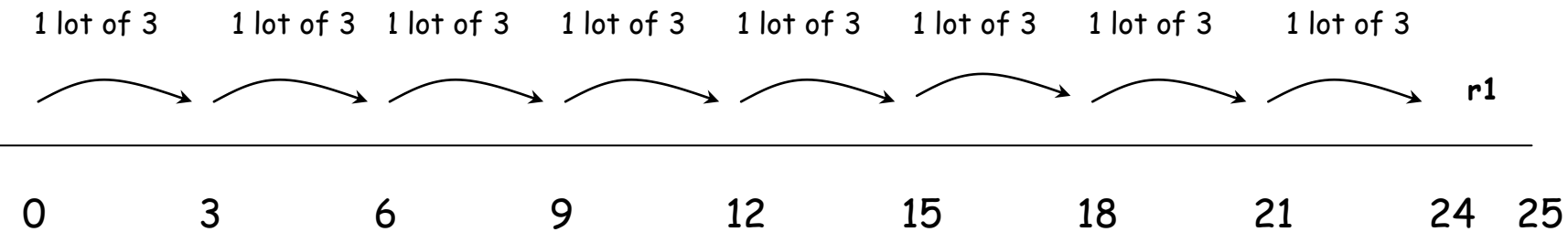$24 \div 3 = 8$

(no remainders)

| 1 lot of 3 | 1 lot of 3 | 1 lot of 3 | 1 lot of 3 | 1 lot of 3 | 1 lot of 3 | 1 lot of 3 | 1 lot of 3 |

0   3   6   9   12   15   18   21   24

Stage 5

$25 \div 3 = 8\ r1$

| 1 lot of 3 | 1 lot of 3 | 1 lot of 3 | 1 lot of 3 | 1 lot of 3 | 1 lot of 3 | 1 lot of 3 | 1 lot of 3 |

r1

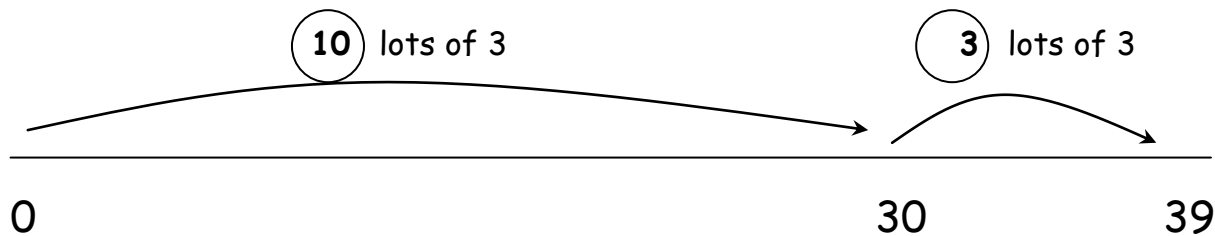0   3   6   9   12   15   18   21   24 25

Stage 6

The completion of the pre-drawn boxes supports children in deciding the size of the jumps that they can make.

Encourage the children to complete <mark>10 x ?</mark> first. This will support the generation of the other answers (through the use of doubling and halving)

$39 ÷ 3 =$
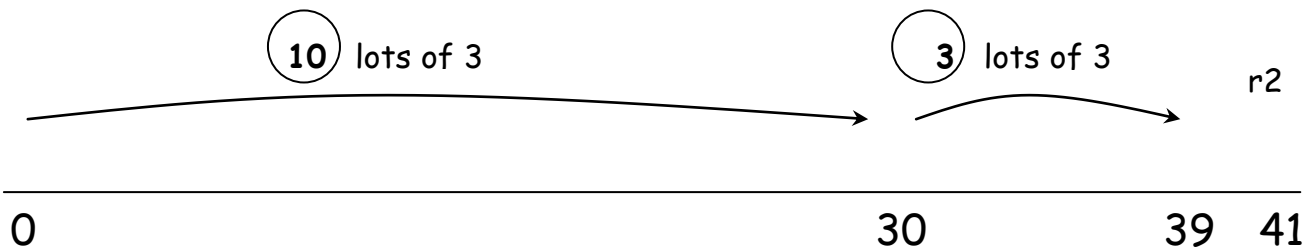


```
20 x 3 = 60
10 x 3 = 30
5 x 3 = 15
3 x 3 = 9
2 x 3 = 6
1 x 3 = 3
```

Stage 7

(with remainders)

$41 ÷ 3 =$


```
20 x 3 = 60
10 x 3 = 30
5 x 3 = 15
3 x 3 = 9
2 x 3 = 6
1 x 3 = 3
```

Stage 8

Short Division (no remainder) – ensure children have a secure understanding of place value.

```
    2 1
3 | 6 3
```

```
    2 7
3 | 8 ²1
```

Extend to :
- TU ÷ U (with a remainder)
- HTU ÷ U (without and with a remainder)
- Also include numbers with a zero as a place holder. E.g. 407 ÷ 4 =, 208 ÷ 3 =

Stage 9

Introduce chunking by dividing by a 1 digit number so that children become secure in the process. (no remainder)

$85 \div 5 =$

```
      8 5
  -   5 0        (10)  lots of 5
      3 5
  -   3 5        (7)  lots of 5
      0 0
```

20 x 5 = 100
10 x 5 = 50
5 x 5 = 25
2 x 5 = 10
1 x 5 = 5

Answer: 17

PLEASE NOTE:

Encourage the children to circle the numbers, so that they know which numbers to add together to generate the answer.

Stage 10

Chunking vertical method

(with remainders)

$72 \div 5 =$

```
        7 2
  -     5 0
        2 2
  -     2 0
          2
```

⑩ lots of 5

④ lots of 5

Answer: $14 \; ^{r \, 2}$

Extend to larger numbers (HTU ÷ TU)

$20 \times 5 = 100$	
$10 \times 5 = 50$	
$5 \times 5 = 25$	
$2 \times 5 = 10$	
$1 \times 5 = 5$	

Stage 11

Short Division with decimals

$$
\begin{array}{c|cc}
 & 2 \ . \ 7 \\
\hline
3 & 8 \ .^2 1 \\
\end{array}
$$

USEFUL MATHS WEBSITES

BBC Maths Activities

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

Gordon's Numeracy

http://www.wmnet.org.uk/wmnet/14.cfm?p=125,index

ITP Grid Method (x)

http://www.edu.dudley.gov.uk/numeracy/ITPs/New%20shockwave%20ITPs/num_itp_multi_grid_2_2.swf

ITP Grouping (÷)

http://www.edu.dudley.gov.uk/numeracy/ITPs/New%20shockwave%20ITPs/nns_itp_groupv1_2.swf

Chunking (÷)

http://www.wmnet.org.uk/wmnet/custom/files_uploaded/uploaded_resources/850/chunking.swf

Teaching times tables

http://www.teachingtables.co.uk/

General Maths Activities

http://www.iboard.co.uk/curriculum.htm#3353