

**Lord Deramore's Primary School**  
**PROGRESSION THROUGH CALCULATIONS FOR MULTIPLICATION**

**MENTAL CALCULATIONS**

**Doubling and halving**

Applying the knowledge of doubles and halves to known facts.

e.g.  $8 \times 4$  is double  $4 \times 4$

**Using multiplication facts**

*Tables should be taught everyday from Y2 onwards, either as part of the mental oral starter or other times as appropriate within the day.*

Year 2      2 times table  
              5 times table  
              10 times table

Year 3      2 times table  
              3 times table  
              4 times table  
              5 times table  
              8 times table  
              10 times table

Year 4      Derive and recall all multiplication facts up to  $12 \times 12$

Years 5 & 6 Derive and recall quickly all multiplication facts up to  $12 \times 12$ .

**Using and applying division facts**

Children should be able to utilise their tables knowledge to derive other facts.

e.g. If I know  $3 \times 7 = 21$ , what else do I know?

$30 \times 7 = 210$ ,  $300 \times 7 = 2100$ ,  $3000 \times 7 = 21\,000$ ,  $0.3 \times 7 = 2.1$  etc

**Use closely related facts already known**

$13 \times 11 = (13 \times 10) + (13 \times 1)$   
           $= 130 + 13$   
           $= 143$

**Multiplying by 10 or 100**

Knowing that the effect of multiplying by 10 is a shift in the digits one place to the left.

Knowing that the effect of multiplying by 100 is a shift in the digits two places to the left.

**Partitioning**

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$$\begin{aligned}23 \times 4 &= (20 \times 4) + (3 \times 4) \\ &= 80 + 12 \\ &= 102\end{aligned}$$

**Use of factors**

$$8 \times 12 = 8 \times 4 \times 3$$

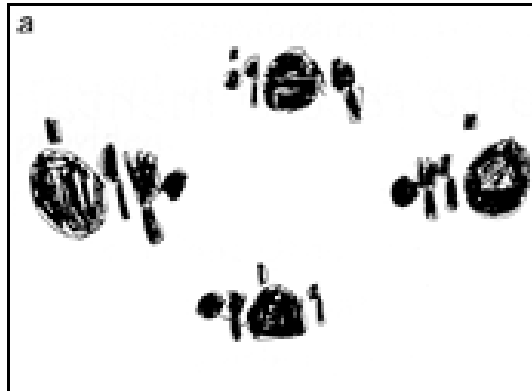
*MANY MENTAL CALCULATION STRATEGIES WILL CONTINUE TO BE USED. THEY ARE NOT REPLACED BY WRITTEN METHODS.*

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THE FOLLOWING ARE STANDARDS THAT WE EXPECT THE MAJORITY OF CHILDREN TO ACHIEVE.

**YR and Y1**

Children will experience equal groups of objects and will count in 2s, 10s and 5s. They will work on practical problem solving activities involving equal sets or groups.



**Y2**

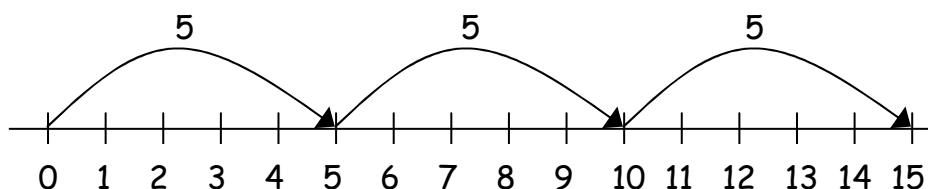
Children will develop their understanding of multiplication and use jottings to support calculation:

✓ **Repeated addition**

3 times 5 is  $5 + 5 + 5 = 15$  or 3 lots of 5 or  $5 \times 3$

Repeated addition can be shown easily on a number line:

$$5 \times 3 = 5 + 5 + 5$$



and on a bead bar:

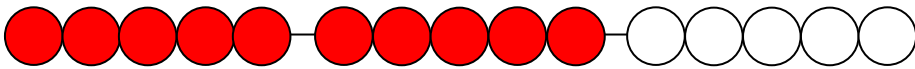
$$5 \times 3 = 5 + 5 + 5$$

5

5

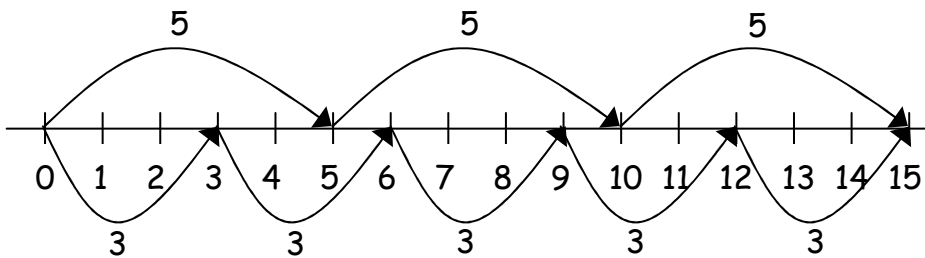
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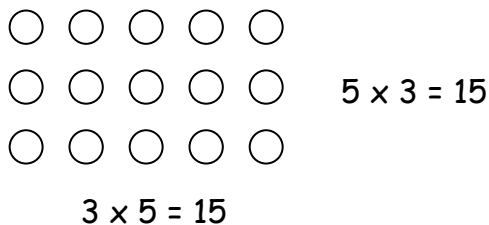
✓ **Commutativity**

Children should know that  $3 \times 5$  has the same answer as  $5 \times 3$ . This can also be shown on the number line.



✓ **Arrays**

Children should be able to model a multiplication calculation using an array. This knowledge will support with the development of the grid method.



**Y3**

Children will continue to use:

✓ **Repeated addition**

4 times 6 is  $6 + 6 + 6 + 6 = 24$  or 4 lots of 6 or  $6 \times 4$

Children should use number lines or bead bars to support their understanding.

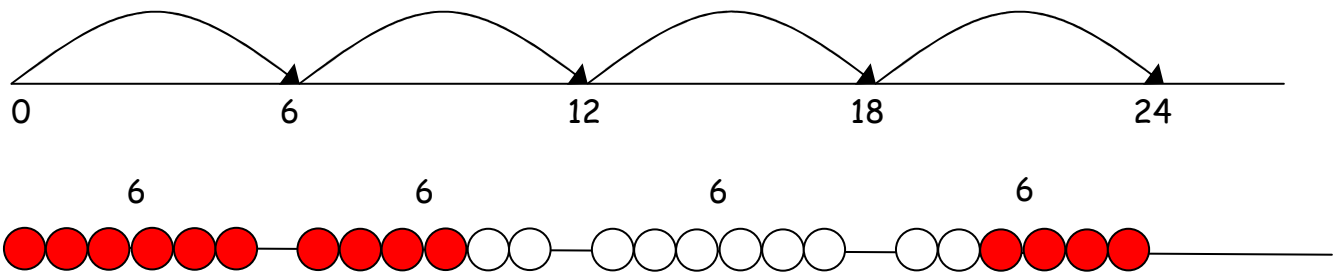
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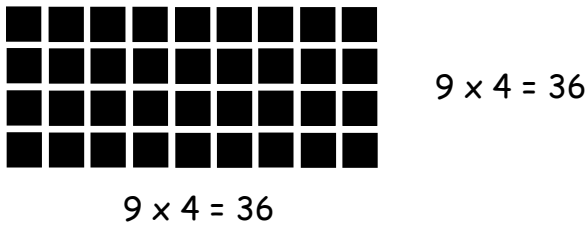
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✓ **Arrays**

Children should be able to model a multiplication calculation using an array. This knowledge will support with the development of the grid method.



Children will also develop an understanding of

✓ **Scaling**

e.g. Find a ribbon that is 4 times as long as the blue ribbon



✓ **Using symbols to stand for unknown numbers to complete equations using inverse operations**

$\square \times 5 = 20$        $3 \times \triangle = 18$        $\square \times \circ = 32$

✓ **Partitioning**

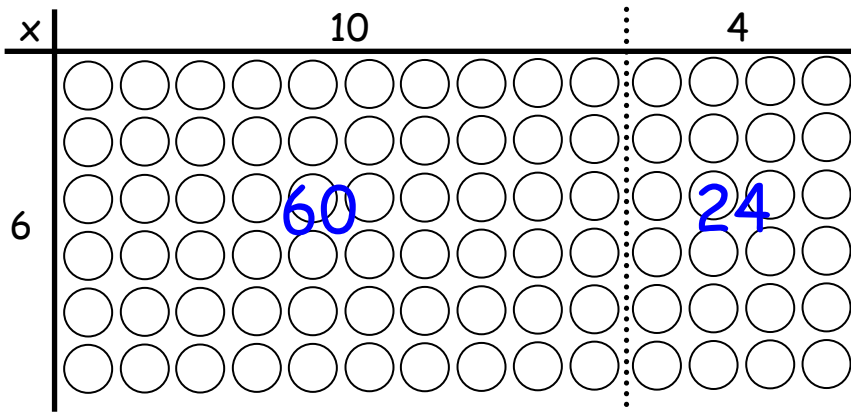
$$\begin{aligned} 38 \times 5 &= (30 \times 5) + (8 \times 5) \\ &= 150 + 40 \\ &= 190 \end{aligned}$$

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**Y3 and Y4**

Children will continue to use arrays where appropriate leading into the grid method of multiplication.



$$(6 \times 10) + (6 \times 4)$$

$$60 + 24$$

$$84$$

**Grid method**

**TU × U**

(Short multiplication - multiplication by a single digit)

$$23 \times 8$$

Children will approximate first

$23 \times 8$  is approximately  $25 \times 8 = 200$

x	20	3
8	160	24

$$\begin{array}{r}
 160 \\
 + 24 \\
 \hline
 184
 \end{array}$$

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**Y5**

**Grid method**

**HTU × U**

(Short multiplication - multiplication by a single digit)

$346 \times 9$

Children will approximate first

$346 \times 9$  is approximately  $350 \times 10 = 3500$

×	300	40	6	
9	2700	360	54	
				2700
				+ 360
				+ 54
				<u>3114</u>
				1 1

**TU × TU**

(Long multiplication - multiplication by more than a single digit)

$72 \times 38$

Children will approximate first

$72 \times 38$  is approximately  $70 \times 40 = 2800$

×	70	2	
30	2100	60	
8	560	16	
			2100
			+ 560
			+ 60
			+ <u>16</u>
			<u>2736</u>
			1

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*Using similar methods, they will be able to multiply decimals with one decimal place by a single digit number, approximating first. They should know that the decimal points line up under each other.*

e.g.  $4.9 \times 3$

Children will approximate first

$4.9 \times 3$  is approximately  $5 \times 3 = 15$

$$\begin{array}{r} \times \quad 4 \quad 0.9 \\ 3 \quad \boxed{12} \quad \boxed{2.7} \end{array}$$

$$\begin{array}{r} 12 \\ + \quad 2.7 \\ \hline 14.7 \end{array}$$

**Y6**

**ThHTU  $\times$  U**

(Short multiplication - multiplication by a single digit)

$4346 \times 8$

Children will approximate first

$4346 \times 8$  is approximately  $4346 \times 10 = 43460$

$$\begin{array}{r} \times \quad 4000 \quad 300 \quad 40 \quad 6 \\ 8 \quad \boxed{32000} \quad \boxed{2400} \quad \boxed{320} \quad \boxed{48} \end{array}$$

$$\begin{array}{r} 32000 \\ + \quad 2400 \\ + \quad 320 \\ + \quad 48 \\ \hline 34768 \end{array}$$



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**HTU x TU**

(Long multiplication - multiplication by more than a single digit)

$372 \times 24$

Children will approximate first

$372 \times 24$  is approximately  $400 \times 25 = 10000$

x	300	70	2	
20	6000	1400	40	6000
4	1200	280	8	+ 1400
				+ 1200
				+ 280
				+ 40
				+ <u>8</u>
				<u>8928</u>

*Using similar methods, they will be able to multiply decimals with up to two decimal places by a single digit number and then two digit numbers, approximating first. They should know that the decimal points line up under each other.*

*For example:*

$4.92 \times 3$

Children will approximate first

$4.92 \times 3$  is approximately  $5 \times 3 = 15$

x	4	0.9	0.02	
3	12	2.7	0.06	12
				+ 0.7
				+ <u>0.06</u>
				<u>12.76</u>

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+ - + - + - + - + - + - +

By the end of year 6, children will have a range of calculation methods, mental and written. Selection will depend upon the numbers involved.

Children should not be made to go onto the next stage if:

- 1) they are not ready.
- 2) they are not confident.

Children should be encouraged to approximate their answers before calculating.

Children should be encouraged to consider if a mental calculation would be appropriate before using written methods.

Year 6 progression to Year 7:

- use standard column procedures to multiply two-digit and three-digit integers by a one-digit or two-digit integer (long multiplication)
- consolidate methods of calculation to include decimals and fractions by single digit integers
- understand the relationship between multiplication and inverse division and use this to check calculations
- use the order of operations (BODMAS) including brackets
- consolidate and extend mental methods of calculation to include finding fractions and percentages of quantities



Approved by FGB

Meeting Date 30th June 2014