Progression Leaflets

Renfrewshire Council

Renfrewshire Attainment Challenge

ADDITION STRATEGIES

Renfrewshire Attainment Challenge

Literacy, Numeracy, Health & Wellbeing

Renfrewshire Council

To demonstrate a depth of understanding of addition, children should be able to progress through and use a variety of strategies to solve problems and show working. Not be over reliant on one method.

Combining 2 collections

Once children can count one group of objects they can begin to combine two sets.

5 yellow flowers plus 3 orange flowers is 8 flowers altogether.

Counting on -screened collections

Roll 2 dice. Allow children to see both sets of numbers, then cover the larger number up.

I rolled a 5 and 2. I have covered the 5.

5,..6,7

This is a tricky concept! Children may initially drop back to counting from 1.

1,2,3,4,5, 6,7

Children can progress to using larger numbers within their counting range. However when using this 'counting on' strategy, the second number should be no larger than 6. E.g 32 +5 …32...33, 34,35,36,37

Regroup to make 5/10

This is an essential skill.
Using ten frames, start with the larger number and place that number of objects on the first ten frame. Now fill up that ten frame with the objects from the second set and then put the remaining objects on the next ten frame.

First I will fill in 6 white flowers on the ten frame. Then I will partition the 5 yellow flowers. I'll put 4 on to fill up the first ten frame. I still have 1 flower left so I will put that on the next ten frame. That makes 11 altogether!

Part-Part whole

Being able to see sets in numbers.

I see 5+5 is 10 and 8 more is 18

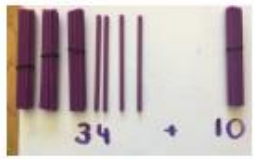
I can split 53 into 50 and 3

36 can be split into 20 +16

Adding 10/100 to 2/3 digit numbers

Using sticks or straws bundled in groups of 10s/1s and add 10/20/30 etc.

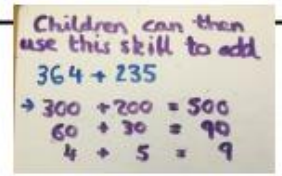
Progress to 100s/10s and 1s. 432 + 10/20/30 etc



Partition numbers in different ways

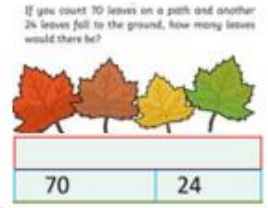
For children to partition they need to have a good understanding of place value –
37 is 30 + 7 or 3 tens + 7 ones

463 is 400 + 60 + 3 or 4 Hundreds + 6 tens + 3 ones



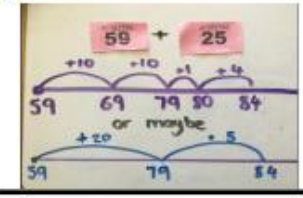
Bar Model

Bar models are a good method to help children solve word problems. They help children visualise what is happening.



Empty Number Line

This method can be used to solve addition and subtraction calculations. It is also an excellent strategy for solving problems involving time and money.



Formal algorithm

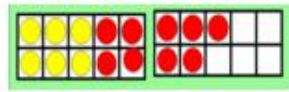
This should be the last strategy children learn for addition/ subtraction. Even when they fully understand how and why to use it, children should continue to be given lots of opportunities to use some of the other methods mentioned in this leaflet. The algorithm requires less mental agility than other strategies and children can become over reliant on this method.

$$\begin{array}{r} {\scriptstyle 11} \\ 489 \\ +\ 916 \\ \hline 1405 \end{array}$$

Decimals

All of the above methods for adding with whole numbers can be applied in the same way for addition with decimals. For some tasks, the whole ten frame can represent 1 and therefore each box would be one tenth.

6/10 +9/10 = 1 and 5/10



SUBTRACTION STRATEGIES

Renfrewshire Attainment Challenge

Literacy, Numeracy, Health & Wellbeing

Renfrewshire Council

To demonstrate a depth of understanding of subtraction children should be able to progress through and use a variety of strategies to solve problems and show working, not be over reliant on one.

Word sequences

Counting backwards in 1s/10s/100s from different starting points e.g., 23, 22, 21,20 or 51, 41, 31, 21. Depending on the stage of the child.

Taking away using real objects

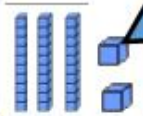
5 teddies in a shop. One gets sold. How many are left?

Subtracting 10/100 to 2/3 digit numbers

44– 10 =34

Cover the straws as you remove 10 and see if the child can visualise how many are left. Repeat for subtracting 20 etc.

Exchanging with concrete materials.



32—17. I can subtract a ten first. That leaves 22. Now I will need to exchange one of the ten blocks for 10 ones so that I can subtract the remaining 7.

Counting back to subtract using screens

Children can count back within their number range. When using this count back in ones strategy, the second number should be no more than 6

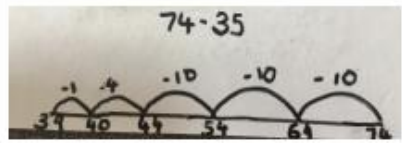
24 –5.
24…..23, 22, 21, 20,19

"9 teddies came for a picnic. 3 of them hid in a box. Count back to find out how many are left?"

9….8, 7, 6

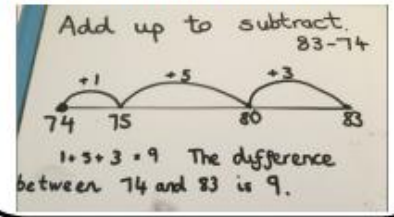
Empty Number Line

This method can be used to solve addition and subtraction calculations and it is also an excellent strategy for solving problems involving time and money.



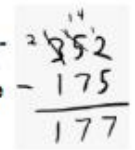
Count up to subtract

When children understand that subtraction can mean 'The difference between' then this is can be an efficient method for solving subtraction problems.



Formal algorithm

This should be last strategy children learn for subtraction with whole numbers. Even when they fully understand how and why to use it, children should continue to be given lots of opportunities to use the other methods mentioned in this leaflet. The algorithm requires less mental agility than other strategies and children can become over reliant on this.



Comparing numbers

It is crucial for children to explore subtraction by comparing sets and finding the difference between numbers.

The difference between 9 and 6 is 3

Part-Part whole

Being able to see that a whole number is made up of different parts. Children begin to understand that subtraction is the inverse of addition. Dominoes are an excellent resource for this.

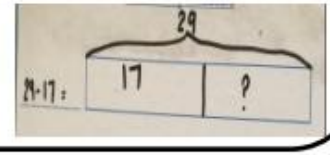
I see 5+3=8
and 3+5=8

So 8-3=5
and 8-5=3

Bar Model

Bar models are a good method to help children solve word problems.

There are 29 pupils in the class. 17 are boys . How many are girls?



Decimals

All of the above methods for subtraction with whole numbers can be applied in the same way for subtraction with decimals.

MULTIPLICATION STRATEGIES

Renfrewshire Attainment Challenge

Literacy, Numeracy, Health & Wellbeing

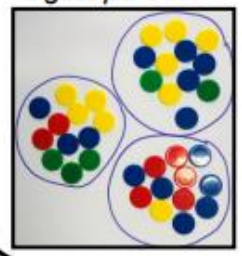
Renfrewshire Council

To demonstrate a depth of understanding of multiplication children should be able to progress through and confidently use a variety of strategies to solve problems and show working, and not be over reliant on one.

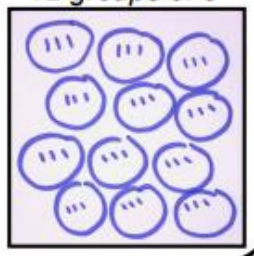
1. Groups Of

Use real items (sweets, counters, toys) and drawings as representations.

3 groups of 12



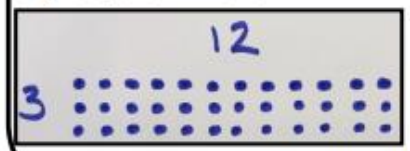
12 groups of 3

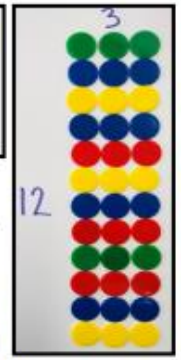


2. Arrays

Arrays are groups arranged in rows and columns in the shape of a rectangle. Always row x column.

3 groups of 12 or 3 x 12





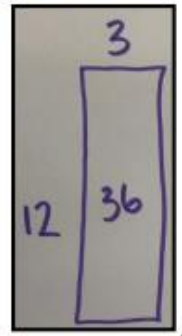
12 groups of 3 or 12 x 3

3. Area Model

Breadth (row from array) and length (column from array) multiply to find the area of the rectangle

3 x 12

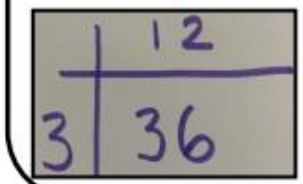
12 x 3



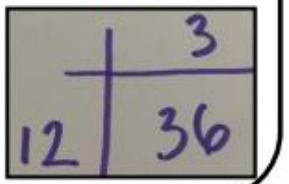
4. Grid

A progression from the Area model, and an informal way of writing or recording multiplication if a picture isn't needed.

3 x 12

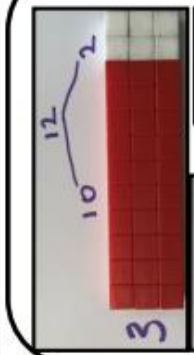


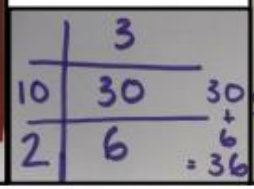
12 x 3

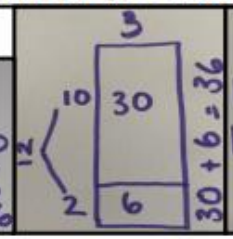


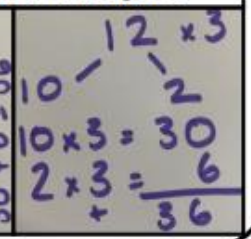
5. Partition

Being able to partition a number to make them easier to work with is very important, and can be done throughout the progression of strategies.



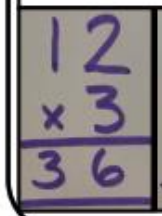


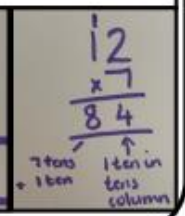




6. Formal Written

A true understanding of multiplication is demonstrated by confidently using a wide range of strategies. The formal written sum should only be used when confidence in the use of others has been achieved.





Skip Counting / Repeated Addition

Count or add in jumps of multiple. Can be done orally or written.

Times Tables

A good indicator for how well a child remembers multiplication facts, but not always how well they know how to multiply. Ask how they know the answer.

DIVISION STRATEGIES

Renfrewshire Attainment Challenge
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Renfrewshire Council

To demonstrate a depth of understanding of division children should be able to progress through and confidently use a variety of strategies to solve problems and show working, and not be over reliant on one.

1. Grouping

Use real items (sweets, counters, toys) and drawings as representations. Children should know the difference between **groups** and **groups of**.

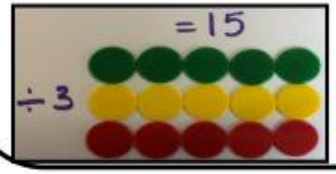
15 into 5 groups

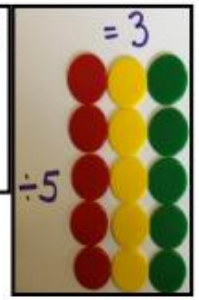
15 into groups of 5

2. Arrays

Arrays are groups arranged in rows and columns in the shape of a rectangle or square. Row = dividing by Colum = Answer

15 into 3 rows 15÷3=





15 into rows of 3

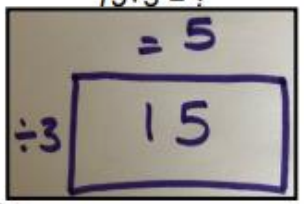
15 ÷?=3

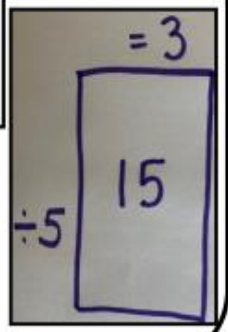
3. Area Model

Rows (breadth) and total amount (area) divide to find the answer of the rectangle or square.

15 ÷?=3

15÷3 = ?

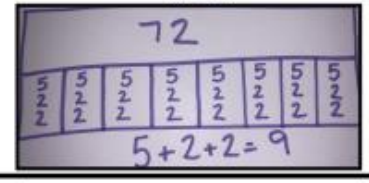




4. Bar Model

Dividing the whole amount into equal parts. Use things to physically share or their knowledge of addition/multiplication amongst the parts to solve.

72÷8

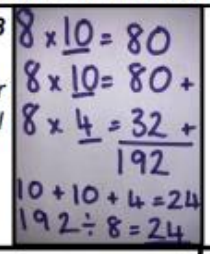


5. Partitioning in different ways

Being able to partition or change a number to make them easier to work with is very important. It can be done throughout the progression of strategies and when working with different numbers.

Multiplying Up 192÷8

Multiply up to a number within number dividing, continue until you reach the total amount then add the total times multiplied.



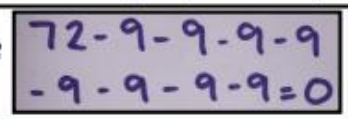
6. Formal Written

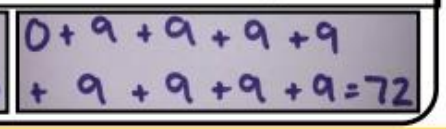
A true understanding of division is demonstrated by confidently using a wide range of strategies. The formal written sum should only be used when confidence in the use of others has been achieved.

Skip Counting / Repeated Addition

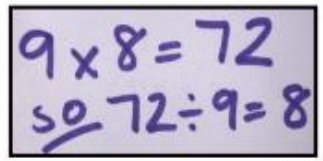
Count/subtract in jumps of multiple. Can be done orally or written.

72÷9=8





Times Tables



Renfrewshire Attainment Challenge

Literacy, Numeracy, Health & Wellbeing

FRACTIONS

Renfrewshire Council

EARLY LEVEL *"I can share out a group of items by making smaller groups and can split a whole object into smaller parts; I understand what a half means"*

Explore ***equal*** and ***unequal*** sharing of a set and understand what it means to have a '***fair share***'.

Split a whole into smaller parts to show that ***equal*** parts are the same size. Provide opportunities to ***half*** whole items.

Cutting, folding & colouring activities to explore how shapes can be halved in different ways; creating different shapes, but the size stays the same.

FIRST LEVEL *"I can show my understanding of how a single item can be shared equally; the notation and vocabulary associated with fractions and where simple fractions lie on the number line"*

Explore sharing an item or collection *fairly*– use materials or draw pictures to show that a single item can be shared into ***equal*** parts and each part is a ***fraction***.

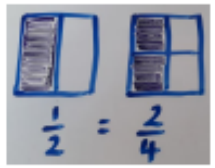
Make & identify ***halves***

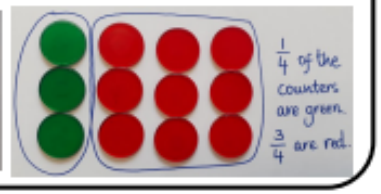
Make & identify ***quarters***

Make & identify ***tenths***

Make & identify ***fifths***

A quarter is half of a half.

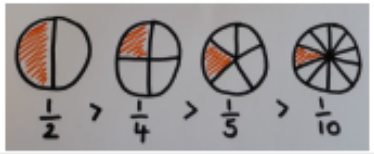




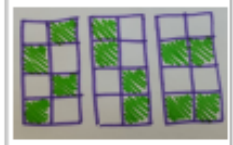
Cutting, folding, drawing and sorting activities will reinforce that ***the greater the number of equal parts, the smaller the size of the share***. It's important that we use multiple representations, fractions are not just about pizzas!

How many equal parts have you split the **whole into if you have split it into quarters?*

**How many quarters make a whole?*

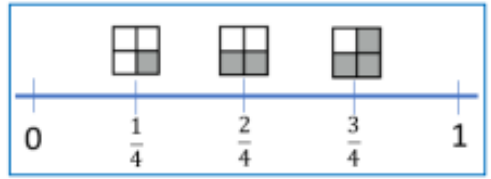


There are different ways to split shapes into equal parts.



one half

Counting on **and** back in fractions is an important skill. Use a counting stick to keep track and record counts on a number line.



Renfrewshire Attainment Challenge

FRACTIONS

Renfrewshire Council

SECOND LEVEL *"I have investigated the everyday contexts in which simple fractions are used and can carry out the necessary calculations to solve related problems"*

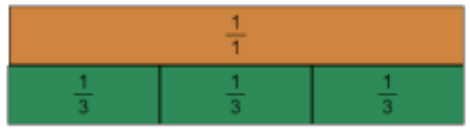
"I can create equivalent fractions and I can express fractions in their simplest form"

"I can use my knowledge of equivalent fractions to put a set of most commonly used fractions in order"

$\frac{1}{3}+\frac{1}{3}+\frac{1}{3}=\frac{3}{3}$

NUMERATOR—how many bits?

DENOMINATOR—how big are the bits?



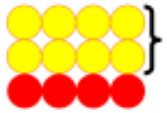
Fractions can be made by splitting an object into ***equal*** parts. This is the same as ***dividing.*** The ***denominator*** of the fraction is the number to ***divide*** by.

$\frac{1}{2}>\frac{1}{3}>\frac{1}{4}>\frac{1}{5}$

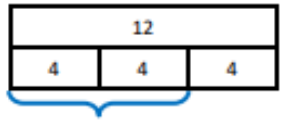
Compare *unit* fractions:

a bigger denominator = a smaller fraction

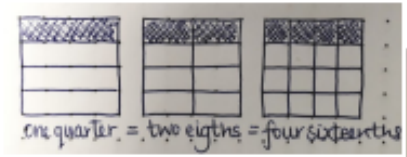
Non-unit fractions of quantities:

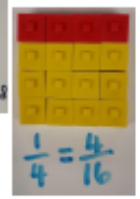


$\frac{2}{3}$ of 12 = 8

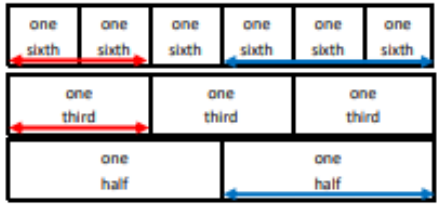


Use concrete materials and pictures to show ***equivalent fractions.***





Equivalent fractions are fractions that are ***equal in size***. When we ***simplify*** a fraction we find an equivalent fraction that is ***simpler*** to make.



$\frac{2}{6}=\frac{1}{3}$

$\frac{3}{6}=\frac{1}{2}$

We can ***simplify fractions*** using ***common factors.***

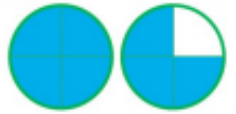
$\frac{3}{6}$ can be simplified to make $\frac{1}{2}$.

2 is a ***common factor*** of 3 and 6.

A ***mixed number*** is made up of a whole number and a fraction.

$1\frac{3}{4}$

Improper fractions—a fraction where the **numerator** is greater than or equal to the **denominator.**



$\frac{7}{4}$

Mixed numbers can be ***converted*** into **improper fractions** using ***equivalence.***

$\frac{12}{5}=2\frac{2}{5}$