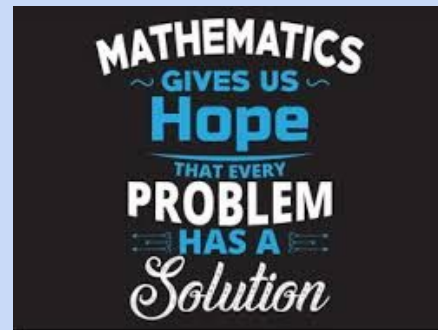


Life is a math equation.  
In order to gain the most,  
you have to know  
how to convert  
negatives into positives



# MATHS

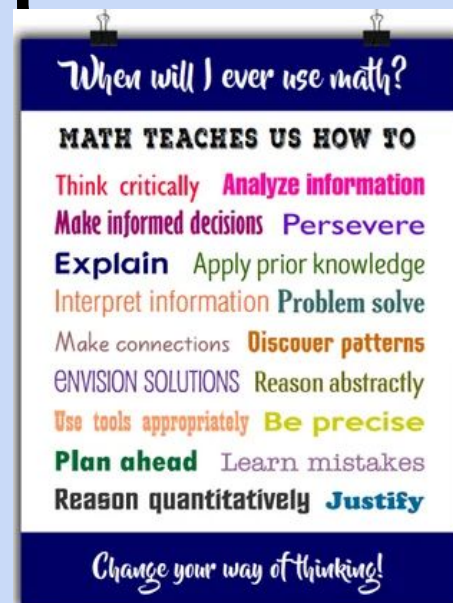
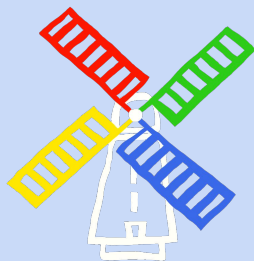
## Parent Workshop

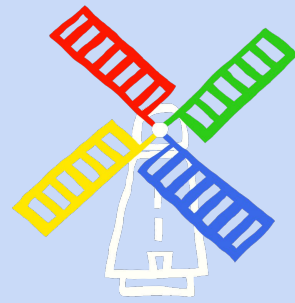
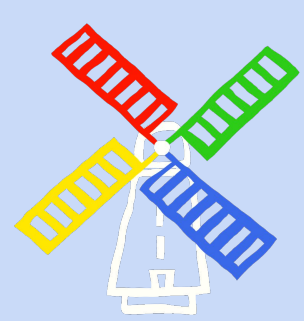
### At

## Widmer End

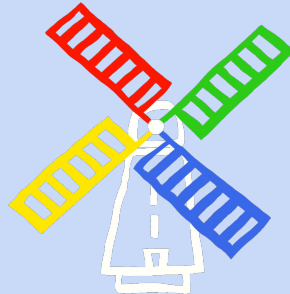
There should be  
**NO SUCH THING**  
as boring  
mathematics.

-Edsger Dijkstra



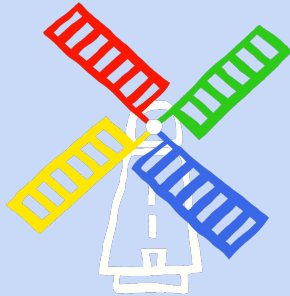


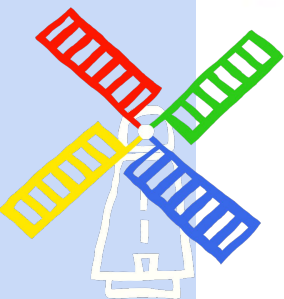
What would  
YOU  
like to get from  
today?



# AGENDA

- What is teaching for Mastery?
- How do Widmer End achieve this?
- Lesson Structure
- What a typical Mastery lesson looks like at Widmer End?
- Ensuring Coherence
- How can I help my child at home?
- Models and Structures
- Your Turn
- Questions

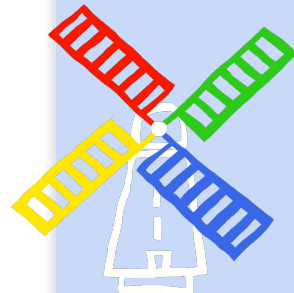
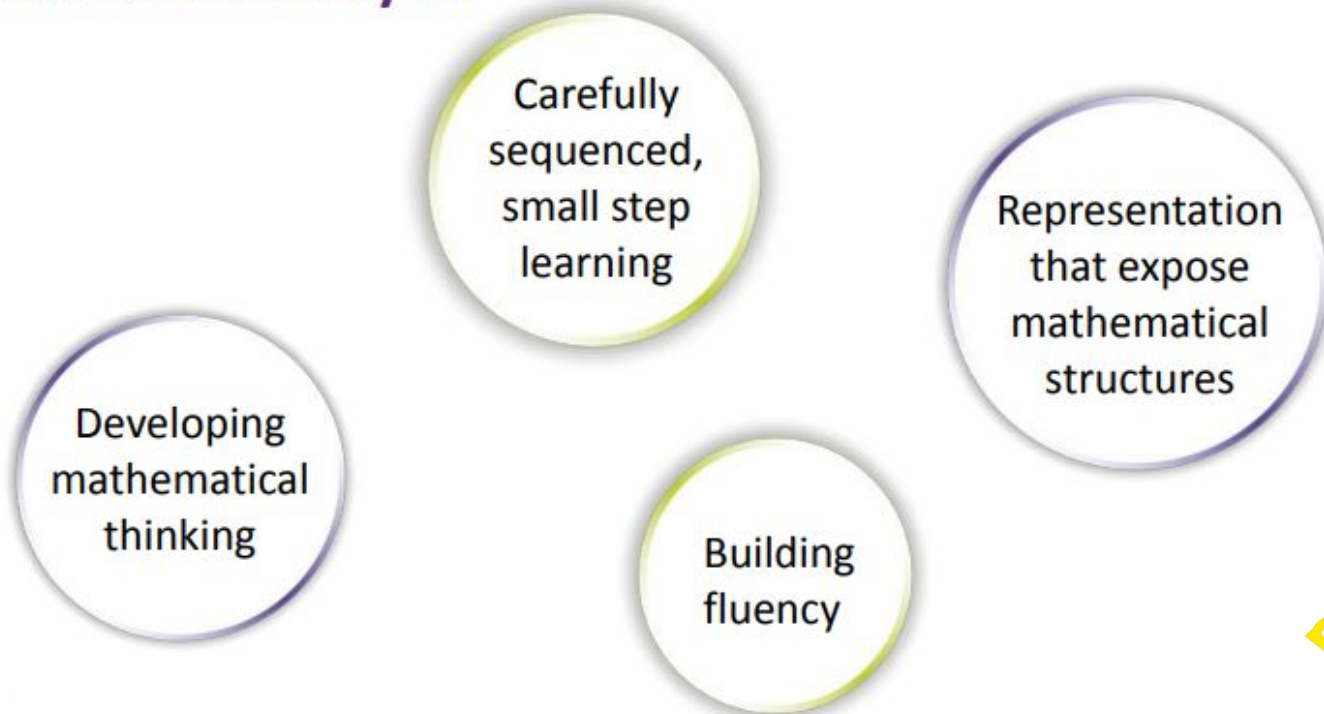




# What is teaching for mastery?

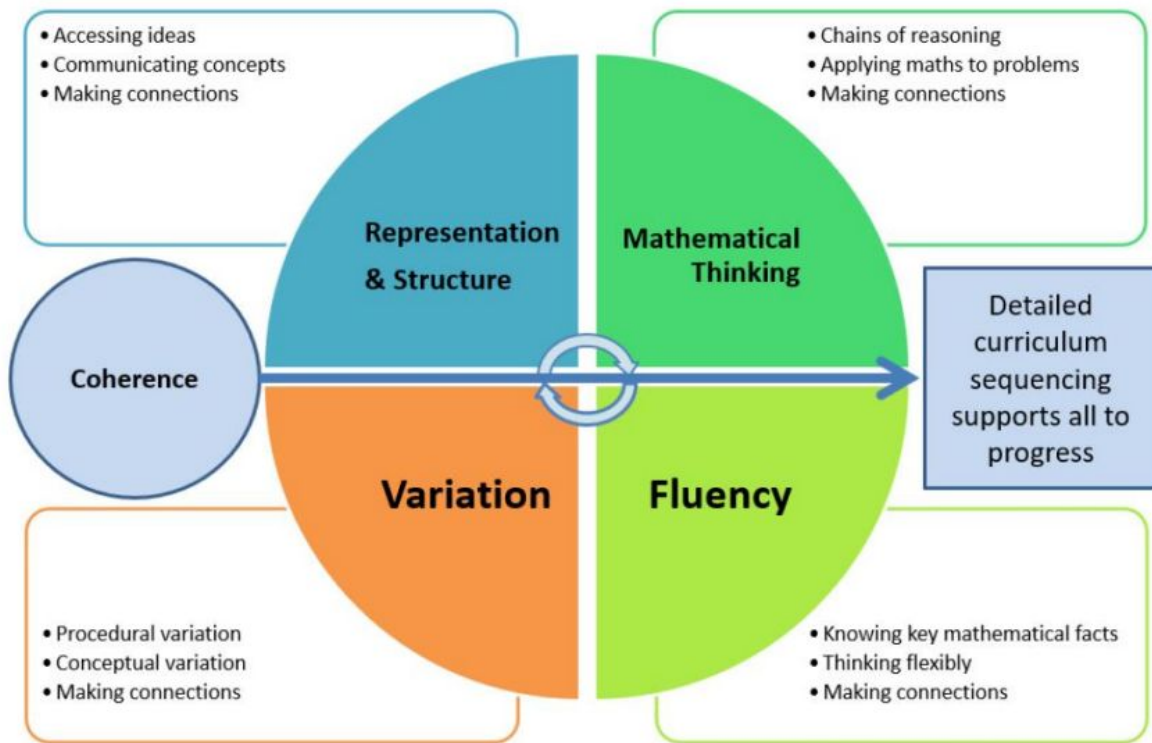
**“Mastering maths means acquiring a deep, long-term, secure and adaptable understanding of the subject” – NCETM**

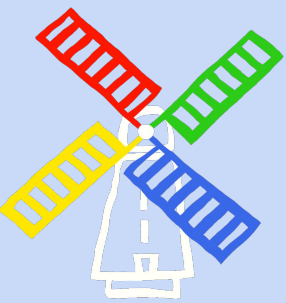
**We achieve this by ...**



# What is teaching for mastery?

## Teaching for Mastery





# How do Widmer End achieve this?

**Scheme that supports mastery**

**Skill development**

**Progression**

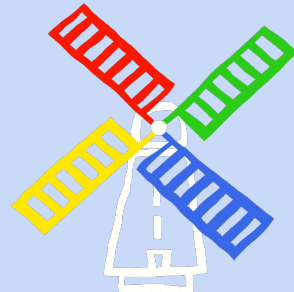
**Overview**

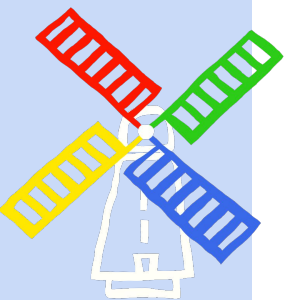


**Questioning  
techniques**

**resources**

**Helps staff of all skill levels**





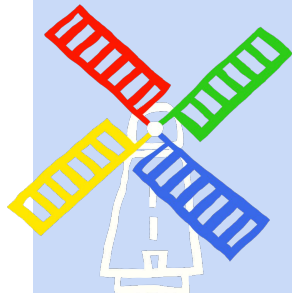
# Key aims of *Power Maths*

**Keeping the whole class progressing together**

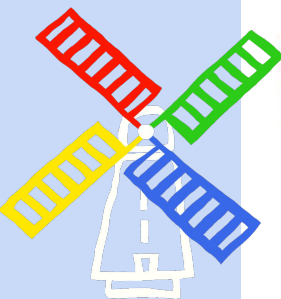
**Providing rich problem solving to challenge and engage every child**

**Practical assessment to reveal misconceptions and inform speedy interventions**

**Nurturing a growth mindset and building children's confidence in maths**







# Growth mindset

## Fixed mindset

"I'm not good at maths – I've never been good at maths"

"I give up – I can't make this any better"

"If I fail I am a failure"

"I can't do this – I keep making mistakes"

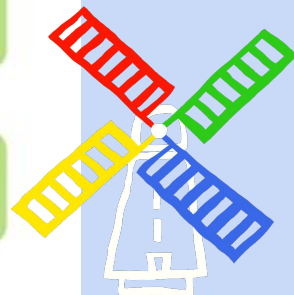
## Growth mindset

"I'm finding maths hard now, but I can improve with time and effort"

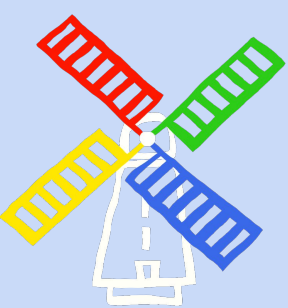
"I can improve if I keep trying"

"Most successful people fail along the way"

"Mistakes help me learn"







## Meet the growth-mindset characters!

### Flo

Flo is flexible and creative. She often with new methods to solve problems.



Can we do it differently?

### Dexter

Dexter is determined. When he makes a mistake he learns from it and tries again.

Let's try again!

## Meet the growth-mindset characters!

### Astrid

Astrid is brave and confident. She is not afraid to make mistakes.

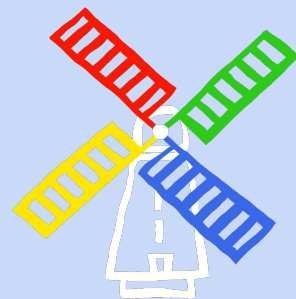


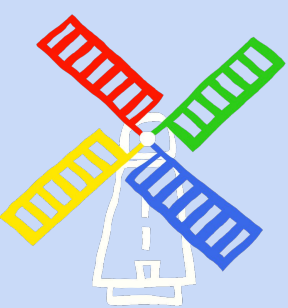
I will share my ideas!

Is there a pattern?

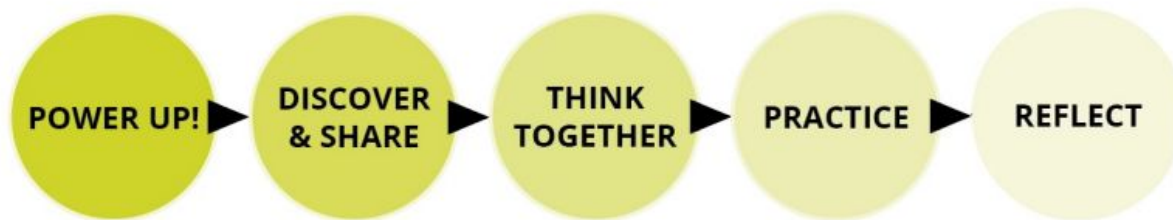
### Ash

Ash is curious and inquisitive. He loves to explore new concepts

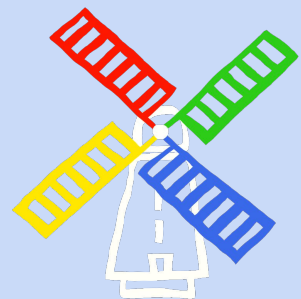


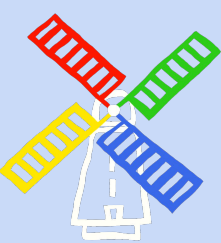


## See the lesson structure

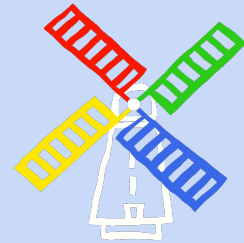


Same Day Intervention





# Quick 10 / Power Up / Flashback etc



Retrieval practice

Supports fluency and working memory by re-visiting ideas previously taught recently or longer term

Helps warm up to lesson

Creates connections between prior knowledge and new learning

**Power Up**  
Find the hidden digits.

Unit 8: Lesson 2

I will work systematically to find all possible ways of answering this subtraction.

Find more than one way to solve this calculation.

Illustration of a boy sitting on the ground, looking thoughtful.

H	T	O
9	5	
- 3	4	
4	5	

H	T	O
9	6	
- 4	6	
5	0	

H	T	O
6	2	
- 4	2	

H	T	O
7	4	
- 3	2	
4	4	

H	T	O
3	3	
- 7	1	8
2	3	

H	T	O
8	4	
- 4	6	
1	7	

H	T	O
8	9	
- 3	5	
5	4	

**Flashback 4** Year 4 | Week 7 | Day 1

1) Write 25 minutes past 6 in the morning using the 24-hour clock.

2) How many days are there in December?

3) Compare using  $<$ ,  $>$  or  $=$   
 $£8.94$   $\bigcirc$   $£8.49$

4) Calculate  $2,394 + 5,139$

White Rose Maths

QUICK 10		Su4.2
1)	$8 \times 12 =$	
2)	$9 \times 3 \times 2 =$	
3)	$64 \div 4 =$	
4)	$283 \times 4 =$	
5)	One side of a square is 13cm in length. What is the perimeter of this square?	
6)	True or false $\frac{2}{3}$ of $99 = 33$	
7)	How do you write $\frac{6}{100}$ as a decimal?	
8)	$7 \div 100 =$	
9)	Draw an arrow to estimate where 18 hundredths would be on this number line. 0 _____ 1	
10)	$78 \times 0 =$	

Children explore the image together  
What can you see / what might the question be?

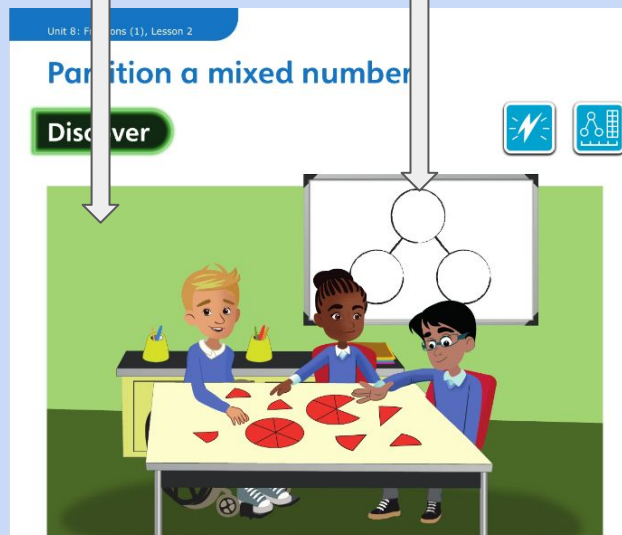
Point out the Part whole model if not already mentioned - ask how can it be helpful  
Whole part / fraction part

Questions to ask children:

Can you see any complete wholes?  
Can you see part of a whole?  
How could this mixed number be partitioned?

# C P A

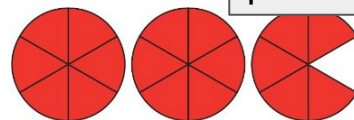
Children will then explore answering the question using practical resources (the same shapes as in the diagram to create a mixed number) - work with a partner



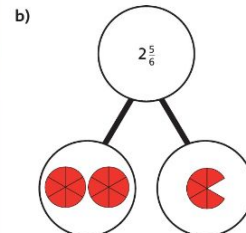
- What mixed number can the children make with all the shapes on the table?
- Complete the part-whole model to show the whole part and fraction part.

## Share

- 6 of the shapes fit together to make a whole.  
Each shape is  $\frac{1}{6}$  of the whole.

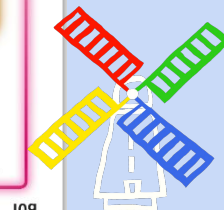


There are 2 whole circles.  
There are  $\frac{5}{6}$  of another circle.  
They can make  $2\frac{5}{6}$ .



$2\frac{5}{6}$  in the whole and then  
2 and  $\frac{5}{6}$  in the parts.

I used a part-whole model for fractions. It allowed me to see the whole part and the fraction part.



## Fluency

Dependent upon key numerical facts  
Familiarity with fractions - what makes a whole / denominator / numerator and the meanings of these  
Mixed number bringing the two together / partitioning

## Variation

Children begin to access concrete resources to explore ideas and match / link to pictorial - this develops understandings preparing them for abstract / reasoning style questions further on

## Representation and Structure

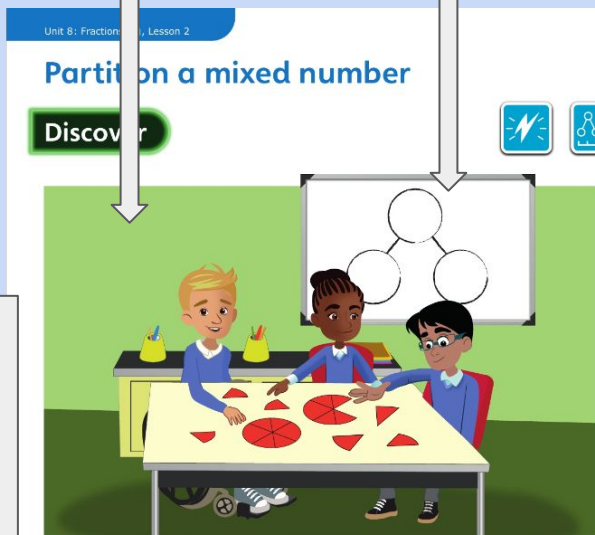
Use of concrete and pictorial materials to expose mathematical structure.

*'The intention is to support pupils in 'seeing' the mathematics, rather than using the representation as a tool to 'do' the mathematics.'* - NCETM

## Mathematical thinking

Before children have even begun they are looking at and assessing what the image is showing and how it links to the learning

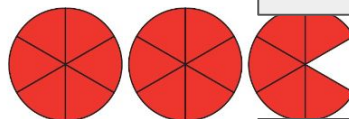
They will be considering:  
What I already know  
How it relates to LO  
How can I connect the two



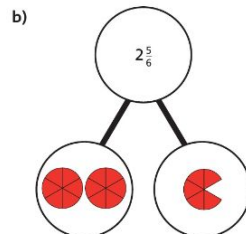
- 1 a) What mixed number can the children make with all the shapes on the table?  
b) Complete the part-whole model to show the whole part and fraction part.

## Share

- a) 6 of the shapes fit together to make a whole.  
Each shape is  $\frac{1}{6}$  of the whole.



There are 2 whole circles.  
There are  $\frac{5}{6}$  of another circle.  
They can make  $2\frac{5}{6}$ .



$2\frac{5}{6}$  in the whole and then  
2 and  $\frac{5}{6}$  in the parts.

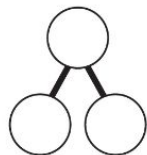
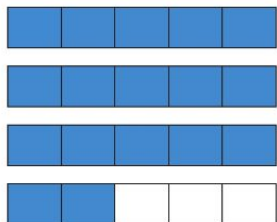
## Coherence

The lesson builds on their developing knowledge. This supports acquisition of new knowledge and deepens prior learning. It also helps children recognise the importance, and application, of what has been learned before and will come after. Flts within a progressive sequence of learning both within and between yr groups.

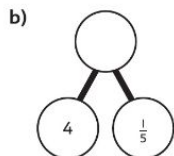
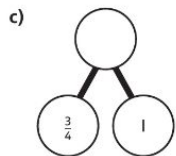
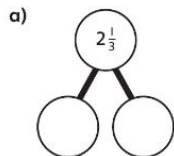
I used a part-whole model for fractions to see the structure of the fractions.

## Think together

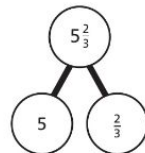
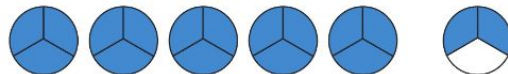
- 1 Each strip is one whole. Complete the part-whole model for the number of coloured strips.



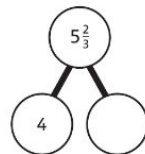
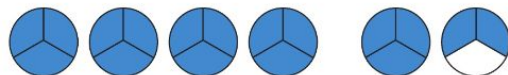
- 2 Complete the part-whole models.



- 3 Emma has represented  $5\frac{2}{3}$ .



Emma wants to partition  $5\frac{2}{3}$  in a different way.



Complete the part-whole model.

I wonder if I could partition the number  $5\frac{2}{3}$  in other ways.



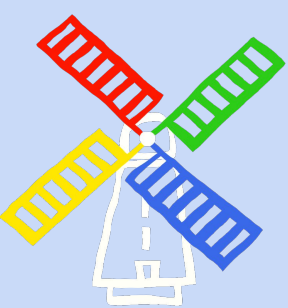
This stage follows I do, we do, you do format - provides children a model to follow and apply to own learning.

Children can still use the manipulatives to support thinking.

Children can access in the way that makes most sense to them.

The challenge question then builds on children's developing knowledge to present them alternative scenarios and consolidate their understanding.





# Independent work echoes the input

Unit 8: Fractions (1), Lesson 2

Date: \_\_\_\_\_

## Partition a mixed number

1 Complete the part-whole models.

a)

b)

c)

d)

80

Unit 8: Fractions (1), Lesson 2

2 Complete the part-whole models.

a)

b)

c)

d)

e)

f)

3 Complete the calculations.

a)  $2 + \frac{1}{5} =$

b)  $3 + \frac{1}{4} =$

c)  $4 + \frac{2}{3} =$

d)  $5 + \frac{7}{10} =$

81

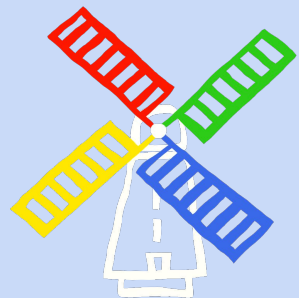
4 Isla has made  $4\frac{3}{4}$  circles using quarter circles. **CHALLENGE**

How many different ways could she complete a part-whole model to show the same total?

**Reflect**

Write down your own mixed number.  
Ask a partner to partition the number.

82

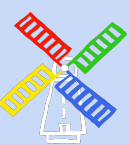






# *Team* **TERRIFIC TRIO**

- 1) Write a question for your teacher to answer, using the skill you have learnt in the lesson
- 2) Help someone that is finding the activity hard by explaining what to do; **DO NOT TELL THEM THE ANSWER!!!**
- 3) Be a teacher - write down the steps you need to succeed.



# Ensuring Coherence

Structured progression within the lesson through CPA approach

This unit would always come after multiplication and division as they are key numerical facts that relate to fractions - those key skills underpin this learning.

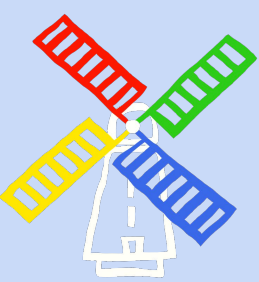
Progression in learning across year groups so ideas are familiar and we build upon them thus not overloading the working memory

Number = Fractions							
3 and 4 yr olds	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
		<p>recognise, find and name a half as one of two equal parts of an object, shape or quantity</p>	<p>Recognise, find and name a half as one of two equal parts of an object, shape or quantity</p> <p>recognise, find, name and write fractions <math>\frac{1}{3}</math>, <math>\frac{1}{4}</math>, <math>\frac{2}{4}</math> and <math>\frac{3}{4}</math> of a length, shape, set of objects or quantity</p> <p>write simple fractions for example, <math>\frac{1}{2}</math> of <math>6 = 3</math> and recognise the equivalence of <math>\frac{2}{4}</math> and <math>\frac{1}{2}</math>.</p> <p>Pupils</p>	<p>recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators</p> <p>compare and order unit fractions, and fractions with the same denominators</p> <p>recognise and show, using diagrams, equivalent fractions with small denominators</p> <p>add and subtract fractions with the same denominator within one whole</p>	<p>practise counting using simple fractions and decimals, both forwards and backwards</p> <p>Reason about the location of mixed numbers in the linear number system</p> <p>Convert mixed numbers to improper fractions and vice versa</p> <p>recognise and show, using diagrams, families of common equivalent fractions</p>	<p>identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths</p> <p>recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements <math>\times 1</math> as a mixed number [for example, <math>2\frac{5}{5} = 4\frac{5}{5} = 6\frac{5}{5} = 1\frac{1}{5}</math>]</p> <p>compare and order fractions whose denominators are all</p>	<p>use common factors to simplify fractions; use common multiples to express fractions in the same denomination</p> <p>compare and order fractions, including fractions <math>&gt; 1</math></p> <p>add and subtract fractions with the same denominator</p> <p>solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number</p> <p>recognise and write decimal equivalents of any number of tenths or hundredths</p> <p>find the effect of dividing a one- or two-digit number by 10 and 100, identifying the value of the digits in</p>

<p>should count in fractions up to 10, starting from any number and using the <math>\frac{1}{2}</math> and <math>\frac{2}{4}</math> equivalence on the number line (for example, <math>1\frac{1}{4}</math>, <math>1\frac{2}{4}</math> (or <math>1\frac{1}{2}</math>), <math>1\frac{3}{4}</math>, <math>2</math>).</p>	<p>[for example, <math>5\frac{1}{7} + 1\frac{1}{7} = 6\frac{2}{7}</math>]</p> <p>solve problems that involve all of the above</p> <p>recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators</p>	<p>add and subtract fractions with the same denominator</p> <p>solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number</p> <p>recognise and write decimal equivalents of any number of tenths or hundredths</p> <p>find the effect of dividing a one- or two-digit number by 10 and 100, identifying the value of the digits in</p>	<p>add and subtract fractions with the same denominator</p> <p>solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number</p> <p>read, write, order and compare numbers with up to three decimal places</p> <p>read and write decimal numbers as fractions [for example, <math>0.71 = \frac{71}{100}</math>]</p>	<p>multiples of the same number</p> <p>add and subtract fractions with the same denominator and denominators that are multiples of the same number</p> <p>multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams</p> <p>read, write, order and compare numbers with up to three decimal places</p> <p>read and write decimal numbers as fractions [for example, <math>0.71 = \frac{71}{100}</math>]</p>	<p>numbers by whole numbers, supported by materials and diagrams</p> <p>multiply simple pairs of proper fractions, writing the answer in its simplest form [for example, <math>\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}</math>]</p> <p>divide proper fractions by whole numbers [for example, <math>\frac{1}{3} \div 2 = \frac{1}{6}</math>]</p> <p>add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions</p> <p>use written division</p>
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<p>the answer as ones, tenths and hundredths</p> <p>recognise and write decimal equivalents of any number of tenths or hundredths</p> <p>compare numbers with the same number of decimal places up to two decimal places</p>	<p>recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents round decimals with numbers given to three decimal places and to one decimal place</p> <p>recognise the per cent symbol (%) and understand that per cent relates to 'number of parts per hundred', and write percentages as a fraction with denominator 100, and as a decimal</p> <p>solve problems involving number up to three decimal places</p>	<p>methods in cases where the answer has up to two decimal places</p> <p>identify the value of each digit in numbers given to three decimal places and multiply and divide numbers by 10, 100 and 1000 giving answers up to three decimal places</p> <p>solve problems which require answers to be rounded to specified degrees of accuracy</p> <p>multiply one-digit numbers with up to two decimal places by whole numbers</p> <p>use written division methods in</p>
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<https://www.widmerend.bucks.sch.uk/maths/>



# How Can I Help My Child at Home?

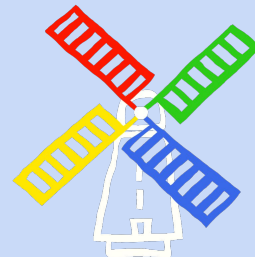
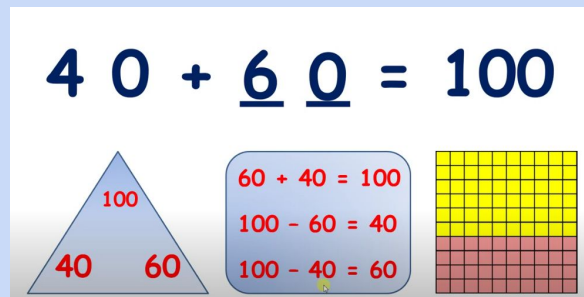
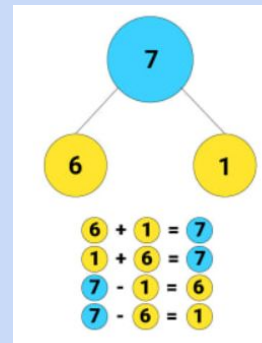
NUMBER BONDS

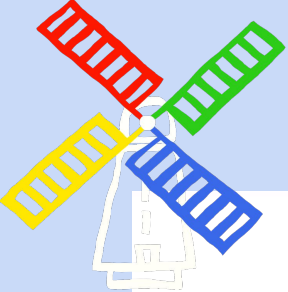
TIMES TABLES

FACT FAMILIES for + - and X /

MAKE CONNECTIONS

- Managing money
- Balancing the checkbook
- Shopping for the best price
- Preparing food
- Figuring out distance, time and cost for travel
- Understanding loans for cars, trucks, homes, schooling or other purposes
- Understanding sports (being a player and team statistics)
- Playing music
- Baking
- Home decorating
- Sewing
- Gardening and landscaping

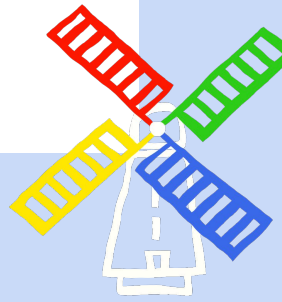




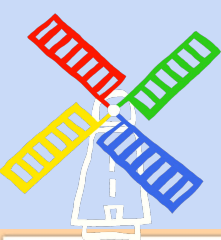
# How Can I Help My Child at Home?

A pupil **really understands** a mathematical concept, idea or technique if they can:

- ***describe it in their own words;***
- *represent it in a variety of ways*
- ***explain it to someone else***
- *create examples and non-examples;*
- *see connections with other facts and ideas;*
- *recognise it in new situations and contexts;*
- *make use of it in various ways, including new situations.*







# Models and representations



Tens and Ones Place Value Grid	
Tens	Ones

Hundreds, Tens and Ones Place Value Grid		
Hundreds	Tens	Ones

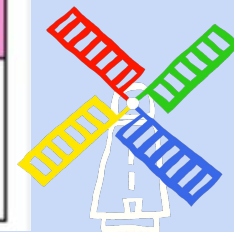
Thousands	Hundreds	Tens	Ones

			
thousands	hundreds	tens	ones

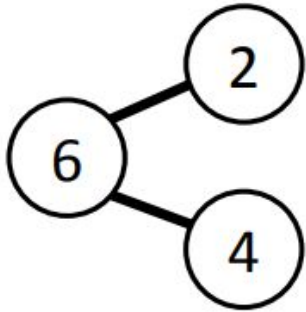
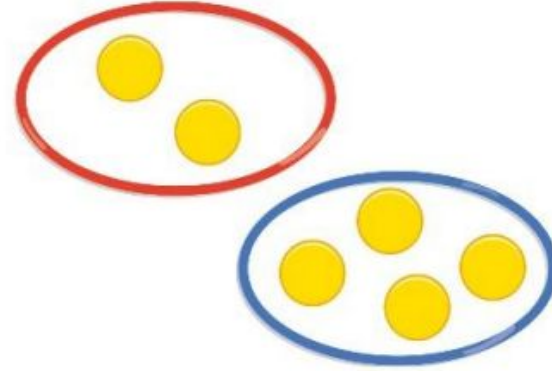
\_\_\_\_\_ + \_\_\_\_\_ + \_\_\_\_\_ + \_\_\_\_\_

Thousands	Hundreds	Tens	Ones	Tenths	Hundredths	Thousandths

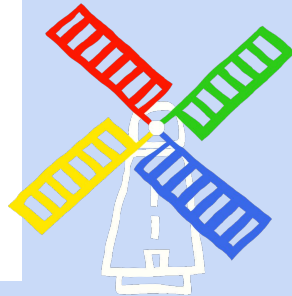
Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones



# Models and representations



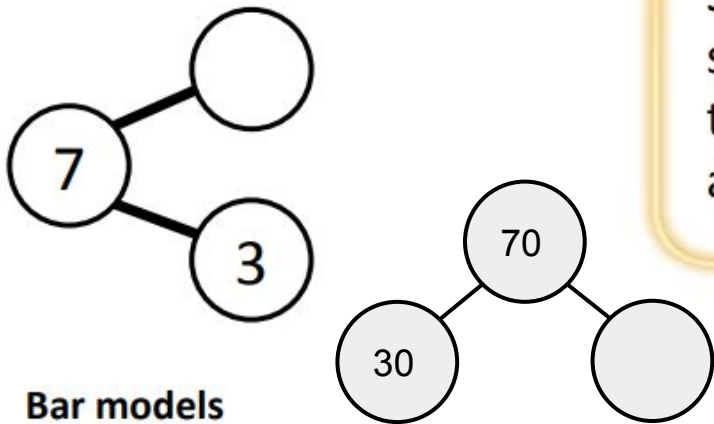
$$2 + 4 = 6$$





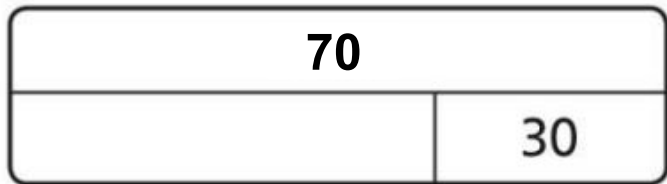
# Models and representations

Part-whole models

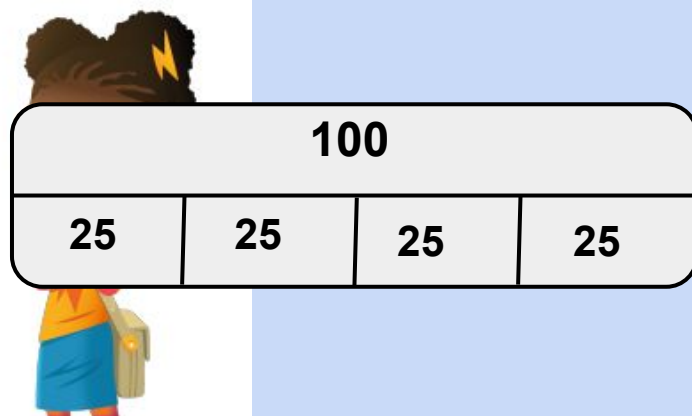


Shows how numbers can be split into parts. Helps show the connection between addition and subtraction.

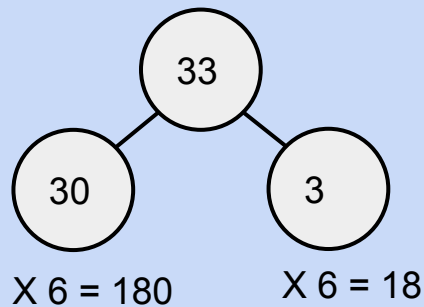
Bar models



Helps show the maths problem as a picture.

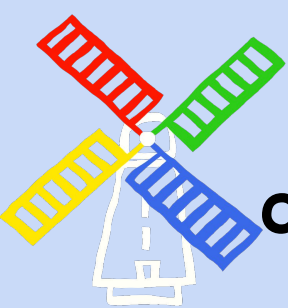


$$33 \times 6 =$$



$$180 + 18 = \underline{198} = 33 \times 6$$





# Extending Learning / strengthening and deepening fluency and problem solving and reasoning skills

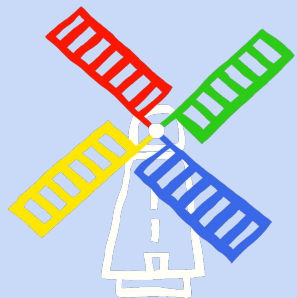
**ALWAYS**

**SOMETIMES**

**NEVER**

<https://nrich.maths.org/12671>

When you add two numbers you  
can change the order and the  
answer will be the same



# YOUR TURN

Each table is set up with your name on it

There are a selection of tasks and tools to work with

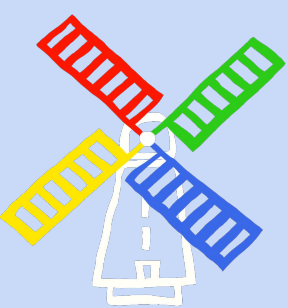
Ask your child to show you how to tackle the problem

Start with the concrete materials (practical application)

Use mathematical language to support discussion and explanation

Use How / Why / What questions to explore thinking - ask them to explain / prove it / offer an misconception and see if they can correct you





## Resources for parents and educators:

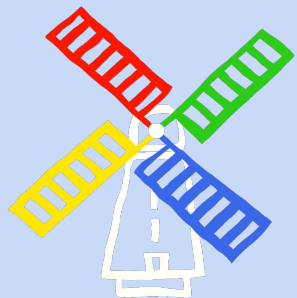
<https://nrich.maths.org/9798>

<https://www.ncetm.org.uk/>

<https://mathsnoproblem.com/en/resources/early-years-guide>

[https://drive.google.com/drive/folders/10PBIKOWqGq9H9dMtGPx1AP2QLAB-C\\_7b](https://drive.google.com/drive/folders/10PBIKOWqGq9H9dMtGPx1AP2QLAB-C_7b)

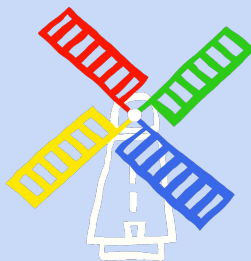
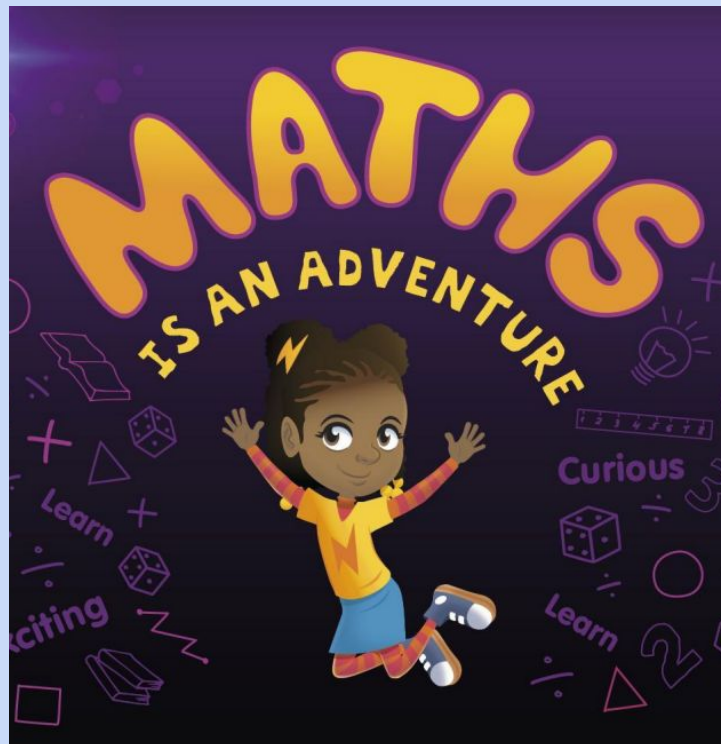
<https://www.widmerend.bucks.sch.uk/maths/>



Life is a math equation.  
In order to gain the most,  
you have to know  
how to convert  
negatives into positives

There should be  
**NO SUCH THING**  
as boring  
mathematics.

-Edsger Dijkstra



**MATHEMATICS**  
~ GIVES US ~  
**Hope**  
THAT EVERY  
**PROBLEM**  
HAS A  
*Solution*

When will I ever use math?

**MATH TEACHES US HOW TO**

Think critically **Analyze information**

**Make informed decisions** Persevere

**Explain** Apply prior knowledge

Interpret information **Problem solve**

Make connections **Discover patterns**

ENVISION SOLUTIONS Reason abstractly

Use tools appropriately **Be precise**

**Plan ahead** Learn mistakes

Reason quantitatively **Justify**

*Change your way of thinking!*