## Helping with Maths Guide

A helpful book of Mathematics strategies and hints.


## Kinross Primary School



## A note for parents:

The maths work your child is doing at school may look very different to the kinds of 'sums' you remember. This guide has been designed to help both students and parents to better understand the range of calculation methods taught in classrooms today. We educate and expose children to a variety of methods and encourage them to use mental strategies rather than the formal sums taught years ago. While formal and written methods have been explained in this guide, they should be used when students cannot use a mental method and only used if they possess the place value understandings to complete them confidently.

We have only included a sample of calculation strategies in this guide. As calculations get more complex, children may use a variety of other, more complicated strategies which we have not included. Ask your child to explain any methods they are learning in class. If you would like further support or clarification on certain methods, we have included some links to useful video guides at the back of this booklet or speak to your child's classroom teacher.

Thank you for your cooperation in best supporting students with their home practise in Mathematics.

KPS Staff and Administration

## Ways to approach problem solving:

## 1. Underline key words

2. Decide which operation:

$$
+-x \text { or } \div
$$

3. Can I do this in my head or do I need a written method?

## 4. Estimate


5. Calculate using either a mental, written or calculator method.
6. Check. Is my answer sensible?

## Times Tables

|  | 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 |

KNOW YOUR TABLES: Times tables are important for many different areas of Maths. Practise your tables every day to improve speed, accuracy and confidence!

## Addition

The complexity of the methods increases throughout the examples below. If your child is struggling with a particular method, you can practise with some of the previous methods.

## Example

## $2+3=$

At a party, I eat 2 cakes and my friend eats 3 cakes. How many cakes did we eat altogether?

$7+4=$
7 people are on a bus. 4 more people get on at the next stop. How many people are on the bus now?
$7+3=10$
$10+1=11$
$47+25=$
My sunflower is 47 cm tall. It grows another 25 cm . How tall is it now?

or


## Calculation Method

## Visual Method

Encourage your child to draw a picture and/or use physical objects to model the process of adding.

As children become more confident, they can draw dots or tally marks to represent the items they are adding.

## Looking for patterns/number facts

Encourage your child to use their understanding of number facts/bonds to help. For example, in this example, using number bonds to 10 will help.

## Number Lines

Drawing an empty number line helps children to record the steps they have taken in a calculation (start on $47+20$, then + 5)
This is much more efficient than counting on in ones.

## Example

$42+32=$
John has 42 smarties and Kevin has 32. How many do they have altogether?
$40=40+2$
$32=30+2$
$40+30=70$
$42+30+2=74$
$2+2=4 \quad$ or
$70+4=74$

## Partitioning-Jottings

Partitioning is the 'breaking up' of numbers into their place values, e.g. $126=100+20+6$.

Children are taught partitioning strategies to help them solve addition problems. They might record jottings down to support their thinking. Eventually, this will lead to mental calculation.

## Using money and partitioning to add decimals

Money and measurement questions can also be solved by using partitioning strategies.

Decimals are always best taught in the context of money and measurement when first introduced to children.

## Vertical Method/Formal Algorithm

This method relies on an understanding of place value and partitioning.

Children should only use this method when they are successful and confident with partitioning and mental addition methods.

This method can be extended to add larger numbers and eventually decimal numbers.

It is important that the numbers are placed in the correct position, i.e. the ones under the ones, the tens and under the tens etc.
5) We get the answer 123 .

## Subtraction

# Children are taught to understand subtraction as taking away (counting back) or finding the difference (counting up). 

Example

5-2
I had five balloons. Two burst. How many did I have left?
Here we take away to find the answer.


Calculation Method

Visual Method
Encourage your child to draw a picture and/or use physical objects to model the process of subtracting.

As children become more confident, they can draw dots or tally marks to represent the items they are subtracting.

## Number Lines

Drawing an empty number line helps children to record the steps they have taken in a calculation (start on 84-20, then-7)

This is much more efficient than counting back in ones.

Alternatively, children could count on from the smaller number to the larger number. This could be used in the example to the left to check our answer from above.

## Example

196-65 =
$190-60=130$
$6-5=1$
$130+1=131$

## Or

$196-60=136$
$136-5=131$

158-34
158

| $-\quad 34$ |
| :--- |

124
Steps:

1) Always start from the ones digit:
$8-4=4$
2) Move onto the tens numbers-$5-3=2$ (It is really $50-30=20$ )
3) Then move onto the hundreds numbers-1-0 = 1 (It is really $100-0=100$ )
$241-35=$
31
241

| $-\quad 35$ |
| :--- |

206
Steps:

1) Always start from the ones digit: 1-5. As 1 is less than 5, we need to borrow ' 10 ' from the tens column.
2) 4 (40), then becomes 3 (30). The 10 we have borrowed gets added to the ones column to make 11.
3) $11-5=6$
4) $3-3=0$ or $30-30=0$
5) $2-0=2$ or $200-0=200$

## Calculation Method

## Partitioning—Jottings

Partitioning is the 'breaking up' of numbers into their place values, e.g. 126=100 + 20 + 6.

Children are taught partitioning strategies to help them solve subtraction problems. They might record jottings down to support their thinking. Eventually, this will lead to mental calculation.

The same method can be used to subtract decimal numbers.

## Vertical Method/Formal Algorithm

## No borrowing

This method relies on an understanding of place value and partitioning. Children should only use this method when they are successful and confident with partitioning and mental addition methods.

This method can be extended to add larger numbers and eventually decimal numbers.

It is important that the numbers are placed in the correct position, i.e. the ones under the ones, the tens and under the tens etc.

## Vertical Method/Formal Algorithm

## With borrowing

This method relies on an understanding of place value and partitioning. Children should only use this method when they are successful and confident with partitioning and mental addition methods.

This method can be extended to add larger numbers and eventually decimal numbers.

It is important that the numbers are placed in the correct position, i.e. the ones under the ones, the tens and under the tens etc.

## Multiplication

# Children are taught to understand multiplication as repeated addition and arrays. 

# Times table and basic facts are also important when multiplying. 

Example

## $2 \times 4=$

Each child has two eyes. How many eyes do four children have?

$5 \times 3=$
There are 5 cakes in a box. How many cakes in 3 boxes?

$3 \times 12=$
$3 \times 6=18$
$18 \times 2=36$

Calculation Method

## Visual Method

Encourage your child to draw a picture and/or use physical objects to model the process of subtracting.

As children become more confident, they can draw dots or tally marks to represent the items they are subtracting.

## Number Lines

Drawing an empty number line helps children to record the steps they have taken when doing repeated addition.

Children are encouraged to skip count (e.g. in 5 s) rather than counting in ones.

## Use Known Number Facts

Sometimes we can use other number facts to help us solve calculations.

In this case, we can use halving and doubling facts to help us. If we don't know our 12 times tables, we can work out $3 \times 6$ then double the answer.

## Arrays

Drawing an array allows children to visualise the answer.

It also helps them develop their understanding that $4 \times 3$ is the same as $3 \times 4$.

## Example

## $13 \times 7=$


$10 \times 7=70, \quad 3 \times 7=21, \quad 70+21=91$
$6 \times 124=$

| $x$ | 100 | 20 | 4 |
| :--- | :--- | :--- | :--- |
| 6 | 600 | 120 | 24 |

$600+120+24=744$
$23 \times 156=$

| $x$ | 100 | 50 | 6 |
| :---: | :---: | :---: | :---: |
| 20 | 2000 | 1000 | $120=3320$ |
| 3 | 300 | 150 | $18=458+$ |
| 3778 |  |  |  |

## $31 \times 5=$

31
$\begin{array}{r}\times \quad 5 \\ \hline\end{array}$
155
$24 \times 31=$
1
$24 \quad 1 \times 4=4$
$\times 311 \times 2=2$
$2430 \times 4=120$ (carry the 1)
$72030 \times 20=600+120=720$
$720+24=744$

Partitioning—Number Lines
As children become more confident, it is not efficient to use repeated addition to multiply. Now we encourage partitioning to allow children to break the number up into more manageable chunks ( $10 \times 7$ and $3 \times 7$ )

## Partitioning-Grid Method

This method relies on children being able to partition numbers. After partitioning the numbers into the different parts (100, 20 and 4), each part is multiplied by 6 . these answers are then added together.

This method can also be used to multiply multi-digit numbers. Again, split up the numbers and multiply each part. Remember to add all the answers up at the end.

As children become more confident, they can also use this method to multiply decimal numbers. This time you will have some a whole numbers and some decimal numbers.

## Vertical Method/Formal Algorithm

This method is the most difficult.
Make sure you align the column from left to right, e.g. the ones are under the ones etc. Working from the ones column, multiply the 5 and the $1(5 \times 1)$. Then multiply the 5 and the 3 ( $5 \times 3$ or $5 \times 30$ ).

Children can use this method as they start to multiply larger numbers. It is important that they remember to keep the numbers in the correct column and carry any numbers if necessary. In this example we carry the 1 to represent 100 in 120. As children move from multiplying the ones to the tens, they need to add a ' 0 ' which acts as a place holder to indicate that we are multiplying tens numbers now.

## Division

# Children are taught to understand division as sharing, grouping or repeated subtraction. 

Example
$6 \div \mathbf{2}=$
6 apples are shared equally between 2 children. How many apples do they get each?

This example shows sharing between two.


There are 6 apples. How many children can have 2 each?

This example shows grouping in twos.

$28 \div 7=$

$35 \div 5=$
$5 \times \underline{7}=35$
$37 \div 5=$
$5 \times \underline{7}=35=5 r 2$

Calculation Method

Visual Method

Encourage your child to draw a picture and/ or use physical objects to model the process of division

As children become more confident, they can draw dots or tally marks to represent the items they are dividing.

Number Lines—Repeated Subtraction
Drawing an empty number line helps children to record the steps they have taken when doing repeated subtraction.

Children are encouraged to skip count (e.g. in $7 s)$ rather than counting in ones.

## Using Times Table Facts

Children can use their times table facts to solve division problems.

We can also use our times table to find remainders. In this example, there are 2 numbers left over so these are the remainders.

## Example

$84 \div 6=14$
$+60+24$


10 groups +4 groups $=14$ groups
182 $\div 7=26$
182

- $140(20 \times 7)$

42

- $42(6 \times 7)$

0
$20+6=26$ lots of 7.
$469 \div 2=$
234r1 400 divided by 2=200
$2 \longdiv { 4 6 9 } 6 0$ divided by 2=30
9 divided by $2=4$ with 1
remaining so $\mathbf{4 6 9} \div \mathbf{2}=\mathbf{2 3 4 r}$ 1
$428 \div 4=$
107
$4 \longdiv { 4 2 8 }$

## Calculation Method

## Number Lines - Chunking

When dividing larger numbers, it can useful to jump along a number line in 'chunks'. Children can use known number facts to count up in manageable 'chunks'.

## Vertical Method/Formal Algorithm

This method works by taking away 'chunks' of 7. First subtract 140 (20x7). You are left with 42. Then subtract $42(6 \times 7)$.

Altogether we subtracted 26 chunks of 7.
Occasionally there may be remainders.
Note: Your child may subtract 10 lots of 5 at once, rather than 20 lots of 5 and may include more steps. That is fine. As they become more confident, encourage them to look for quicker ways.

## Formal Algorithm

This method requires a good understanding of place value. Children start by working out how many times 2 can 'go into' 4 (or 400). As it is 2, the 2 represents 200 . They then see how many times it can 'go into' 6 (or 60) and finally 4.

Formal Algorithm - With Place Holders
Using the same method, see how many times the divisor (the number you are dividing by) goes into each digit (rather than each number).

4 (as in 400$) \div 4=1.2($ as in 20$) \div 4=$ You can't do it with whole numbers so we need to add a zero. The 2 carries over to the 8 to make $28 \div 4$ $=7$. This makes a total of 107.

## Useful Measurements

Capacity:
$\begin{array}{ll}1000 \text { millilitres }=1 \text { litre }(\mathrm{L}) & 1000 \text { grams }(\mathrm{g})=1 \text { kilogram (kg) } \\ 1000 \text { litres }=1 \text { kilolitre }(\mathrm{kL}) & 1000 \text { kilograms=1 tonne }(\mathrm{t})\end{array}$

Length:
10 millimetres $(\mathrm{mm})=1$ centimetre $(\mathrm{cm})$
1000 millimetres $=1$ metre $(\mathrm{m})$
100 centimetres $=1$ metre
1000 metres $=1$ kilometre (km)

Time:
60 seconds $=1$ minute $(\min ) \quad 12$ months $=1$ year
60 minutes $=1$ hour $(\mathrm{h}) \quad 10$ years $=1$ decade
24 hours $=1$ day 100 years $=1$ century
7 days $=1$ week
2 weeks $=1$ fortnight
365 days $=1$ year
366 days $=1$ leap year

## Useful Maths Language

Angles: Angles that are formed when 2 straight lines meet. Different sized angles have different names.
Acute Angles are angles smaller than 90 degrees
Right Angles are 90 degrees
Obtuse Angles are larger than 90 degrees but smaller than 180 degrees.
Reflex Angles are larger than 180 degrees but smaller than 360 degrees.
Revolution Angle is 360 degrees.
Capacity: the measure of the amount of liquid a container holds.
Equilateral Triangle: a triangle with sides of equal lengths and equal angles ( 60 degrees)
Factor: A factor is a whole number which will divide exactly into another whole number. E.g. 3 is a factor of 12
Isosceles Triangle: A triangle with 2 equal sides and 2 equal angles Mean: The average of a set of numbers or scores. To find the mean you add all of the scores and divide by the number of scores.
Median: When the data is arranged in order of size the median is the one in the middle.
Mode: Is the number which appears most frequently in a collection of data.
Multiple: Multiples of a given number are the product of that number and any other whole number greater than zero.
Eg 12 is a multiple of 3 as $3 \times 4=21$.
Prime Numbers: Numbers which will divide exactly only by themselves and 1.
Product: The answer when something has been multiplied.
Eg. The product of 3 and 4 is 12
Scalene Triangle: A triangle with no equal sides and no equal angles Square number : The total when a number is multiplied by itself.
E.g. $2 \times 2=4,3 \times 3=9$

## Counting Ideas

－Practice chanting the number names．Encourage your child to join in with you．When they are confident，try starting from different numbers－4，5，6 ．．．
－$\quad$ Sing number rhymes together－there are lots of commercial tapes and CDs available and YouTube is a fantastic resource！
－Give your child the opportunity to count a range of interesting objects （coins，pasta shapes，buttons etc．）Encourage them to touch and move each object as they count．
－Count things you cannot touch or see（this is more difficult），e．g．the lights on the ceiling，window panes，jumps，claps etc．
－Play games that involve counting（e．g．snakes and ladders，dice games，games that involve collecting objects etc）．
－Look for numerals／numbers in the environment．You can spot numerals at home，in the street or when out shopping．
－Cut out numerals／numbers from newspapers，magazines or birthday cards．Then help your child put the numbers in order．
－Make mistakes when chanting，counting or singing．Can your child spot what you have done wrong？
－Choose a number of the week，e．g．5：Practise counting to and on from 5，count in groups of 5，count groups of 5 objects，see how many places you can spot the numerals 5 etc．
－When your child has counted a collection of objects，ask them how many there are．Can they identify that the final number they counted equals the total number of the collection？
－When your child has counted a variety of objects，rearrange the objects．Do they understand that there are still the same number of objects，just in a different position or do they start and count again？
－When counting a group of objects，start counting from different positions．Do you always get the same answer？

## Real-Life Problems

- Go shopping with your child to buy two or three items. Ask them to work out the total amount spent and how much change they will get.
- Buy some items with a percentage discount. Help your child to calculate how much of the product is free.
- Plan an outing during the holidays. Ask your child to think about what time you need to set off and how much money you will need to take.
- Use a TV guide. Ask your child to work out the length of their favourite programmes. Can they calculate how long a TV show is on for, how long until the next show, how long they have spent watching TV in total etc.
- Use a bus or train timetable. Ask your child to work out how long a journey between two places should take. If you go on the journey , did it take as long as you thought? Was it longer/shorter?
- Help your child to scale a recipe up or down to feed the right amount of people.
- Work together to plan a meal or a party on a budget.

These are just a few ideas to give you a starting point. Try and involve your child in as many problemsolving activities as possible. The more 'real' a problem is, the more motivated they will be when trying to solve it.


## Practising Number Facts



- Find out which number facts your child is learning at school (addition facts to 10, times tables, doubles etc.) Try to practise for a few minutes each day using a range of vocabulary.
- Have a 'Fact of the Day'. Pin this fact around the house and practise reading it in a variety of voices every day. (e.g. in quiet/loud/squeaky voice etc.) Ask your child over the day if they can recall the fact.
- Play 'Ping Pong' to practise number bonds with your child. You say a number, they reply with the matching number to make the given number, e.g. when making number facts to 10 , you say 6 and they reply with 4. You can also play this game for number bonds to 20 , 100, 1000 etc. Encourage your child to answer quickly, rather than counting on their fingers.
- Throw two dice. Ask your child to find the total of the two numbers $(+)$, the difference (-) and the product (x). Can they work this out quickly without using their fingers?
- Use a set of playing cards (no pictures). Turn over two cards and ask your child to add or multiply the cards. If they get the answer correct, they keep the cards. How many cards can they collect in two minutes?
- Play 'Bingo' to practise a variety of number facts. Each player chooses 5 or so answers (e.g. number bonds to 10, multiples of 5 for the 5 times tables). Ask a question, if a player has the answer, they cross it off. First player to cross off all their answers wins.
- Give your child an answer. Ask them to write as many addition sentences as they can with this answer. Try with subtraction, multiplication or division.
- Give your child a number fact, (e.g. $5+3=8$ ). Ask them what else they can find out from this fact (e.g. $3+5=8,8-5=3,8-3=5,30+$ $50=80,300+500=800,5+4=9,15+3=18$ etc). Add to the list over the next few days. Can you reach a target by the end of the week, e.g 20 facts? You can try this for times table facts as well.


## Shapes and Measures



- Choose a shape of the week eg. cylinder. Look for this shape in the environment (tins, candles etc). Ask your child to describe the shape to you ( 2 circular faces, 2 curved edges etc).
- Play 'Guess My Shape'. You think of a shape. Your child asks you questions to try and identify it but you can only answer 'yes' or 'no',(e.g. Does it have more than 4 corners? Does it have any curved sides?)
- Hunt for right angles around your home. Can your child also spot angles bigger or smaller than a right angle?
- Look for symmetrical objects. Help your child to draw or paint symmetrical pictures/patterns.
- Make a model using boxes/containers of different shapes and sizes. Ask your child to describe the model. Can they draw it from where they are sitting?

Practise measuring the lengths or heights of objects (in metres or centimetres). Help your child to use different rulers and tape measures correctly. Encourage them to estimate before measuring.

- Let your child help with cooking at home. Help them to measure ingredients accurately using weighing scales or measuring jugs. Talk about what each division on the scale stands for.
- Choose some food items out of the cupboard. Try to put the objects in order of weight, by feel alone. Check by looking at the amounts on the packets.
- Practise telling the time with your child. Use both digital and analogue clocks. Ask your child to be a 'timekeeper' (e.g. tell me when it is half past four because then we are going swimming).

Use a stop clock to time how long it takes to do everyday tasks (e.g. how long does it take to get dressed?) Encourage your child to estimate the time first.

