



Multiplication and Division at *Hollington Primary Academy*



We are going to look at the key mental and written calculation procedures that are taught throughout the academy.

It is important to note that mental calculation is not the exclusion of written recording and should be seen as complementary to and not as separate from it.

When deciding which method to use, children should be encouraged to consider:

- Can I do this in my head? (using rounding, adjustment)
- The size of an approximate answer (estimation)
- Could I do jottings to keep track of the calculation?
- Do I need to use a written method?

When are children ready for written calculations?

- Do they know the 2,3,4,5 and 10 times tables?
- Do they know the result of multiplying by 1 and 0?
- Do they understand 0 as a place holder?
- Can they multiply two and three digit numbers by 10 and 100?
- Can they double and halve two digit numbers mentally?
- Can they use multiplication facts they know to derive other multiplication facts?
- Can they use multiplication facts to derive division facts?
- Can they explain their mental strategies orally and record them using informal jottings?



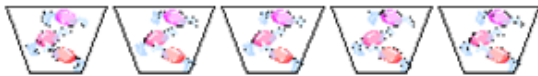
Multiplication Stage 1



Pictures and Symbols

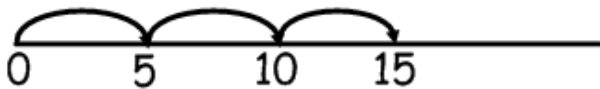
There are 3 sweets in one bag.

How many sweets are there in 5 bags?



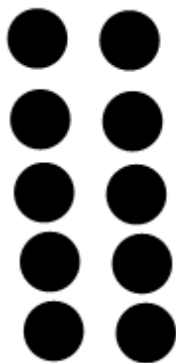
Children are encouraged to use a numberline to help with repeated addition in groups of 2, 5 or 10.

$$5 \times 3 =$$

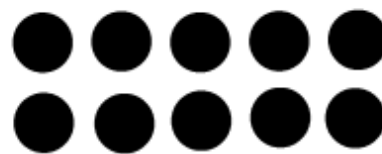


Arrays

Arrays are drawn to support children with calculating an answer.



5 lots of 2 $5 \times 2 = 10$



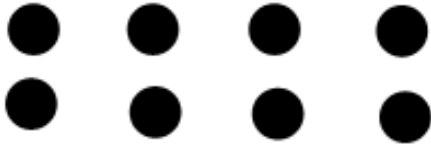
2 lots of 5 $2 \times 5 = 10$



Multiplication Stage 2

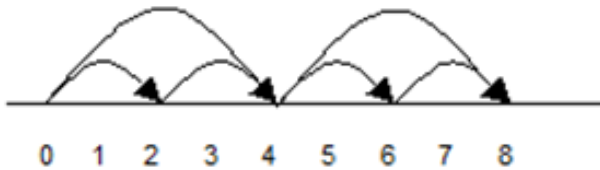


Arrays and Repeated addition



$4 \times 2 \text{ or } 4 + 4$

$2 + 2 + 2 + 2$



Partitioning

Multiply TU by U by partitioning larger number

15×2

$10 \times 2 = 20$

$5 \times 2 = 10$

$20 + 10 = 30$



Multiplication Stage 3



Arrays and repeated addition

Continue to understand multiplication as repeated addition (number lines can be used to support) and continue to use arrays

Partitioning

Continue building upon partitioning in stage 2

$23 \times 2 = 46$

$20 \times 2 = 40$

$3 \times 2 = 6$



Multiplication Stage 4



Formal Methods

$$\begin{array}{r}
 323 \\
 \times \quad 3 \\
 \hline
 969
 \end{array}$$

Step 1: Multiply the lowest value column ($3 \times 3 = 9$)

Step 2: Move along the columns to the left ($2 \text{ tens} \times 3 = 6 \text{ tens}$)

Step 3: Move along the columns to the left ($3 \text{ hundreds} \times 3 = 9 \text{ hundreds}$)

Step 1: Multiply the lowest value column ($6 \times 2 = 12$)

$$\begin{array}{r}
 246 \\
 \times \quad 2 \\
 \hline
 492
 \end{array}$$

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Step 2: Put the 2 in the units column and carry the ten.

Step 3: Move along the columns to the left ($4 \text{ tens} \times 2 = 8 \text{ tens}$)

Don't forget to add the extra ten!

Step 4: Move along the columns to the left ($2 \text{ hundreds} \times 2 = 4 \text{ hundreds}$)



Multiplication Stages 5 and 6



Step 1: Multiply by the units (as short multiplication)

$$\begin{array}{r} 123 \\ \times 32 \\ \hline 246 \\ + 3690 \\ \hline 3936 \end{array}$$

Step 2: Put a place holder before multiplying by tens

Step 3: Multiply by the tens

Step 4: Add together

$$\begin{array}{r} 123 \\ \times 232 \\ \hline 246 \\ 3690 \\ + 24600 \\ \hline 28536 \end{array}$$

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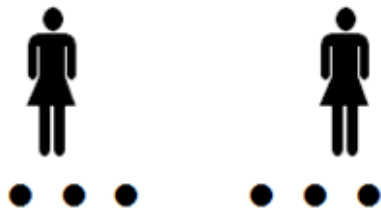
Division Stage 1



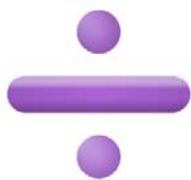
Sharing

Requires secure counting skills.

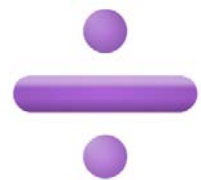
6 sweets are shared between 2 people. How many do they have each?



Practical activities involving sharing, distributing cards when playing a game, putting objects onto plates, into cups, hoops etc.



Division Stage 2



Grouping

$6 \div 2$ can be modelled as:

There are 6 strawberries.

How many people can have 2 each? How many 2s make 6?

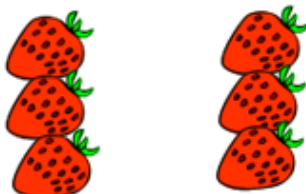


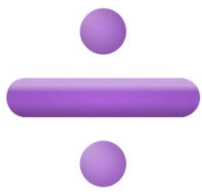
Sharing

$6 \div 2$ can be modelled as:

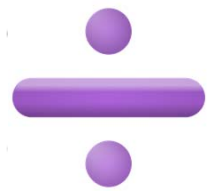
There are 6 strawberries.

They are shared between two people. How many do they get each?



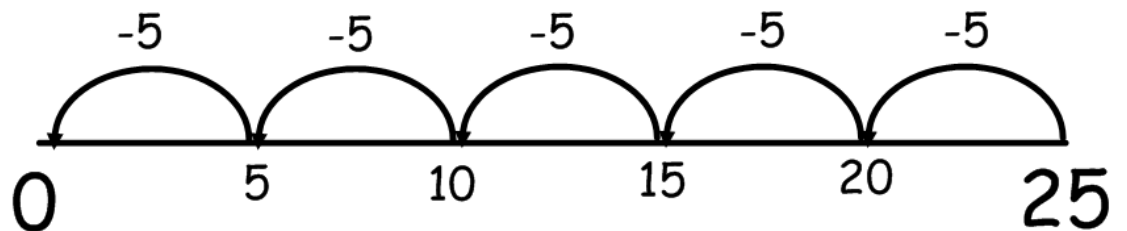


Division Stage 3

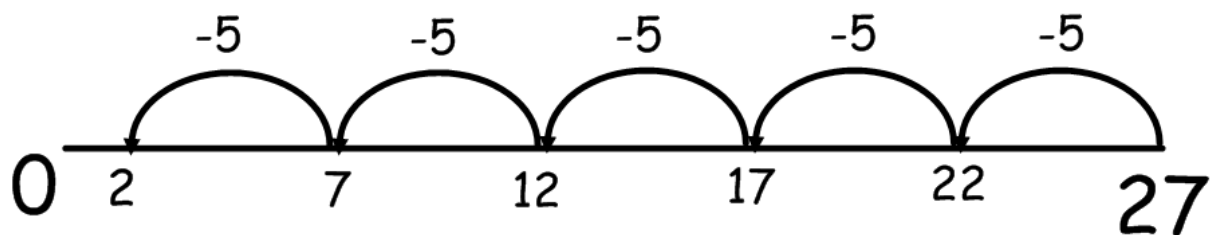


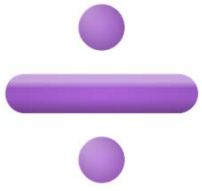
Repeated Subtraction on a numberline

$$25 \div 5 = 5$$

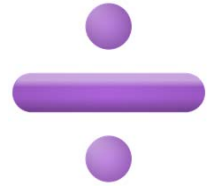


$$27 \div 5 = 5 \text{ r}2$$



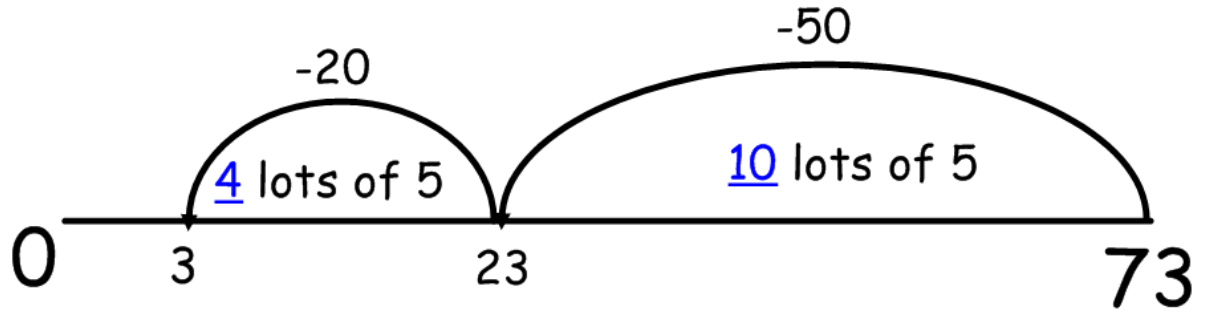


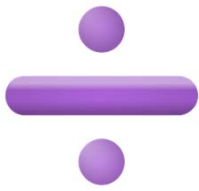
Division Stage 4



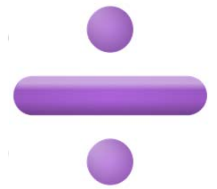
Grouping on a numberline

$$73 \div 5 = 14 \text{ r}3$$





Division Stage 5



Bus Stop (short division)

$$639 \div 3 = 213$$

Step 1: $6 \div 3 = 2$

Step 2: $3 \div 3 = 1$

$$\begin{array}{r} 213 \\ 3 \overline{) 639} \end{array}$$

Step 3: $9 \div 3 = 3$

$$637 \div 3 = 212 \text{ r}1$$

Step 1: $6 \div 3 = 2$

Step 2: $3 \div 3 = 1$

$$\begin{array}{r} 212 \text{ r}1 \\ 3 \overline{) 637} \end{array}$$

Step 3: $7 \div 3 = 2 \text{ r}1$

$$429 \div 3 = 143$$

Step 1: $4 \div 3 = 1 \text{ r}1$

Step 2: $12 \div 3 = 4$

$$\begin{array}{r} 143 \\ 3 \overline{) 429} \end{array}$$

Step 3: $9 \div 3 = 3$

Division Stage 6

Long Division

$$374 \div 12 = 31 \text{ r}2$$

$$\begin{array}{r}
 \text{0 3 1 r}2 \\
 12 \overline{) 374} \\
 \underline{- 36} \\
 14 \\
 \underline{- 12} \\
 2
 \end{array}$$

Step 1: 12 **does not** 'fit into' 3

Step 2: 12 'fits into' 37 **3** times

Step 3: subtract the answer to **3 x 12**

Step 4: bring down the next digit

Step 5: 12 'fits into' 14 **1** time

Step 6: subtract the answer to **1 x 12**

$$2695 \div 11 = 245$$

$$\begin{array}{r}
 \text{0 2 4 5} \\
 11 \overline{) 2695} \\
 \underline{- 22} \\
 49 \\
 \underline{- 44} \\
 55 \\
 \underline{- 55} \\
 0
 \end{array}$$