Mathematics Mastery

At home materials

Year 2 Weeks 1-2

Number bonds within 100

ark

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Printable resources can be found at the back of the pack.

Guidance

Using the at home materials

This pack contains a series of tasks for you to experience with your child. Each session has been carefully designed to develop number sense and support understanding. Provide lots of opportunities to get children to use mathematical vocabulary and explain their reasoning and reveal their thinking.

We have purposefully selected these short tasks, which should last around 15 minutes, so that you can fit them around your daily lives.
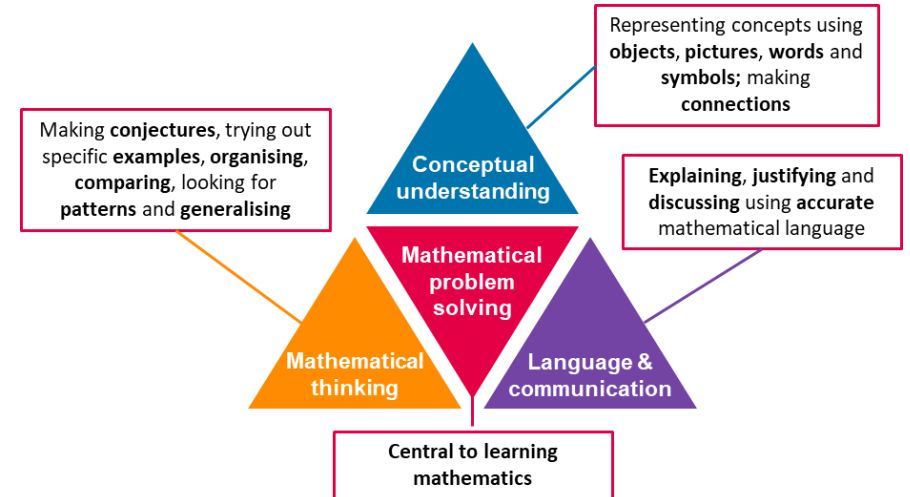
Each session begins with a short adult guided input, followed by a suggested task to complete and a suggested task to explore, which will take their learning deeper.

Success for all

At school we believe <u>all</u> pupils can achieve success in maths. We encourage pupils to have a belief that effort leads to success and that challenges are opportunities to learn.

Here are a few tips to encourage your children at home with maths:

✓Talk to your children about everyday maths
✓Play games with them
✓Value mistakes as learning opportunities
✓Recognise that there is more than one way to work things out
✓Praise children for effort over outcome
✓Avoid saying things like "I'm useless at maths"

Representing concepts using **objects**, **pictures**, **words** and **symbols;** making **connections**

Making **conjectures**, trying out specific **examples**, **organising**, **comparing**, looking for **patterns** and **generalising**

Conceptual understanding

Mathematical problem solving

Mathematical thinking

Language & communication

Explaining, **justifying** and **discussing** using **accurate** mathematical language

Central to learning mathematics

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. To achieve this we aim to develop pupils' **Conceptual Understanding, Mathematical Thinking** and **Language and Communication** (see diagram).

Number Bonds Within 100: Understanding number bonds

Focus 1: To explore number in subsets

About the maths

Being able to identify the number of objects in sets and subsets is key to developing an understanding of the concept of parts and whole in number bonds.

Vocabulary

set

combine

Resources

A range of other objects for sorting that could go together e.g. a set of cutlery with sub-sets of knives and forks, a crockery set with sub-sets of plates and bowls etc.

Getting started

Display your chosen set of objects that have been sorted into two subsets.

Example: Tell pupils that the shapes are all squares. Ask pupils to explain how the shapes have been sorted and label them 'red' and 'not red'.
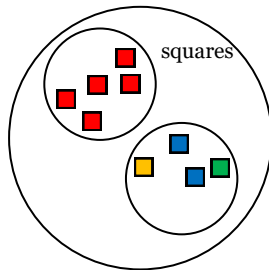
Ask:

How many squares are there in the set?

How many red squares are there in this sub set?

How many squares are not red?

Task for pupils

Provide pupils with objects that have been sorted into subsets.

Example: Ask pupils to identify what they all have in common (they are all triangles).

Ask pupils to label each subset (green, not green)
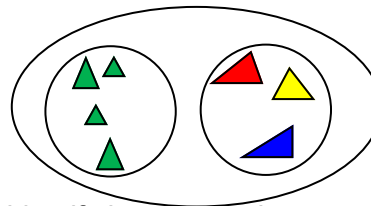
Ask pupils to identify how many there are in each subset.

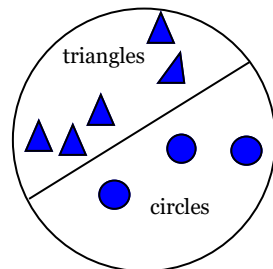Ask pupils to identify how many there are altogether in the set.

Pupils should be able to identify that:
- there are seven triangles altogether.
- there are four green triangles.
- there are three triangles that are not green.

Deepening understanding

Provide pupils with shapes that have been sorted into more than two subsets.

Ask pupils to identify how many there are in the set and how many there are in each subset.
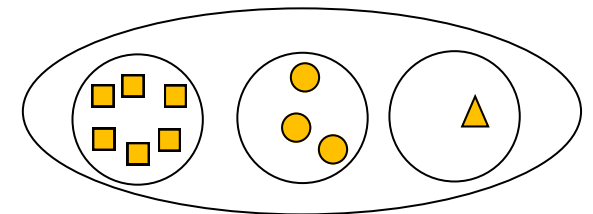
Example: Pupils should be able to identify that:
- there are ten orange shapes altogether.
- there are six orange squares.
- there are three orange circles.
- there is one orange triangle.

![Mathematics Mastery logo]

Number Bonds Within 100: Understanding number bonds

Focus 2: To understand the concept of 'whole' and 'parts'

About the maths

The concept of 'whole' and 'parts' is a key concepts to understanding number bonds and is a concepts that pupils will apply when learning about different operations.

Vocabulary

Whole part

Resources

A range of other objects for sorting that could go together e.g. a set of cutlery with sub-sets of knives and forks, a crockery set with sub-sets of plates and bowls etc.

Getting started

Display your chosen set that has been sorted into two subsets.

Example - Ask:

How many blue shapes are there in the set?

How many blue triangles are there in this sub set?

How many blue circles are there in this subset?

Highlight that the set represents the whole and the subsets represent the parts.

Task for pupils

Provide pupils with four green triangles and two yellow triangles.

Example: Ask pupils to sort the triangles into parts.

Ask pupils to identify how many there are in each part.

Ask pupils to identify how many there are altogether in the whole.
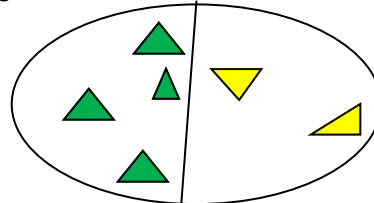
Pupils should be able to identify that:

• the whole is six.

• the parts are four and two.

Deepening understanding

Provide pupils with five objects from the set that can be sorted to illustrate all number bonds within 5. *Example:* Model how to place the five triangles in different arrangements so that the parts are different for each example.

Say the whole and the parts for each example.

There are five triangles. There are zero squares. Five is the whole. Five and zero are the parts.

There are five triangles. Four are the same. One is different. Five is the whole. Four and one are the parts.

There are five triangles. There are two blue triangles. There are three red triangles. Five is the whole. two and three are the parts.

Number Bonds Within 100: Understanding number bonds

Focus 3: To be able to find number bonds for 'four'

About the maths	Vocabulary	Resources
For pupils to develop their understanding of number bonds, it is important that they explore number bonds using the same sixteen shapes for the tasks.	Set Whole, part	A set of objects that can be put into two sub-sets, part-whole model

Getting started
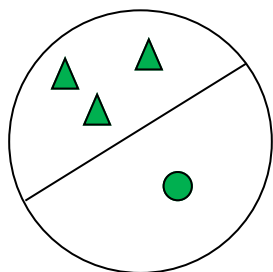
Display your set of objects. Sort the objects into two subsets.

Example—Ask:

How many green shapes are there in the set?

What is the whole?

How many green triangles are there in this subset?

How many green circles are there in this subset?

What are the parts?

Task for pupils

Provide pupils with a set of objects.

Example—Ask pupils to sort the shapes so that they are in two parts.

For each example, ask pupils to identify the whole and the parts.
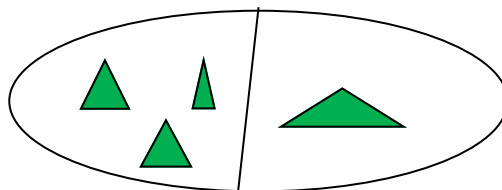
Four is the whole.

Four and one are the parts.

! Ensure pupils find **all** number bonds for 4 (0 and 4, 1 and 3, 2 and 2).

Deepening understanding

Introduce the part—whole model.
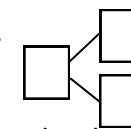
Display one representation of a number bond for four and the part-whole model ask pupils to identify the whole and record it in the model. Ask pupils to identify the parts and record them in the model.
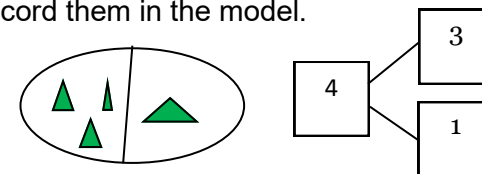
Create a representation for the same number bond for four with the parts on different sides. Discuss what is the same and what is different. Through this discussion pupils should recognise that the whole and the parts are the same but the shapes have been rearranged.
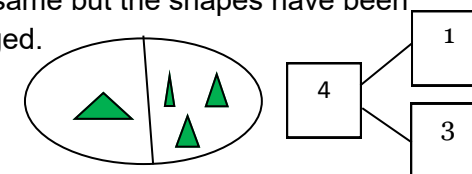
Number Bonds Within 100: Preparing for number bonds within 100

Focus 1: To explore number bonds within 10

About the maths

Pupils need a secure understanding of number bonds within 10 before learning number bonds within 100.

Vocabulary

Rod, colour, equal

Whole, part

Resources

Number rods e.g. Cuisenaire ®

Coloured counters

Part-whole model

Getting started

These tasks are designed to review number bonds within 10. Pupils who appear to have gaps in their learning about number bonds within 10 may need to focus more on these number bonds within 10 before learning number bonds within 20.

Display 5 counters placed into sets to represent the different number bonds for five.
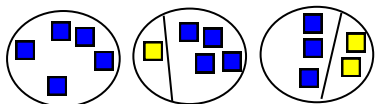
E.g.

Ask pupils to say how many there are in each set (five) and in each subset.

Place the counters from each set in a row.

Emphasise that the whole remains is the same (five) and the parts differ in each example. Say what the whole is and what the parts are for each example.

Repeat with number bonds for 4, 3, 2, 1 and 0.

Task for pupils

Provide pupils with the number rod that represents 4 and tell pupils that the number rod represents the whole (four).

Provide pupils with two rods for each number 0-4)

Ask pupils to find the different pairs of rods that are equal to the whole, ask them to find the two parts that are equal to the whole.

Ensure pupils say what the whole is and what the parts are.

E.g.

Four is the whole.

Three and one are the parts.

Four is the whole.

Two and two are the parts.

Allow time for pupils to find all possible number bonds for 4 and then 3.

Deepening understanding

Display an example of a number bond for six represented using number rods and a part-whole model.
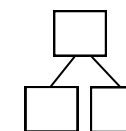
Ask pupils to identify which is the whole and which are the parts.

Ask pupils to record the whole and the parts on the model.

Ask pupils to find all possibilities for 7, 8, 9 and 10.

If pupils record the same numbers more than once, use it as an opportunity to explore how they represent the same number bond.

Number Bonds Within 100: Preparing for number bonds within 100

Focus 2: To consolidate number bonds within 10

About the maths

A secure understanding of number bonds within 10 will support pupils with making connections between number bonds within 10 and within 100.

Vocabulary

How many

Whole, part

Resources

Bead string or other resource with twenty items threaded onto string e.g. pasta tubes, buttons.
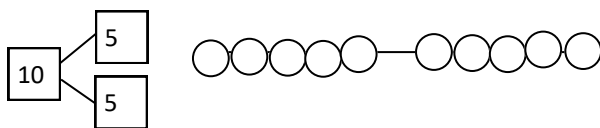
Part-whole model

Getting started

Display a bead string and a part-whole model.

Tell pupils that the whole is ten and display ten beads.

Ask pupils to discuss how a bead string could be used to help us to find the parts.

Share suggestions and model how to put the ten beads into two parts.

Record the parts on the part-part-whole model

Repeat with all number bonds for 10, 9 and for 8.

Task for pupils

Ask pupils to find the different number bonds for seven using a bead string.

For each example, pupils should use the same seven beads to reinforce that the whole is the same and that the parts change.

E.g.
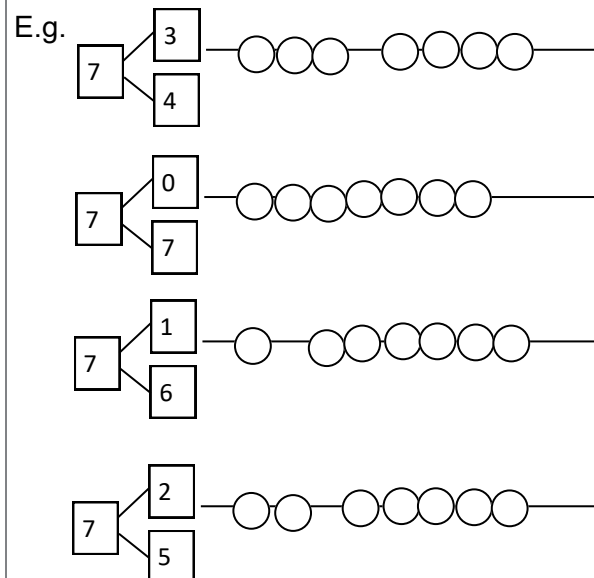
Repeat for all number bonds for 6 and 5.

Deepening understanding

Display a part-whole model with the whole and one of the parts recorded.
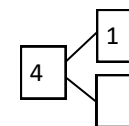
Discuss how the bead string could be used to help us to find out what the missing part is.

Prompts:

What is the whole? Ask pupils to make the represent the whole with the bead string.

What is one of the parts? Ask pupils to move the same number of beads from the whole to represent one part.

How many are there in the other part? Ask pupils to count the beads in the other part.
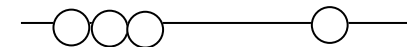
Repeat with any number bond within 10.

Number Bonds Within 100: Preparing for number bonds within 100

Focus 3: To explore grouping in tens

About the maths

A secure understanding of place value with numbers within 20 will support pupils with making connections between number bonds within 10 and within 100.

Vocabulary

Group, groups of

Exchange, regroup

ones

Resources

Dienes (ones cubes and tens sticks)

Getting started

Provide pupils with a tens Dienes stick (do not tell pupils that is it a ten).

Ask pupils to place the ones Dienes cubes alongside each other to find out how many ones Dienes are equal to a tens Dienes.

Ensure that pupils recognise that ten ones are equal to one ten.

Tell pupils that the longer stick is called a ten because it has the same value as ten ones, it is equal to one group of ten.

Tell pupils that the smaller cube is called a one because it has the value of one.

Display 10 ones. Model how to regroup one ten ones for one ten and find out how many ones there are left.

Record it in the table.

10

Tens	ones
1	0

Task for pupils

Provide pupils with 20 ones and two tens. Ask pupils to explore grouping 20 ones into two groups of ten ones. Then swap (regroup) each group of 10 ones cubes into 1 ten stick. You will be left with 2 ten sticks. Ask pupils to record their answers in a table
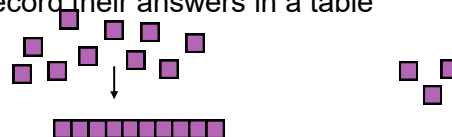
20

tens	ones
2	0

Repeat with 30, 40 and 50.

Deepening understanding

Display the numbers 1 and ten next to each other and create representations of the numbers using Dienes before completing the place value table.

1

tens	ones
0	1

10

tens	ones
1	0

Discuss the similarities and differences between the numbers.

Repeat with 2 and 20, 3 and 30, 4 and 40, 5 and 50, 6 and 60, 7 and 70, 8 and 80, 9 and 90.

Number Bonds Within 100: Preparing for number bonds within 100

Focus 4: To consolidate place value for multiples of ten

About the maths

A secure understanding of place value for multiples of ten will support pupils with making connections between number bonds within 10 and within 100.

Vocabulary

Group, groups of

Regroup

Tens, ones

Resources

Dienes (ones cubes and ten sticks)

Bead string (grouped in tens)

Number line

Getting started

These tasks should be repeated for each pair of numbers (1 and 10, 2 and 20, 3 and 30, 4 and 40, 5 and 50, 6 and 60, 7 and 70, 8 and 80, 9 and 90, 10 and 100)

This example is for 5 and 50.

Provide each pupil with a bead string.

Tell pupils that each bead represents one.

Explain and highlight how the beads on the string have been arranged into groups.

Ask pupils to find out how many beads there are in one group.

Ensure that pupils know the bead string has been grouped into tens.

Ask pupils to show you one bead, ten beads and then 5 beads and 50 beads.

Discuss how they know they have the correct number of beads.

Task for pupils

Provide pupils with partially completed place value charts and ask pupils to find out the missing number.

tens	ones
0	5

Tens	ones
5	0

Ask pupils to explore the numbers represented on the place value chart and discuss how they are the same and how they are different.

Ask pupils to represent the numbers using a bead string and discuss how they are the same and how they are different.

Through this discussion pupils should recognise that 50 has five groups of ten than 5 has five groups of one.

Deepening understanding

Ask pupils to represent five using Dienes blocks. Ask pupils to represent 50 using Dienes blocks.

For pupils who attempt to count in ones for 50, spend more time regrouping ten ones for one ten, and counting in multiples of ten to ensure pupils understand that the value of one ten and to ensure that they know the sequence of numbers when counting on in multiples of ten.

Discuss the similarities and differences between the two numbers.

Ensure that pupils recognise that 5 is five ones and 50 is five tens.

Both numbers have one five. The five in 50 represents the number of tens. The five in 5 represents the number of ones.

# Number Bonds Within 100: Number bonds within 100

Focus 1a: To be able to use known number bonds within 10 for finding number bonds within 100

About the maths

Links between knowledge of place value within 100, known number bonds within 10 and number bonds within 20 should be made clear to pupils to enable them to find efficient methods for finding number bonds within 20.

Vocabulary

Dienes, tens, ones

Bead string

Whole, part

Resources

Dienes

Part-whole model

Bead string or other resource with 100 items threaded onto string e.g. pasta tubes,

Getting started

These tasks are designed to be explored by pupils with the following pairs of numbers (1 and 10, 2 and 20, 3 and 30, 4 and 40, 5 and 50, 6 and 60, 7 and 70, 8 and 80, 9 and 90, 10 and 100).

The example for this guide focuses on number bonds for 40.

Display the number 4 and the number 40 and ask pupils to record the number of tens and the number of ones on a place value chart for each number.

Explore what is similar and what is different and ensure that pupils recognise that 40 has four tens and that 4 has four ones.

Create a representation of a number bond for 4.

Discuss and explore how we can use our known number bonds for 4 and the knowledge that 40 is equal to 4 tens to find number bonds for 40.

Task for pupils

Ask pupils to create all representations for the number bonds for four.
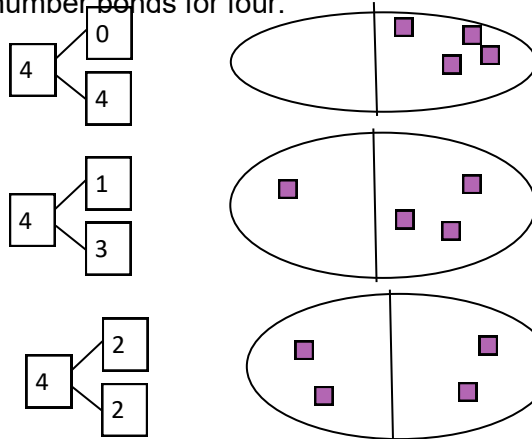
Ask pupils to use the known number bonds and knowledge of place value to find some number bonds for 40 using their knowledge of place value. '*If I know 2 + 2 = 4, then I know 20 + 20 = 40*'

For each example, make sure pupils use the same Dienes for 40 each time.

Deepening understanding

Display an example of a number bond for four and two number bonds for 40 with the whole and one of the parts completed.
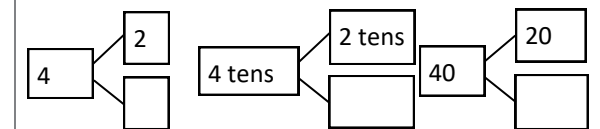
Ask pupils to identify what is known (the whole and one of the parts) and what is unknown (one of the parts).

Ask pupils to refer to their known number bonds for four and identify what the other part would be if four is the whole.
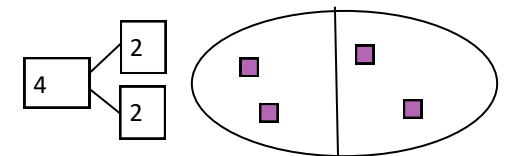
Number Bonds Within 100: Number bonds within 100

Focus 1b: To be able to use known number bonds within 10 for finding number bonds within 100

...continued

Getting started
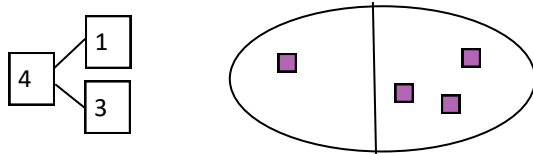
Four is the whole. One and three are the parts.

Four is equal to four ones. Forty is equal to four tens.

If 1 one, plus 3 ones is equal to 4 ones then 1 ten plus 3 tens is equal to 4 tens.
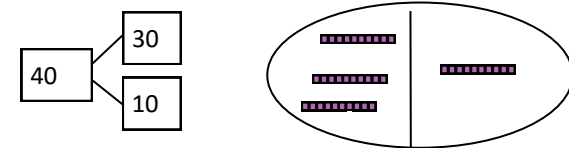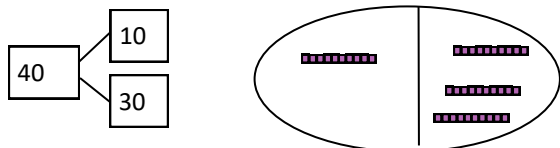
When exploring the number bonds, use the same Dienes to show that the whole remains the same.

For each number bond make links between the number bond for 4 and that 4 is equal to 4 ones and 40 is equal to 4 tens.

Task for pupils

E.g.

Four is the whole. Zero and four are the parts.
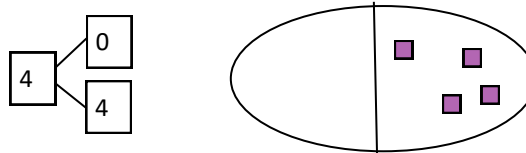
Four is equal to four ones. 40 is equal to 4 tens. If four ones is the whole and, zero ones and four ones are the parts. Then when zero tens and four tens are the parts, four tens are the whole.
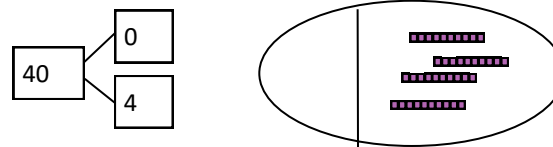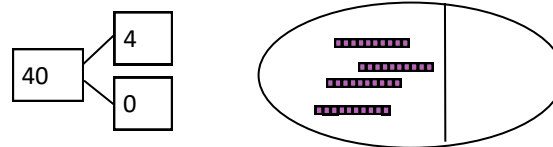
Ensure pupils find all number bonds they can using known number bonds for four and place value.

Deepening understanding

Ask pupils to refer to their knowledge of place value and knowledge of number bonds for four and identify what the other part would be if there were four tens as the whole.
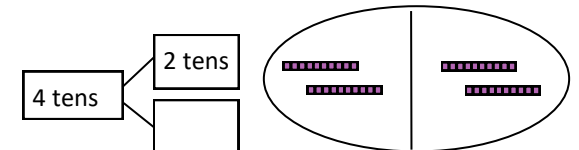
Ask pupils to refer to their knowledge of place value, multiples of ten and knowledge of number bonds for four and identify what the other part would be if forty is the whole.
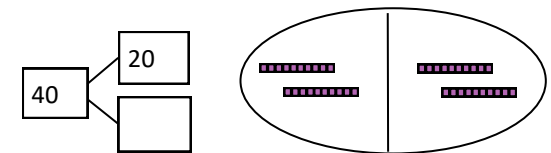
Continue to make links between number bonds within 10, place value and number bonds within 100.

![Mathematics Mastery logo]

# Number Bonds Within 100: Number bonds within 100

Focus 2a: To be able to find out unknown numbers in number bonds

About the maths

Pupils' understanding of number bonds will develop through exploring number bonds in a variety of ways. References should be made to the 'whole' and the 'parts' throughout these tasks.

Vocabulary

How many

Whole, part

Resources

Part-whole model

Bead string or other resource with 100 items threaded onto string e.g. pasta tubes, buttons.

Getting started

These tasks are designed to be explored by pupils for each multiple of ten 10-100.

The example for this guide focuses on number bonds for 40.

Display a bead string and a part-part-whole model.

Tell pupils that the whole is forty and count out forty beads by counting in multiples of ten. Highlight that there are four groups of ten beads.

Ask pupils to discuss how a bead string could be used to help us find the parts.

Share suggestions and model how to put the forty beads into two parts, ensuring that each part is a multiple of ten.

Record the parts on the part-part-whole model

E.g.
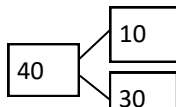
Task for pupils

Ask pupils to find the different multiple of ten number bonds for 40 using a bead string.

For each example, pupils should use the same 40 beads to reinforce that the whole is the same and that the parts change.

For each example, pupils should be encouraged to use a systematic approach to reinforce that, when one part decreases by ten, the other part increases by ten when the whole is the same.

E.g.
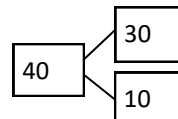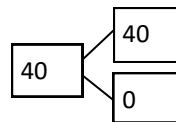
Deepening understanding

Display a part-part-whole model with the whole and one of the parts recorded.
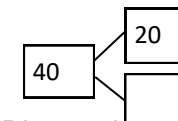
Discuss how the bead string could be used to help us to find out what the missing part is.

Prompts:

What is the whole? Ask pupils to represent the whole with the bead string.

What is one of the parts? Ask pupils to move the same number of beads from the whole to represent one part.

How many are there in the other part? Ask pupils to count the beads in the other part.
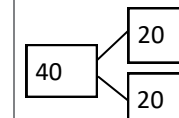
Number Bonds Within 100: Number bonds within 100

Focus 2b: To be able to find out unknown numbers in number bonds

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Getting started

Starting with the whole as one of the parts, display the part-part-whole model with the whole and one of the parts shown. Show representation of the whole and the parts using a bead string.
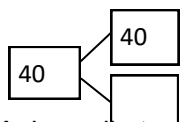
Ask pupils to use the bead string to find out what the missing part is.

Move one group of ten beads from the part to show a different number bond. Ask pupils to discuss how each part has changed.

> ⚠ Highlight that, when one part decreases by one group of ten, the other part increases by one group of ten when the whole is the same.

Repeat with another example using a systematic approach. Each time highlighting that when one part decreases by one group of ten, the other part increases by one group of ten when the whole remains the same.

Task for pupils
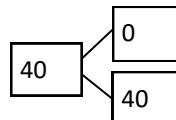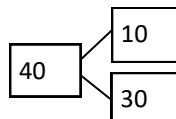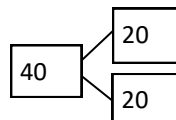
Ask pupils to continue to ensure that they have got all of the number bonds for the whole.

Once pupils have found all of the number bonds, ask pupils to identify the part-whole models that have the same parts but in a different order.

i.e.
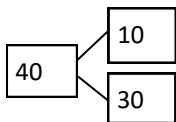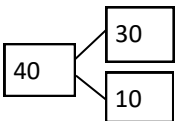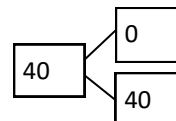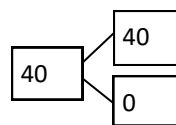
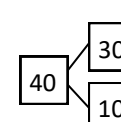
Deepening understanding

Repeat with other examples for number bonds for 40 making explicit links between the number bonds for 4 and place value.
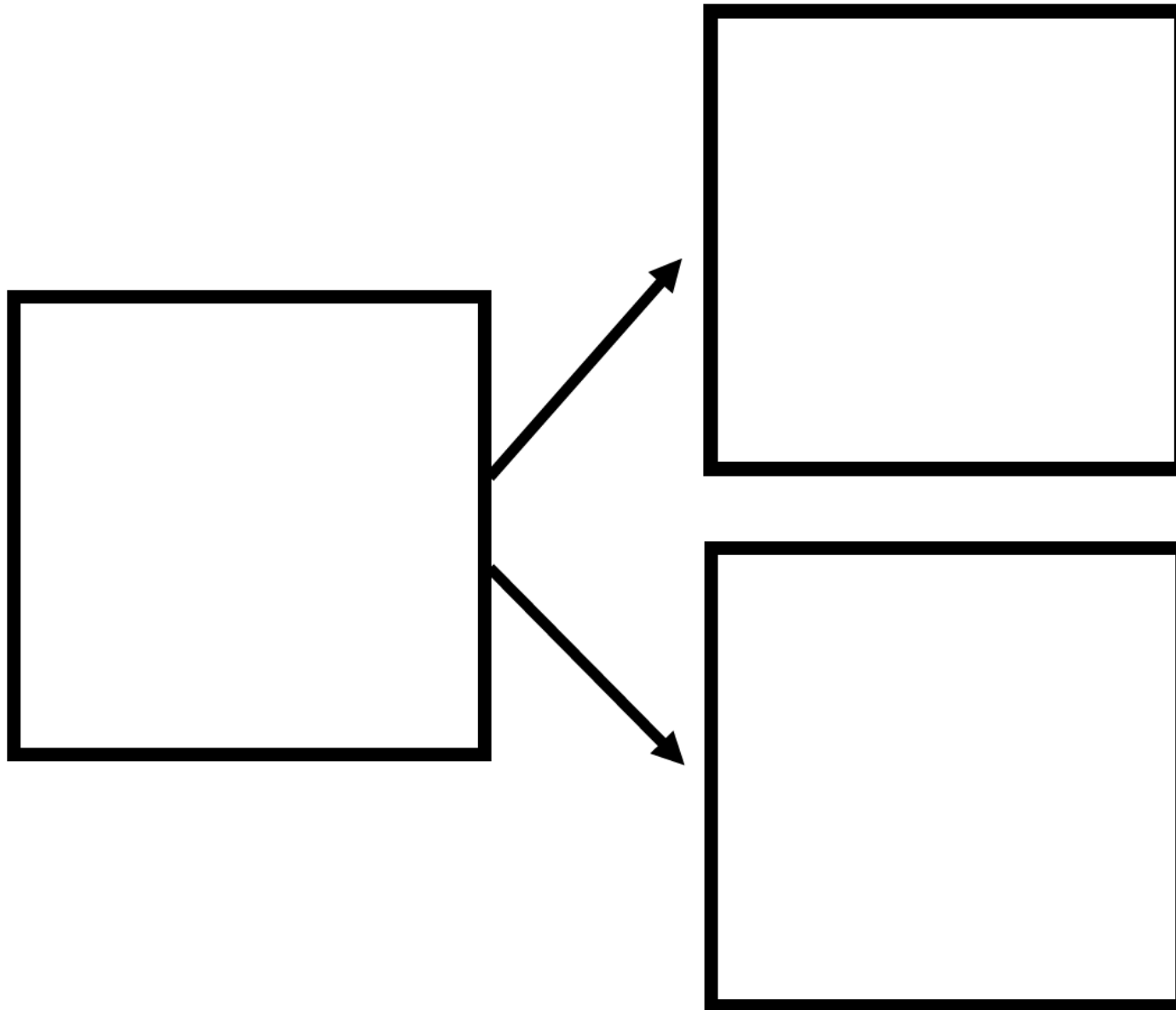
E.g.
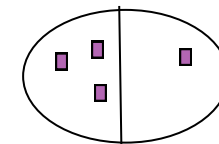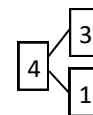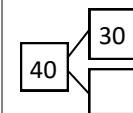
 4 is the whole, 1 and 3 are the parts.

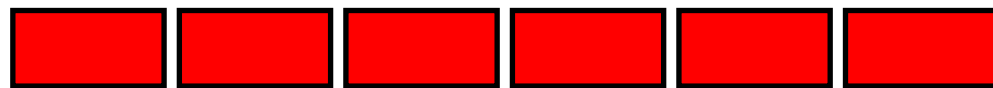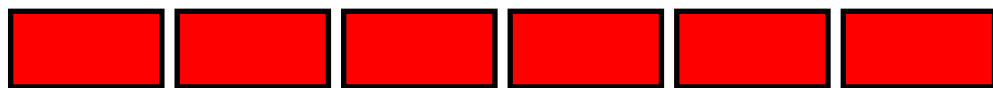There are 4 ones in 4. 3 ones and 1 one are the parts.
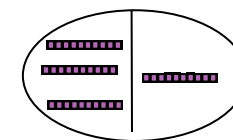
There are 4 tens in 40. 3 tens and 1 ten are the parts.

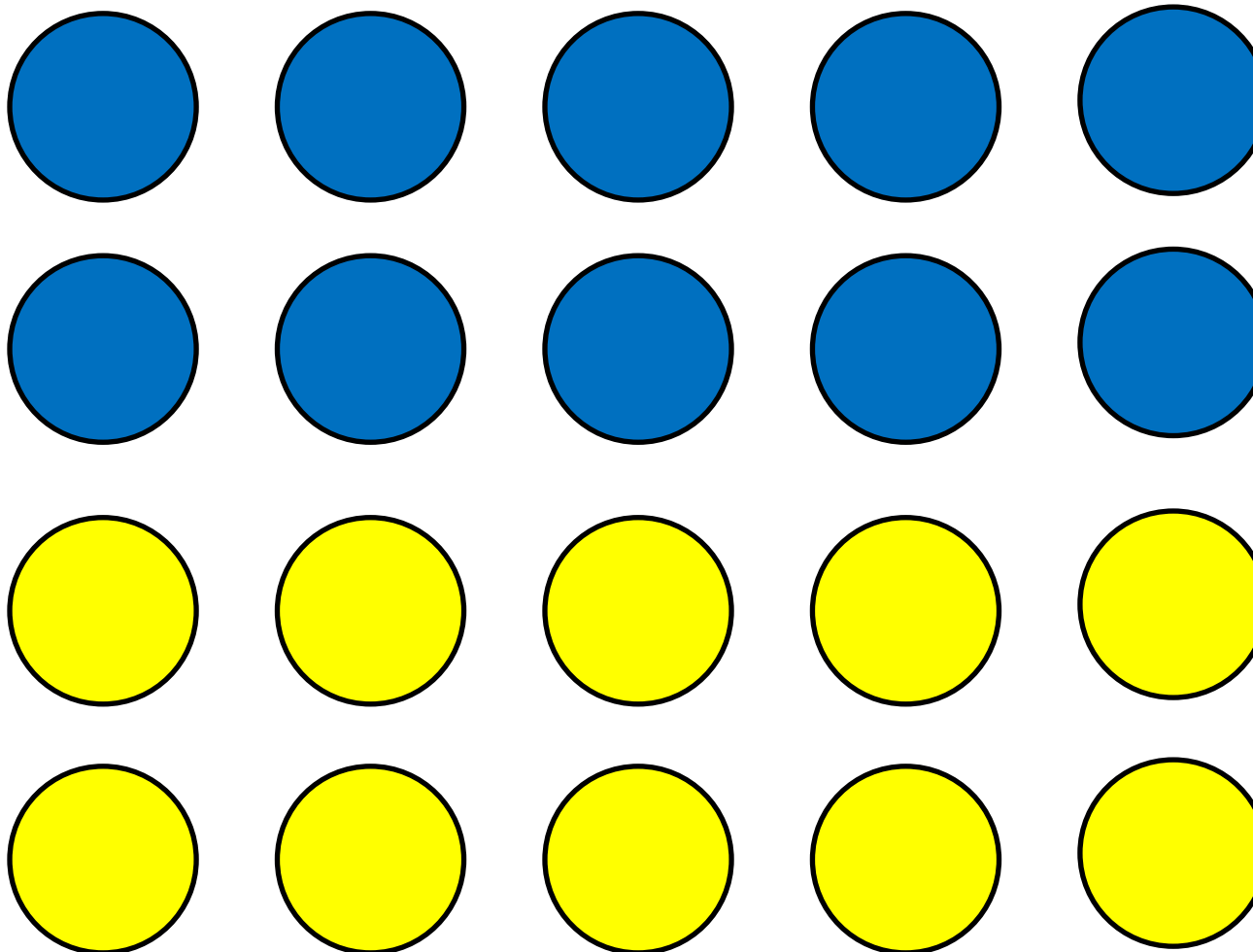For each example, ask pupils to show the whole and the parts with a bead string as well as with Dienes.
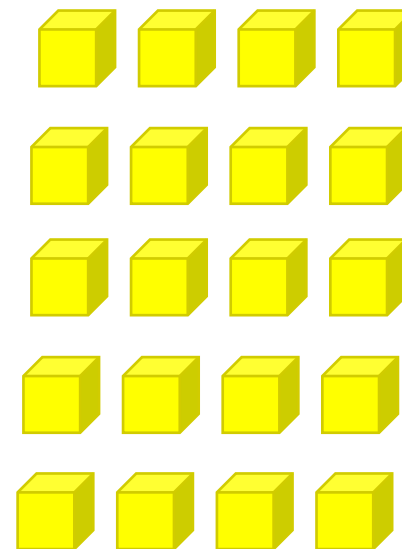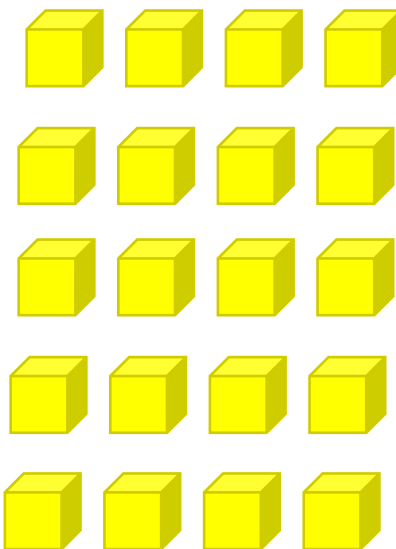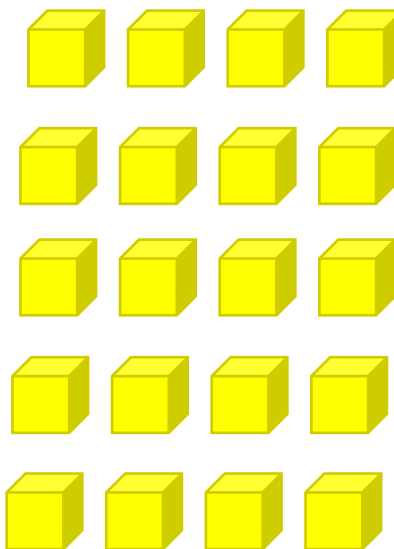
Part-whole model

Cuisenaire

Mathematics Mastery

Counters

Dienes
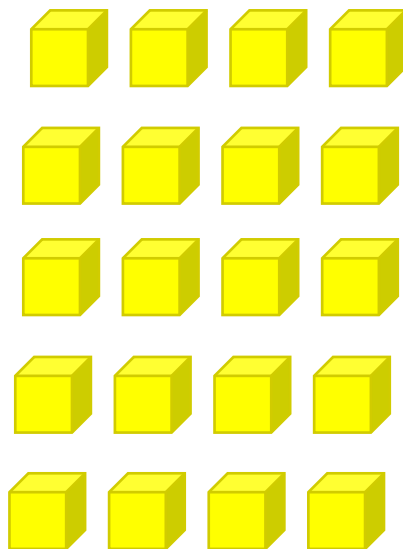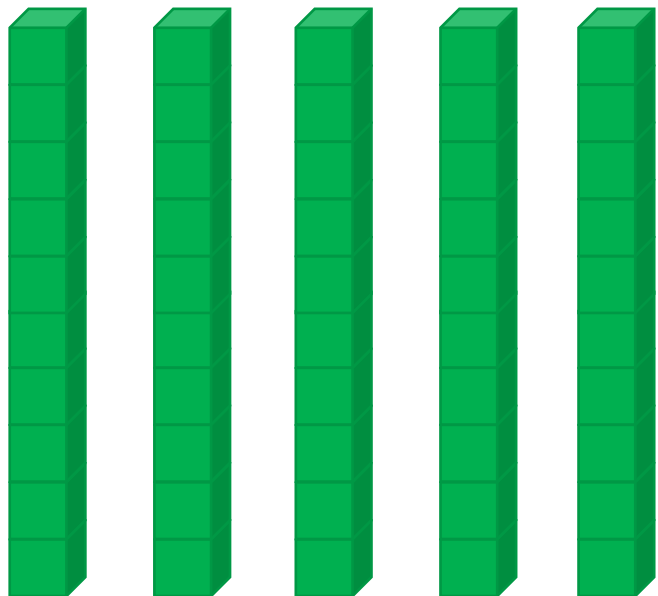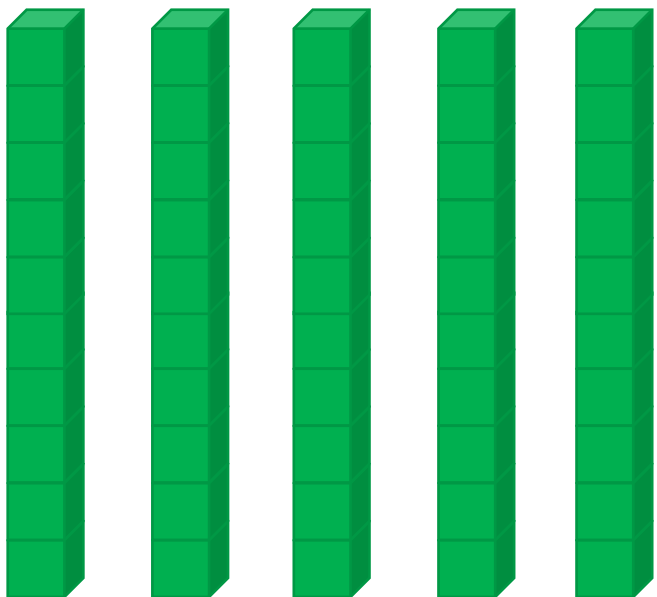
Place value chart

Tens	Ones