A guide to how written calculations are taught at Godinton Primary School

Introduction

Methods for teaching Mathematics have changed over several years. This booklet will illustrate how the 4 main calculations (add, subtract, multiply and divide) are taught in Years 3, 4, 5, 6 and as an extension for Yr 2 children.

Each page focuses upon one calculation and will detail the methods taught in each year groups.

It is hoped that this booklet will help you when you assist your child in completing their homework.

Maths Vocabulary

Addition

add

and

plus

more

sum

addition

double

altogether

total

increase

Subtraction

subtract

take away

less

fewer than

minus

decrease

difference between

Multiplication

lots of

times

groups of

multiply

multiplied by

factor

repeated addition

array

product

Division

share

share equally

divided by

groups of

left over

divisible by

remainder

Addition

Stage 4 (Approx Year 3)

Use of an empty number line e.g. 36 + 48 =

Begin to record calculations in an expanded column form with some progressing to the use of the compact method.

e.g. 86 +57 =

Adding the units first to prepare for the 'carrying' method.

```
  86
+ 57
  13  (6+7)
+130  (80 + 50)
 143  (total)
```

Children need to remember that the units line up under units, tens under tens, hundreds under hundreds.

Stage 5 (Approx Year 4) Continue recording calculations with empty number lines and in expanded column form.

e.g. 264 + 48 =

```
1)   264
   +  48
      12 (4+8)
     100 (60 + 40)
     200 (200+0)
     312  (total)
```

Progress to compact 'carrying' method →

e.g. 657 + 784

```
2)   657
   + 784
    1441
     11
```

Once the compact method is secure, children will progress to addition of decimals (see Year 5).

Addition

Stage 6 (Approx Year 5)

Continue with compact 'carrying' method using larger numbers. Extend to decimals, using compact 'carrying' method.

Children are encouraged to approximate answers first before calculating and check answers using the inverse operation.

Examples:

3587 + 675 =

Approx 3500+ 700 = 4200

```
  3587
+  675
  4262
  1 1 1
```

Inverse operation:

4262 - 675 = 3587

£5.68 + £2.79 =

Approx. £6.00 + £3.00 = £9.00

```
  £5.68
+ £2.79
  £8.47
   1  1
```

It is important to continue to ensure that the columns all line up in their values as before.

Stage 7 (Approx Year 6)

Continue with compact 'carrying' method using larger numbers and a range of decimal numbers.

Examples:

7986+5089+ 407 =

Approx: 8000 + 5100 + 400 = 13500

```
  7986
  5089
+  407
 13482
  1 1 2
```

2.09 + 16.7 + 58.67

Approx: 2 + 17 + 60 = 79

```
  58.67
  16.70
+  2.09
  77.46
  1 1 1
```

Subtraction

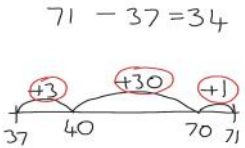
By the **end of year 2** children need to know all the subtraction facts up to and including 20.

Stage 4 (Approx Year 3)

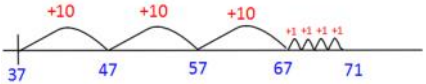
Use an empty number line for counting back, encouraging fewer jumps.

346-123 =

Use a **number line** to **'find the difference'** by counting on:

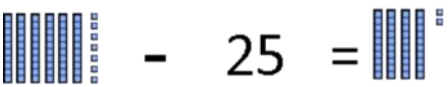


or

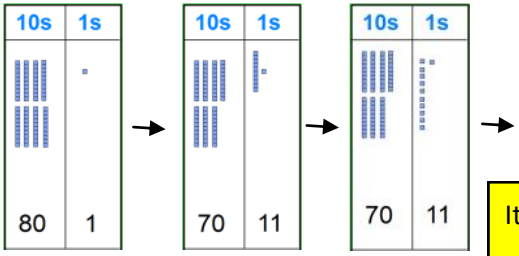


Progress to setting out **column subtraction** without exchanging a 10 (**decomposition)**, partitioning the tens and units and then combining:

e.g. 67= 60 7
- 25= 20 5
40 + 2 = 42



Practical exchanging progressing to expanded written method e.g. 81—57



80 1 = 70 11
-50 7 = - 50 7
20 + 4 = 24

It is important that the children are exchanging a '10' for 10 units and **not** borrowing a '10'.

Subtraction

Stage 5 (Approx Year 4)

- Continue using a number line for counting back in fewer steps eg; multiples of 100 and multiples of 10.
- Develop and refine written methods to subtract 2 and 3 digit numbers e.g. 755 - 86

HTU		H	T	U	
755	=	700	50	5	
- 86	-		80	6	
		700	40	15	
	-		80	6	
		600	140	15	
	-		80	6	
		600	60	9	= 669

Progress to compact layout when children are confident that tens and hundreds are brought across .

H	T	U
$^{6}\cancel{7}$	$^{14}\cancel{5}$	$^{1}5$
-	8	6
6	6	9

Stage 6 (Approx Year 5)

When secure with place value and mental methods children will progress to larger and more complex numbers e.g thousands, hundreds, tens and units.

Stage 7 (Approx Year 6)

Continue with formal compact method.

Extend compact method to decimals, with up to 2 decimal places.
e.g. 24—0.21

- Find an approximate answer before calculating.
- Check answers by using inverse operation. Use addition to check a subtraction calculation.

e.g. 24 - 0.21 = 23.79 can be checked by adding 23.79 and 0.21 to ensure that it equals 24.

2	$^{3}\cancel{4}$	.	$^{9}\cancel{0}$	$^{1}0$
-	0	.	2	1
2	3	.	7	9

Multiplication

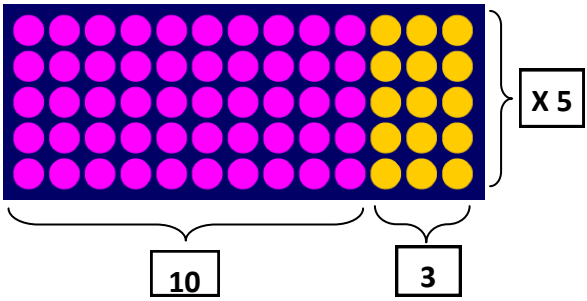
Stage 4 (Approx Year 3)

Learn by heart multiplication facts for the 2, 3, 4, 5, 8 and 10 times tables.

Continue Year 2 understanding of multiplication as **repeated** addition, an **array**, **scaling** – making something 3 times as long or 5 times higher.

Derive multiplications by a 'teens' number using arrays:

E.g. 13 x 5 = (10 x 5) + (3 x



Use informal written methods to support multiplying 2 digit numbers by a 1 digit number.

Examples:

23 x 2 =

23 = 20 + 3
23 x 2 = 20 x 2 = 40
3 x 2 = 6
Therefore: 40 + 6 = 46

36 x 5 =

36 = 30 + 6
36 x 5 = 30 x 5 = 150
6 x 5 = 30
Therefore: 150 + 30 = 180

Introduce grid method involving partitioning.

Example:

27 x 6 =

x	20	7
6	120 (6 x 20)	42 (6 x 7)

= 162

Once pupils have achieved an understanding of place value they will move onto an expanded form of vertical recording. (See right).

27
x 6
42 (7 x 6)
+ 120 (20 x 6)
162

Multiplication

Stage 5 (Approx Year *4)*

Know by heart multiplication facts up to 12 x 12.

Continue informal written methods to support multiplying 2 digit numbers by a 1 digit number and grid methods leading to expanded method (as stage 4)

Example: 346 x 9

Expanded method

```
  346
x   9
   54 (6 x 9)
+ 360 (40 x 9)
 2700 (300 x 9)
 3114
 1 1
```

Compact method

```
  346
x   9
 3114
 4 5
```

Stage 6 (Approx Year 5)

Extend writen methods to multiply TU x U, HTU x U and introduce decimal multiplication. The grid or expanded methods may still be used. Children will move onto long multiplication for TU x TU

Long multiplication:

```
   72
x  38
   16 (  2 x 8)
+ 560 ( 70 x 8)
   60 (  2 x 30)
 2100 (70 x 30)
 2736
  1
```

Stage 7 (Approx Year 6)

Use multiplication facts to 12 x 12 to derive related multiplication facts involving decimal numbers .

e.g. 6 x 3 = 18 therefore 0.6 x 3 = 1.8 and 6 x 0.3 = 1.8 etc.

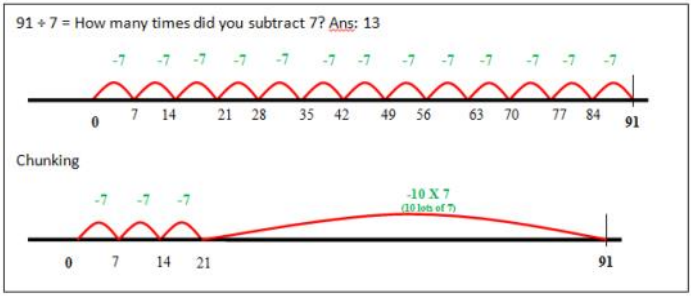
Continue with expanded layout and compact layout for written methods.

Extend to HTU x TU and decimals up to 2 decimal places.

Division

Stage 4 (Approx Year 3)

- Use practical and informal methods to divide a 2 digit number by a 1 digit number by using **repeated subtraction** on a number line moving to subtracting 'chunks'.



- Recall the corresponding division facts for the 2,3,4,5 and 10 times table.
- Round remainders up or down according to the word problem.

Example: 46 ÷5 = 9 r1
I have £46. Tickets cost £5 each and therefore I can only buy 9 tickets. The remainder is **rounded down.**

I have 46 cakes. One box holds 5 cakes therefore I will need 10 boxes. The remainder is rounded up.

- Divide whole numbers by 10 and 100. 80 ÷ 10 = 8 600 ÷ 100 = 6

Stage 5 (Approx Year 4)

Develop and use written methods to divide 2 digit numbers by a 1 digit number, including remainders. Children would use a repeated subtraction method, but 'chunk' groups together.

Example: 72 ÷ 5 = 14 r 2

$$
\begin{array}{r}
14\text{r}2 \\
5\overline{)72} \\
-\ 50 \quad (10 \times 5) \\
\hline
22 \\
-\ 20 \quad (4 \times 5) \\
\hline
2
\end{array}
$$

Once secure, this would then develop to a compact method.

$$
\begin{array}{r}
1\,4\ \text{r}\ 2 \\
5\overline{)7^{2}2}
\end{array}
$$

Division

Year 5:

Extend written methods to 3 digits by 1 digit by repeated subtraction or 'chunking'. The compact method is taught once the children are confident in using the repeated subtraction method or chunking method.

Example:

256 ÷ 7 =

```
  36 r 4
7|256
 210 (30 x 7)
  46
  42 (6 x 7)
   4
```


Compact method

```
   3 6 r 4
7 | 25⁴6
```

Year 6:

Continue with written compact method of division—see above method.

Extend written methods to HTU ÷ TU by repeated subtraction (chunking method). Children also use compact written methods for division of decimals.

Example:

972 ÷ 36 =

```
   27
36|972
 — 720 (20 x 36)
  252
 — 180 ( 5 x 36)
   72
 —  72
    0
```

Example: Division of decimals:

```
   1 4. 6 1
6 |8 ²7.³6 6
```

How can I help my child at home?

There are numerous ways in which you can help your child with maths at home. Detailed below are some suggested activities that you may find useful.

- Help your child to learn their times tables off by heart. Make times tables cards where answers have to be matched to the right question.
- Play games with your child. Many card games and board games use number skills like counting in order and working out who has the highest score (even word games like scrabble). Try bingo, Monopoly, Snakes & Ladders or Ludo. Perhaps even make your own board games, cards and counters.
- When you shop, talk about prices or add things up together as you go around. Talk about getting change when you pay for something. Discuss the special offers, how much do you really save?