St Peter the Apostle High School

A Curriculum for Excellence:

Numeracy Booklet

A Guide for Parents

Dear Parents/Guardian,

With the introduction of a Curriculum for Excellence it has been explicitly stated that:

All teachers have responsibility for promoting the development of numeracy. With an increased emphasis upon numeracy for all young people, teachers will need to plan to revisit and consolidate numeracy skills throughout schooling.

Our school, working with our partners, will develop strategies to ensure that all children and young people develop high levels of numeracy skills through their learning across the curriculum. These strategies will be built upon a shared understanding amongst staff of how children and young people progress in numeracy and of good learning and teaching in numeracy. These strategies will be built upon in the coming years and will become a key feature of your child's learning.

One of the major concerns for a parent is how you can help your child improve their numeracy at home. The primary purpose of this booklet is to provide parents with some examples of how and where your child will meet each mathematical concept. We have also tried to include examples of setting out where appropriate. At the end of the booklet there are also some visual resources which may be used in class.

It is hoped that the information in this booklet will help you understand the way numeracy is taught to your child, making it easier for you to help with homework, and as a result improve their numerical ability.

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Tips for helping with homework

- ✓ Set aside a regularly scheduled time for your child to complete his/her homework
- ✓ Provide a quiet environment for your child to work
- ✓ Be positive about your child's efforts
- ✓ Offer clear guidance to help, not solutions
- ✓ Help your child explain what is being asked
- ✓ Point out real life applications of the problems

Websites

The following websites are good resources for both parents and pupils:

- www.sptamaths.co.uk
- www.mathsrevision.com
- www.bbc.co.uk/schools/bitesize
- www.bbc.co.uk/skillswise/
- www.mathsisfun.com
- www.mathplayground.com
- www.supermathsworld.com
- www.coolmath4kids.com
- www.mrbartonmaths.com
- www.mad4maths.com
- www.mathatube.com
- www.multiplication.com

Estimation and rounding

Second Level

I can use my knowledge of rounding to routinely estimate the answer to a problem then, after calculating, decide if my answer is reasonable, sharing my solution with others.

Experiences and Outcomes

- ✓ I can estimate height and length in cm, m, 1/2m, 1/10m
  e.g. length of pencil = 10cm, width of desk = 1/2m

- ✓ I can estimate small weights, small areas, small volumes
  e.g. bag of sugar = 1kg

- ✓ I can estimate areas in square metres, lengths in mm and m
  e.g. area of a blackboard = $4m^2$
  diameter of 1p = 15mm

Third Level

I can round a number using an appropriate degree of accuracy, having taken into account the context of the problem.

Experiences and Outcomes

- ✓ I can round any number to the nearest 10 or 100
  e.g. 347.5 is:
  348 (to nearest whole number);
  or 350 (to nearest ten);
  or 300 (to nearest hundred).

- ✓ I can round any number to 1 decimal place
  e.g. 7.51 is:
  7.5(to 1 decimal place);
  e.g. 8.96 is:
  9.0 (to 1 decimal place).

Make the Link

Craft and Design – Tolerance

Physics – Measuring error

Everyday Lives

In real life whether to round up or down often depends on the nature of the problem.

Example:

Seven friends wish to go to the airport by taxi. A taxi can carry five passengers, how many taxis are needed?

7÷5 = 1.4 , to the nearest whole number this rounds to 1, but we would obviously need two taxis for everyone to get there.

- ✓ I can round any number to any number of decimal places
  e.g. 3.14159 is:
  3.142 (to 3 decimal places);
  or 3.14 (to 2 decimal places);

- ✓ I can round any number to any number of significant figures
  e.g. 245361 is:
  or 245400 to 4 sig figs
  or 245000 to 3 sig figs

Number place and value

Second Level

I have extended the range of whole numbers I can work with and having explored how decimal fractions are constructed, can explain the link between a digit, its place and its value.

Outcomes

- ✓ I can set out and solve sums involving decimal fractions

Remember

hundreds	tens	units	Decimal Point	tenths	hundredths
3	5	6	.	7	5

Example

Calculate:- 5.84 + 8 + 12.79.

Solution:

$$\begin{array}{r} 5.84 \\ 8.00 \\ +12.79 \\ \hline 26.63 \\ \hline \end{array}$$

Example

Calculate:- 83.79 – 57.684.

Solution:

$$\begin{array}{r} 7\ \ 1\ \ 8\ \ 1 \\ 8\not{3}.\ 7\ 9\not{0} \\ -\ 5\ 4.\ 6\ 8\ 4 \\ \hline 2\ 9.\ 1\ 0\ 6 \\ \hline \end{array}$$

Make the Link

Geography – Handling numerical data

Science – Scientists need a good grasp of decimals as they work in very exact numbers

Everyday Lives

Money is always calculated to 2 decimal places, take time to work out your change when paying for items.

Athletic races are most often measured to tenths and hundredths of seconds in order to decide a winner in a very close race.

Number processes

Second Level

Having determined which calculations are needed, I can solve problems involving whole numbers using a range of methods, sharing my approaches and solutions with others.

I have explored the contexts in which problems involving decimal fractions occur and can solve related problems using a variety of methods.

Outcomes

- ✓ I can determine which process to use to solve a problem
- ✓ I understand key words such as sum, difference, product and quotient

Third Level

I can use a variety of methods to solve number problems in familiar contexts, clearly communicating my processes and solutions.

I can continue to recall number facts quickly and use them accurately when making calculations.

Outcomes

- ✓ I know my timetables up to 12
- ✓ I can use BODMAS rules to solve problems

BODMAS – a mnemonic which helps pupils to know the correct sequence to carry out mathematical operations.

Brackets, **O**rder, **D**ivision, **M**ultiplication, **A**ddition, **S**ubtraction

Make the Link

Science – These particular skills are 'ubiquitous', which means they are found everywhere. Don't use a calculator, the more you practise the better you will become.

Everyday Lives

Marion, Jeff and Andrew each had different things for lunch. Their bills were £3.45, £4.27 and £2.90. They agreed just to share the total bill equally. How much did they each pay?

We total 3.45 + 4.97 + 2.90 = 10.62

To share among three

10.62 ÷3 = 3.54

Each person paid £3.54

Example

Calculate:- $4 + 70 \div 10 \times (1 + 2)^2 - 1$

Brackets: $4 + 70 \div 10 \times (3)^2 - 1$
Order: $4 + 70 \div 10 \times 9 - 1$
Division: $4 + 7 \times 9 - 1$
Multiplication: $4 + 63 - 1$
Addition: $67 - 1$
Subtraction: 66

Integers

Second Level

I can show my understanding of how the number line extends to include numbers less than zero and have investigated how these numbers occur and are used.

Outcomes

- ✓ I can show understanding of negative numbers in context
- ✓ I have looked at the most common uses of negative numbers

Examples

- To add two numbers on the number line, start at the first number and treat the second number as the instruction to move.

4 + 3, start at 4 and go up 3, ending at 7.
4 + (-3) start at four and go down 3, ending at 1.

- Subtracting a number is the same as adding the negative of the number.

4 – (-3) = 4 + 3, start at 4 and go up 3, ending at 7.
-4 – (-3) = -4 + 3, start at - 4 and go up 3, ending at -1.

Third Level

I can use my understanding of numbers less than zero to solve simple problems in context.

Outcomes

- I can add and subtract negative numbers
- I can multiply and divide negative numbers

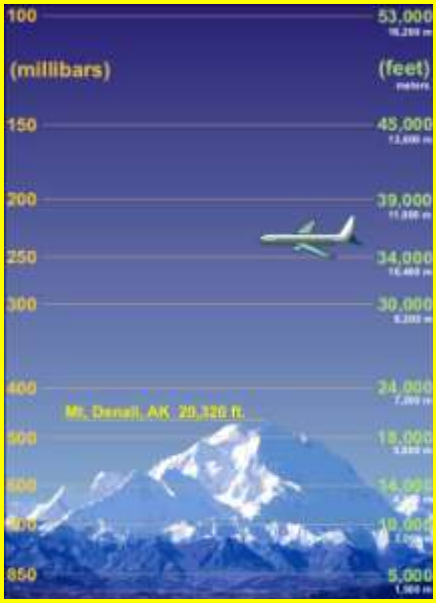
Make the Link

Geography – Using sea level as zero, latitude and longitude, time zones

P.E – Goal difference

Everyday Lives

All heights are measured from sea level. This is defined as halfway between high tide and low tide in the open ocean. The shores of the Dead Sea form one of the few pieces of land that is actually below sea level...its height is negative. As you walk towards the Dead Sea from sea level, your height drops by 3 metres for every kilometre you travel. After 20km you are 60m below sea level.



Rules

Whether multiplying or dividing:
If signs are the **same** the product / answer is **positive.**
If signs are **different** the product / answer is **negative.**

Example

The goal difference is important to a football team. Goals 'for' are considered positive and goals 'against' negative. We find the goal difference by adding the 'for' and 'against' scores.

Fractions, Decimals and Percentages

Second Level

I have investigated the everyday contexts in which simple fractions, percentages or decimal fractions are used and can carry out the necessary calculations to solve related problems.

I can show the equivalent forms of simple fractions, decimal fractions and percentages and can choose my preferred form when solving a problem, explaining my choice of method.

Outcomes

- ✓ I can use equivalent forms of a simple fraction

10%	1/10	0.1
20%	1/5	0.2
25%	¼	0.25
33 1/3%	1/3	0.33
50%	½	0.5
66 2/3%	2/3	0.66
75%	¾	0.75
100%	1	1

Third Level

I can solve problems by carrying out calculations with a wide range of fractions, decimal fractions and percentages, using my answers to make comparisons and informed choices for real-life situations.

I can show how quantities that are related can be increased or decreased proportionally and apply this to solve problems in everyday contexts.

Make the Link

Physics – Resistances in parallel require the use of fractions.

History – Egyptians only worked with fractions when building the pyramids and working out times.

Technical – Mixing cements and mortars requires ratios as does the making of alloys.

Everyday Lives

Ratios are needed to make sense of the gears on a bicycle. If the gear wheel at the pedal has 20 teeth and the gear wheel at the back wheel has 30 then the pedal has to turn 3 times to get the road wheel to turn twice. This is expressed in the ratio 3:2.

During the credit crunch an employer asked his workforce to take a 10% pay decrease this year. He said that he would make it up to them by giving them a 10% increase the next year.

Look at what happens to a £100 wage.

10% decrease: 10% of £100 = £10

- ➢ New wage £90

10% increase: 10% of £90 = £9

- ➢ New wage£99

Each employee loses out by £1 for every £100.

Outcomes

- ✓ I can find percentages with and without a calculator
- ✓ I can identify direct and inverse proportion

Examples

If 5 bananas cost 80 pence, then what do 3 bananas cost?
$5 \rightarrow 80$
$1 \rightarrow 80 \div 5 = 16$
$3 \rightarrow 16 \times 3 = 48$ pence

Measurement

Second Level

I can use the common units of measure, convert between related units of the metric system and carry out calculations when solving problems.

Outcomes

- ✓ I can change units of measure to suit the problem I am solving.
  e.g. 10cm = 0.1m
  e.g. Find the area of 

  80mm = 8cm
  A = l x b
  = 8 x 2
- ✓ I can convert units of measure
  e.g. $1cm^3$ = 1 ml
  e.g. 1km = 1000m
  e.g. 1 litre = 1000 ml

Second Level

I can explain how different methods can be used to find the perimeter and area of a simple 2D shape or volume of a simple 3D object.

Outcomes

- ✓ I can find the area of a square using 2 different formulae
  e.g. $A = L^2$ $A = L \times b$
- ✓ I can find the perimeter of any shape by adding together the length of each side.
- ✓ I can find the volume of a cube. e.g. $V=L^3$ $V=Lxbxh$
- ✓ I can find the volume of a prism. e.g. V=AH

Make the Link

Sport – The power generated by a sail on a yacht is a direct function of the area of the sail.

Physics – The law of flotation.

Everyday Lives

A tiler wants to cover a rectangular area in the kitchen with tiles.

The area is 262cm by 143cm. The tiles are 10cm by 10cm and come in boxes of 20. How many boxes should the tiler order?

Area to be covered:
$262 \times 143 = 37{,}466cm^2$
Area of one tile
$10 \times 10 = 100cm^2$
Number of tiles required:
$37\,466 \div 100 = 374.66$
so 375 tiles = 19 boxes ×

Before doing the calculations you must realise that when you have to cut a tile to fit, the material cut off is waste and will not be usable elsewhere.

Consider the rectangle
How many tiles in a row?
$262 \div 10 = 26.2$ tiles = 27 tiles
(remember to round up, if you need a bit of a tile you'll cut it from a whole tile)

Continued…

Measurement

Second Level

I can use my knowledge of familiar objects or places to assist me when making an estimate of measure.

Outcome

- ✓ I can make good estimates using prior knowledge
  e.g. my height is 1.5m so the door must be 2.5m

Third Level

I can solve practical problems by applying my knowledge of measure, choosing the appropriate units and degree of accuracy for the task and using a formula to calculate area or volume when required.

Outcomes

- ✓ I can combine my knowledge of area and find the area of a composite shape.
  e.g.

$A_1 = Lxb$

$A_2 = ½xbxh$

Total Area = $A_1 + A_2$

- ✓ I can create a scale drawing using an appropriate scale and units.

How many rows?
143 ÷ 10 = 14.3 rows = 15 rows
Tiles required: 15 x 27 = 405 tiles
How many boxes:
405 ÷ 20 = 20.25 = 21 boxes
The wrong method was 2 boxes short.

Make the Link

Geography – Map reading and scale drawing

Home Economics – Volume is a large factor when considering cooking times.

Everyday Lives

Make a scale drawing of a rectangular garden that is 10 metres wide by 14 metres long.

First you need to consider an appropriate scale. 1cm: 2m

Measurements in your drawing:

Length of garden = 14 ÷ 2 = 7cm

Width of garden = 10 ÷ 2 = 5cm

Scale: 1cm =

Money

Second Level

I can manage money, compare costs from different retailers, and determine what I can afford to buy.

Outcomes

- ✓ I can find prices for the same item from different shops.
- ✓ I can add costs together.
- ✓ I can decide if I have enough money to pay for the items.

Third Level

When considering how to spend my money, I can source, compare and contrast different contracts and services, discuss their advantages and disadvantages and explain which offer best value to me.

Outcomes

- ✓ I can look at differing contracts and decide which is best value for money.
- ✓ I can decide which service will give me more for my money.

Make the Link

Home economics,
Finance

Everyday Lives

In real life work out where to find the best value and calculate affordability.

Example:

David has £25 and wants to buy 2 new games. Asda is selling the games at £13.99 and Morrisons is selling the games at £11.99. Can David afford to buy the games and where from?

ASDA 2 x £13.99 = £27.98

Morrisons 2 x £11.99 = £23.98

David has £25 so he can afford to buy the 2 games in Morrisons.

Money

Second Level

I understand the costs, benefits and risks of using bank cards to purchase goods or obtain cash and realise that budgeting is important.

Outcomes

- ✓ I can make decisions on earning, spending and saving money.
- ✓ I can calculate the amount of money I have left over after I have purchased goods or services.
- ✓ I can weigh up the pros and cons of borrowing and saving.

Third Level

I can budget effectively, making use of technology and other methods, to manage money and plan for the future.

Outcomes

- I can monitor the amount of money in my bank account using internet banking or by looking at my bank statement.
- I can budget and save for something I want in the future.

Make the Link

Maths
PSE

Everyday Lives

How to spend our money so it gives us the best value and use, can be a difficult decision.

Example:

Jack is 16 years old and has been given £100 as birthday presents from his family. He has had his eye on a new games console for the last 2 months; however, the console also costs £100. Jack must decide what to do with his money.

Should he:

- ✓ buy the console straight away spending all of his money.
- ✓ open a bank account where he will earn interest until he is sure what he wants to spend his money on.
- ✓ Keep the money in a locked box in his bedroom.

Time calculations

Second Level

I can use and interpret electronic and paper-based timetables and schedules to plan events and activities, and make time calculations as part of my planning.

I can carry out practical tasks and investigations involving timed events and can explain which unit of time would be most appropriate to use.

Using simple time periods, I can give a good estimate of how long a journey should take, based on my knowledge of the link between time, speed and distance.

Outcomes

- I can convert between the 12 and 24 hour clock
  e.g. 2327 = 11.27pm

- I can calculate duration in hours and minutes by counting up to the next hour then on to the required time.

Third Level

Using simple time periods, I can work out how long a journey will take, the speed travelled at or distance covered, using my knowledge of the link between time, speed and distance.

Outcomes

- I can convert between hours and minutes
  e.g. multiply by 60 for hours to minutes
- I can convert minutes to hours. e.g. divide by 60 for minutes into decimal of an hour

Make the Link

Physics – Velocity, Displacement & Time

Everyday Lives

Using the counting on method to find the duration of a journey

Example

How long is it from 0755 t0 0948?

0755 → o800 → 0900 → 0948

(5 min) + (1 hr) + (48 min)

Total time 1hr 53 minutes

Ideas of chance and uncertainty

Second Level

I can conduct simple experiments involving chance and communicate my predictions and findings using the vocabulary of probability

Outcomes

- ✓ I can predict the chance of events occurring
  e.g. There is an equal chance of a coin landing heads up or tails up when it is tossed
  e.g. There is a one in six chance of rolling a four on a dice

- ✓ I can understand how chance is used in real life
  e.g. A coin is tossed to decide which of two decisions to take
  e.g. The weather forecast states there is a 25% chance of rain

Third Level

I can find the probability of a single event happening and explain why the consequences of the event, as well as its probability, should be considered when making choices

Outcomes

- ✓ I can calculate the probability of an event happening
  e.g. The probability of rolling a 1 on a dice is 1/6
  e.g. The probability of picking a heart from a pack of cards is 13/52 (which is ¼)
  e.g. The probability of choosing a vowel, if a letter is chosen at random, from the word CHOCOLATE is 4/9

Make the Link

Geography - the chance of rain is often given as a percentage - 'there is a 50% chance of rain today'

Everyday Lives

Thinking about going to a casino to play roulette? Before you go you should know that the casino is much more likely to win than you.

The roulette wheel is divided into 38 numbered slots. 2 of these are green, 18 are red and 18 are black. To begin the round, the wheel is spun and a ball is dropped onto its outside edge. When the wheel stops the ball drops into one of the 38 slots. If you choose green the chance of winning is 2 in 38, however, the chance of the casino winning are 36 in 38.

Both you and the casino are gambling, playing the odds, but the odds that the casino owner will win are far greater than the odds that you will. The mathematics of the game guarantees that the casino will make money even if they don't win every time.

- ✓ I can find the probability of an event **not** happening if I know the probability of it happening
  e.g. The probability of **not** rolling a 1 on a dice is 1 – 1/6 = 5/6
  e.g. The probability of **not** picking a heart from a pack of cards is 1 – 13/52 = 39/52 (which is ¾)

- ✓ I can calculate how often I would expect an event to happen, if I know the probability of it happening
  e.g. If a coin is tossed 300 times, I would expect heads to come up 300 x ½ = 150 times
  e.g. If a dice is rolled 300 times, I would expect a 1 to be rolled 300 x 1/6 = 50 times

Probability can be written as a fraction or a decimal or a percentage

e.g. ¼ or 0.25 or 25%

Data analysis

Second Level

Having discussed the variety of ways and range or media used to present data, I can interpret and draw conclusions from the information displayed, recognising that the presentation might be misleading.

I have carried out investigations and surveys, devising and using a variety of methods to gather information and have worked with others to collate, organise and communicate the results in an appropriate way.

Third Level

I can work collaboratively and independently, making use of technology to source information presented in a range of ways, interpret what it conveys and discuss whether I believe the information to be robust, vague or misleading.

Outcomes

- ✓ I can draw bar and line graphs following the criteria below :-
  - use a pencil and ruler
  - give the graph a title
  - label the axes / bars (in centre of bar)
  - choose an appropriate scale for axes to fit the paper
  - number the lines **not** the spaces
  - plot the points neatly
  - fit a suitable line (line graph)
  - leave spaces between bars (bar chart)
- ✓ I can draw pie charts following the criteria below –
  - use a pencil
  - label all slices or insert a key
  - give the pie chart a title
- ✓ I can interpret information from graphs and other sources.

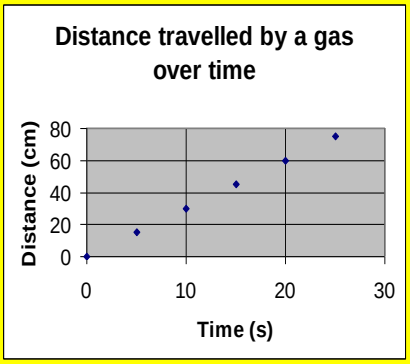
Make the Link

Science – introductory topic investigations

Everyday Lives

Listening to daily news and reading articles in newspapers and magazines. e.g.- general election, campaign statistics.

Line Graph



Bar Chart

Pie Chart