Mathematics Mastery

Homework book

Spring

Year 4

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This guide is for parents/carers and any adult working with the child.

The Year 4 homework book is aimed at parents and carers, to enable you to engage in maths with your child in a fun and practical way. There are ten activities, each linked to the units of work in the Year 4 programme of study.

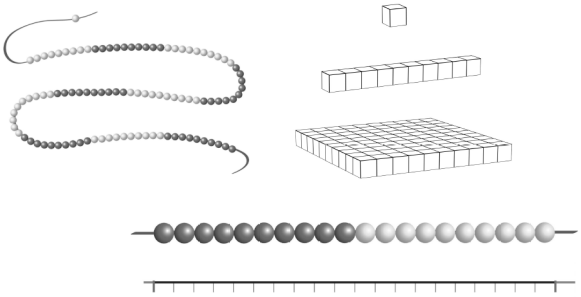
In order to support your child with the tasks, each piece of homework is accompanied by parental guidance. This guidance aims to provide an opportunity for you to understand the methods your child is being taught, which may differ from methods you are familiar with.

What is 'Mastery'?

The 'mastery approach' to teaching mathematics is the underlying principle of Mathematics Mastery. Instead of learning mathematical procedures by rote, we want your child to build a deep understanding of concepts which will enable them to apply their learning in different situations. We do this by using three key principles:

Conceptual understanding

Your child will use multiple concrete and pictorial representations and make connections between them. A key part of a 'deep understanding' in maths is being able to represent ideas in lots of different ways.



34 864 - 25 423 = 9441

This is an ***equation***

We don't round a number 'up' or 'down', we round it to the ***nearest multiple*** of 10, 100, 1000 etc.

Mathematical language

When asked to explain, justify and prove their ideas, your child is deepening their understanding of a concept. The correct mathematical vocabulary is taught from the outset and communication and discussions are encouraged.

Mathematical thinking

Lots of opportunities are planned for your child to investigate open questions that require them to sort and compare, seek patterns and look for rules. Good questioning, both for and from your child, build a deeper understanding of maths.

What is the same? What is different?

Is there a rule? Is it always, sometimes or never true?

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Parental guidance

Unit 1: Reasoning with 4-digit numbers (week 1 of 2)

Parental Guidance

Pupils extend their understanding of the number system and place value to include 4-digit numbers. This week explores recognising the place value, ordering and comparing 4-digit numbers.

In Year 3 *pupils consolidated and deepened their understanding of 3- digit numbers through reasoning and problem solving.*

In Year 5 *pupils will further extend the number system to include 5-digit and 6-digit numbers.*

Understanding place value

Thousands	Hundreds	Tens	Ones
1000 1000 1000	100 100		1 1 1

This number is 3203

This number is three thousand, two hundred and three.

Children are expected to write numbers in **digits** and **words** with the correct spelling.

There are two hundreds in this number

There is a place holder in the tens place

There are 3 ones

The position of the digit in a number determines its **value.** Where the value is zero (as in the tens place in this number), it does not mean there are none of that value (i.e. 'no' tens). The ten have been regrouped into hundreds, in this example creating 2 hundreds.

Unit number and unit title

Key learning

Prior and future learning: where this objective fits into the sequence of learning over time.

A worked example followed by key points to support your child.

On every parental guidance page the unit title is located at the top, followed by an overview of the key learning. In addition, you will see at the beginning of each unit where the key learning fits in with what your child has previously learnt, along with where the learning will be taken in subsequent years of study. It is important to understand that the principle of mastery does not encourage acceleration, and remember, **depth** of understanding is key to your child becoming a confident mathematician who can think flexibly.

Parent's and pupil's comments

Pupil's comments

Parent's comments

Every activity has a space for parents and pupils to write some comments after it has been completed. This is an opportunity to comment on the result of the activity, if it was enjoyable and how your child found the maths.

You can find further information about the Mathematics Mastery programme online at **www.mathematicsmastery.org**. If you have any questions regarding this homework book please speak with your child's class teacher.

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Parental Guidance

By the end of Year 4, pupils are expected to know all of their multiplication tables up to 12 × 12. This week is an opportunity for pupils to further explore and become familiar with these. Learning does not have to stop at the end of this week if your child is still unfamiliar with their times tables – keep practising!

In Year 3 *pupils learnt about the six and eight times tables.*

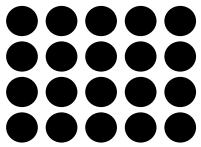
In Year 5 *pupils will continue to consolidate these facts, relying on them increasingly to derive other facts, for example when multiplying by decimals.*

Understanding and learning multiplication facts

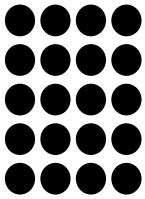
To understand multiplication facts, and how they relate to addition, pupils will be familiar with using **arrays**. This is an arrangement of pictures or objects (dots are often used for ease) which demonstrate a multiplication fact.

Drawing an array to show 4 x 5:

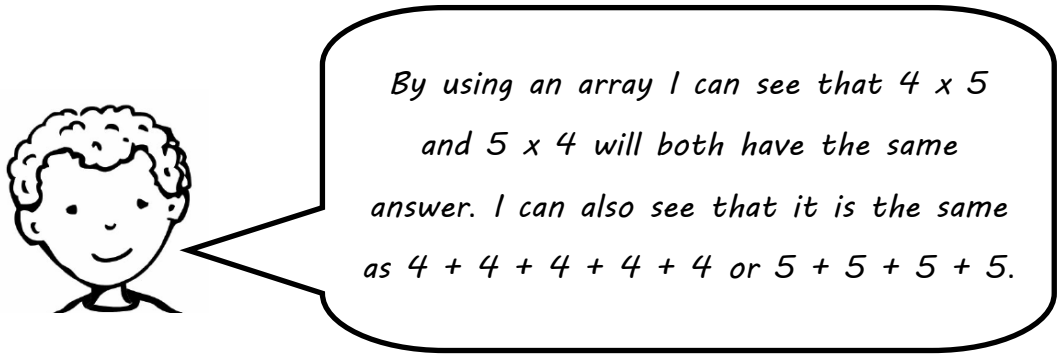
I could draw 4 rows of 5 dots:



Or I could draw 5 rows of 4 dots:



Both of these are an array, which show 4 x 5 or 5 x 4.



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Speedy tables

You will need:

Multiplication cards on page 26, cut out and shuffled.

Instructions:

This activity will need to be completed twice – once at the start of the week, and once at the end.

- *Choose a times table to learn – it should be a tricky one which you need some extra practice with!*
- *Now shuffle the multiplication cards. You are going to be timed by an adult to see how quickly you can multiply your chosen times table number by the number on each card, getting through the whole pack of 13 cards correctly.*

What was your time? Record it below.

- *Practice and learn this times table throughout the week – your adults can test you, as well as practising yourself – write them down, say them aloud and play some games to help you.*
- *Ask an adult to time you again at the end of the week and write your time below. Have you improved?*

What were the 3 trickiest facts you had to learn?

Write them down and draw the array below:

Pupil's comments

I choose the ☐ *times table.*

My first time was ☐

My last time was ☐

Parent's comments

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Parental Guidance

During this unit, pupils explore fractions, including finding equivalent fractions, adding and subtracting fractions and finding fractions of quantities. This week pupils will have focused on representing fractions in different ways, and finding equivalent fractions.

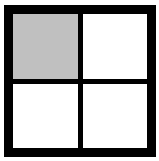
In Year 3 *pupils recognised and found fractions of a set of objects, found equivalent fractions using diagrams and added and subtracted fractions. Pupils worked with fractions with small denominators, and learnt many skills which will be built upon in Year 4.*

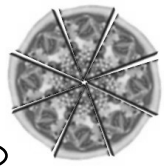
In Year 5 *pupils will be adding and subtracting fractions with different denominators, multiplying fractions by whole numbers and continue to convert between mixed and improper numbers.*

What is a fraction?

Fractions are complex and cover a range of concepts. Ask yourself, "What is a fraction? When are fractions used?" and you will have lots of different answers.

One quarter of the area of the shape is shaded

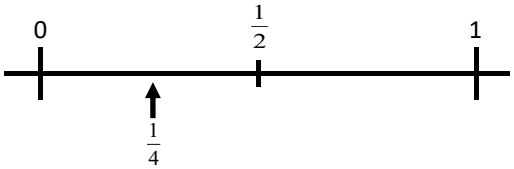




I want to eat a quarter of the whole pizza

A fraction can describe part of a whole

A fraction is a number



$$\frac{1}{4} = 1 \div 4$$

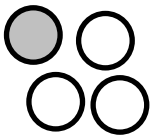
$$\begin{array}{r} 0.25 \\ 4\overline{)1.^{1}0^{2}0} \end{array}$$

(Decimal equivalents will be explored later in the Spring term)

A fraction is the result of a division

A fraction can be part of a set of an amount

One quarter of the counters are grey



One quarter of £4 is equal to £1

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Fraction Find

You will need:

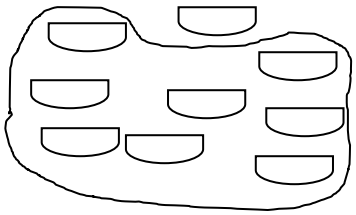
A pen or pencil.

Instructions:

Have a look around your home. Draw and find 5 different fractions which you can see. Some of them might not be exact fractions – for example you might say a mug is ***about*** half full with tea.

For example:

My apple has been cut into eighths. Mum ate one eighth, so I had seven eighths of an apple. I'll draw my eight apple pieces and circle seven. I'll write the fraction next to it.



$\frac{7}{8}$

Write the examples you find below:

Pupil's comments

Parent's comments

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Parental Guidance

During this unit, pupils explore fractions, including finding equivalent fractions, adding and subtracting fractions and finding fractions of quantities. This week pupils have been recognising and converting improper fractions and mixed numbers.

Improper fractions and mixed numbers

Fractions can be greater than one.

*An **improper fraction** has a numerator that is greater than the denominator.*

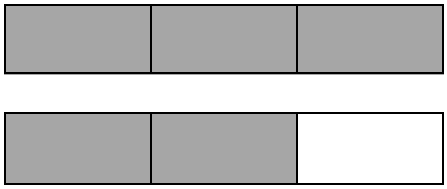
numerator → $\frac{5}{3}$ ← denominator

*A **mixed number** is a whole number and a fraction.*

whole number → $1\frac{2}{3}$ ← fraction

Diagrams can be useful to convert between improper fractions and mixed numbers.

$$\frac{5}{3} = 1\frac{2}{3}$$



I know that three thirds is the same as one whole, so five thirds will be the same as one whole, and there will be two thirds remaining.

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Hidden fractions

You will need:

A pen or pencil.

Instructions:

In the grid below there are pairs of mixed numbers and improper fractions which are equivalent. Circle the pairs which you can find next to each other, either across a row or down a column.

One example has been completed for you – there are ten more pairs to find!

$\frac{6}{5}$	$\frac{2}{3}$	$\frac{3}{2}$	$1\frac{1}{2}$	$3\frac{1}{4}$	$\frac{4}{4}$	$1\frac{1}{4}$	$\frac{5}{4}$
$1\frac{2}{3}$	$\frac{5}{3}$	$2\frac{1}{8}$	$\frac{9}{8}$	$\frac{7}{4}$	$\frac{15}{5}$	2	$\frac{9}{5}$
$\frac{11}{6}$	$1\frac{5}{6}$	$\frac{15}{8}$	$1\frac{7}{8}$	$1\frac{3}{4}$	$\frac{7}{5}$	$\frac{4}{2}$	$2\frac{1}{2}$
$2\frac{1}{2}$	$\frac{5}{2}$	$\frac{9}{8}$	$\frac{20}{8}$	$\frac{6}{5}$	$1\frac{1}{5}$	$\frac{4}{5}$	$\frac{4}{3}$
$1\frac{1}{5}$	$3\frac{1}{2}$	$1\frac{2}{8}$	$\frac{8}{6}$	$1\frac{2}{6}$	$2\frac{1}{3}$	$\frac{6}{3}$	$1\frac{1}{3}$

Pupil's comments

Parent's comments

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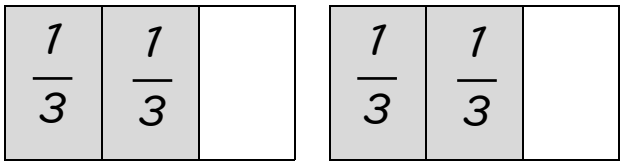
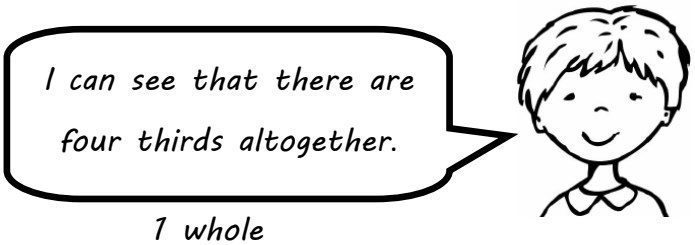
Parental Guidance

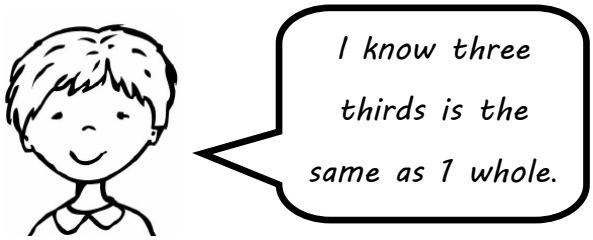
During this unit, pupils explore fractions, including finding equivalent fractions, adding and subtracting fractions and finding fractions of quantities. This week pupils have been adding and subtracting fractions.

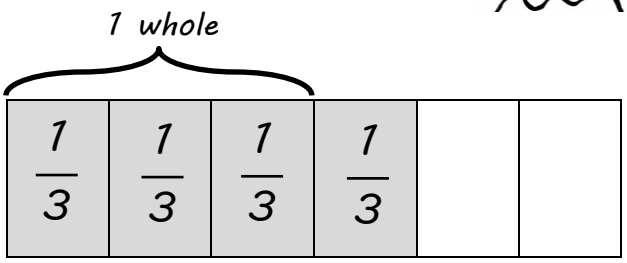
Adding fractions which equal more than one:

$$\frac{2}{3} + \frac{2}{3} =$$





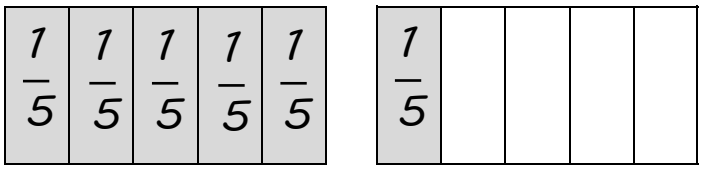


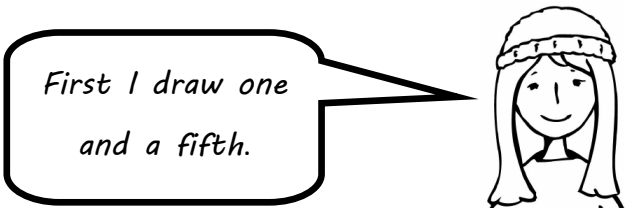


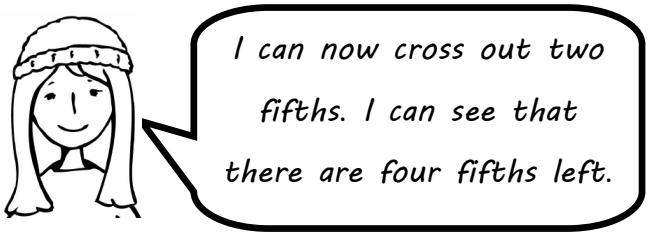
$$\frac{2}{3} + \frac{2}{3} = \frac{4}{3} = 1\frac{1}{3}$$

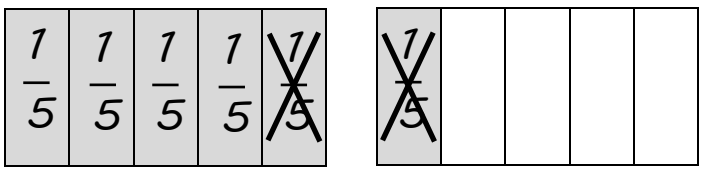
Subtracting fractions with a fraction equal to more than one:

$$1\frac{1}{5} - \frac{2}{5} =$$









$$1\frac{1}{5} - \frac{2}{5} = \frac{4}{5}$$

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Fraction sum pairs

You will need:

Fraction sum cards on pages 28 and 30, cut out and shuffled.

Instructions:

This is recommended as a two or three person game.

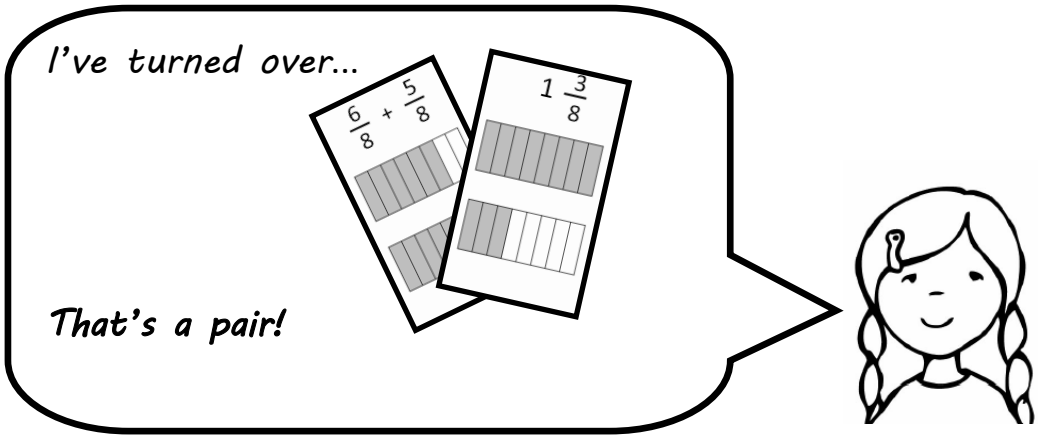
Spread out the cards upside down on a flat surface.

Take it in turns to turn over two different pairs and show all of the other players. Turn them back over in the same place, trying to remember the position of each card – you might need them later!

When a player turns over two cards which are equal to each other, that player gets to keep the cards.

The game finishes when all cards have been taken.

The winner is the player with the most cards at the end.



Pupil's comments

Parent's comments

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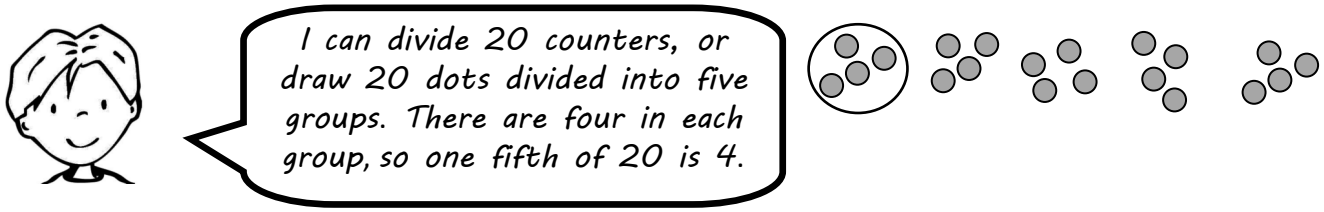
Parental Guidance

During this unit, pupils explore fractions, including finding equivalent fractions, adding and subtracting fractions, and finding fractions of quantities. This week pupils have been finding fractions of amounts.

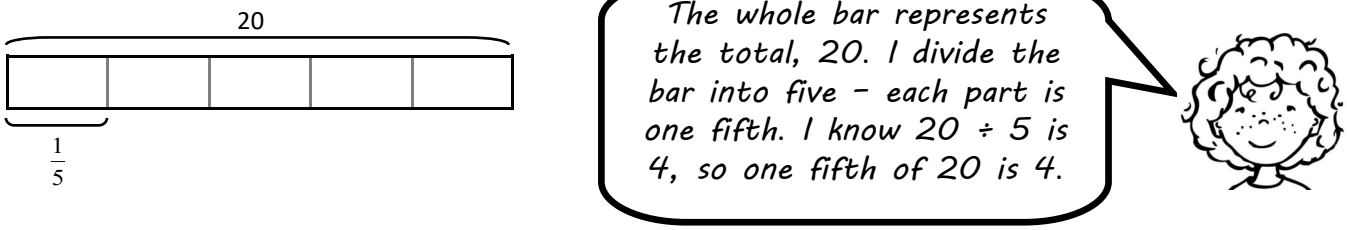
Fractions of an amount

What is one fifth of 20?

This could be represented with counters or dots:

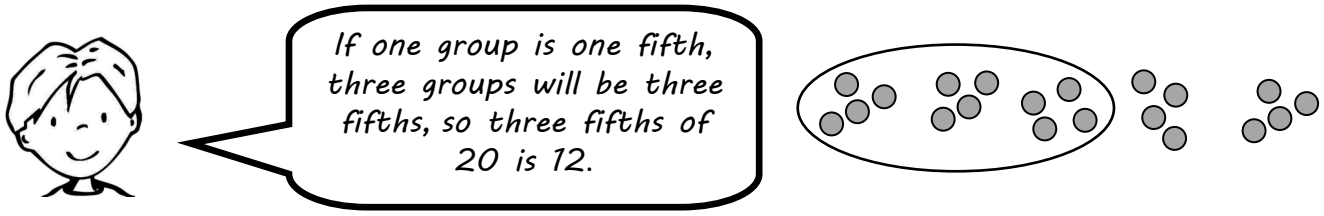


Or this could be represented with a bar model:

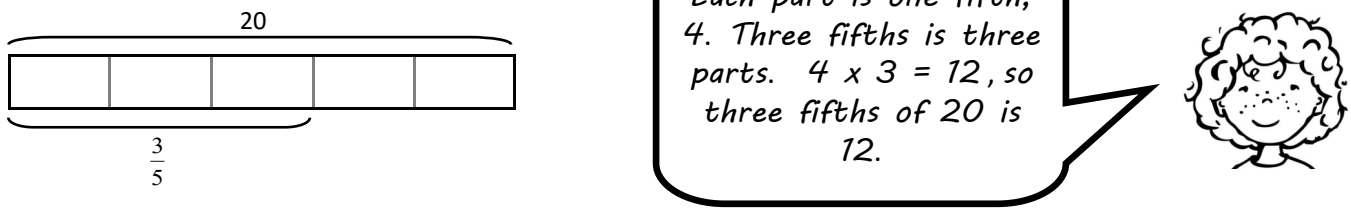


What is three fifths of 20?

This could be represented with counters or dots:



Or this could be represented with a bar model:



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Two truths and a lie

Crystal, Greg and Amy have all written three fraction statements. Two of the statements are true, but one is a lie–tick the two correct statements and circle the incorrect statement.

Challenge: *write your own 2 truth and 1 lie statements.*

One quarter of 32 is 7.

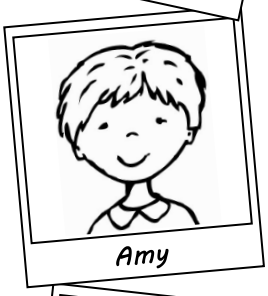
Three quarters of 20 is 15.

Three quarters of 32 is 24.

One third of 24 is 8.

Two thirds of 30 is 20.

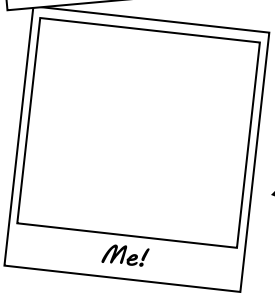
Two thirds of 24 is 18.



Four fifths of 20 is 16.

One fifth of 15 is 5.

Two fifths of 25 is 10.



Pupil's comments

Parent's comments

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Parental Guidance

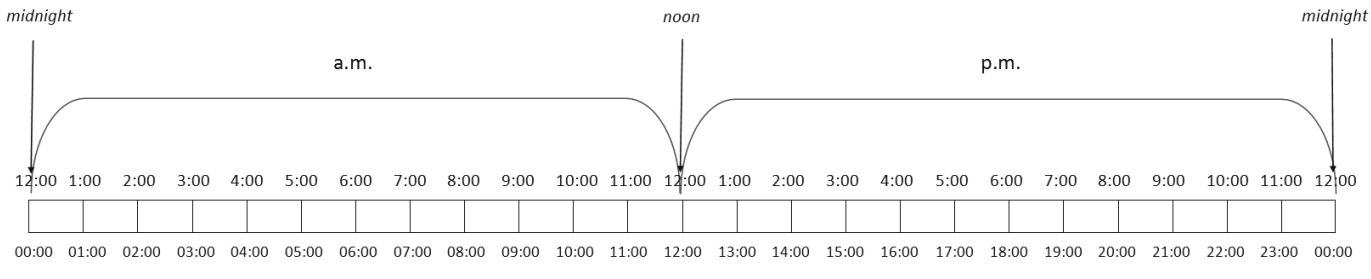
In Year 4 pupils are first formally introduced to using the 24-hour clock. They also revise their knowledge of reading and writing both analogue and digital time, as well as calculating conversions between different units of time. Time is a notoriously difficult area of maths, and the best way to consolidate pupils' understanding of telling the time is through practical, everyday situations, and regular practice.

In Year 3*, pupils became fluent with 12-hour digital and analogue clocks, and used vocabulary such as o'clock, a.m./p.m., morning, afternoon, noon and midnight. Pupils read the time to the nearest minute, and recorded time in seconds, minutes and hours.*

In Year 5 *pupils will solve increasingly complex problems involving converting units of time.*

This week's task involves matching clocks which show the same time in analogue, and 24-hour digital formats. If pupils struggle with this task, it may be more appropriate to turn all of the cards over, so that they're face up, and work through them as a matching task together, rather than as a game.

The chart below should be familiar to pupils as a tool to convert between 12-hour and 24-hour clock times. This should be used by pupils when completing the 'Time pairs' activity.



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Time pairs

You will need:

Time pair cards on page 32 cut out and shuffled.

Instructions:

This is recommended as a two or three person game.

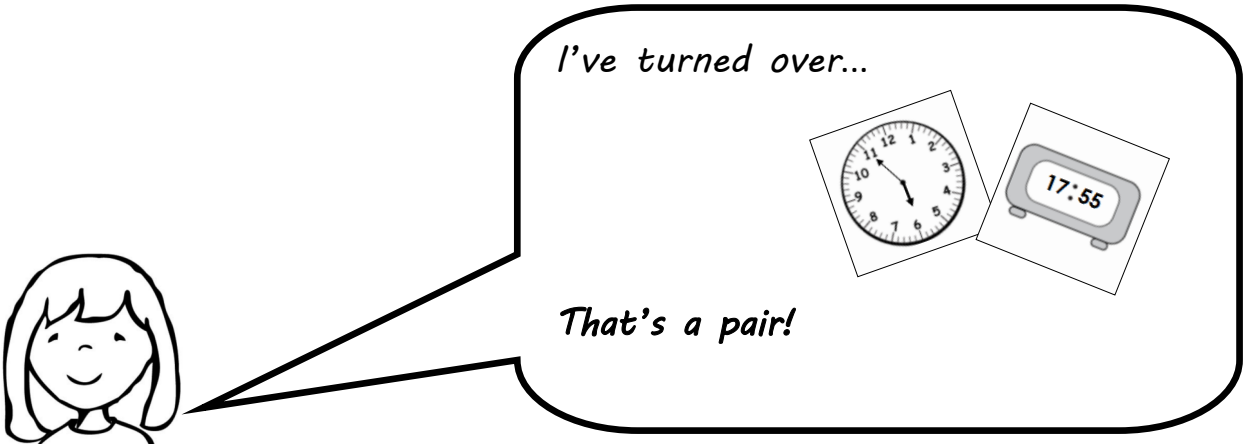
Spread out the cards upside down on a flat surface.

Take it in turns to turn over 2 different pairs and show all of the other players. Turn them back over in the same place, trying to remember the position of each card- you might need them later!

When a player turns over two cards which show the same time, that player gets to keep the cards.

The game finishes when all cards have been taken.

The winner is the player with the most cards at the end.



Pupil's comments

Parent's comments

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Parental Guidance

The learning in this unit is the first time that pupils have formally learnt about decimal numbers. Pupils develop their understanding of decimals to 2 decimal places– with an emphasis on the value of tenths and hundredths. This week pupils have been introduced to decimal tenths (decimals with just one decimal place), including comparing and rounding them.

In Year 5 *pupils will be working with decimals with up to three decimal places.*

This week's task involves rounding decimals to the nearest whole number. The game will be familiar to pupils from the Autumn term.

Rounding to the nearest whole number

Rounding 3.6 to the nearest whole number

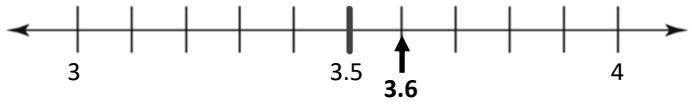
- Find the two nearest whole numbers

The closest multiples are 3 and 4.

- Write the mid-point between the two whole numbers

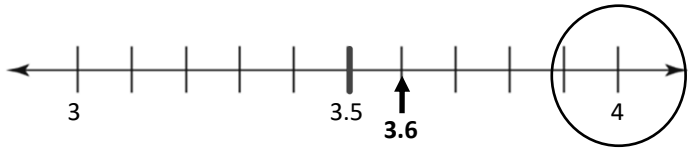
The mid point between 3 and 4 is 3·5. If the number is 3·5 or greater, it will round to 4. If it is less than 3·5 it will round to 3.

- Plot the position of the number on the number line



The closest whole number is 4. 3·6 rounded to the nearest whole number is 4.

- Decide which is the nearer whole number



When rounding, avoid using positional language such as "round up/down". Instead, say "***round to the nearest multiple of…***"

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Rounding race

You will need:

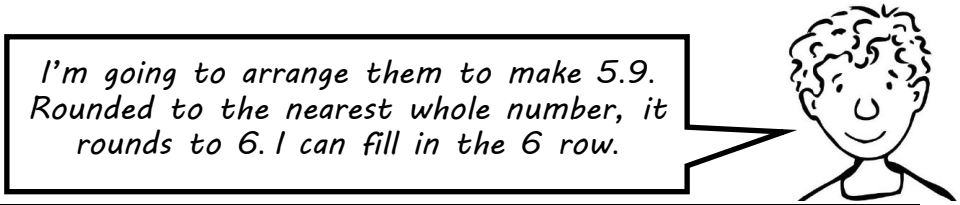
Number cards 0-9 and the decimal point cards on page 34, and a pen or pencil.

Instructions:

Take it in turns to pick two number cards. Arrange the two digits and the decimal pace card to make a 2-digit decimal number. The aim is to be the first player to fill every row with a number.

For example:

Theo picked a 5 and a 9:



Rounded to the nearest whole number, this number rounds to…	Player 1	Player 2
1		
2		
3		
4		
5		
6		
7		
8		
9		

Pupil's comments

Parent's comments

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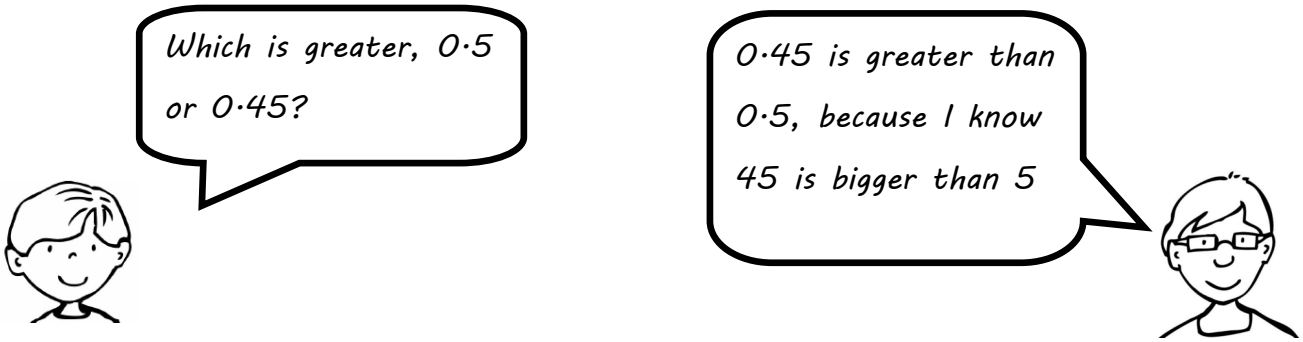
Parental Guidance

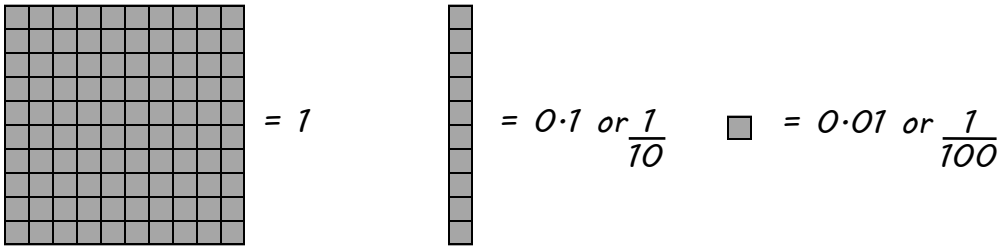
The learning in this unit is the first time that pupils have formally learnt about decimal numbers. Pupils develop their understanding of decimals to 2 decimal places– with an emphasis on the value of tenths and hundredths. This week pupils have been introduced to decimal numbers with two decimal places.

A common difficulty with fractions, is understanding their relative size. For example:

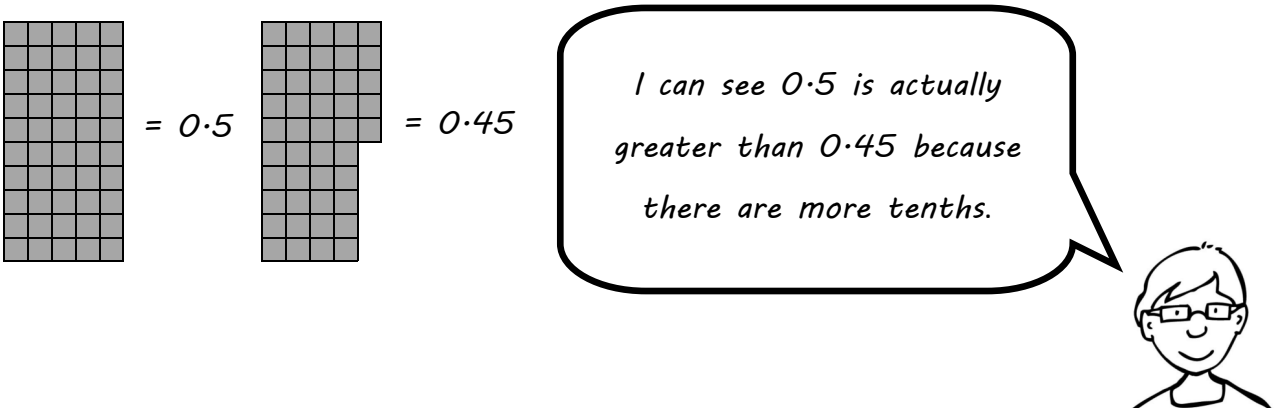


This misunderstanding can be addressed by using representations to show the two decimals.

This is one representation pupils will have used this week:



Using this representation, 0.5 and 0.45 can be represented like this:



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Friend or foe?

You will need:

The number cards on page 34, cut out and shuffled and a pencil or pen to keep score.

Instructions:

Take it in turns to randomly select a number card (0-9). Place your number card either on your grid (below), or your opponent's grid.

The aim is to be the player with the greatest number, and to stop your opponent making a number greater than your own!

Take it in turns to go first.

	Ones	Tenths	Hundredths
Player One			

	Ones	Tenths	Hundredths
Player Two			

Use the table below to keep track of the score with a tally.

Player 1	Player 2

Pupil's comments

Parent's comments

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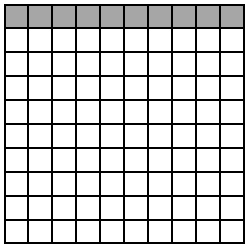
Parental Guidance

The learning in this unit is the first time that pupils have formally learnt about decimal numbers. Pupils develop their understanding of decimals to 2 decimal places– with an emphasis on the value of tenths and hundredths. This week pupils have been multiplying and dividing by 10 and 100, including using decimals. The homework task this week will consolidate understanding of fraction and decimal equivalents.

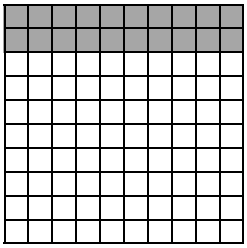
Knowing decimal equivalents to any number of tenths, one quarter, one half and three quarters.

A 100 square can be a useful tool to show decimal and fraction equivalents.

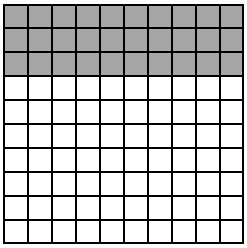
Tenths



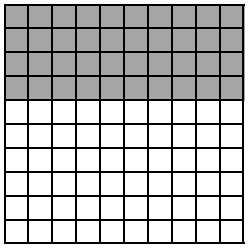
$= 0{\cdot}1$ or $\frac{1}{10}$



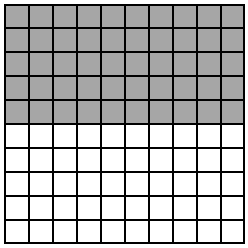
$= 0{\cdot}2$ or $\frac{2}{10}$



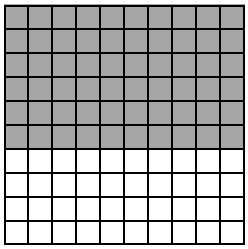
$= 0{\cdot}3$ or $\frac{3}{10}$



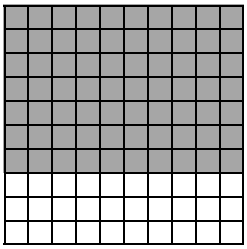
$= 0{\cdot}4$ or $\frac{4}{10}$



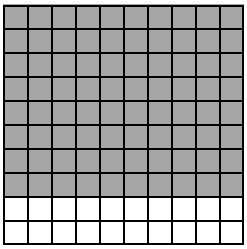
$= 0{\cdot}5$ or $\frac{5}{10}$



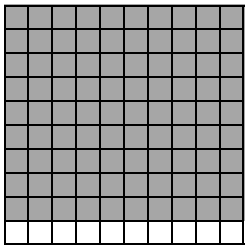
$= 0{\cdot}6$ or $\frac{6}{10}$



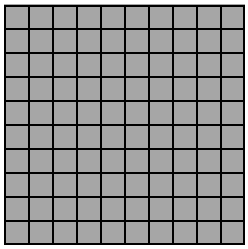
$= 0{\cdot}7$ or $\frac{7}{10}$



$= 0{\cdot}8$ or $\frac{8}{10}$

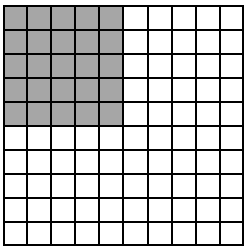


$= 0{\cdot}9$ or $\frac{9}{10}$

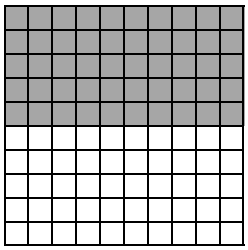


$= 1$ or $\frac{10}{10}$

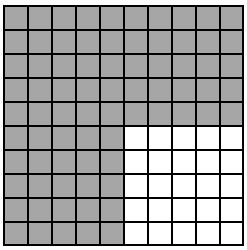
Quarters and a half



$= 0{\cdot}25$ or $\frac{1}{4}$



$= 0{\cdot}5$ or $\frac{1}{2}$



$= 0{\cdot}75$ or $\frac{3}{4}$

Note: Pupils should be aware of and understand the equivalence between 0·5, one half and five tenths.

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Decimal bingo

You will need:

The fraction cards on page 36 cut out and shuffled.

Instructions:

Both players begin by choosing 6 decimals to fill their bingo grid with. Choose your decimals from the following:

0.1	0.2	0.25	0.3	0.4	0.5	0.6	0.7	0.75	0.8	0.9

Cut and shuffle the fraction cards, and place them in a pile, face down.

Take it in turns to pick the top card, and read out the fraction. If either player has the equivalent decimal written on their bingo grid, they can cross it out.

The winner is the first player with all 6 decimals crossed out.

Note: there's one decimal which is twice as likely to have a fraction equivalent chosen!

Player 1

Player 2

Pupil's comments

Parent's comments

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Parental Guidance

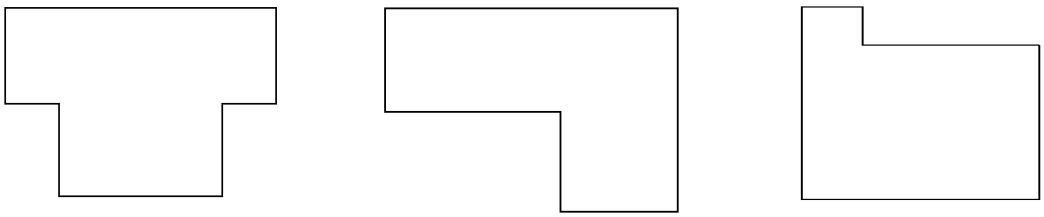
During this unit, pupils will be first introduced to finding the area of different shapes. They will also build on their learning from Year 3, finding the perimeter of different shapes. This week pupils have explored perimeter, being extended to find the perimeter of composite rectilinear shapes in mixed units, for example centimetres and millimetres.

What is perimeter?

Perimeter is a measure of length, for example the distance around a field or the total length of all the sides of a pentagon.

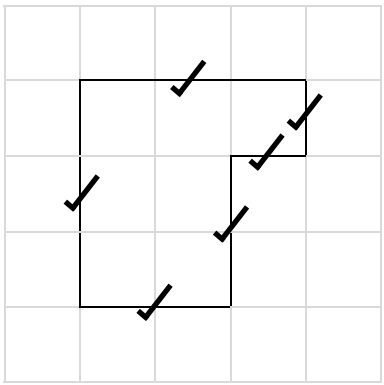
What is a composite rectilinear shape?

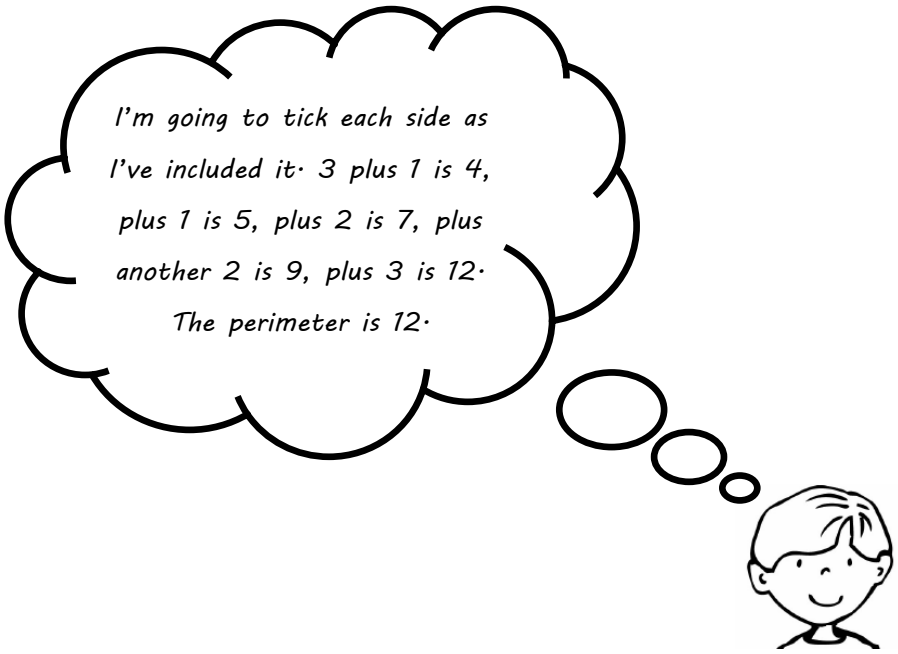
A composite rectilinear shape is a shape which can be divided into more than 1 rectangle. Here are some examples:



How do I find the perimeter of a composite rectilinear shape?

A common error in calculating the perimeter of a shape is either double counting, or missing out a side. Therefore when finding the perimeter of a shape pupils should be encouraged to work systematically- mark each side as they include it in calculating the total perimeter.





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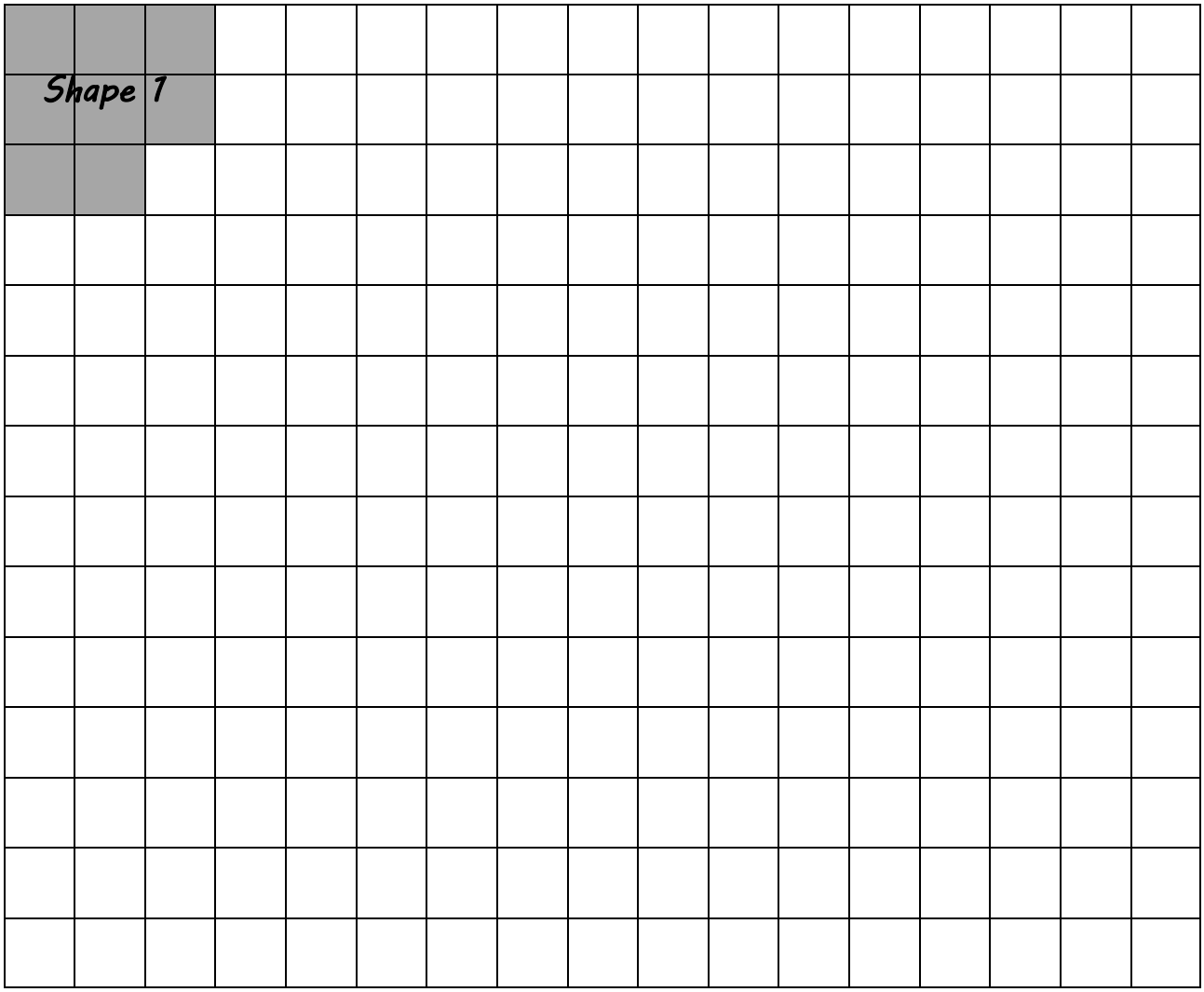
Perimeter challenge

Challenge 1: *What is the perimeter of Shape 1?*

Challenge 2: *Draw a rectilinear shape with a perimeter of 18. Mark it 'Shape 2'.*

Challenge 3: *How many different rectilinear shapes can you draw with a perimeter of 16?*



Pupil's comments

Parent's comments

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Unit 9: Area and perimeter (Week 2 of 2)

Parental Guidance

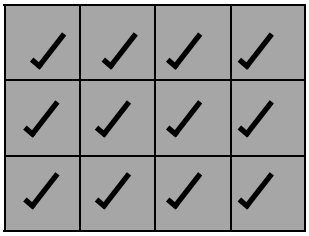
During this unit, pupils will be first introduced to finding the area of different shapes. They will also build on their learning from Year 3, finding the perimeter of different shapes. This week pupils have been introduced to area and finding the area of shapes by counting squares, making connections between this and earlier work on arrays and multiplication.

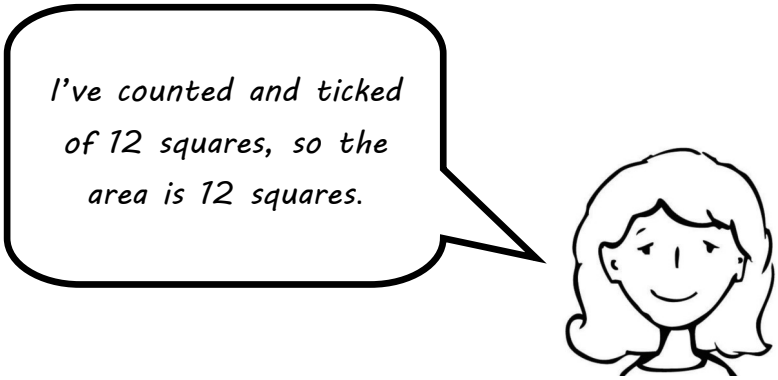
What is area?

Area *is the amount of surface something covers. Area is measured in square units, for example cm², articulated as 'square centimetres', or 'centimetres squared'.*

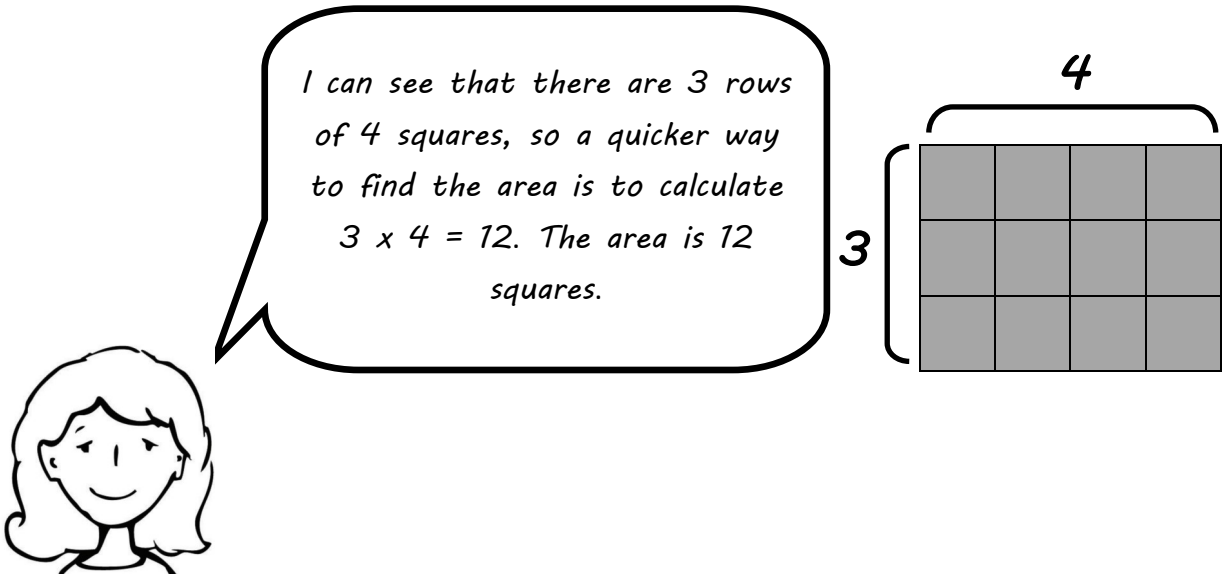
How do I find the area of a shape?

In Year 4, pupils begin by counting squares to find the area of a rectangle.





Pupils then link area to arrays, using multiplication to find the area of a rectangle.



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Area 100

You will need:

Two 100 square grids– these can be found on page 38 and 40.

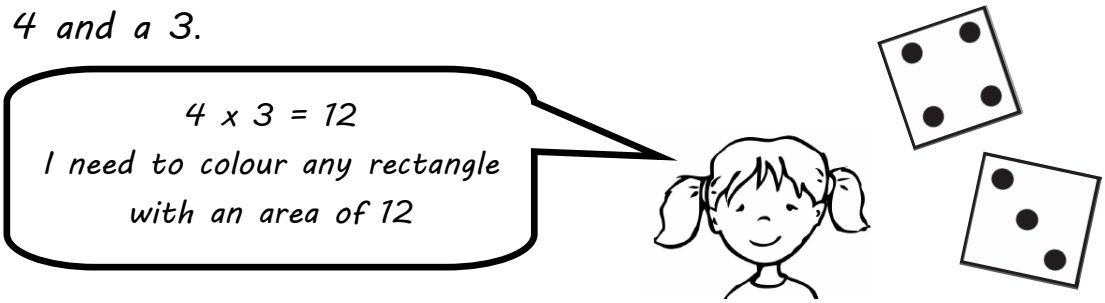
Instructions:

Both players have a 100 square grid. Take it in turns to roll a dice, twice (alternatively, number cards 1-6 may be picked at random). Multiply the two numbers together. Colour in a rectangle on your grid of that number of squares. The winner is the first person to colour all 100 squares.

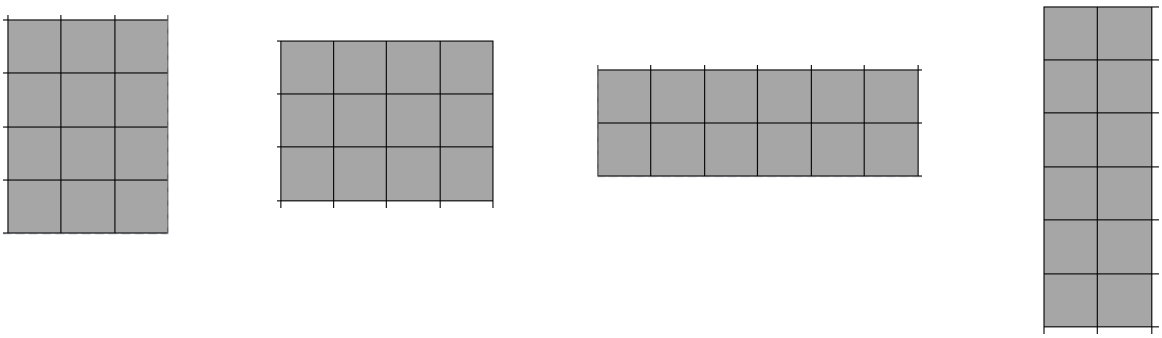
Tip: The numbers rolled do not have to be the dimensions of the rectangle, but can be any rectangle with the same area.

For example:

Thea rolled a 4 and a 3.



She could colour:



Pupil's comments

Parent's comments

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Resource for Speedy Tables

×0	×1	×2	×3
×4	×5	×6	×7
×8	×9	×10	×11
×12			

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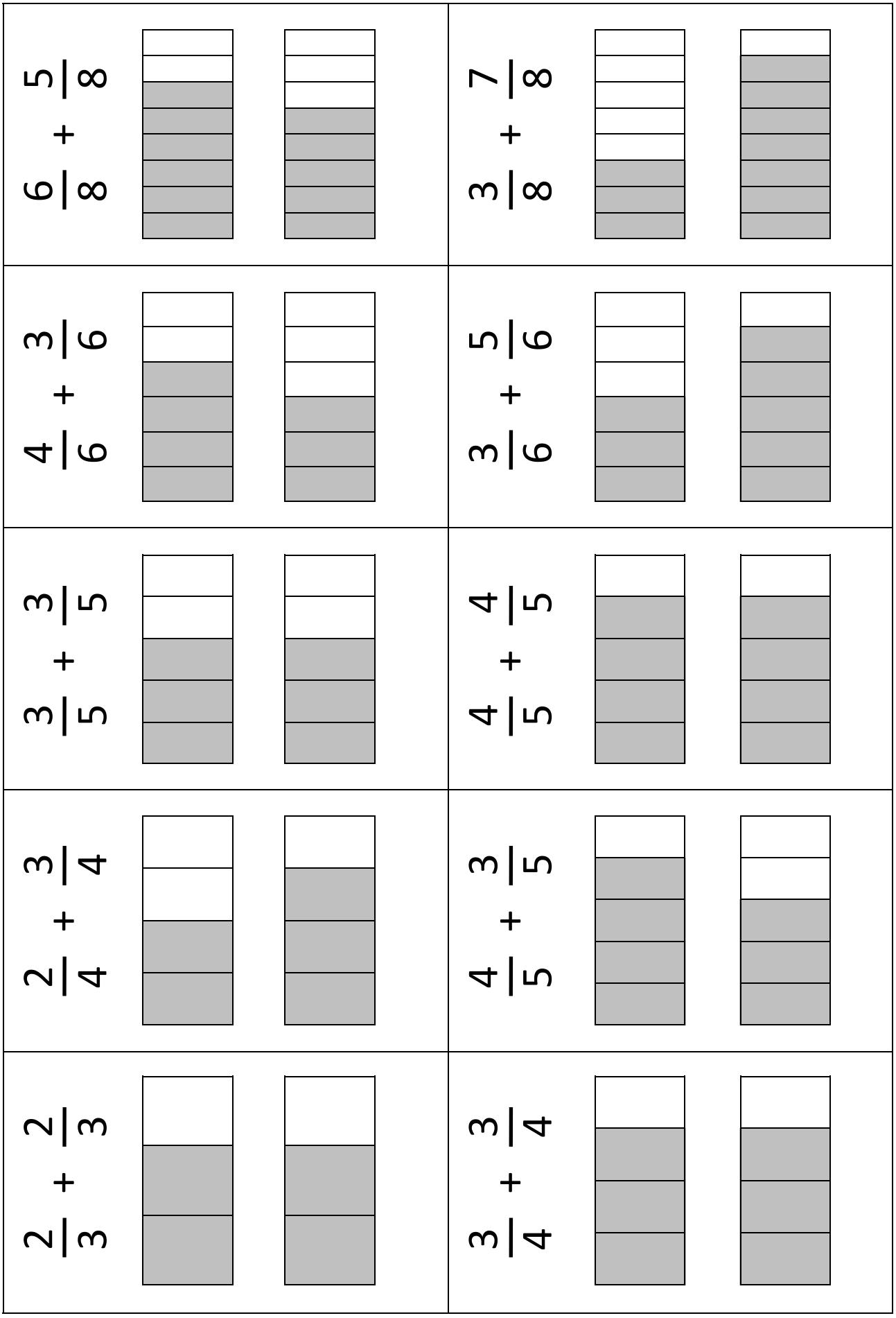
Resource for Fraction sum pairs



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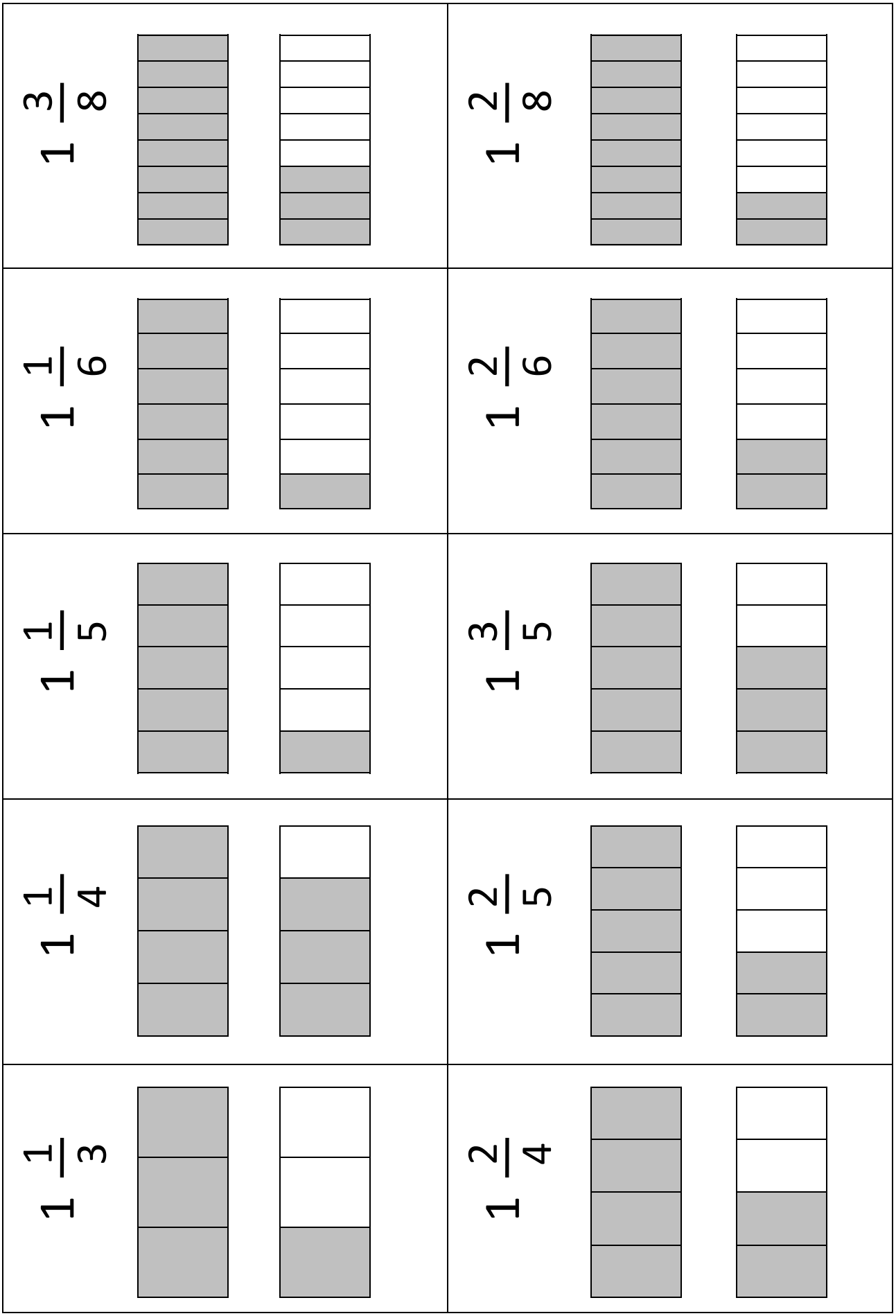
Resource for Fraction sum pairs



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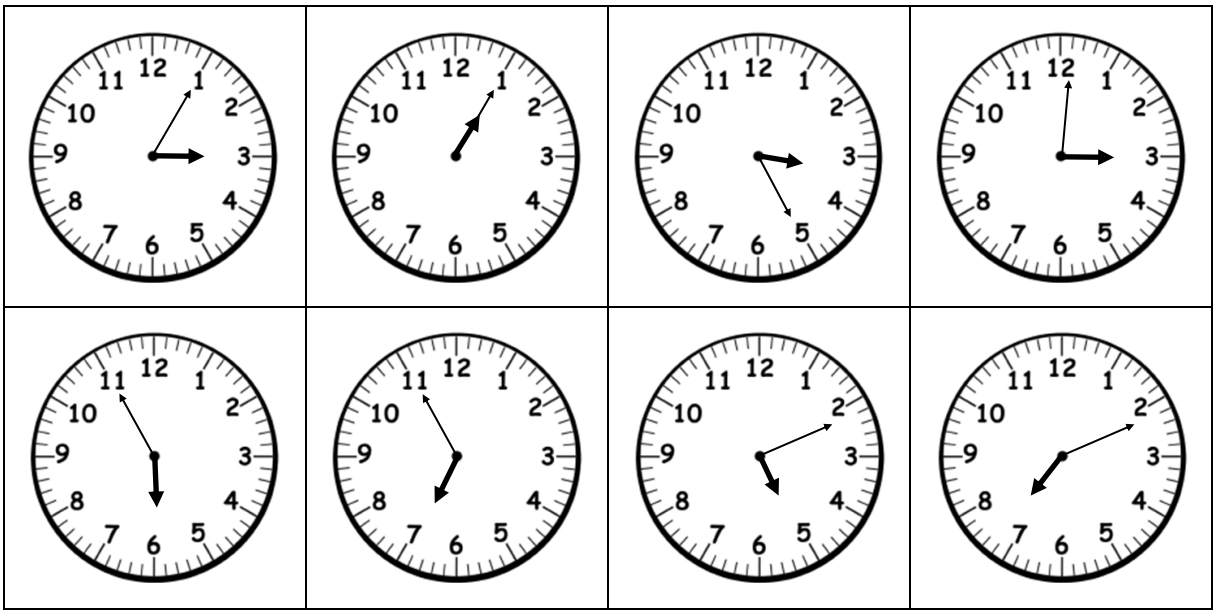
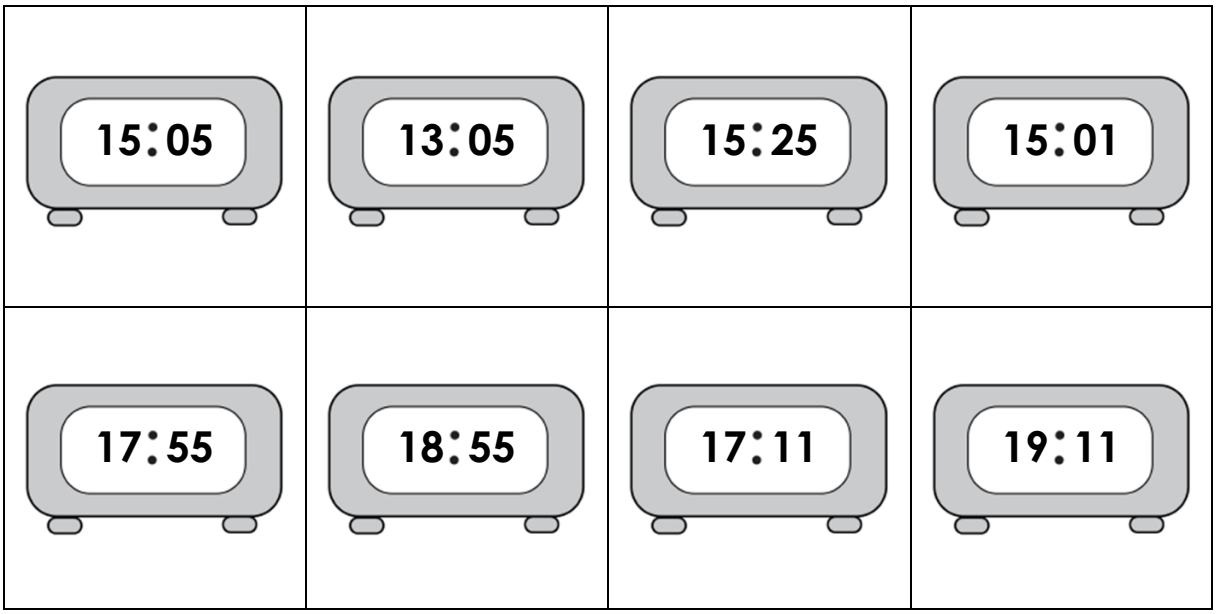
Resource for Time Pairs





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Resource for Rounding Race

0	1	2	3
4	5	6	7
8	9	.	.

Resource for Friend or Foe?

0	1	2	3	4
5	6	7	8	9

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Resource for Decimal Bingo

$\frac{1}{10}$	$\frac{2}{10}$	$\frac{3}{10}$
$\frac{4}{10}$	$\frac{5}{10}$	$\frac{6}{10}$
$\frac{7}{10}$	$\frac{8}{10}$	$\frac{9}{10}$
$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$

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Resource for Area 100

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