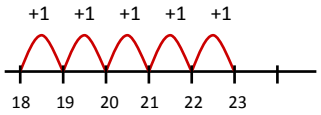
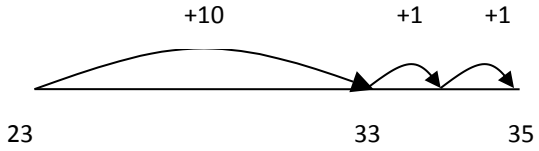
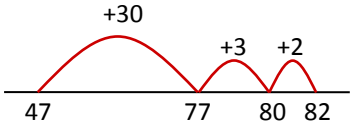
Addition

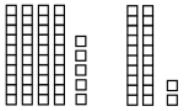
Stage 1	**Number line – jumps of 1** 18 + 5 
Stage 2	**Partitioning the second number and jumping in tens and ones** 23 + 12 = 23 + 10 + 1 + 1 = 33 + 1 + 1 = 35 
Stage 3	**Number line using partitioning (efficient jumps)** 35 + 47  **Extend to HTU + TU (with or without a number line)** 57 + 285 285 + 50 = 335 (this step might need to be broken up into 285 + 15 = 300 → 300 + 35 = 335) 335 + 7 = 342
Stage 4	**Expanded vertical** 336 + 87 13 (6 + 7) 110 (30 + 80) 300 (300 + 0) 423
Stage 5	**Compact vertical** 374 + 248 622 11 **Compact vertical** 3.243 +18.070 21.313 1 1 Extend to more than two numbers and then decimals with differing numbers of decimal places

Subtraction

Stage 1

Pictures / Symbols

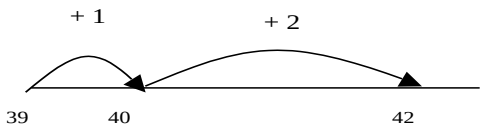
45 – 22 = 23



Stage 2

Find a small difference by counting up

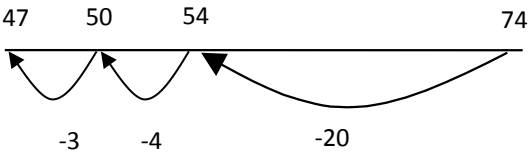
42 – 39 = 3



Stage 3

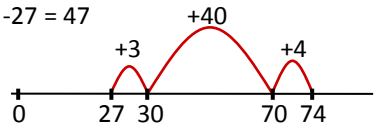
Number lines - taking away

74 -27 = 47



Number lines – counting on/up

74 -27 = 47

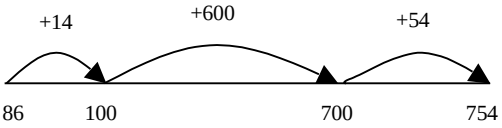


[Also jumps can be in 10s and 1s]

Stage 4

Complementary addition

754 – 86 = 668



Stage 5

Decomposition

Remember to use "exchange" when explaining what is being done with the top number.

741 – 367

$$\begin{array}{r} {}^{6}\not{7}\,{}^{13}\not{4}\,{}^{1}1 \\ -\ 3\,6\,7 \\ \hline 3\,7\,4 \end{array}$$

72.5 – 45.7

$$\begin{array}{r} {}^{6}\not{7}\,{}^{11}\not{2}\,{}^{1}5 \\ -\ 4\,5\,.\,7 \\ \hline 2\,6\,.\,8 \end{array}$$

Develop the stages of decomposition introducing zero

$$\begin{array}{r} {}^{4}\not{5}\,{}^{1}\not{0}\,{}^{9}\not{0}\,{}^{1}0 \\ -\ \ 4\,5\,7 \\ \hline 4\,5\,4\,3 \end{array}$$

However, this is not always the best way to solve this calculation

Counting on with large numbers when it is the most efficient method [use empty number line if needed]

8006 – 2993 = 5013

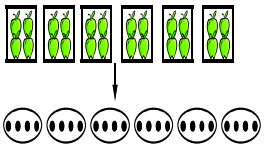
2993 + 7 = 3000, 3000 + 5000 = 8000 and 8000 + 6 = 8006

Multiplication

Stage 1

Pictures / Symbols

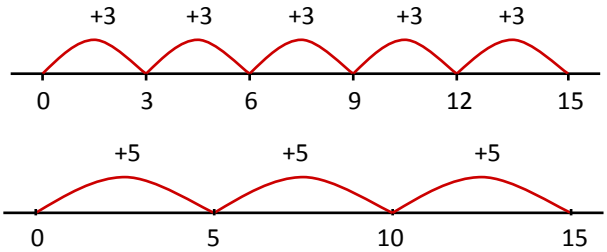
There are four apples in each box.
How many apples in six boxes



Stage 2

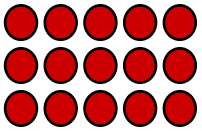
Repeated addition

5 x 3 or 3 x 5



Arrays

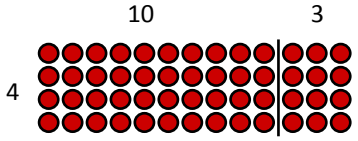
5 x 3 or 3 x 5



Stage 3

Arrays leading to

13 x 4:



10 x 4 = 40
3 x 4 = 12

Grid method

47 x 36 (estimate: 50 x 40 = 2000)

x	40	7
30	1200	210
6	240	42

1410
+ 282
1692

Stage 4

Compact vertical

43 x 6 (estimate: 40 x 6 = 240)

```
  43
x  6
 258
 1
```

Stage 5

Compact vertical

256 x 18 (estimate: 250 x 20 = 5000)

```
  256
x  18
 2048 (256 x  8)
 2560 (256 x 10)
 4608
 1
```

Compact vertical with a decimal

1.46 x 28 (estimate: 1.5 x 28 = 28 (one of 28) + 14 (half of 28) = 42)

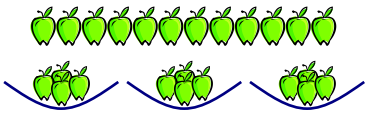
```
  1.46
x   28
 11.68 (1.46 x  8)
 29.20 (1.46 x 20)
 1
 40.88
1
```

Division

Stage 1

Pictures / Symbols

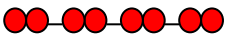
How many apples in each bowl if I share 12 apples between 3 bowls?



Stage 2

Number tracks / Number line

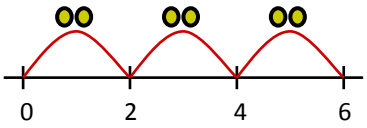
8 ÷ 2 = 4



Ensure language of division is introduced:

1) **GROUPING** – "How many groups of 2 can I make from 8?"
2) **SHARING** – "If I share 8 beads between two people how many will they receive?"

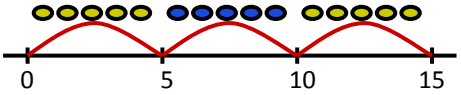
6 ÷ 2 = 3

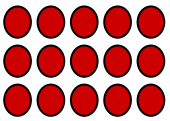


Stage 3

Number lines / Arrays

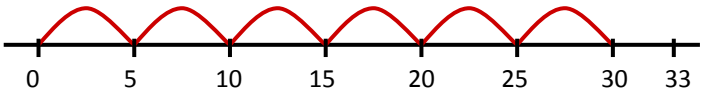
15 ÷ 5





Number lines (start from zero)

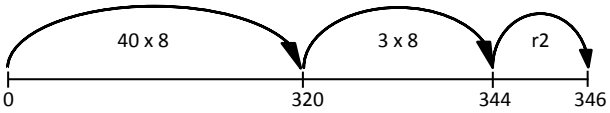
33 ÷ 5 = 6 r3



Stage 4

Grouping (efficient on a number line) when dividing by U

346 ÷ 8 = 43r2



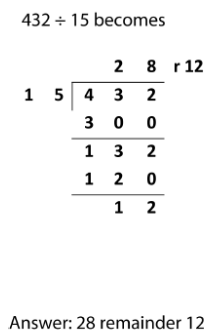
Stage 5

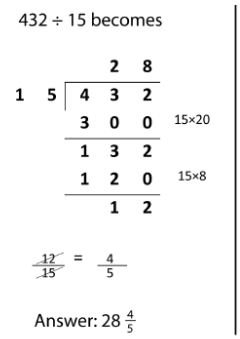
'Short' division

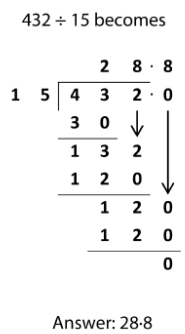
291 ÷ 3 (estimate: 270 ÷ 3 = 90)

$$3\overline{)2^{2}9^{2}1} \quad 0\,9\,7$$

'Long' Division (dividing by TU)







The use of a 'Ready Reckoner' is very useful when completing these, start with 10 lots of the divisor and use this to work out other useful amounts:

25 x 15 = 375
20 x 15 = 300
10 x 15 = 150
8 x 15 = 120
5 x 15 = 75
4 x 15 = 60
2 x 15 = 30