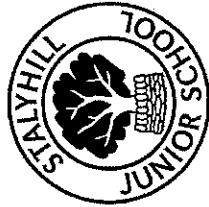
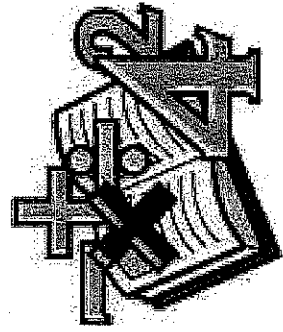
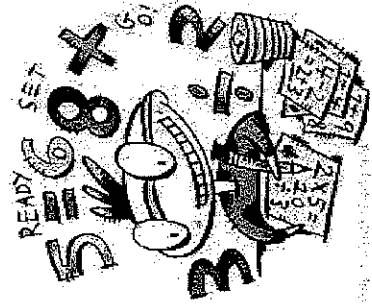


Stalyhill Junior School



Calculation Booklet



This booklet shows how to record mathematical calculations and has been agreed by all Stalyhill staff.

It shows how to tackle calculations in all four operations and is a guide to the progression of approaches and methods that your child will be introduced to in school.

Children should be encouraged to see mathematics as both a written and spoken language.

When working with your children please encourage them to ask ...

'Can I do this in my head?'

Can I do this in my head using drawings or jottings?'

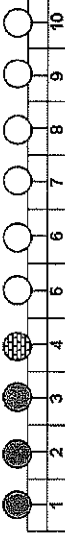
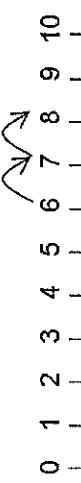
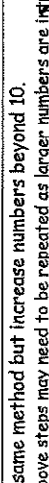
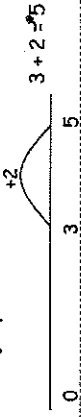
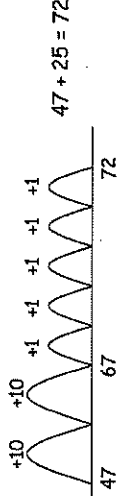
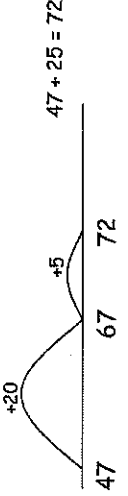
'Do I need to use a pencil and paper procedure?'

'Do I need a calculator?'



Addition



• Practical counting of objects in a group • Say the number that is one more • Recognition of numerals • Match numerals to groups of objects • Counting two groups of objects to find a total • Record these groups in preferred way • Read and understand a number sentence using standard symbols • Write a number sentence to match two groups of objects • Begin to understand that addition can be done in any order $3 + 2 = 2 + 3$ $a + b = b + a$ • Use numbered number line to do practical jumps (e.g. three and one more)  • Record addition jumps on a simple number line (e.g. 6+2)  • Visual aid of a 100 square for adding tens and ones  • Use the same method but increase numbers beyond 10. (The above steps may need to be repeated as larger numbers are introduced) • Use empty number line to jump on and record the horizontal number sentence to go with it.  • Increase to two two-digit numbers or three-digit numbers, using partitioning skills. Extend to adding three numbers together in this way.  	Vocabulary + add addition plus and more altogether total equals balance sum much increase same as make equals inverse near double
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Regular number bond practice and recall of facts

Make estimates for calculations



- When the previous methods are secure children may wish to record in one of the ways below as opposed to the number line.

Partitioning (both numbers)

$$36 + 45 = 30 + 40 + 6 + 5$$
$$= 70 + 11$$
$$= 81$$

Partition (one number)

$$36 + 45 = 36 + 40 + 5$$
$$= 76 + 5$$
$$= 81$$

Rounding and adjusting:

$$36 + 45 = 36 + 50 - 5$$
$$= 86 - 5$$
$$= 81$$

- Vertical column addition - adding the most significant digits first.

$$\begin{array}{r} 427 \\ + 328 \\ \hline 700 \\ 40 \\ 15 \\ \hline 755 \end{array}$$

Understanding that addition is commutative means that the hundreds do not have to be added first, any order of adding will give the same total. It is possible to add with the least significant digits first.

$$\begin{array}{r} 427 \\ + 328 \\ \hline 427 \\ + 328 \\ \hline 755 \end{array}$$

- This makes it possible to record the vertical method more quickly by making a note of multiples of 10 or 100 rather than writing it all out.

$$\begin{array}{r} 68 \\ + 26 \\ \hline 14 \\ 80 \\ 94 \end{array}$$

becomes

$$\begin{array}{r} 68 \\ + 26 \\ \hline 94 \\ 1 \end{array}$$

(This method would not normally be used before Year 5, and even then there is no hurry to move to this.)

Pupils can then use either the expanded or compact method with larger numbers or decimals.

$$\begin{array}{r} 3968 \\ + 5493 \\ \hline 8000 \\ 1300 \\ 150 \\ 11 \\ \hline 9461 \end{array}$$
$$\begin{array}{r} 53.2 \\ + 4.9 \\ \hline 58.1 \\ 1 \\ \hline 58.1 \end{array}$$
$$\begin{array}{r} 28.53 \\ + 9.7 \\ \hline 38.23 \\ 1 \\ \hline 38.23 \end{array}$$

Please note:

- Use of any method is appropriate depending on the type of calculation.
- Practise choosing the most appropriate method for a variety of calculations.
- Apply methods learnt and use confidently in a range of situations



- Vocabulary**
- subtract
less than
minus
difference
decrease
between
take away
count on
leave
left over
gone
fewer
half
halve
equals
inverse

$5 - 3 = ?$

We count on from 3 up to 5 to find the difference



- Move on to using higher numbers and partitioning.

$$73 - 26 =$$

So $73 - 26 = 47$

• This meth

The graph shows the number of books on shelves over time. The x-axis represents time in minutes, with labels at 0, 286, 290, 300, 300, 458, and 472. The y-axis represents the number of books, with labels at 0, 286, 290, 300, 458, and 758. The graph shows a series of peaks and valleys, with the highest peak at 458 books at 472 minutes.

Regular number bond practice and recall (with associated facts)

~~Make estimates for calculations~~

So $434 - 168 = 266$

Initially the number line and the vertical method will be recorded side by side.

Expanded methods

$$\begin{array}{r} 46 - 22 = \\ \underline{20} \quad \underline{2} \\ 24 \end{array}$$

$$\begin{array}{r} 73 - 47 = \\ \underline{26} \end{array}$$

This involves partitioning both numbers before subtracting. Partitioning means separating the digits of the numbers e.g. 46 is 40 plus 6

Decomposition - In the example opposite 7 units can't be taken away from 3 units so we move a ten from the 70 to make it 60 and add it to the units to make it 13. This is called 'exchanging'.

Standard Compact method

$$\begin{array}{r} 46 \\ - 22 \\ \hline 24 \end{array}$$

$$73 - 47 = \overset{6}{\cancel{7}}3 - \overset{4}{\cancel{4}}\overset{7}{\cancel{7}}\overset{2}{\cancel{2}}\overset{6}{\cancel{6}}$$

The expanded and compact methods can also be used with decimals

Please note:

- Use of any method is appropriate depending on the type of calculation.
- Practise choosing the most appropriate method for a variety of calculations.
- Apply methods learnt and use confidently in a range of situations



Multiplication

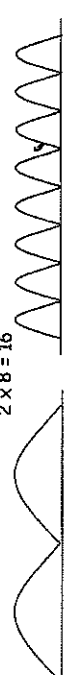


Vocabulary

times
groups of
multiply
product
lots of
multiplied by
sets of
multiple of
once
twice
repeated -
addition
array
row
column

Regular number times table practice and recall (with associated facts)

Make estimates for calculations

• Making equal groups of objects – How many altogether? • Repeated Addition – three groups of 2 • Lots of 2's 5's 10's • Add another group • Drawing objects in groups. • Match numerals to groups of objects. • Record numbers, possibly in a horizontal sentence along with drawings • Use x sign to indicate groups of • Draw arrays (arrangements of dots/marks) • Write related horizontal calculations.	***** ***** 8 x 2 = 16 2 x 8 = 16 16 ÷ 2 = 8 16 ÷ 8 = 2								
• Regular times table practice begins. • Make the connection with the inverse and matching division facts									
• Use a number line or hundred square to count on in groups of a number. • Record the horizontal number sentence to go with it. • Use a number line to jump forward in groups and record the horizontal number sentence to go with it.	8 x 2 = 16 2 x 8 = 16 								
• Write horizontal number sentences and use partitioning	8 x 23 = 8 x 10 + 8 x 10 + 8 x 3 = 80 + 80 + 24 = 184								
• This develops into the grid method	<table> <tr> <td>X</td> <td>20</td> <td>3</td> <td></td> </tr> <tr> <td>8</td> <td>160</td> <td>24</td> <td>= 184</td> </tr> </table>	X	20	3		8	160	24	= 184
X	20	3							
8	160	24	= 184						

The grid method can then be used for 2-digit by 2-digit multiplication.

X	60	6	
30	1800	180	= 1980
4	240	24	= 264
			= 2244

X	2000	30	5
10	20000	300	50
7	14000	210	35
			= 20350
			= 14245
			= 34595

Expanded method

$$\begin{array}{r} 38 \times 7 = \end{array} \begin{array}{r} 3 \quad 8 \\ \times \quad 7 \\ \hline 2 \quad 6 \quad 6 \\ 2 \quad 6 \quad 6 \\ \hline 2 \quad 6 \quad 6 \end{array}$$

$= (7 \times 8)$
 $= (7 \times 30)$

when multiplying with more than 1 digit always start with the largest number i.e. 10 (1) and place a zero in the units column (under the 7) as place holder.

$$\begin{array}{r} 3 \quad 8 \\ \times \quad 1 \quad 7 \\ \hline 3 \quad 8 \quad 0 \\ 2 \quad 6 \quad 6 \\ \hline 6 \quad 4 \quad 6 \end{array}$$

Decimals

$$1 \quad 2 \times 0.4 = \text{(multiply by 10 to make a whole number)}$$

$$1 \quad 2 \times 4 = 48 \text{ (REMEMBER to divide by 10 to return to decimal)}$$

$$4 \quad 8 \div 10 = 4.8$$

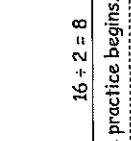
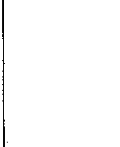
Please note:

- Use of any method is appropriate depending on the type and context of calculation.
- In problem solving situations practise choosing the most appropriate method for a variety of calculations.
- Apply methods learnt and use confidently in a range of situations
- Ongoing consolidation of times tables and related division facts
- Instant recall of 2, 5, 10, 3, 4, 6, 7, 8, 9 times tables (usually in that order)





Division

Vocabulary	Regular times table practice and recall (with associated facts)
- Sharing objects into equal groups - Repeated subtraction/addition - Discussion and practical activities - Drawing objects and splitting into groups - Match numerals to groups - Write a horizontal sentence along with drawings of groups of objects - Use ÷ sign to indicate sharing/grouping - Draw arrays (arrangements of dots/marks) - Write related horizontal calculations.	Make estimates for calculations
$16 \div 8 = 2$	
$16 \div 2 = 8$	
- Regular times table practice begins. - Make the connection with the inverse and matching multiplication facts.	Use a number line to jump forward in groups from 0 to the number being divided into and record the horizontal number sentence to go with it. $17 - 8 = 2 \text{ r } 1$ 
	Partitioning This method is good for mental calculation as well as written when dividing by 1 digit only. $124 \div 5 = 24 \text{ r } 4$ 



Regular times table practice (with associated division facts)

Make estimates for calculations

Place value understanding is needed to count on in multiples of the divisor.

Short division (bus stop)

$$\begin{array}{r} 0\ 8\ r\ 2 \\ 5 \overline{) 4\ 3\ 2} \end{array}$$

Long division

$$\begin{array}{r} 2\ 8\ r\ 2 \\ 15 \overline{) 4\ 3\ 2} \\ \underline{3\ 0\ 0} \\ 1\ 3\ 2 \\ \underline{1\ 2\ 0} \\ 1\ 2 \end{array}$$

I know...

$15 \times 2 = 30$

$15 \times 4 = 60$

$15 \times 10 = 150$

$15 \times 20 = 300$

For many pupils, the addition of an 'I know' box can be very beneficial.

The remainder can be written as a fraction (simplifying fractions where possible) and then using equivalent decimals)

$$674 \div 6 = 112\ r\ 2 = 112\frac{2}{6} = 112\frac{1}{3}$$

$$3786 \div 4 = 946\ r\ 2 = 946\frac{2}{4} = 946\frac{1}{2}$$

Please note:

- Use of any method is appropriate depending on the type of calculation.
- Practise choosing the most appropriate method for a variety of calculations.
- Apply methods learnt and use confidently in a range of situations
- Ongoing consolidation of times tables and related division facts
- Instant recall of 2, 5, 10, 3, 4, 6, 7, 8, 9 times tables (usually in that order)