Ellesmere Port Catholic High School

VERITAS ET SAPIENTIA

Numeracy Booklet

A Guide for Parents/carers and staff explaining how topics involving numbers are taught within EPCHS

ELLESMERE PORT CATHOLIC HIGH SCHOOL

Making Maths Count

Contents

Introduction

All teachers have a responsibility for promoting the development of Numeracy within their classrooms. To this end it is important that a consistent approach is adopted to teaching. Pupils often struggle to identify transferable skills between subjects, teaching in the same manner, with the same techniques will help this. It is important to clarify that we will promote and teach specific techniques, if a student has successfully learnt and mastered a viable alternative, then they should most certainly not be discouraged from using it.

What is 'numeracy', and why is it so important?

"Numeracy is a life skill. Being numerate goes beyond simply 'doing sums'; it means having the confidence and competence to use numbers and think mathematically in everyday life…"
http://www.nationalnumeracy.org.uk/what-is-numeracy/index.html

Having a good level of numeracy is essential if children are to make the best of all the opportunities available to them, both whilst at school and in their future lives. There are unfortunately too many shocking statistics that describe the serious consequences of having low levels of numeracy for young people and adults. At EPCHS we are committed to ensuring all children leave us with a love of mathematics, but also with the confidence to embrace any mathematical task they may face in their future.

We believe there are 3 essential factors needed in order for a child to become fully numerate:

1. The belief that they can be, and are good at Maths.
2. The belief that Maths is relevant for their everyday life.
3. Excellent teaching. Teaching that recognises and meets the needs of every pupil.

These points cannot be achieved without consistent support and encouragement from both home and school. This booklet provides some practical advice and support on how to achieve this consistency. We hope it is helpful.

Websites

There are a wide range of internet based resources available to support your child's mathematical development. Some of these are games and challenges, some of them are more revision or tutorial based activities.

Below are a few that we recommend:

- **Manga High** – lots of great games.
- **Coolmath4kids.com** – interactive games.
- **MathsZone at Woodlands school** – http://resources.woodlandsjunior.kent.sch.uk/maths/
- **BBC Bitesize** – academically focused with tutorials, revision resources and games http://www.bbc.co.uk/schools/ks3bitesize/
- **Maths Games** - http://www.maths-games.org/
- **MathsGames.com** - http://www.mathsgames.com/
- **Subtangent.com** – games, projects, worksheets and investigations – http://www.subtangent.com/maths/games.php

‘Everyday Maths’

As mentioned above it is essential that we encourage children to see mathematics as part of their everyday lives, not simply as a subject they do for 3 hours a week in a classroom at school! There are lots of ways this can be done. Below are a few ideas to get you started at home:

Shopping

Shopping is probably the most obvious example and the easiest to implement. There are endless opportunities for pupils to practice working out sale prices with percentages and fractions; adding up totals; working to a budget; understanding contracts (mobile phones); calculating change and comparing deals to work out the best value.

Cooking

The following activities contain an enormous amount of Maths: Weighing out ingredients; calculating amounts needed; using scales; estimating; following instructions and recipes; setting cooking times; using ratio to scale recipes up or down and understanding units of measurement.

Measuring and decorating

Any kind of building or decorating work at home may involve taking accurate measurements; using measuring instruments; understanding units; using ratio to mix things; calculating areas; solving word equations (e.g. the room is 7m long, each tile is 0.3m wide, how many do we need to buy?) and following or drawing scaled plans.

Booking a holiday

Involving your child in the process of booking a holiday would allow them interpret information from a table; read charts and graphs; calculate total costs; calculate flight times and time differences; convert between different currencies and compare offers to find the best value.

Going on a journey

Simple car journeys can be enhanced to involve reading maps; using scale; discussing compass directions; calculating time; calculating speed or petrol consumption and discussing the different units of distance.

Reading newspapers

Finally, everyday newspapers contain a wide variety of graphs, charts, averages and other statistical data. Simply asking children what these things tell us will help them practice a wide range of mathematical skills.

And there are lots more…!!

Games at home

Mathematical games are a great way for pupils to practice their skills in a relaxed atmosphere. It is especially good for those pupils who find maths practice a really stressful, panic-ridden time. Below are some suggestions:

- 'Connect 4' and Chess are great games to practice logical and strategic thinking.
- Playing 'Monopoly' allows pupils the chance to add and multiply money.
- There are lots of great card games that practice strategic thinking.
- Sudoku puzzles and Brain Teasers are fantastic for problem solving.
- Making up your own version of the number challenge on Countdown is an excellent way of practising key number skills.
- Speed Tables. Using a mixed multiplication grid is a good way to encourage your child to practice their Times Tables. The benefit being that they don't just follow the usual pattern of the table, but instead think about each one individually.
- 'Dominoes with a twist' is great for practicing multiples. You play dominoes in the usual way but also include some scoring. The aim is to get the end numbers to add up to any multiple of 3 and/or 5. Your score each time is how many multiples of 3 and 5 there are in the total of the last two numbers. For example if the last two numbers were 6 and 4 you would score 2 (as these add up to 10 and there are 2 multiples of 5 in 10)
- Bingo – a game requiring at least 2 players and a 'caller'. Agree on a range of values, for example 10-30. The players then pick 4 numbers within that range and write them down. The 'caller' asks questions and the answers are crossed off by the players in each case if they have them. The winner is the first person to have all of their numbers crossed off.

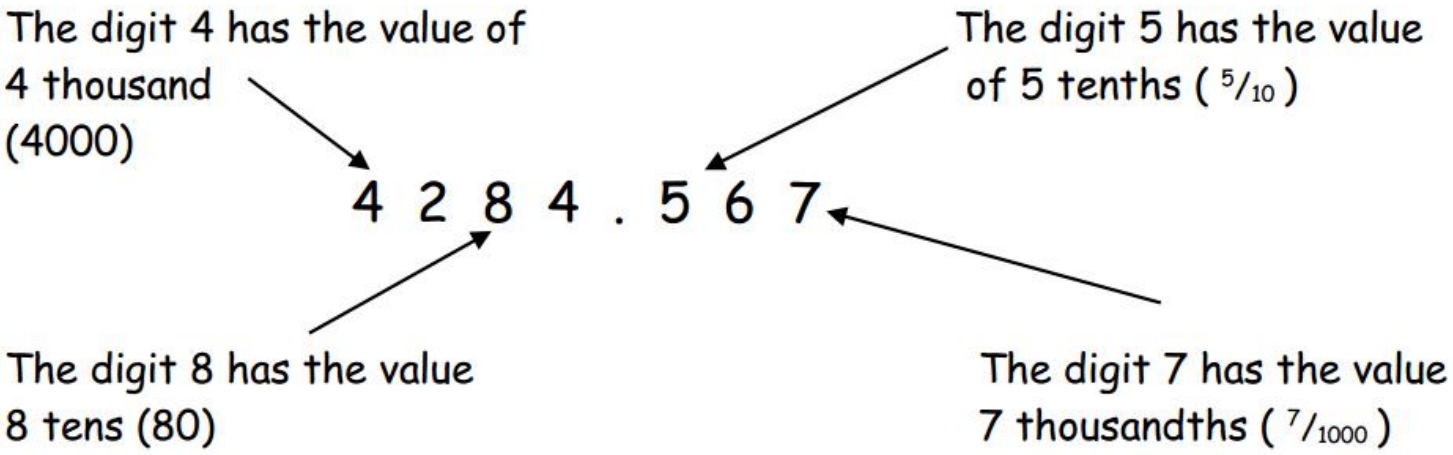
Happy Puzzling!

Place value, multiplying and dividing by 10, 100, 1000

Millions	Hundreds of Thousands	Tens of Thousands	Thousands	Hundreds	Tens	Units	Decimal Point	Tenths	Hundredths
M	HTh	TTh	T	H	T	U	.	t	h
1 000 000	100 000	10 000	1 000	100	10	1	.	$\frac{1}{10}$	$\frac{1}{100}$

10 units = 1 ten
10 tens = 1 hundred
10 hundreds = 1 thousand

10 thousandths = 1 hundredth
10 hundredths = 1 tenth
10 tenths = 1 unit



The placement of the digits within the number gives us the value of that digit.

Eg.1 46 × 100 = 4 600

Th	H	T	U
		4	6
4	6	0	0

The same method is used for decimals. Eg. $5.34 \times 10 = 53.4$

H	T	U	.	t	h
		5	.	3	4
	5	3	.	4	

Empty spaces after the last digit to the left are not filled with zeros. The place value of numbers is not affected by these spaces.

When dividing by 10 each digit is moved one place to the right, so making it smaller.

Eg.2 $350 \div 10 = 35$

H	T	U	.	t	h
3	5	0	.		
	3	5	.		

Eg.3 $53 \div 100 = 5.34$

H	T	U	.	t	h
	5	3	.		
		0	.	5	3

When the calculation results in a decimal the units column must be filled with a zero to maintain the place value of the numbers.

Addition and subtraction

EPCHS will promote the use of column method for addition and subtraction. Pupils are encouraged to set out their working neatly. The most common error is that pupils fail to line up their columns and decimal points correctly.

Addition

Eg.1 Calculate 12.5 + 6.12

$$\begin{array}{r} 1\ \ 2.5 \\ +\ \ \ \ \\ \hline 6.1\ \ 2 \\ \hline 7\ \ 3.7 \end{array}$$ ✗

$$\begin{array}{r} 12.50 \\ +\ \ \ \ \\ \hline 06.12 \\ \hline 18.62 \end{array}$$ ✓

Note: When adding or subtracting decimals, figures with the same place value must be in line with each other. Zeros can be added in to help pupils line up and consequently answer question correctly.

Eg.2 How much does it cost altogether for a book costing £6.68 and a math's set at £12.43?

$$\begin{array}{r} +\ \ 6.68 \\ 12.43 \\ \hline 19.11 \\ \ \ 1\ \ 1 \end{array}$$

It would cost £19.11 altogether.

Note: We put the carry on figure underneath the line.

Subtraction

Eg. What is the difference between £16.79 and £13.85?

$$\begin{array}{r} \ \ \ \ \ \ 5 \\ 1\not{6}.{}^{1}79 \\ -\ 13.85 \\ \hline 02.94 \end{array}$$

The difference in price is £2.94

Note : Communicate your final answer using appropriate units.

Multiplication

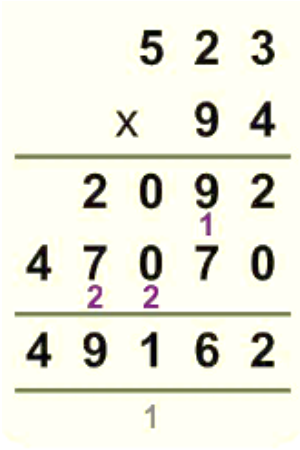
Eg. 1 **Grid Method** **26 × 158 = 4108**

X	20	6
100	2000	600
50	1000	300
8	160	48

2000 + 1000 + 160 + 600 + 300 + 48 = 4108

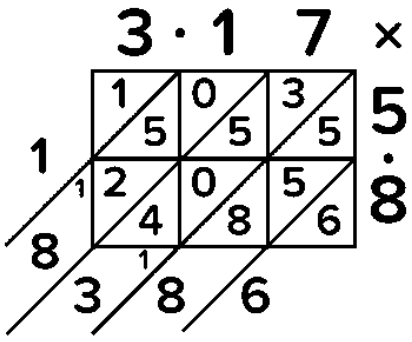
Note : the most common mistake is to leave off a zero when multiplying 100 x 20

Eg. 2 **Long Multiplication** **523 × 94 = 49162**



Eg. 3 **Chinese Multiplication** **3.17 × 5.8 = 18.386**

There are three digits followed by 2 digits, so our grid must be 3 columns and two rows.



Multiply each column number by each row number to for the grid. Add the numbers in each lane, carrying over any 10s into the next lane.

Count the numbers behind a decimal point in the sum, here there are three, so from the left count three digits in and put in the decimal point.

Note : this is a very quick and efficient method when mastered.

Division

Pupils will not be able to divide if they are not confident with their times tables.

Again we must be encouraged pupils to learn tables. It is always a good idea to estimate your answer.

Eg. Tony is paid £44.94 for working 7 hours. How much does he earn each hour?

$$7 \overline{)\, {}^{4}4\,.\,{}^{2}9^{1}4000} \quad = 06.42\_\_\_$$

Tony earns £6.42 each hour.

Note: when using Short Division:

1. *Get in the habit of adding 3 zeros to any sum to help us with any remainders later. We may need them, we may not.*
2. *How many times does 7 go into 4, answer none.*
3. *Carry the 4, how many times does 7 go into 44. Answer is 6, carry the remainder 2.*
4. *How many times does 7 go into 29, answer 4 remainder 1, carry the one. Note we have passed the decimal point, so that must be put on our anwer line.*
5. *How many times does 7 go into 14, answer 2, no remainder.*
6. *The sum is complete.*

Even Numbers

2, 4, 6, 8, 10, 12, 14, 16, 18, 20, …….

2 divides exactly into every even number.

Odd Numbers

1 ,3, 5, 7, 9, 11, 13, 15, 17, 19, ……..

2 doesn't divide exactly into odd numbers.

Prime numbers

A prime number has exactly two factors namely 1 and itself.

The factors of 17 are 1 and 17, therefore 17 is a prime number.

The prime numbers between 1 and 100 are:

2, 3, 5, 7, 11, 13, 17, 19, 23,29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, 97

Note: 1 is not a prime number!

Square numbers

$$1^2 = 1 \times 1 = 1$$

$$2^2 = 2 \times 2 = 4$$

$$3^2 = 3 \times 3 = 9$$

The first 10 square numbers are: 1, 4, 9, 16, 25, 36, 49, 64, 81, 100

Cube numbers

$$1^3 = 1 \times 1 \times 1 = 1$$

$$2^3 = 2 \times 2 \times 2 = 8$$

$$3^3 = 3 \times 3 \times 3 = 27$$

The first 5 cube numbers are: 1, 8, 27, 64, 125

Factors

A factor is a number that divides exactly into another number.

The factors of 12 are: 1, 2, 3, 4, 6, 12

The factors of 13 are: 1 and 13.

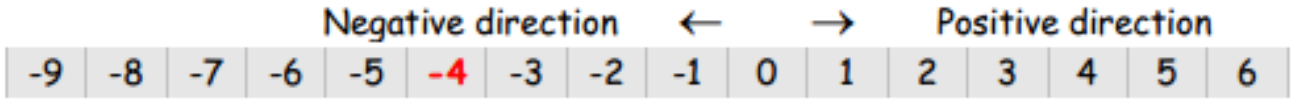
Multiples

Multiples are what we get after multiplying the number by an integer (whole number).

The multiples of 4 are: ……. , -12, -8, -4, 0, 4, 8, 12, 16, …….

Directed Numbers

The negative sign (-) tells us the number is below zero e.g. -4. The number line is useful when working with negative numbers. Below is a part of the number line.



The numbers on the right are greater than the numbers on the left e.g. 5 is greater than 2 and 2 is greater than -3. Note that -3 is greater than -8.

Adding and subtracting directed numbers

Rules: Start at the first number in the calculation

\+ means you are going up the number line

\- means you are going down the number line

Double signs

$+- = -$ e.g $4 + -3 = 4 - 3, \quad -6 + -2 = -6 - 2$

(– in front of 6 doesn't change as it is on its own)

$-- = +$ e.g $4 - -3 = 4 + 3, \quad -6 - -2 = -6 + 2$

Multiplying and dividing directed numbers

We multiply and divide directed numbers in the usual way whilst remembering these very important rules:

Two signs the same, a positive answer.

Two different signs, a negative answer.

×	+	−
+	+	−
−	−	+

÷	+	−
+	+	−
−	−	+

Remember, if there is no sign before the number, it is positive.

Examples:

$5 \times -7 = -35$ (different signs give a negative answer)

$-4 \times -8 = 32$ (two signs the same give a positive answer)

$48 \div -6 = -8$ (different signs give a negative answer)

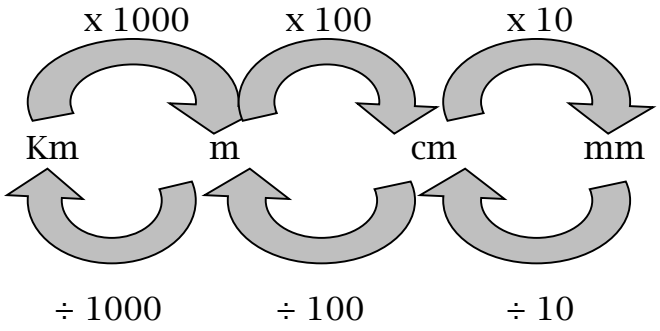
$-120 \div -10 = 12$ (two signs the same give a positive answer)

Units of measurement

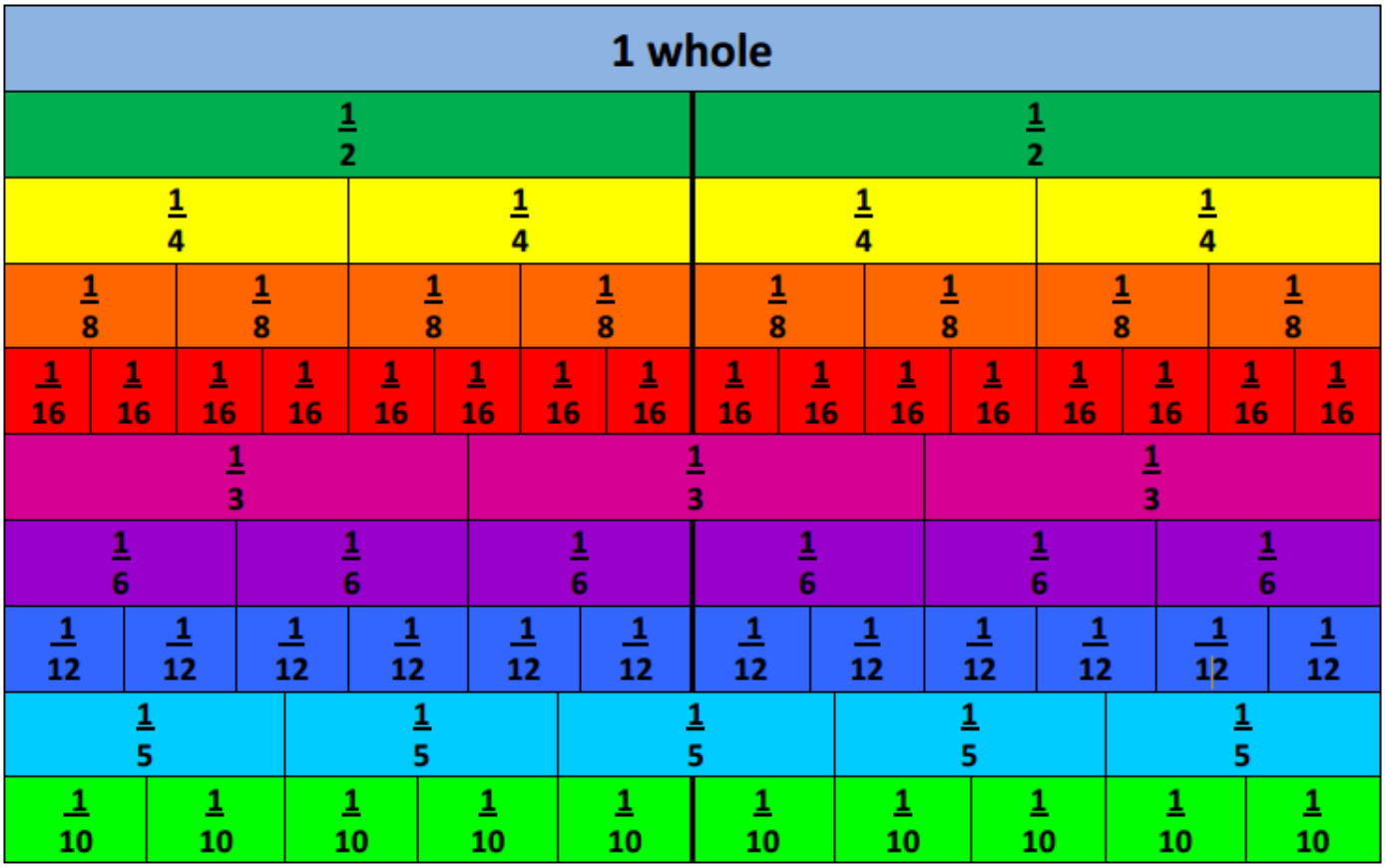
The following units and conversions should be learnt by all.

Length	Weight	Volume
10mm = 1cm	100ml = 1 litre	1000mg = 1g
100cm = 1m	100 centilitres = 1 litre	1000g = 1 kg
1000m = 1km	1000cm³ = 1 litre	1000kg = 1 tonne

The following diagram can help when converting between units of length:



Fraction Wall



Times Table grid

X	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144