

Fractions Policy



Objective: understand a half

Concrete Experience: Ask children to cut a piece of paper, or other item, into halves. Share objects equally between two. Build a tower half the size of another. Create a pattern where half are one colour/shape and half are another colour/shape. Turn half turns. Emphasise that halves should be exactly the same size.

## Images:



Language: one half, halves, equal, two, parts
Symbols: $\frac{1}{2}, 1 \div 2$
Questions: What is a half? How many halves make one whole? Is this a half? How do you know if it is a half?

Objective: solve problems including halving

Concrete Experience: Find half of different objects (by folding, cutting, colouring and so on) and sets of objects. Draw lines half the size of another line.
Role play - shops, café, tea party (finding half a jug of drink, half a cake and so on).

Images:


Language: one half, halves, equal, two, equal parts, divide into 2, split, share, whole.

## Symbols: $\frac{1}{2}, 1 \div 2$

Questions: Show me half a page, half a ribbon, half of these six eggs. Give me half of the pencils in the pot. Here is a set of 12 pencils. How many is half the set?


## understanding fractions

counting in fractions
Objective: count in fractions ( $\frac{1}{2}$ and $\frac{1}{4}$ )
Concrete Experience: Start with real things, e.g. apples, toast


Cut in half and/or quarters.


Count using the language they are familiar with - one half apple, two half apples, three half apples, four half apples etc.

Images: Use pictures to represent the things e.g. circles to represent the apples.


Drop the name of the object when counting, i.e. one half, two halves, three halves.

Match counting to a counting stick and placing numbers on it.

http://www.topmarks.co.uk/Flash.aspx?f=EggFractions

## Language: fraction, quarter(s)

Symbols: $\frac{1}{2} \frac{1}{4}$
Questions: How many halves would I have if I cut 3 pieces of toast Questions: How many how me? How many oranges do I need to make 6 half oranges? How do you know?

## fractions as operators

 of an object, shape or quantity
## Concrete Experience: Find half of different objects (by folding

 cutting, colouring and so on) and sets of objects.Role play - shops, café, tea party (finding half a jug of drink, half a cake and so on).


Language: one half, halves, equal, two, equal parts, divide into 2, split, share, whole.
Symbols: $\frac{1}{2}, 1 \div 2$
Questions: How will you find half of that circle? How will you find half of these counters? Which shape is more than half shaded?


There are twenty children in a classroom. Half of them are girls. How many are boys? Explain how you worked it out
What number is halfway between 6 and 12? How did you work it out? How could we give someone half of 20p if we had one 20p coin? What about half of 12 p if we had one 10 p and two 1 p coins? What is half of this amount?


Complete the shading on this diagram so that one half of the shape is shaded.


How could we work out half of three equal strips of paper?
parts of an object, shape or quantity
Concrete Experience: Fold paper strips into quarters (move onto adding numbers). Fold paper with paint and make 4 identical images. Cut dough into 4 equal pieces. Share objects out equally into 4 groups.

Images:


Language: one quarter, quarters, equal, four, equal parts, divide into 4, split, share, whole

Symbols: $\frac{1}{4}, 1 \div 4$
Questions: Shade one quarter of each shape.



In PE, can you turn through a quarter turn clockwise and anticlockwise? Now make a three quarter turn
How could you find one quarter of a piece of strin? What about quarter of two pieces of string?
Here is a set of 12 pencils. How many is a quarter of the set?


How will you find one quarter of that rectangle?
If one quarter of a set of shells is 2 , how many shells are in the set? Is this shape divided into quarters? Explain how you know.


Complete this statement in different ways:


## understanding fractions

Objective: understand unit fractions $\left(\frac{1}{2}, \frac{1}{4}\right)$ and non-unit
fractions $\left(\frac{3}{4}\right)$ fractions $\left(\frac{3}{4}\right)$
-oncrete Experience: Cut items into Guarters and select 3 of them. Share objects equally into 4 groups and select 3 of the Jroups. Build $a$ tower three quarters the size of another. Turn $\frac{1}{4}$ rurns. Mark $\frac{3}{4}$ onto a number line. Make patterns with $\frac{3}{4}$ being me colour/shape and the rest being another colour/shape.

-anguage: numerator (tells you the 'number' of), denominator nominates or names the fraction), one half, halves, one quarter
three quarters, equal. parts, whole.
symbols: $\frac{1}{2} \frac{1}{4} \frac{3}{4}$
2uestions: Complete the shading on this diagram so that $\frac{1}{2}$ is Questions: Complete the shading on this diagram s.
shaded. Describe the shaded part in another way.


Two of these shapes
Explain how you know

=xplain how to find three quarters of a set of objects/a shape/ in a number line etc.

## (percentages and decimals)

Objective: Count in fractions ( $\frac{1}{4}, 1,1, \frac{1}{2}$ and $\frac{3}{4}$ ) up to 10 , starting
from any number and 4 using the $\frac{1}{1}$ and $2 / 4$ equivalence on the from any number and using the $\frac{1}{2}$ and $2 / 4$ equivalence on the number line (e.g. $1 \frac{1}{4}, 12 / 4$ (or $1 \frac{1}{2}$ ), $1 \frac{7}{7}, 2$ )

Concrete Experience: Start with real things, e.g. strips of plasticine.


Images: Use pictures to represent objects.


Count whirds...

Count placing numbers on the counting stick. Count noticing the Count placing numbers on the cour ing whele oune and one third, one and two thirds...
http://www.topmarks.co.uk/Flash.aspx?f=EggFractions Language: third(s), equivalent, equivalence, equal to, same as Symbols: $\frac{1}{4}, 1 / 3, \frac{1}{2}, \frac{3}{4}, 1 \frac{1}{2}, 1 \frac{1}{4}$
Questions: How else could I say 7 halves? How do you know? How many halves are there in 3 whole apples and half an apple? How many halves are there in 3 whole apples and half an apple?
Can you show me? What is a half more than three halves? What is Ca you show me? What is a half more than three halves? What is
5 and a half subtract two halves? How many halves are there in two and a half? What is equivalent to five halves? What are the missing numbers in the sequence?

$$
\begin{array}{cccc}
\frac{1}{4} & \frac{1}{2} & \frac{3}{4} & 1
\end{array} \quad \square \quad 1 \frac{1}{2} \quad 1 \frac{3}{4}
$$

Objective: recognise the equivalence of $\frac{2}{4}$ and $\frac{1}{2}$

## Concrete Experience: Find $\frac{1}{2}$ and then $\frac{2}{4}$ of a set of objects and

 compare amounts. Shade in $\frac{1}{2}$ then $\frac{2}{4}$ of shapes and compare the sizes. Use fraction cards to overlay $\frac{2}{4}$ onto $\frac{1}{2}$. Images:

| 1 |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| $\frac{1}{2}$ |  |  |  |  |  |
|  |  | $\frac{1}{2}$ |  |  |  |
| $\frac{1}{4}$ | $\frac{1}{4}$ | $\frac{1}{4}$ | $\frac{1}{4}$ |  |  |

Language: equivalent, fraction, balance, equal, whole, numerator,

## denominator

Symbols: $\frac{1}{2}=\frac{2}{4}$
Questions:
Tell me some fractions that are equivalent to $\frac{1}{2}$ How do you know? Are there any others? How do you know when a fraction is equivalent to $\frac{1}{2}$ ? How could you show that $\frac{1}{2}$ is equivalent to $\frac{2}{4}$ ?

## Objective: write simple fractions for example, $\frac{1}{2}$ of $6=3$

## Concrete Experience:

Use practical resources to link fractions of shapes and fractions
of amounts. Make a set of card shapes/poper plates divided into hamounts. Make a set of card shapes/paper plates divided into
halves, thirds, quarters, etc. To find, for example $1 / 3$ of 12 , ask children which shape shows the appropriate fraction (thirds). Take 12 counters/objects and ask a child to place these onto the Take 12 counters/objects and ask a child to place these onto the
shape so that there is the same number of counters/objects on each third.
Images:


Language: half, quarter, third, three quarters, equal, divide hare

Symbols: $\frac{1}{2} \frac{1}{4} \frac{3}{4} \quad 1 / 31 / 5$
Questions: What is $1 / 3$ of 12? How did you find $1 / 3$ of 12 ? What number sentence could we write?
$\frac{3}{3}$ jective: recognise, find, name and write fras
$\frac{3}{4}$ of a length, shape, set of objects or quantity
Concrete Experience:
Give children opportunities to find fractions of shapes where the shape is divided into small pieces. These should not always be regular.
Cut, move, share objects that involve measures, e.g. string dough, drinks etc.
Images:
Use models and images alongside oral work. For example, display 12 smal
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Arange the cunnersis in ways that thep children to see the process and
ard



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N
3/3of 12 is 12
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Language: fraction, equal parts, numerator, denominator, divide, division, multiply, multiplication

Symbols: $\frac{1}{2} \frac{1}{4} \frac{3}{4} \quad 1 / 31 / 5$
Questions:
Shade $1 / 3$ of this shape. How many squares is it made from? What is $1 / 3$ of 15 ? How do you know? How many squares do you need to shade?


Explain how we could find one quarter of this set of 12 pencils? What about three quarters?
Shade more squares so that exactly half of the shape is shaded.


Take 20 counters. Can you show me one quarter? Two quarters? Three quarters? Four quarters? What do you notice? Can you write that down in some way?
Here is a set of 12 pencils. How many is three quarters of the set?


Find three quarters of 20 biscuits. Three quarters of 24 buttons. Find three quarters of 20 biscuits. Three quarters of 24 buttons.
How will you find one quarter of that rectangle? Three quarters? Here is a pizza cut into eight equal pieces. How many pieces are needed for three quarters of the pizza? Take 20 cubes. Make a shape which is $1 / 2$ red and $1 / 4$ blue.
What fraction of the shape is not red What fraction of the shape is not red or blue?
understanding fractions
objective: recognise that tenths are dividing an dumbers 10 equal parts or dividing one-digit numbers or quantities by 10 (connect to place value decimal measures and to division by 10)

Concrete Experience: Ask children to make a strip of paper 1 metre long. Use a metre s
divide the strip into ten equal pieces.

I
Images: 'Blow-Up' Dienes so: Long $=1$ and Unit

## 1

cmages

anguage: numerator, denominator, one half, alves, one quarter, three quarters, third, fifths renths, equal, parts, whole.
$8 \div 2=\frac{8}{2}=2 \sqrt{8}=$ half of 8
$=8 \times 1 / 2=$ how many 2 s in 8 ?
$\frac{1}{5} \times 10=$ one fifth of $10=10 \div 5$ $= 5 \longdiv { 1 0 } =$ how many 5 s in 10 ?

Questions: What fraction of this shape is shaded? Zould the same fraction be shaded in another way? tow many?


What fraction of these tiles is circled?
$\diamond \Delta \square$
Tell me some fractions that are greater than $\frac{1}{2}$.
tow do you know?

Objective: recognise and use fractions as numbers:
unit denominators
Concrete Experience: Use knowledge of counting in Concrete Experience: Use knowledge of counting in
fractions to place fractions along a number line and recognise their value.
Use knowledge of tenths to find fractions of 10 and Use knowledge of tenths to find fractions of 10 and
place them on a number line. place them on a number line.

Images:


$\frac{0}{12} \frac{1}{12} \frac{2}{12} \frac{3}{12} \frac{4}{12} \frac{5}{12} \frac{6}{12} \frac{7}{12} \frac{8}{12} \frac{9}{12} \frac{10}{12} \frac{11}{12} \frac{12}{12}$
$\stackrel{11}{\stackrel{1}{5} \frac{1}{4}} \underset{\frac{1}{3}}{\longrightarrow}$
Language: place value, partition, digit, ones, units, tens, hundreds, one-digit number, two-digit number,
three-digit number, tenths three-digit number, tenths
Symbols:
$\frac{1}{2} \frac{1}{5} \frac{2}{5} \frac{3}{5} \frac{4}{5} \frac{5}{5} \frac{1}{10} \frac{2}{10} \frac{3}{10} \frac{4}{10} \frac{5}{10} \frac{6}{10} \frac{7}{10} \frac{8}{10} \frac{9}{10} \frac{10}{10}$
Questions:
Draw an arrow on the number line to show $1 \frac{1}{4}$. I ate more than $\frac{1}{2}$ a pizza but less than $\frac{3}{4}$. What fraction could I have eaten?
counting in fractions Objective: count up and down in tenths Concrete Experience: Start with real things, e.g. strips of paper, or Dienes rods and units -1 rod $=1$ whole. .
$=1$ tenth.
Count (using images) in tenths from zero, then from any whole number, any tenth and then any number (e.g. 2 and a half, 2 and 6 tenths...)

Images:


Language: tenths, numerator, denominator
Symbols: $\frac{1}{10}$
Questions: Why does the numerator change? If we count in tenths, will the denominator change What does it mean if the numerator is bigger than the denominator/the denominator bigger than the numerator/ the numerator and denominator are the same size?

equivalent fractions (percentages and decimals) | Objective: recognise and show, using diagrams, | Objective: understand unit and non-unit fractions as |
| :--- | :--- |

equivalent fractions with small denominators
 Concrete Experience: Use fraction cards and/or
cuisiniere rods to make a fraction wall and explore cuisiniere rod
equivalence.

## Images:






Number lines

| - |  |  |  |  |  |  | 1 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| - | $\frac{1}{5}$ |  |  |  |  |  | $\stackrel{\square}{7}$ |
| - |  | 10 |  | \% |  | ! |  | between them, such as size, and equivalence

Concrete Experience: Use knowledge of counting in fractions to place fractions along a number line and recognise their value. Compare the size of different fractions.
Use fraction cards and/or cuisiniere rods to make a fraction wall and compare fractions.
Take equal strips of into quarters (half and half again) and one into eighths (half, half and half again). Label each half, quarter and eighth. Use this to discuss how many halves make one whole, how many quarters make one whole, etc.

| 1 |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\frac{1}{2}$ |  |  |  | $\frac{1}{2}$ |  |  |  |
| $\frac{1}{4}$ |  | $\frac{1}{4}$ |  | $\frac{1}{4}$ |  | $\frac{1}{4}$ |  |
| $\frac{1}{6}$ | $\frac{1}{6}$ |  | $\frac{1}{6}$ | $\frac{1}{6}$ | $\frac{1}{6}$ |  | $\frac{1}{6}$ |
| $\frac{1}{8}$ | $\frac{1}{8}$ | $\frac{1}{8}$ | $\frac{1}{8}$ | $\frac{1}{8}$ | $\frac{1}{8}$ | 8 | 8 |
| $\begin{array}{\|l\|} 16 \\ 16 \\ 16 \end{array}$ | $\begin{array}{\|l\|l\|} \hline 16 & \frac{1}{16} \end{array}$ | $\begin{array}{l\|l\|l\|} \hline 16 & \frac{1}{16} \end{array}$ | $\begin{array}{\|l\|l\|} \hline \frac{1}{16} & \frac{1}{16} \end{array}$ | $\frac{1}{6} \frac{1}{16}$ | $\frac{1}{161}$ |  | $\frac{1}{16} \frac{1}{16}$ |

Language: equivalent, fraction, balance, equal whole, numerator, denominator

Symbols: $1=\frac{3}{3}, \frac{1}{2}=\frac{2}{4}$ and so on.
Questions: Tell me some fractions that are Questions: Tell me some fractions that are Quivalent to $\frac{4}{4}$. How do you know? Are there any
others? What about $\frac{1}{4}$ ? How do you know that two fractions are equivalent?
How could you show that $\frac{3}{6}$ is equivalent to $\frac{1}{2}$ ?
What do you know about $\frac{3}{3}$ and $\frac{6}{6}$,


## 



| IWhate |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\frac{1}{\frac{1}{2}}$ |  |  | $\frac{1}{2}$ |  |  |  |
| $\frac{1}{3}$ |  | $\frac{1}{3}$ |  | $\frac{1}{3}$ |  |  |
| $\frac{1}{4}$ | $\stackrel{4}{4}$ | $\frac{1}{6}$ |  | $\frac{1}{4}$ |  | $\div$ |
| - |  |  |  |  |  | 5 |
| $\frac{1}{6}$ | $\frac{1}{6}$ | $\frac{1}{6}$ | $\frac{1}{6}$ | $\frac{1}{6}$ |  | $\frac{1}{6}$ |
|  |  |  | $\frac{1}{4}$ $\frac{1}{8}$ $\frac{1}{8}$ <br> 1   |  |  | $\frac{1}{8}$ |
| $\frac{1}{10} \frac{1}{10}$ | $\frac{1}{10} \frac{1}{10}$ | $\frac{1}{10}$ | $\frac{1}{10} \frac{1}{10}$ | $\frac{1}{10} \frac{1}{10}$ | $\frac{1}{10}$ |  |
| $\frac{1}{12} \frac{1}{12}$ | $\frac{1}{2} \frac{1}{12} 1 \frac{1}{12}$ | $\frac{1}{12} \frac{1}{12}$ | $\frac{1}{12} \frac{1}{12}$ | $\frac{1}{12} \times \frac{1}{12} 1 \frac{1}{11}$ | $\frac{1}{12} \frac{1}{12}$ | $\frac{1}{12} \frac{1}{12}$ |

Language: place value, partition, digit, ones, units, tens, hundreds, one-digit number, two-digit numbe three-digit number, tenths, equivalent, fraction
balance, equal, whole, numerator, denominator

## Symbols: $\frac{1}{2} \frac{1}{4} \frac{3}{4}$ 《

Questions
Draw an arrow on the number line to show ${ }^{\frac{3}{3}}$ I ate more than $\frac{1}{10}$ a cake but less than $\frac{1}{4}$. What fraction could I have eaten?
What would you divide by if you needed to find $\frac{1}{2}, \frac{1}{4}$.
oncrete Experience: 'Make' different fractions by Iding/ cutting paper, cutting items, colouring shaps, and so the sizes of each and order them. se a fraction cards or number line to identify differen ins, and compare and order them
[mages:

-anguage:
Symbols: $\frac{1}{2} \frac{1}{3} \frac{2}{3} \frac{1}{4} \frac{3}{4} \frac{1}{5} \frac{2}{5} \frac{3}{5} \frac{4}{5} \frac{1}{10} \frac{3}{10} \frac{7}{10} \frac{9}{10}<>$
Questions: Which is smalier - a quarter of an elephant or a juarter of a mouse?
rite a fraction that is larger than ${ }^{2 / 7}$
What would you divide by if you needed to find $\frac{1}{2}, \frac{1}{4}$, etc? an you visualise factions with the same denominator to help you der it?

## Concrete Experience:

Give children practical
Give children a rectangle that is 10 cm long and access to a ruler Explain that you want them to draw lines to divide the rectangle into fifths.
divide the rectangle into? How can we make sure that each piec is the same size?
Images:


$$
\times 3\binom{1 / 5 \text { of } 40=8}{3 / 5 \text { of } 40=24} \times 3
$$



Language: fraction, part, equal parts, one whole, parts of a whole number of parts, divide, one half, one third, one quarter, one denominator, multiply, multiple.

Symbols: $\mathrm{x}=\frac{1}{2} \frac{1}{3} \frac{2}{3} \frac{1}{4} \frac{3}{4} \frac{1}{5} \frac{2}{5} \frac{3}{5} \frac{4}{5} \frac{1}{10} \frac{3}{10} \frac{7}{10} \frac{9}{10}$
Questions: Would you rather have $1 / 5$ of 30 sweets or $3 / 4$ of 12 sweets?
Why?
What would you prefer: 3 pizzas shared between 4 people or 6 pizzas shared between 10 people? Explain why.
What is $1 / 3$ of $9,12,15$ ? How did you work it out?
bjective: understand the relation between unit fractions as erators (fractions of), and division by integers
Concrete Experience: Share objects between children Use Concrete Experience: She
Dienes to model processes.


A number line can then be used as a jotting/image to help solve fraction as operator problems. E.g. when finding $1 / 3$ of $£ 60$,
drawing a line, then marking 0 and $£ 60$ at either end might help awing a line, then mat (-3).
Language: fraction, part, equal parts, one whole, parts of a whole, umber of parts, divide, one half, one third, one quarter, one fth one sixth one tenth, unit fraction, numerator, denominator, multiply, multiple.
Symbols: $x=\frac{1}{2} \frac{1}{3} \frac{2}{3} \frac{1}{4} \frac{3}{4} \frac{1}{5} \frac{2}{5} \frac{3}{5} \frac{4}{5} \frac{1}{10} \frac{3}{10} \frac{7}{10} \frac{9}{10}$
Questions: Tell me how to find one sixth of 42
Questions:- Tell me how to find one sixth of 42 . $1 / 3$ of 75 is 25 . Write this as a division statement.
What operation would you key into a calculator to find $1 / 8$ What
256?

Objective: solve problems that involve all of the above denominator within one whole [for example, $1 / 5+2 / 5=3 / 5$ ]

Concrete Experience: Use fraction cards to model the process.

## Images:



Singapore Bar Method


Language: fraction, part, equal parts, one whole, parts of a whole,
number of parts, divide, one half. one third, one guarter one number of parts, divide, one half, one third, one quarter, one fifth, one sixth, one tenth, unt
denominator, add, subtract.

## Symbols: + $\frac{1}{2} \frac{1}{3} \frac{2}{3} \frac{1}{4} \frac{3}{4} \frac{1}{5} \frac{2}{5} \frac{3}{5} \frac{4}{5} \frac{1}{10} \frac{3}{10} \frac{7}{10} \frac{9}{10}$

Questions:
add up to 1.


Here is a chocolate

eats 3 pieces and Ann eats 2 pieces.
What fraction of the chocolate bar remains

Language: fraction, part, equal parts, one whole, parts of a whole, number of parts, divide, one half, one third, one quarter, one fifth, one sixth, one tenth, unit fraction, numerator,

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Concrete Experience: Use RUCSAC (or similar problem solving cess) before (selecting most appropriate) and/or Singapore Bar Method (below). Investigate statements about fractions (Always. Sometimes, Never).
Images: use a variety of models and images (previously shown) to solve problems.

## Singapore Bar Method:

Kelly buys 24 flowers. Two thirds of them are white. How many hite flowers are there

Questions: A haf of an object is bigger than a quarter of object. Always/Sometime/ Never?
Fold a piece of paper in half. Now fold another piece inaf different way. Are there any other ways? What is the same? What is different?
Halving a number less than 20 gives an answer of less than ten Always/Sometime/ Never?

## oncrete Experience:

se measuring equipment and measure
hole quantities, halves, quarters and so
n. Mark the quantities along
ne measured in fractions.
mages
$\stackrel{+}{0}$
0
$\begin{array}{cccc}0 & 0.5 & 1 & 1,5 \\ 0 & 1 / 2 & 2 / 2 & 3 / 2\end{array}$
$\underset{25 \mathrm{~cm}}{\stackrel{\frac{1}{4}}{1}} \stackrel{\frac{1}{2}}{1}{ }_{50 \mathrm{~cm}}^{1}{ }_{1 \mathrm{~m}}^{1}$
anguage: measurements, one metre, ne hundred centimetres, one litre, jarters, tenth, fifth, hhird ymbols: $m, \mathrm{~cm}, \mathrm{~km}, 1, \mathrm{ml}, \mathrm{kg}, \mathrm{g}$, hal $\frac{1}{2} \frac{1}{2} \frac{1}{3} \frac{13}{4} \frac{3}{5} \frac{2}{5} \frac{3}{5} \frac{1}{5} \frac{1}{10} \frac{3}{10} 90$
!uestions: If this jug holds 500 ml , hat would half of the jug be? Show me na number line. Can you mark the
ivisions on this number line in tenths $f$ the whole amount?

Objective: make connections betwee fractions of a length, of a shape and as a representa
quantities
Concrete Experience
Measure strips of paper then fold in
half and meosure half and measure again and so on.
Fill a jug with water and measure, calculate and pour out half and so on


Language: : measurements, one metre one hundred centimetres, one litre,
1000 millilitres, half 1000 millilitres, half, quarter, three
quarters, tenth, fifth, third quarters, tenth, fifth, third Symbols: $\mathrm{m}, \mathrm{cm}, \mathrm{km}, \mathrm{l}, \mathrm{ml}, \mathrm{kg}, \mathrm{g}$, haf
quarter, fifth, tenth, third, $\frac{1}{2} \frac{1}{3} \frac{2}{3} \frac{1}{4} \frac{3}{4} \frac{1}{5} \frac{2}{5} \frac{3}{5} \frac{4}{5} \frac{1}{10} \frac{3}{10} \frac{7}{10} \frac{9}{10}$ Questions:
Questions:
What fraction of this shape is shaded?
Can you say this fraction in another Can you say this fraction in another
$\stackrel{\text { way? }}{\square} \square \square$
I circled a quarter of the shapes. How
many were in the original set?

fractions number, tenths, hundredths

Symbols: $1 \div 10,1 \div 100, \frac{1}{10} \frac{1}{100}$
Questions: What fraction is each piece? How many hundredths make one
whole? What is one hundredth whele? What is one hundredth
less/more than
less/more than ..? How could you show
a hundredth? Which of these decimals a hundredth? Which of these decim
means ${ }^{7} 10$ ? A 70 B 7 CO

Objective: recognise that hundredths arise when dividing an object by one
hundred and dividing tenths by ten

Concrete Experience:
Use Dienes equipment to model a 'blown
up' unit (see below).
up' unit (see below).
Ask children to cut up squares on a
$10 \times 10$ square to divid it Ask children to cut up squares on a
$10 \times 10$ square to divide it into 10 equal
pieces and then 100 equal pieces. pieces and then 100 equal pieces.
100 objects (e.g. interlocking cubes or 100 objects (e.g. interlocking cubes
counters).
counters).
Explore money using a pound to Explore money using a pound to
represent $1,10 \mathrm{p}$ to represent a a tenth and 1 p to represent a hundredt .

Images:
$=\square$
Blow up' Dienes so: Flat $=1$, Long $=1 / 10$ Blow up Dienes so: Flat $=1,1$
$=0.1$ and Unit $=1 / 100=0.01$


Language: place value, partition, digit, ones, units, tens, hundreds, one-digit
number two-digit number three-digit

Review counting in tenths and relate counting in tenths to counting in decimals (0.1. 0.2, 0.3..) before moving onto hundredths.
Start with real t. Start with real things, e.g. Dienes rods
and units -1 flat $=1$ whole, 1 rod $=1$ tenth. 1 unit $=1$ hundred., or money$£ 1=1$ whole, $10 \mathrm{p}=1$ tenth, $1 \mathrm{p}=1$
hundredth.
hundredth.
Count (using images) in hundred
from zero, then from any whole from zero, then from any whole
number, any hundredth and then any number, (e.g. 2 and $a$ half, 2 and 51
hundredths..) hundredths ...)
Make the calculator into a counting machine by using the 'constant' function
e.g. $4.38++0.01==$ etc.

4.39

| 4.4 |
| ---: |
| 4.41 |

symbols: $\frac{10}{}=0.1 \overline{100}=0.01$
Questions: Which is greatest: one tenth or one hundredth? What is the
next hundredth after 122? What is the hundredth before 3.5 ?


Objective: recognise and show, using
diagrams, families of common diagrams, families of co
equivalent fractions

Concrete Experience
Explore fraction walls.
Find different fractions of the same thing (e.g. a square or rectangle (on
squared paper for ease) or a strip of paper. Match the pieces that are the same size.
Find different
Find different fractions of the same
number and compare which fractions number and compare which fractions



Language: equivalent, fraction, , equal,
whole, , numerator, denominator, factor, multiple, simplify.

## Symbols

Language: equivalent, fraction,

Symbols: $=$
$\frac{1}{2} \frac{1}{3} \frac{2}{3} \frac{1}{4} \frac{3}{4} \frac{1}{5} \frac{2}{5} \frac{4}{5} \frac{1}{51} \frac{3}{10} \frac{7}{10} \frac{9}{10}$

Whestions:
Which fractions are equivalent? How
do you know? Can you show me that one quarter is equivalent to four sixteenths?
to recoonise equivalent fractions and to recognise equivalent fract
simplify where appropriate

Concrete Experience:
Fill in multiplication +0
Fill in mult tiplication tables to enable children to see the equivalence and
simply fractions sthe factor simply fractions (the factor at the top
of the column indicates the number to divide by to simplify the fraction) and solve problems, for example.

$\frac{1}{3} \frac{2}{3} \frac{1}{4} \frac{3}{4} \frac{1}{5} \frac{2}{5} \frac{3}{5} \frac{4}{5} \frac{1}{10} \frac{3}{10} \frac{7}{10} \frac{9}{10}$
Questions:
$\frac{7}{10}=\frac{\square}{30}$
How do you know?
Tell me a fraction that is equivalent to did you do it?

Find the missing number
$\square^{3}=\frac{12}{16}$
Karen makes a fraction using two Karen makes a fracions.
number cards. She says,
My fraction is equivalent to $1 / 2$. One of the number cards is 6 What could Karen's fraction be? Give both possible answers. What clues did you look for to cancel these fr
form?
low
How do you know when you have the simplest form of a fraction?

Objective: recognise and
equivalents to $\frac{1}{4}, \frac{1}{2}, \frac{3}{4}$ Concrete Experience: Link to counting in fractions. Use a simple number line marked in divisions of 0.5 to familiarise children with
counting forwards and backwards in counting forwards and backwards
steps of 0.5. Extend this to other number lines to develop counting in other step sizes (e.g. 0.2). Use $10 \times 10$ grids and establish each
square is one hundredth $(0.01)$. Find square is one hundredth $(0.01)$. Find
fractions of the square (100) and use it to write decimal equivalents. Use a calculator to carry out the division, e.g. $\frac{3}{4}$ would be $3 \div 4$.


Language: numerator, denominator equivalent, proper fraction, decimal

Symbols: $\div=\frac{1}{2} 0.5$
Questions: What is three quarters as a decimal? How would you find the decimal equivalent of $y$ ?

Objective: recognise and write decimal
equivalents of any number of tenths or hundredths

Concrete Experience:
Establish that the decimal point is
used to separate whole amounts and
parts of the whole.
Use a calculator and
Use a calculator and the language of
fractions to find decimal and fraction equivalents.
Present children with commonly
confused fraction and decimal
confused fraction and decimal
equivalents, for example, 0.4 and

Images


Language: place value, decimal, tenths.
Language: place value, decimal,
hundredths, $3.6=$ 'three point six
$=$
and three units and six tenths
$0.13=$ one tenth + three hundredths $=13$ hundredths.
Symbols: $1 \div 10,1 \div 100, \frac{1}{10} \frac{1}{100}$
Questions: Tell me two fractions that are the same as 0.5 . Are there any ore the same as $£ 0.25$ ? How many
ar hundredths are the same as 0.25 ? How else could you write twenty-five
hundredths? How many centimetrent hundredths? How many centimetres
are the same as 0.75 m? How many are the same as 0.75 m ? How many
hundredths are the same as 0.75 ? How else could you write seventy-five hundredths?
Which of thes
Which of these fractions is the same as 0.5$)^{\frac{1}{2}} \quad \frac{1}{3} \quad \frac{1}{4} \frac{3}{4}$
Which of these is the same as 0.4 ?
$A$ four $B$ four tenths $C$ four A four B four tenths $C$ four
hundredths $D$ one fourth hundredths $D$ one fourth
Which of these fractions is the same as nought point four?
$\begin{array}{ccccc}\frac{1}{4} & \frac{1}{40} & \frac{1}{400} & \frac{4}{10} & \frac{4}{100}\end{array}$ How would you write ${ }^{37} / 100$ as a decimal?
Which num
er represents the shaded

point, tenths, hundredths $3.6=$ 'three $0.13=$ one tenth + three hundredths $=13$ hundredths.

## Symbols: 7.23

Questions: Write down a number lying
Questions: Write down a number lying and then as a decimal. Enter 5.3 on to your calculator display. How can y change this to 5.9 in one step (operation)? A CD costs between
$£ 5.50$ and $£ 5.65$. How much could it $£ 5.50$
cost?

$\qquad$ 5

Language: digit, decimal, multiply,
times , divide shore, times, divide, share, scale up, scale
down, increase, decrease, factor, tens of thousands, thousands, hundreds, tens, units, ones, tenths, hundredths, thousandths
Explore the language of units, for example, roots from which 'centi' and
'milli' are derived and where else they are used (e.g. century, centurion).
Symbols: -
Questions: What is ... $\div 10 /=100$ ? How do you know? Can you show me how to divide by ten? What mistak have I made here?
decimals to two d.p.
Concrete Experience: Use RUCSAC (or similar problem solving process) to read, understand (and model). calculate, solve, answer and check.
Select relevant models and images used before (selecting most appropriate) and/or Singapore B Method (below). Investigate statements about fractions (Always, Sometimes, Never). See Calculation Policy.
Images: All those used before Language: All those used before Symbols: All those used before. Questions: Range of questions (se those above), including Always,
Sometimes. Never statements etc.
bjective: understand that percentages,
zcimals and fractions are different ways of <pressing proportions
merete Experience: Find fractions of $100 \%$, ilculate $1 \div 2$. Use strips of paper as number les and fold.
nages

age: equivalence, fractions, percentages,
cimals, division
ymbols: $\frac{3}{4}=3 \div 4$
uestions
II in the missing numbers in the grid

| Fraction | Decimal | Percentage |
| :--- | :--- | :--- |

Objective: recognise the per cent symbol( $\%$ )
and understand that per cent relates to and understand that per cent relates to
number of parts per hundred', and write
percentages as a fraction with denominato 100, and as a decimal
Concrete Experience: Use money to show how 10 p can be expressed as a percentage
and a fraction of 1 . Give children the opportunity to use coins to convince themselves that, for example, 10p is $1 / 10$ or $10 \%$ of $£ 1$ because they need ten 10p coins to make $£ 1$.


Language: percentage, per cent, tenths,

- 0

Symbols: \%, 0.1, 0.01
Questions: How can you model a percentage?
How can it be written as a fraction with How can it be written as a fraction with 0 denominator of 100 ? W
equivalent decimal be?

Objective: understand and use the
equivalence between percentages, fractions and decimals (e.e.g. $100 \%$ percentages, fractions and $1 \%$ is $1 / 100,50 \%$ of 100 is 50 ) and relate
this to fo this to finding 'fractions of'
Concrete Experience: Using number lines is an effective way to see the equivalence etween the numbers. This could be linked
to measure, for example, finding $50 \%$ of 1 m 50 measure, for example, finding $50 \%$ of 1 m Images:


Use Dienes to represent percentages, eg Use Dienes $=100 \%$ and so on on.
flater


Lraction, equal
Symbols: \% =
Quest
grid


How do you know that

Objective: read and Write decimal numbers
as fractions [for example, $0.71=71 / 100$ ] Concrete Experience: Use Dienes to represent decimals numbers and compare to Dienes as fractions.
Use a $10 \times 10$ grid to represent 1. Colour in the decimal amount shown and compare to Use skills of simplifying f. simplify fractions where possible.

## Images:





as at as as es as as at as as 1
Language: equivalence,
decimal fraction, equa
Symbols: $0.1,0.01$,
Questions: How could you write this fraction as a decimal? How could you write this decimal as a fraction with a denomino
100? Can you simplify this fraction?

Objective: recoognise mixed numbers and sand convert from one form to the other

Concrete Experience: Use knowledge of counting to mark numbers on number lines. Make fractions using fraction cards,
exchanging equivalent units and so on

Images:



Language: denominator, numerator, whole,
raction, equivalent, mixed number, improper fraction.
$\frac{7}{5}=1 \frac{2}{5}$
Questions
Tell me a fraction that is bigger than 3. Ho Show me what eight thirds looks like. What is equivalent to it?

Objective: identify, name and write equivalent fractions of a given fraction,
represented visually including tenths on hundredths

Concrete Experience: Use various models and images to represent fractions in ifferent ways. Compare fractions and
dentify equivalence. Investigate using multiplication and division to create equivalent fractions and to simplify fractions to find simplest equivalent

Images:


nuag: numerator, denominator, decima Language: numerator, dens
point, tenths, hundredths

Symbols:=
Questions: Show me what... looks like. How else can we model. .? What fraction is are equivalent? How can we use multiplication/division to find equivalent ractions? decimal equivalents

Concrete Experience:
Use a calculator and the language of
fractions to find decimal and fraction
Blow up' Dienes so 1 cube represents 1 whole,
and therefore unit cubes represent one thousandths.
Images:


Language: numerator, denominator, decimal point, tenths, hundredths, thousandths,
$3.652=$ 'three point six five $=$ three unit, $3.652=$ 'three point six five $=$ three units, six
tenths, 5 hundredths and 2 thousandths $=$ tenths, 5 hundredth
3652 thousandths
Symbols: $1 \div 10,1 \div 100,1 \div 1000$ $\frac{1}{10} \frac{1}{100} \frac{1}{1000}$

Questions: How would you read this number 1.234. What is the place value of each digit? How many units are there? How many enths? How many hundredths? How many

## Concrete Experience:

se fraction cards or a fraction wall to hysically compare the sizes of fractions and se knowledge of simplifyin
ractions with denominators that all have nultiples of the same number.
Jse a calculator to perform the division and them to the original fraction.

write, order and com numbers with up to three decimal places Concrete Experience: consolidate understanding to read, write, order and
compare numbers with compare numbers with up to two decimal Link to ordering numbers in the thousands.

## Images:



Language: decimal, decimal fraction, decimal point, decimal place, tenth, hundredth,
thousa thousandth, significant digit

## Symbols: < = >

Questions: Put these in order: $£ 0.56,125$ p $£ 3.60,250 \mathrm{p}, 7 \mathrm{p}$, $£ 5,205 \mathrm{p}$. Which is the
smallest? How do you know? Which is the E3.60, 250p, tp , Ł5, 205p. Which is the
smallest? How do you know? Which is the
largest? How do you know? largest? How do you know? What amount of money comes next: $£ 1.76$,
$£ 1.86, £ 1.96 \ldots$ ? What length comes next $1.76 \mathrm{~m}, 1.86 \mathrm{~m}, 1.96 \mathrm{~m}, \ldots$ ?

Objective: round decimals aces to the nearest whole number and to one Concrete Experience
Mark number on a number line. Identify the whole numbers surrounding it, and mark the midpoint between the two whole numbers. This
will clearly indicate the whole number to round to. When rounding 3.47 to the nearest whole number, children need to be aware that the answer will either be 3 or 4 and this can clearly
seen on the number line below They then need to mark the middle between 3 and 4 and know that it is 3.5 . Marking on 3.47 allows children to see clearly
that 3.47 is less than 3.5 and thus close t 3 That 3.4 is less than 3.5 and thus closer to 3
than 4. than 4.
Compare
Compare to rounding 3 digit numbers to the
hearest 100. In this example it is also usefu to make the comparison with rounding 347 to he nearest 100 .
Repeat but mark the surrounding tenths.
Images


Smonsman fippomes

Language: place value, ten, unit, tenths, Symbols:

Questions: What is 4.37 rounded to the nearest whole number? I rounded my number
to 5. What number (with two decimal laces) 10 5. What number (with two decimal places)
could it have been? What is the Ligest/smallest number I would Simon rounded 1.64 to 2. Was he right? explain how you know. Show me why I would round 2.3 to 2 . I am nearly 1.6 m tall. How tall could I be?

Concrete Experience: Use fraction cards to model the process (including equivalence where
needed $1 . e 4 / 4=1)$ needed, 1.e $4 / 4=1$ ).


Singapore Bar Method:
Alex $x$ raveled from his house to the tennis
court. He rode $1 / 3$ mile and then walked court. He redede $1 / 3$ m mile and then walked
$5 / 12$ mile. How far did Alex travel from his $5 / 12$ mile. How far did Ale
house to the tennis court?

hitp://wwww.mathplolaground.com/thinkkingblocks.shm Language: : fraction, part, equal parts, one whole, parts of a whole, number of parts, divide, one half, one third, one quarter, one fifth, one sixth, one tenth, unit fraction,
non-unit fraction, numerotor, denamina non-unit fraction, numerator, denoming
simplify, equivalence, add, subtract.

Symbols: $+\frac{1}{2} \frac{1}{3} \frac{2}{3} \frac{1}{4} \frac{3}{4} \frac{1}{5} \frac{2}{5} \frac{3}{5} \frac{4}{5} \frac{1}{10} \frac{3}{10} \frac{7}{10} \frac{9}{10}{ }_{\text {etc }}$
Questions:
Questions:
What is $\frac{3}{4}+\frac{3}{8}$ ? What is $\frac{4}{5}-\frac{3}{10}$ ?
What is $\frac{5}{4}$ less than $1 \frac{1}{2}$ ?
me how you worked it out.

Objective: solve problems which require knowing percentage and decimal equivalents
of $\frac{1}{2}, \frac{1}{4}, 1,2 \%, y / s$ and those fractions with a denominator of a multiple of 10 or 25 .
Concrete Experience: Use previous Concrete Experience: Use previous
knowledge of equivalence of fractions, knowledge of equivalence of
decimals and percentages.
decimals and percentages.
process) to: read, understand (and model), calculuate, solve, answer and check. Select
relevant models and images used relevant models and images used befor
(selecting most appropriate) and/or (selecting most appropriatelon). Investigate
Singapore Bar Method (below) statements about fractions (Always, Sometimes, Never).

Images: All those used before. Language: All those used before Symbols: All those used before Questions: Range of questions (see those bove), including Always, Sometimes, Never statements etc.

Images: All those used before. Language: All those used before. Symbols: All those used before. Questions: Range of questions (see those above), including Always, Sometimes, Never statements etc. eir understanding of multiplication with
actions (fractions as operators (fractions of)
numbers, and ase oual parts of objects, for numbers, and as equal parts of objects, for ample as parts of a rectangle]
ncrete Experience: In 3/5, the 3 tells you at you have three pieces and the 5 tells you
at each piece is one fifth of a whole. One wa read $3 / 5$ is ' 3 in every 5 '.

## lages:

$111 \square$

of $£ 20=£ 15$ | $2: 3$ |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- |
|  |  |  |  |  |
| $\frac{3}{5}$ |  | $\frac{3}{5}$ |  |  |


(1)

tower one tenth of the size of the other
nguage: fraction, part, equal parts, one whole, rts of a whole, number of parts, divide, one
If one third one If, one third, one quarter, one fifth, one sixth
e tenth, unit fraction, non-unit fraction, merator, denominator, of, equals, multiply
mbols: $x=+-1$ :
sestions: How many different ways can you ow me..? Can you explain what this shows us? iw would you explain..? Does this show..? hy/why not?

Objective: use common factors to simplify
fractions: use common multiples to express fractions: use common multiples to expres
fractions in the same denomination

Concrete Experience: Use knowledge of times table facts to find common factors, and division to simplify. Use multiplication to express fractions in the same denomination. Images


Language: numerator, denominator, fraction roper /improper fraction, equivalent denominator, factor, multiple, simplify.
Symbols: $x$ -
Questions:
What is the missing number?
$\frac{7}{10}=\frac{\square}{30}$
How do you know?
Tell mea fraction that is equivalent to $2 / 3$
but has a denominator of 9 . How did you do
Find the missing number
$3=12$
$\square=\frac{12}{16}$ Karen makes a fra
cards. She says.
My fraction is equivalent to $1 / 2$. One of the Mumber cards is $6^{\prime}$
What could Karen's fraction be?
ive both possible answers.
What clues did you look for to $c$
fractions to their simplest form?
fractions to their simplest form?
How do you know when you have the simplest
form of a fraction?

Objective: associate a fraction with division
and calculate decimal fraction equivalents Ifor and calculate decimal fraction equivalents [f
example, 0.375 ] for a simple fraction [for example, $\frac{3}{8]}$
exam

Concrete Experience: Link to performing division calculations (with decimal remainders)
Images:

## ${ } ^ { \text { Earcel } \frac { 3 } { 4 } \rightarrow 3 \div 4 } 4 \longdiv { 3 . 7 5 }$ $\frac{3}{4}=0.75$

Language: equivalence,

## Symbols:-

Questions: Can you find the decimal fraction for $\frac{1}{2}$ ? Is the decimal equivalent of 2/2.5? How do you know? Can you show me..?

Objective: compare and order fractions,
including fractions > 1 including fractions >1

Concrete Experience: Label the fractions on a fraction wall or use the Fractions ITP to create strips that are divided into halves, thirds, quarters, etc. Compare the size of fractions and position them on a number line.
Use knowledge of decimal and percentage equivalence to help position fractions.


Language: Fraction, top heavy, improper, proper, de
less than.
Symbols: < = >
Questions: Which is bigger, $1 / 2$ or 1/3? How do you know? Which is larger: $1 / 3$ or $2 / 5$ ? Explain how you know.
Arrange these numbers in order: $13 / 4$
15/8, 1.6 - with a calculator and without a calculator. Which way of working do you prefer? Why
numbers to 3 d.p.


Language: place value, units, decimal point,
tenths, hundredths, thousandths.
symbols:
Questions: Can you tell me what the digit $x$ represents in each of these amounts..? Which is larger: $x$
Show me.

Objective: develop their skills of rounding
and estimating as a means of predicting and and estimating as a means of predicting and
checking the order of magnitude of their checking the ordder of magnitude of
answers to decimal calculations

Concrete Experience: Use rounding skills (from Year 5) to find estimates to (from Year 5) to find estimates to
calculations. Then perform calculations and Calculations. Then perform calculations and
compare.
Provide Provide children with incorrect answers to
calculations and ask children to identify ther calculations and ask children to identify them by rounding and estimating.


Language: place value, ten, unit, tenths, Language: place value, ten, unit, tenths,
hundredths, halfway, nearest, round, estimate, reasonable, approximate.

## Symbols: :

Questions: What will be the approximate answer to ...? How did you work it out? Which is the best approximation to ...? Why?
fractions as operators

Lmages: Also see Calculation Policy.


5 | 037.20 |
| ---: |
| $1_{1}^{1} 8^{3} 6 . .^{1} 000$ |
| 37.20 |
|  |
| $\frac{111.60}{2}$ |

-anguage: Multiply, divide, numerator Jenominator, decimal, decimal point,
symbols: $x$ +
Questions: Tim has spent $£ 3$, which is $4 / 5$ गf his pocket money. How much did he have? Jver 3 days Jo earns $£ 186$. How much
noney does she earn in a week? noney does she earn in a week? -arry weighs $3 / 8$ of the weight of a
Shetland pony that is 264 kg . How much does tarry weigh? division to multitly a quantity representing
unit fraction to find the whole quantity (for example if if of a length $i s 3 \mathrm{~cm}$, then the
whole length is $36 \times 4=144 \mathrm{~cm}$ ) whole length is $36 \times 4=144 \mathrm{~cm}$ )

Concrete Experience:
Model how to record the steps in a multistep problem so that each stage is clear. Encourage children to develop confidence by
writing down every calculation they do even writing down every calculation they do, even
when they work them out mentally or on a calculator. For example: Charlie has saved $£ 15$ towards buying a computer game. This is $3 / 5$ of the cost of the game. How much does the game
cost?
o We kn

- We know that $3 / 5$ of the cost $=£ 15$
So $1 / 5$ of the If $1 / 5$ of the cost $=£ 15 \div 3=£ 5$ cost = $£ 5 \times 5=£ 25$ the cost is $£ 5$, then the whole cost $=£ 5 \times 5=£ 25$
OThe game costs $£ 25$

Images:
Language: Multiply, divide, numerator, denominator, decimal, decimal poin
remainders,
Questions: Charlie has saved $£ 15$ towards Questions: Charlie has saved
buying a computer game. This is $3 / 5$ of the buying a computer game. This is $3 / 5$ of the
cost of the game. How much does the game cost of the game. How much does the gam
cost?
If $\frac{2}{4}$ of a length is 36 cm , then the whole length is $36 \times 4=144 \mathrm{~cm}$ rocesss (including equivalence). most effective way of adding or subtracting in each case.
use tids (bstar addition/subbraction.

Images:
$\frac{11}{12}-\frac{1}{3}=$ ?

$1 \frac{2}{3}+2 \frac{1}{2}$
Use denominators to draw grids (in
this case $2 \times 3$ ) that represent units.


Language: fraction, part, equal parts, one whole, parts of a whole, number of parts,
divide, one half, one third, one quarter, one ifth, one sixth, one tenth, unit fraction, on-unit fraction, numerator, denomina

Symmols:
$\frac{1}{2} \frac{1}{2} \frac{1}{3} \frac{1}{4} \frac{1}{5} \frac{2}{5} \frac{3}{5} \frac{4}{5} \frac{1}{510} \frac{7}{10} \frac{7}{10} 10$
etc
Questions: Of the flags in Jackie's Flag Shop, $3 / 5$ are green and another $1 / 5$ are teal. Shop, $3 /$ arace green and another $1 / 5$ are teal.
What fraction of the flags are either green or teal? Sadie's milkshake recipe calls for $3 / 4$ of a scoop of ice cream and Robbie's recipe calls for $1 / 4$ of a scoop. How many
more scoops of ice cream are used in Sadie's more scoops of ice cream are used in Sadie'
recipe than in Robbie's recipe? How would you model..? Can you explain why this is wrong?


Singapore Bar Method:



## Concrete Experience:

Draw grids (or cut up paper grids) to model
the process of the process of multiplying fractions.
Emphasise the use of 'of 'in the
Images:
 Language: fraction, part, equal parts, one
whole, parts of a whole, number of parts, divide, one half, one third, one quarter, one fifth, one sixth, one tenth, unit fraction, non-unit fraction, numerator, d
simplify, equivalence, multiply.
$\sin _{\frac{1}{2} \frac{1}{3} \frac{1}{3} \frac{1}{4} \frac{3}{4} \frac{1}{5} \frac{2}{5} \frac{3}{5} \frac{1}{5} \frac{3}{510} \frac{7}{10} \frac{9}{10} 0_{\text {etc }}}$
Questions: What is $a \times b$ ? How do you know
Questions: What is $a \times b$ ? How do you know
that $c \times d=e$ ? How can you show me that $f x$ $g=h$ ? What is wrong here? Nellie and Brad are collecting clothes for a clothing drive.
Brad collected $3 / 4$ as many clothes as Nellie. Brad collected $3 / 4$ as many clothes as Ne
did. If Nellie collected $2 / 3$ of a bag of did. If Nellie collected $2 / 3$ of a bag of
clothes, how many bags of clothes did $B$ clothes, how many bags of clothes did Brad
collect? Last week, Debbie's Fruit Stand sold $1 / 2$ of a box of melons. Down the road,

Calculating with fractions (decimals, and percentages

Objective: multiply one-digit numbers with up to two decimal places by one-digit and
two-digit whole numbers two-digit whole numbers, such as $0.4 \times$
0.8 , and in practical contexts, such as measures and money

## Concrete Experience:

Concrete Experience:
Start with known multiplication facts before
Start with known mutipication facts before
relating these to decimal multiplication facts: for example, count on and back in steps of 3 before relating this to counting on and back
in steps of 0.3 . Or $6,12,18,24,30,36, \ldots$ in steps of 0.3 . Or $6,12,18,24,30,36, \ldots$
$0.6,1$. Investigate the relationship between the two sets of numbers.
Reinforce the division facts corresponding to multiplication facts; for example: $8 \times 0.7=$
$560.7 \times 8=5656=07=855=0.7$ $5.60 .7 \times 8=5.65 .6 \div 0.7=85.6 \div 8=0.7$
Ensure that chidren meet and can interpret Ensure that children meet and can interpret
multiplication and division calculataions that are written in a variety of different ways, for example: $7 \times 0.8=5.6 \quad 9=5.4 \div 0.60 .3$
$\times 8=6 \times 0.4$ $\times 8=6 \times 0.4$
Always ask children to check that the size of their answer sounds reasonable. For example,
children should recognise that $0.18 \div 2=0.9$ cannot be correct. Using a number line to locate numbers such as 0.18 and then
thinking about dividing by two could help thinking about dividing by two could help
children to check the reasonableness of an answer.
Images: Also see Calculation Policy
$42+6=\quad 0.7 \times 6=4.2 \quad 0.07 \times 6=$
$4.2+6=$

## 

 Language: place value, digit, column,
point, tenth, hundredth, thousandth,
point, tenth, hund
partition, integer
Symbols: $x \div=$
Questions:
at is $7 \times 0.6$
$0.6 \times \square=5.4$
$5 \square \square=0.05$

Concrete Experience:
Draw grids to model the process. Look a the why it works (e.g. $\frac{1}{2}+2=\frac{1}{2} \times$
by 2 is the same as halving).
Images


Language: fraction, part, equal parts, one hole, parts of a whole, number of parts, ivide, one half, one third, one quarter, one
ifth, one sixth, one tenth, unit fraction, non-unit fraction, numerator, denominator, simplify, equivalence, divide
Symbols: $x$;
$\frac{1}{2} \frac{1}{3} \frac{2}{3} \frac{1}{4} \frac{3}{4} \frac{1}{5} \frac{2}{5} \frac{3}{5} \frac{4}{5} \frac{1}{10} \frac{3}{10} \frac{7}{10} \frac{9}{10}{ }_{\text {etc }}$
Questions
What is $a \div b$ ? How can you show me that $f$ $\div=h$ ? What is wrong here? wanted to shre it between two friends. What fraction of the original cake do they have?

## Concrete Experience:

Use place value grids (..tens, units, decimal point, tenths, hundredths, thousandths, ...).
These could be draw on paper or made into a These could be draw on paper or made into a
wall display for children to hold digit cards against. Create numbers and look at effect of dividing by 10,100 and 1000 . Discuss Explore the visual pattern of the digits within division.

Images:

## 

# $42{ }^{2}$ <br> $204 \cdot 85$ 

Language: digit, decimal, multiply, times, divide, share, scale up, scale down, increase, decrease, factor, tens of thousands,
thousands, hundreds, tens, units, one tenths, hundredths, thousandths Explore the language of units, for example, roots from which 'centi' and 'milli' are derived and where else they are used (e.g. century. centurion).

## Symbols: *

Questions: What is ... $10 / \sim 100 /=1000$ ? What is ... $\times 10 / \times 100 / \times 1000$ ? How do you What is ... $\times 10 \times 100 / \times 1$ 000? How do yo
know? Can you show me how to multiply/divide by ten/hundred/thousand? What mistake have I made here?
unding numbers ed understand (andiar problem solving process) to: and check. Select relevant models and images used دefore (selecting most appropriate) and/or Singapore 3ar Method (below). Investigate statements about ractions (Always, Sometimes, Never).
[mages: All those used before -anguage: All those used before, Symbols: All those used before. Questions: Range of questions (see those above) ncluding Always, Sometimes, Never statements etc.

Objective: solve problems involving the relative sizes
of two quantities where missing values can be found by of two quantities where missing values can be $f$
using integer multiplication and division facts

Concrete Experience:
Ensure that children meet proportion described in different ways:
Using everyday language: ten out of 25 children
are girls. ten in 25 child - In simplified form: two out of every five children are girls: two in every five children are girls.
As a fraction: $2 / 5$ of the class are feme - As a fraction: $2 / 5$ of the class are female. - As a decimal: 0.4 of the class are female. Ensure that children can use and describe ratios in their simplest form, for example $1: 3$ is the simplest form of
Images


## ingapore Bar Method:

Dana and Kendra share some erasers in the ratio $3: 4$. Kendra has 40 erasers. How many erasers do they have altogether?

htpp://www.mathplayground.com/thinkingblocks.htm
anguage: ratio, for every to every equivalent anguage: ratio, for every, to every, equivalent,
simplify, problem, pattern, relationship, scale up/down

Symbols: \% . x -
Questions: The ratio of girls to boys at the school play $s 5: 4$. There are 44 boys. How many more girls are
here than boys?
the sum of two numbers is 40 . The ratio of the bigger number to the smaller number is $3: 2$. What is the smaller number?
Mrs Tto has 25 s
Mrs Ito has 25 students in her class. 2 out of 5 students stayed after school yesterday for play How many students stayed for band practice?

## Ratio and Proportion

Objective: solve problems involving the calculation of
ercentages [for example of measures and such os $5 \%$ of 360 ] and the use of percentages for comparis

## Concrete Experience:

When finding percentages of amounts, encourage
children to work out key percentuges such $50 \%$ Children to work out key percentages such as $50 \%$ and or texample, to find $15 \%$ of $£ 40$ : or example, to find
$10 \%$ of $£ 40=£ 4$
halving gives $5 \%$ of $£ 40=£ 2$ dding these gives $15 \%$ of $£ 40=£ 6$ ven fraction or percentage of
uestions. Ian scores $80 \%$ in a test. There were 40 Whole test $=100 \%=40$ questions
hoo e test $=10 \%$ questions
$10 \%=32$ questions
You are told an amount and asked to work out what fraction or percentage it is of another amount. or example, I Iscore 30 out of 50 in a test. What
ercentege sis this? percentage is this?
Whole test $=50$ que
Whole test $=$ S. questions $=100 \%$
questions $=10 \%$
5 questions $=10 \%$
30 questions $=60 \%$
Images
Images:
Help children make links by creating webs of Help children make lins by creating webs of
percentages of numbers and then comparing the
different amounts. For example, 'What would $£ 2.48$ different amounts. For example, 'What would $£ 2.48$ wy in comparison with $£ 248$ ?

anguage: hundredths, percentage, equivalent, tenths
Symbols: \%
Questions:
find $75 \%$ of 200 ml . How did you do this?
What is fifty per cent of $£ 20$ ?
What percentages can you easily work out in your head? Talk me through a couple of examples.
Harry said: 'To calculata $10 \%$ of a quantity you divide it by 10 , so to find $20 \%$ of a quant ity you must divide by
0.1 What is wrong with Harry's statement? xplain the steps you would take to find $35 \%$ of an amount without a calculator.
How would you find $35 \%$ of an amount using a What is tw
What is two per cent of three hundred?

## Concrete Experience:

Rehearse scaling proportions up and down. This echnique can be used to solve problems. Provide visual mages, for example:
ne in four tiles is black
one in four tiles is black
two in eight tiles is black
three in twelve tiles are blac
then


The ratio of a distance on a map to the Rehearse caling ratios up/
solve problems:

- 5 miles is approximately equal to $8 \mathrm{~km}(1$
kilometre is $z \frac{5}{8}$ of a mile)
- 15 miles is is approximimately equal to 16 km


Sninn
ingapore Bar Method:
The ratio of the height of a rectangle to its width
is $3: 2:$ It the eheight is $3: 2$. . If the height of the rectangle is 13
centimetres, what is its width?

http://www..nothplayyround.com/thinkingbbocks.htm anguage: ratio, scale, up, down, multiply, divide actors, multiples, quotients, fractions.
Symbols: $x=\tilde{\sim}=$
Questions: The ratio of the height of a rectangle to its width is $3: 2$. If the height of the rectangle is 12 width is 3 :2. If the height of
centimetres, what is its width? Two numbers are in the ratio 3:2. If the smaller number is 20 , what is the bigger number?
For every 4 books that Lily sold, Monica sold 3. Lily sold 6 books last month. How many books did Monica sell?
The ratio of girls to boys in Mrs Wang's class is 3 : here are 24 boys, how many girls are in the class?
rovide visual images for ratios then ask children to lescribe the scenario using the language and notation ratio, and vice vers
$\nabla \nabla \nabla \nabla \nabla \nabla \nabla \nabla$
Each cone has two scoops of chocolate ice cream to
every one scoop of strawberry Ensure that childre very one scoop of strawberry. Ensure that children understa
ways:


Using everyday language: there is one black tile to hree white tiles:
hree white tiles.
Using a colon (use everyday language first, then the colon form): The ratio of black tiles to white tiles is
one to every three. The ratio of black tiles to white one to every three. The ratio of black tiles to white
ties is $1: 3$. The ratio of white tiles to black tiles is 3 .

## mages:



## Ratio and proportion ITP <br> 

ingapore Bar Method:
The sum of two numbers is 40 . The ratio of the bigger number to the smaller number is $3: 2$. What is the smaller number?

| Snaleer |
| :--- |
| number |

```
\square?
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htp://www.mathplayground.com/thinkingblocks.html
Language: problem, pattern, relationship, ratio, proportion, in every, for
equivalent, simplify
Symbols: : $x==$ /
Questions: The ratio of the number of flags in Eric's Questions: The ratio of the number of flags in Eric's
collection to the number of flags in Will's collection is
$5: 4$. Will has 16 flags. How many flags do they have collection
5:4. Will has 1
altogether?
The ratio of
The ratio of jazz tunes to country tunes on Kayla's mp 3
player is $6: 5$. She has 3 more jazz tunes than country player is $6: 5$. She has 3 more jazz tunes than country
unes. How many jazz tunes does Kayla have? Clares. How Nany Nan took turns driving to Integer Claire drove 5 out of every 8 miles travelled. By the ime they reached Integer Park, Nathan had driven 12 fewer mile
drive?
bjective: link percentages or $360^{\circ}$ to calculating
angles of pie charts
Concrete Experience:
Use a circle to represent a pie chart. Fold and cut it to ind $50 \%$ ( $\frac{1}{2}$ or 0.5 ), 25\% ( $\frac{1}{4}$ or or 0.25 ) and so on. At each tage measure the angle with a protractor to ascertain $50 \%=180^{\circ}$ and so on.
Images:


## 

Language: angles, percentages, fraction,

## Symbols: = $0 \% x=1$.

Questions: How many degrees are there in a whole turn a whole pie chart? What is $50 \%$ (or $\frac{1}{2}$ ) of the angles n pie chart? What is $25 \%$ (or $\frac{1}{4}$ ) of a pie chart? How can you show me? Can you fold this circle to show faction? How many angles are in each
fraction? How many a ag
fraction/percentage?

