



Sunnydown School

Name of policy	Sunnydown calculations policy
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INTRODUCTION

To ensure consistency in teaching throughout Sunnydown school this Mathematical Calculations Policy has been produced. This handbook will give an overview of the different strategies used in our school to teach the fundamentals in Mathematical computing and calculating throughout the Secondary Mathematics Curriculum.

By the end of KS3 all students should be confident in the four operations and have preferred methods. In KS4, it may be that students in pathway one need further revision of written methods and will follow a method appropriate to their level of understanding.

A key to improving mathematics across the curriculum for students is developing cultural capital by accessing key words and their meanings, this can be achieved through active learning such as what happens in lessons and passive learning, which can be accessed through classroom posters.

Knowledge organisers also contain many worked examples of the methods mentioned in this calculation policy. They will be particularly prevalent in the KS3 (Y7, 8 and 9) knowledge organisers but also visible in the KS4 knowledge organisers.

BASICS

Every student should know their tables, particularly as they progress through the school. Their six, seven, eight, and nine times tables are very important and can be practised at home but any opportunity across the curriculum to work with single digit mental calculations can only assist progress in mathematics. In all arithmetic, the importance of place value and neat column keeping should be stressed. In a line of workings an “equals” sign should only appear once.

This is poor practice: $£3.50 \times 0.85 = 2.975 + 3.50 = 6.475 = £6.48$

This is good practice: $£3.50 \times 0.85 = 2.975$

$$2.98 + 3.50 = £6.48$$

APPROACHES

Where a student is gaining success with a particular method it is important that he is not confused by being given another method. It is recognised that there is never only one correct method. Students should be encouraged to develop their own correct methods, where appropriate, rather than be taught 'set' ways. However, this document outlines many of the preferred methods that allow students to progress to harder skills and concepts. All students should be helped to understand the methods they are using or being taught. Students gain more, and are likely to remember much more easily, if they understand rather than are merely repeating by rote.

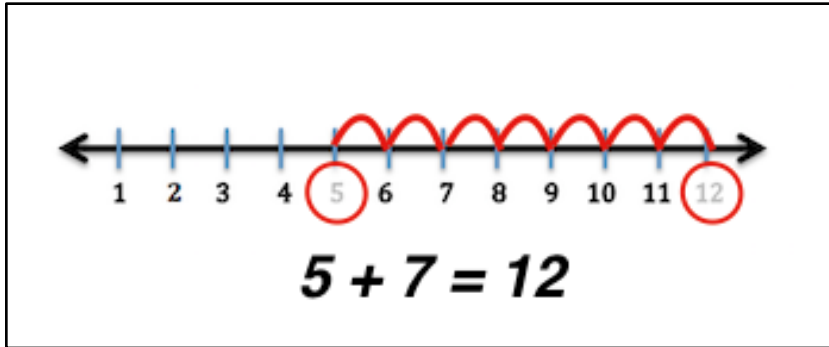
TOPICS

The strategies used for the following topics will be highlighted in each section. These are the typical strategies used across the Mathematics curriculum and include worked examples for each method. However it must be highlighted again, that if a student has a preference for a method not taught, then he will be encouraged to continue with that method.

Page	Topic
4	Addition
5	Subtraction
6-7	Multiplication
8-9	Division
9-10	Algebra
11	Fractions, Decimals & Percentages

Addition

Number line




Column method without carrying

Column method with carrying

Column method with decimals

Mental strategies/estimation

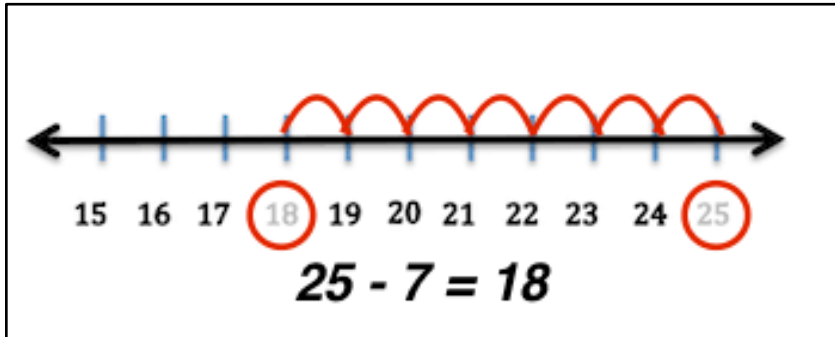
Worked example 

Work out $67 + 48$ using the **column method**.

$\begin{array}{r} 67 \\ + 48 \\ \hline \end{array}$	Set out the numbers in columns. Line up the units with units, and the tens with tens.
$\begin{array}{r} 67 \\ + 48 \\ \hline 5 \\ \hline 1 \end{array}$	Start in the units column. Add the numbers together ($7 + 8 = 15$) Put the 5 in the units column and carry the ten. Write the ten as a 1 underneath the tens column.
$\begin{array}{r} 67 \\ + 48 \\ \hline 115 \\ \hline 1 \end{array}$	Next add the tens (6 tens + 4 tens) and add the ten carried over. This makes 11 tens.

Subtraction

Number line




Column method without borrowing

Column method with borrowing

Column method with decimals

Mental strategies/estimation

Worked example 

Use the column method to work out $392 - 165$.

392
 -165

Write the larger number on top.

Start with the units column.
You can't subtract 5 from 2 because this gives a negative answer.

$3^8 9^1 2$
 -165

Take a ten from the 9 tens to make 8 tens and 12 units.
 $12 - 5 = 7$

Now look at the tens column and the hundreds column.

$3^8 9^1 2$
 -165

227


Check: $400 - 170 = 230$, which is close to 227

Round each number to the nearest ten and subtract.

Multiplication

Column method 2 digit by 1 digit

Column method 2 digit by 2 digit (and bigger)

Worked example 

Work out 625×3 using the **column method**.

$$\begin{array}{r} 625 \\ \times 3 \\ \hline 1875 \end{array}$$

Start in the units column. Multiply each digit in the top row by the digit in the bottom row.
 $5 \times 3 = 15$. That's 5 units and 1 ten.

In the tens column:
 $2 \times 3 = 6$.
 $6 + 1 = 7$.
That's 7 tens altogether.

In the hundreds column:
 $6 \times 3 = 18$.

Napier's bones

	1	4	2	3	
	1	4	2	3	1
2	7	8	4	1	7
4	5	0	0	1	5
	9	0	2	5	

Times tables
Mental strategies/estimation

Division

Grouping


Short bus stop no remainders

Short bus stop with remainders (r3)

Short bus stop with decimal remainders

Worked example

Work out $112 \div 4$ using short division.



$$\begin{array}{r} 2 \dots \\ 4 \overline{)112} \end{array}$$

Look at the digits in 112, starting on the left.
4 doesn't go into 1, so look at 11.
4 goes into 11 twice so write a 2 in the tens column.

$$\begin{array}{r} 2 \dots \\ 4 \overline{)11^3}2 \end{array}$$

The difference between 11 and 4×2 is 3
so write the remainder 3 tens in the units
column, to make 32.

$$\begin{array}{r} 28 \\ 4 \overline{)11^3}2 \end{array}$$

4 goes into 32 eight times. So write 8 in the units column.

Long bus stop no remainders

Long bus stop with remainders (r3)

Long bus stop with decimal remainders

Worked example

Work out $326 \div 14$ using long division.
Estimate the answer first.

Estimate: $326 \div 14$ is roughly $330 \div 15 = 22$

$$\begin{array}{r} 2 \\ 14 \overline{)326} \\ \underline{-28} \\ 46 \\ \underline{-42} \\ 4 \end{array}$$

$2 \times 14 = 28$

$2 \times 14 = 28$. So 14 goes into 32 twice. $6 - 0 = 6$, so bring down 6.

$$\begin{array}{r} 23 \\ 14 \overline{)326} \\ \underline{-28} \\ 46 \\ \underline{-42} \\ 4 \end{array}$$

$2 \times 14 = 28$

Try multiplying 14 by different numbers to get close to 46. $3 \times 14 = 42$

$3 \times 14 = 42$

4 is less than 14, so the remainder is 4.

$326 \div 14 = 23$ remainder 4

Check: 23 remainder 4 is close to 22 ✓

Check your answer.

Mental strategies/estimation
Sharing & real life examples
Vocabulary used

Algebra

Missing boxes/function boxes

Using Function Machines

Opposite operations when going in the opposite direction

$c \rightarrow \boxed{\times 4} \rightarrow 4c$

$c \leftarrow \boxed{\div 4} \leftarrow 4c$

$c \rightarrow \boxed{+4} \rightarrow 4 + c$

$c \leftarrow \boxed{-4} \leftarrow 4 + c$

Balancing an equation

$$\begin{array}{r} 4x + 8 = 24 \\ -8 \quad -8 \\ \hline 4x + 0 = 16 \\ \hline 4x = 16 \\ \hline \cancel{4} \quad \cancel{4} \\ x = 4 \end{array}$$

Fractions, Decimals & Percentages

Converting between fractions, decimals and percentages

