

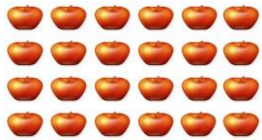
Multiplying

Stage 1:

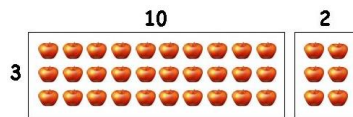
Arrays

Use arrays to count in groups within times tables

$$6 \times 4$$



Use arrays, chunking in tens to calculate beyond times tables



$$10 \times 3 = 30$$

$$2 \times 3 = 6$$

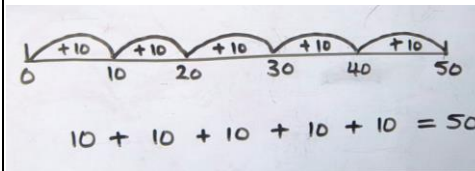
$$30 + 6 = 36$$

Introduced in year 3

Stage 2:

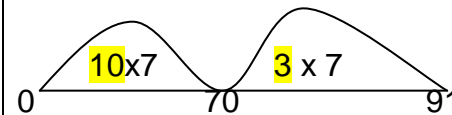
Numberlines

- 1)
Repeated Addition
 $10 \times 5 = 50$



5 lots of 10 = 50

- 2)



$$13 \times 7 = 91$$

Circle the numbers to add.

Introduced in year 3 and 4

Stage 3:

Grid method

Start with arrays – proportional grid method.

Use the grid method to multiply TU x U, then add using a chosen method.

×	30	5
7	210	35

$$210 + 35 = 245$$

Use the grid method to multiply HTU X U, then add using a chosen method.

For example, 327×6

×	300	20	7
6	1800	120	42

$1800 + 120 + 42 = 1962$

Introduced in year 4 and 5

Stage 4:

Grid method

Use the grid method to multiply TU X TU.

×	30	5
20	600	100
6	180	30

$$600 + 100 = 700$$

$$180 + 30 = 210$$

$$700 + 210 = 910$$

Use the grid method to multiply HTU X TU.

For example, 248×58

×	200	40	8	Totals
50	10000	2000	400	12400
8	1600	320	64	1984
				14384

Introduced in year 5 + 6

Multiplication

Stage 4:

Column multiplication

Stack the numbers vertically, partitioning and multiplying with jottings

Column Method Multiplication

$$\begin{array}{r}
 \text{T} \quad \text{U} \\
 32 \\
 \times 8 \\
 \hline
 16
 \end{array}
 \quad
 \begin{array}{r}
 \text{H} \quad \text{T} \quad \text{U} \\
 32 \\
 \times 8 \\
 \hline
 16 \\
 240
 \end{array}
 \quad
 \begin{array}{r}
 \text{H} \quad \text{T} \quad \text{U} \\
 32 \\
 \times 8 \\
 \hline
 16 \\
 240 \\
 \hline
 256
 \end{array}$$

Jottings: $8 \times 2 = 16$, $8 \times 30 = 240$, $30 + 16 = 256$

Then move onto 2 digit by 1 digit, and then 3 digit by 1 digit.

$$\begin{array}{r}
 345 \\
 \times 4 \\
 \hline
 20 \\
 160 \\
 \hline
 1200 \\
 \hline
 1380
 \end{array}$$

Introduced in year 5 and 6

Stage 6:

Short column multiplication

Carry any tens or hundreds by writing that digit in the correct column.

$$\begin{array}{r}
 123 \times 5 \\
 \text{1st Step} \quad \text{2nd Step} \quad \text{3rd Step} \\
 \begin{array}{r}
 123 \\
 \times 5 \\
 \hline
 615
 \end{array}
 \quad
 \begin{array}{r}
 123 \\
 \times 5 \\
 \hline
 15 \\
 11
 \end{array}
 \quad
 \begin{array}{r}
 123 \\
 \times 5 \\
 \hline
 615 \\
 11
 \end{array}
 \end{array}$$

The move the children onto 4 digit and then multiplying by 2 digit numbers.

$$\begin{array}{r}
 123 \times 45 \\
 \text{1st step} \\
 \begin{array}{r}
 123 \\
 \times 45 \\
 \hline
 615 \quad (123 \times 5) \\
 4920 \quad (123 \times 40) \\
 \hline
 5535 \quad (615 + 4920)
 \end{array}
 \end{array}$$

$$\begin{array}{r}
 \text{2nd step} \\
 \begin{array}{r}
 123 \\
 \times 45 \\
 \hline
 615 \\
 0 \quad (\text{because we are multiplying tens})
 \end{array}
 \end{array}$$

Introduced in year 6

Video Clips:

1) Number lines

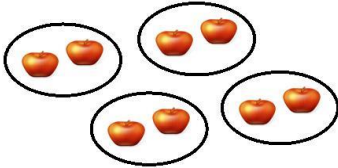
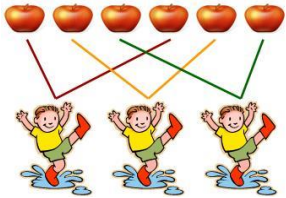
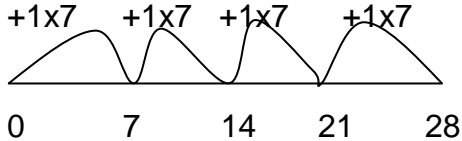
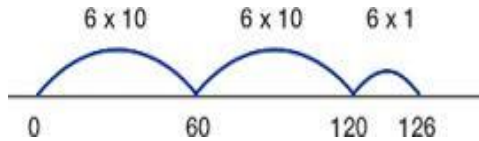
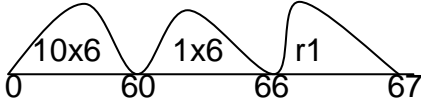
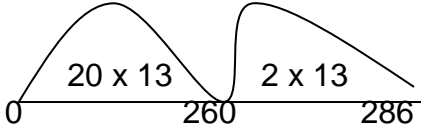
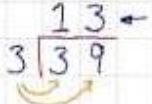
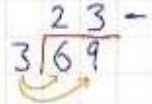
2) Grid method

http://www.youtube.com/watch?v=7_2fiYzEf8A

3) Column Method

http://www.youtube.com/watch?v=t_bnIB2KRL4

Division

<u>Stage 1:</u>	<u>Stage 2:</u>	<u>Stage 3:</u>	<u>Stage 4:</u>															
<p>Concrete objects:</p> <p>Use concrete objects, sharing them into groups of the same size using 2, 5 and 10.</p> <p>8 apples into groups of 2:</p>  <p>6 apples into groups of 3:</p> 	<p>Numberlines</p> <p>1)</p> $28 \div 7 = 4$ <p>+1x7 +1x7 +1x7 +1x7</p>  <p>0 7 14 21 28</p> <p>Begin with 0 and use times tables to count up to the number.</p> <p>2)</p> $126 \div 6 = 21$ <p>6 x 10 6 x 10 6 x 1</p>  <p>0 60 120 126</p>	<p>Remainders</p> <p>1)</p> $67 \div 6 = 11 \text{ r}1$  <p>0 60 66 67</p> <p>2)</p> $294 \div 13 = 22 \text{ r}8$  <p>0 260 286 294</p> <p>Count up to 294 to find the remainder.</p>	<p>Short Division</p> <p>Divide the number into the tens then the units. Write the numbers on top.</p> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p>1. $39 \div 3$</p>  </div> <div style="border: 1px solid black; padding: 5px;"> <p>2. $69 \div 3$</p>  </div> <p>1) If any remainders write them at the end of the sum.</p> <p>2)</p> <div style="text-align: center;"> <table style="margin: auto;"> <tr> <td></td> <td>H</td> <td>T</td> <td>U</td> <td></td> </tr> <tr> <td></td> <td>1</td> <td>3</td> <td>4</td> <td>r4</td> </tr> <tr> <td style="border-right: 1px solid black; border-bottom: 1px solid black; padding-right: 5px;">6</td> <td style="border-bottom: 1px solid black; padding: 0 5px;">8</td> <td style="border-bottom: 1px solid black; padding: 0 5px;">0</td> <td style="border-bottom: 1px solid black; padding: 0 5px;">2</td> <td style="border-bottom: 1px solid black; padding: 0 5px;">8</td> </tr> </table> </div>		H	T	U			1	3	4	r4	6	8	0	2	8
	H	T	U															
	1	3	4	r4														
6	8	0	2	8														
Introduce in year 3	Introduce in year 4	Introduce in year 4 and 5	Introduced in year 6															

Stage 5:

Long Division (Chunking)

$$972 \div 36 = 27$$

Find out „How many 36s are in 972?“ by subtracting „chunks“ of 36, until zero is reached (or until there is a remainder).

Teach pupils to write a „useful list“ first at the side that will help them decide what chunks to use, e.g.:

Useful list:

$$1x = 36$$

$$10x = 360$$

$$100x = 3600$$

$$\begin{array}{r} 27 \\ \hline 36 \overline{) 972} \\ \underline{- 720} \\ 252 \\ \underline{- 252} \\ 0 \end{array}$$

20x
7x
↓
27

Answer : 27

Video Clips: Division:

1) Division with number lines

<http://www.youtube.com/watch?v=D3T14OwSZIc>

2) Short Division

<http://www.youtube.com/watch?v=2X0Cjy7oEgw>

3) Long Division (chunking)

<http://www.youtube.com/watch?v=vyay77atBZM>

Introduced in year 5 and 6

Vocabulary

<u>Year 3</u>	<u>Year 4</u>	<u>Year 5</u>	<u>Year 6</u>
lots of, groups of x, times, <i>multiplication</i> , multiply, multiplied by multiple of, <i>product</i> once, twice, three times, four times, five times... ten times... times as (big, long, wide and so on) repeated addition array row, column double, halve share, share equally one each, two each, three each... group in pairs, threes... tens equal groups of ÷, divide, <i>division</i> , divided by, divided into left, left over, <i>remainder</i>	lots of, groups of times, multiplication, multiply, multiplied by multiple of, product once, twice, three times four times, five times... ten times times as (big, long, wide, and so on) repeated addition array row, column double, halve share, share equally one each, two each, three each... group in pairs, threes... tens equal groups of divide, division, divided by, divided into, <i>divisible by</i> remainder <i>factor, quotient</i> <i>inverse</i>	lots of, groups of times, multiply, multiplication, multiplied by multiple of, product once, twice, three times four times, five times... ten times times as (big, long, wide, and so on) repeated addition array row, column double, halve share, share equally one each, two each, three each... group in pairs, threes... tens equal groups of divide, divided by, divided into, divisible by remainder factor, quotient, divisible by inverse	lots of, groups of times, multiplication, multiply, multiplied by multiple of, product once, twice, three times four times, five times... ten times times as (big, long, wide, and so on) repeated addition array, row, column double, halve share, share equally one each, two each, three each... group in pairs, threes... tens equal groups of divide, division, divided by, divided into remainder factor, quotient, divisible by inverse