



## Stone Church of England Combined School

### Multiplication Methods in Mathematics

#### Mission Statement

*"I can do all things through Him who strengthens me"*

Philippians 4:13

We believe that our school is a special place, where children can learn, develop and thrive in a happy, nurturing environment.

The school has high expectations of academic progress for all children and we encourage our children to achieve academic excellence across the curriculum so they can contribute positively to society.



# Multiplication: Stage A

## Multiplication as repeated addition

Level 1: Using Pictures and Marks



Looking at columns

$$2 + 2 + 2$$

3 groups of 2

Looking at rows

$$3 + 3$$

2 groups of 3

Counting using a variety of practical resources.

Counting in 2s e.g. counting socks, shoes, animal's legs.

Counting in 5s e.g. counting fingers, fingers in gloves, toes.

Counting in 10s e.g. fingers, toes, beads and cubes.

## Applying to word problems

There are 2 sweets in one bag.

How many sweets are there in 5 bags?



## **Pre-requisite skills**

Counting in 2s, 5s and 10s

Repeated addition

Understand the concept of groups of equal size

## **Learning commentary**

5 groups of 2

How big does each group have to be? 2

or

How many are in each group? 2

How many groups do we need / are there? 5

How many objects are there altogether? 10

## **Vocabulary**

add  
same

lots of  
repeated addition

groups of



## Multiplication: Stage B

### Linking multiplication and repeated addition

Level 2 : Arrays support understanding of the concept of repeated addition

An array is a systematic arrangement of objects, often in rows and columns.

$$\begin{array}{cccc} \bullet & \bullet & \bullet & \bullet \\ \bullet & \bullet & \bullet & \bullet \end{array} \quad \begin{array}{l} 4 \times 2 \\ 4 + 4 \end{array}$$

$$\begin{array}{cc} \bullet & \bullet \\ \bullet & \bullet \\ \bullet & \bullet \\ \bullet & \bullet \end{array} \quad \begin{array}{l} 2 \times 4 \\ 2 + 2 + 2 + 2 \end{array}$$

8 is the total number of objects



## **Pre-requisite skills**

Understand multiplication as repeated addition

Understand that  $4 \times 2$  is the same as  $2 \times 4$ ,  $3 \times 6 = 6 \times 3$  and so on.  
(Commutative law)

## **Learning commentary**

Which groups can you see in the array?

2 groups of 4 (across)

4 and 4

$$4 + 4 = 8$$

4 groups of 2 (down)

2 and 2 and 2 and 2

$$2 + 2 + 2 + 2 = 8$$

## **Vocabulary**

across

array

down

repeated addition

total

## Multiplication: Stage C

### Partition. begin grid method up to T U x U

Towards Level 3

Start to partition (split Tens and Units numbers e.g. 12) into their Tens and Units e.g.  
 $12 = 10 + 2$ ,  $24 = 20 + 4$ )

$$12 \times 4 =$$

$$10 \times 4 = 40$$

$$2 \times 4 = 8$$

$$40 + 8 = 48$$

Partitioning: Start of grid method

$$32 \times 3 = 96$$

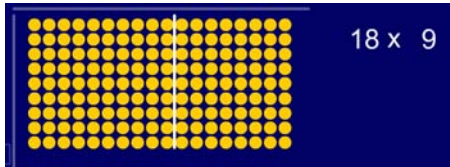
	<b>T</b>	<b>U</b>
x	30	2
3	90	6

$$\begin{array}{r} \text{T} \quad \text{U} \\ 9 \quad 0 \\ + \quad 6 \\ \hline \underline{9 \quad 6} \end{array}$$

## Pre-requisite skills

Understand multiplication as repeated addition.

Use arrays to support understanding of partitioning.



Doubling multiples of 10 up to 30

Partition 2 digit numbers

Multiples of 10 up to 100

Addition (T U + T U)

Multiplications facts (appropriate tables)

Understand that multiplying by 10 involves digits shifting to the left on a number grid.

## Learning commentary

32 x 3

How can we partition 32? (30 and 2)

Put the numbers into a grid.

	T	U
x	30	2
3	90	6

$$\begin{array}{r} \text{T} \quad \text{U} \\ 9 \quad 0 \\ + \quad 6 \\ \hline 9 \quad 6 \end{array}$$

Now work out 3 x 30 (90).

Then work out 3 x 2 (6).

Add up those answers using T U columns.

The total is the answer.

## Vocabulary

Tens

Units

x 10

x 100

multiplication

multiply

represents

rows / columns

multiples of 10 and 100

how many altogether

repeated addition

arrays

total

partitioning

## Multiplication: Stage D

### Grid method for questions up to T U x U

Towards Level 3

Use the grid method of multiplication (as below)

23 x 7

Grid method:

Estimate:  $20 \times 10 = 200$

	T	U
x	20	3
7	140	21

$$\begin{array}{r} \text{H} \quad \text{T} \quad \text{U} \\ 1 \quad 4 \quad 0 \\ + \quad \quad 2 \quad 1 \\ \hline \quad 1 \quad 6 \quad 1 \end{array}$$



## Pre-requisite skills

Column addition to H T U

Can multiply by multiples of 10

Know appropriate times tables

Partition 2 digit numbers

## Learning commentary

23 x 7

We estimate by rounding the numbers to the nearest 10 and multiply them ( $20 \times 10 = 200$ ).

How can we partition 23? (20 and 3).

Put the numbers into a grid.

	T	U
x	20	3
7	140	21

Now work out  $7 \times 20$  (140).

Then work out  $7 \times 3$  (21).

Add up those answers using H T U (writing the larger number first).

The total is the answer.

	H	T	U
	1	4	0
+		2	1
	1	6	1

## Vocabulary

estimate  
Units  
 $\times 10$   
 $\times 100$

Tens  
multiply  
represents  
rows / columns

multiplication  
how many altogether  
repeated addition  
arrays

multiples of 10 and 100  
partitioning  
total



# Multiplication: Stage E

## Grid method up to T U x T U

Level 3 / 4

Grid Method

Use the grid method of multiplication (as below)

72 x 38

Grid method:

Estimate:  $70 \times 40 = 2800$

	T	U
x	70	2
30	2100	60
8	560	16

$$\begin{array}{r} \begin{array}{cccc} \text{Th} & \text{H} & \text{T} & \text{U} \\ 2 & 1 & 0 & 0 \\ & 5 & 6 & 0 \\ & & 6 & 0 \\ + & & \underline{1} & \underline{6} \\ 2 & 7 & 3 & 6 \\ \hline & 1 & & \end{array} \end{array}$$



## **Pre-requisite skills**

Column addition to Th H T U

Can multiply multiples of 10 by multiples of 10.

Know appropriate times tables.

Partition 2 digit numbers.

## **Learning commentary**

72 x 38

How can we partition 72? (70 and 2)

How can we partition 38? (30 and 8)

Put the numbers into a grid

	<b>T</b>	<b>U</b>
x	70	2
30	2100	60
8	560	16

Now work out 30 x 70 (2100)

Then work out 30 x 2 (60)

Now work out 8 x 70 (560)

Then work out 8 x 2 (16)

Add up the answers using Th H T U (writing in the numbers from largest first to smallest last).

The total is the answer.

## **Vocabulary**

estimate

Units

x 10

x 100

Tens

multiply

represents

rows / columns

multiplication

how many altogether

repeated addition

arrays

multiples of 10 and 100

partitioning

total



# Multiplication: Stage F

## Grid and begin long multiplication

Level 4

Grid method

Use the grid method of multiplication (as below) and move towards column multiplication.

56 x 27

Grid method:

Estimate:  $60 \times 30 = 1800$

	T	U
x	50	6
20	1000	120
7	350	42

$$\begin{array}{r}
 \begin{array}{cccc}
 \text{Th} & \text{H} & \text{T} & \text{U} \\
 1 & 0 & 0 & 0 \\
 & 3 & 5 & 0 \\
 & 1 & 2 & 0 \\
 + & & 4 & 2 \\
 - & & 1 & 2 \\
 \hline
 1 & 5 & 1 & 2 \\
 \hline
 & 1 & & 
 \end{array}
 \end{array}$$

## Column Multiplication

$$\begin{array}{r}
 \begin{array}{cccc}
 \text{Th} & \text{H} & \text{T} & \text{U} \\
 & & 5 & 6 \\
 \times & & 2 & 7 \\
 & 3 & 9 & 2 \\
 + & 1 & 1 & 2 & 0 \\
 & 1 & 5 & 1 & 2 \\
 \hline
 & 1 & 5 & 1 & 2 \\
 \hline
 & 1 & & & 
 \end{array}
 \end{array}$$

Extend to multiply T U . t x U e.g.  $36.2 \times 8$



## **Pre-requisite skills**

Multiplying by 10, 100.

Multiplying by multiples of 10, 100.

Column addition to Th H T U.

Know appropriate times tables.

Partition up to 4 digit numbers.

## **Learning commentary**

Grid method: see the example and Learning Commentary.

Column version:

We need to multiply 56 by 7 and then multiply 56 by 20.

7 multiplied by 6 is 42. Put down the 2 in the Units column and carry the 4 Tens.  
7 multiplied by 5 is 35 plus the 4 is 39. Put the 9 in the Tens column and carry the 3.  
7 multiplied by 0 is 0 plus the 3 carried is 3. Write the 3 in the Hundreds column.

Multiplying by 20 is the same as multiplying by 2 and then multiplying by 10 so put down 0 as a place holder in the Units column.

2 multiplied by 6 is 12. Put down the 2 in the Tens column and carry the 1.  
2 multiplied by 5 is 10 plus the 1 is 11. Put the 1 in the Hundreds column and carry the 1.  
2 multiplied by 0 is 0 plus the 1 carried is 1. Write the 1 in the Thousands column.  
Add the numbers up using Th H T U.

## **Vocabulary**

multiples of 10, 100  
0 as a place holder

carry

column

multiply



# Multiplication: Stage G

## Column Multiplication

Towards Level 5

Th H T U x U

T U.t x U

### Method 1 (longer)

$$\begin{array}{r} \text{T} \quad \text{U} \quad . \quad \text{t} \quad \text{h} \\ 7 \quad . \quad 9 \quad 6 \\ - \quad \underline{\times} \quad \underline{8} \\ 0 \quad . \quad 4 \quad 8 \\ 7 \quad . \quad 2 \quad 0 \\ - \quad \underline{+} \quad \underline{5} \quad \underline{6} \quad . \quad \underline{0} \quad \underline{0} \\ \hline 6 \quad 3 \quad . \quad 6 \quad 8 \\ 1 \end{array}$$

### Method 2 (shorter)

$$\begin{array}{r} \text{T} \quad \text{U} \quad . \quad \text{t} \quad \text{h} \\ 7 \quad . \quad 9 \quad 6 \\ \underline{\times} \quad \underline{8} \\ - \quad \underline{6} \quad \underline{3} \quad . \quad \underline{6} \quad \underline{8} \\ \quad \quad 7 \quad \quad 4 \end{array}$$



## **Pre-requisite skills**

Appropriate times tables

Understanding of place value when multiplying

Understanding of place value when adding the total

Column addition

## **Learning commentary**

### **Method 1**

To multiply 7.96 by 8, place 8 below 7.96.

Make sure that you put the digits in the correct columns and make sure all numbers are the same length, putting 0's after the decimal point where necessary.

Then we calculate  $8 \times 0.06 = 0.48$

and  $8 \times 0.9 = 7.20$

and  $8 \times 7 = 56.00$

We need to add up the answers to find the total.

### **Method 2**

To multiply 7.96 by 8, place 8 below 7.96.

Make sure that you put the digits in the correct columns.

Then we calculate  $8 \times 0.06 = 0.48$ .

Put the 8 in the hundredths column and carry the 4 to the tenths column.

Then we calculate  $8 \times 0.9 = 7.2$  plus the 4 tenths carried is 7.6.

Put the 6 in the tenths column and carry the 7 Units.

Then we calculate  $8 \times 7 = 56$  plus the 7 Units carried is 63.

Put the 3 in the Units column and carry the 6 Tens.

$8 \times 0$  Tens plus the 6 Tens carried is 6 Tens.

Put the 6 Tens in the Tens column.

You now have your answer.

## **Vocabulary**

multiples of 10, 100

0 as a place holder

hundredths

carry

calculate

column

decimals

multiply

tenths

