Has difficulty in partitioning, for example, 208 into 190 and 18 and 31 into 20 and 11

Opportunity for: developing mental images

Resources

- Three 100-bead strings
- Whiteboards
- Place value (arrow) cards

Key vocabulary

partition	complement	add	hundreds
split it into	total	subtract	tens
left	how many	represent	
right	plus	same as	

Teaching activity

Time 15–20 minutes

Show the child the bead string and explain that the coloured beads are in groups of ten beads.

'Today we are going to use these beads to do some partitioning of numbers. That means splitting numbers up into two or more parts. So we could split ten up into five and five, or partition it into four and six.'

Together count up in tens, to confirm there are one hundred beads in total.

Start the count again, but stop at forty.

Move these beads to the left and ask:

? How many beads are there to the right?

If the child doesn't know there are sixty, count them carefully together. Agree there are sixty.

? How do you know without counting?

Establish that there are one hundred beads in total and 40 + 60 = 100.

Explain that sixty is the complement to one hundred of forty, and that one hundred has been partitioned into forty and sixty. Remind the child that finding the complement means to complete, in this case complete to make one hundred.

Repeat, starting with multiples of ten. Then include multiples of five, for example eighty-five, to establish that fifteen is the complement to one hundred of eighty-five and that one hundred has been partitioned into eighty-five and fifteen.

If the child struggles with this, use markers to indicate the multiples of ten on the bead string. At first, encourage them to count in tens, through both the left-hand and right-hand groups of beads. Link the complements to ten to the complements to one hundred to help them see the relationship. Remind the child that halfway along a group of ten is a fives number, and use their knowledge of tens and hundreds complements to identify the complements of the multiples of five.

Point to the position where there are thirty-five beads to the left, then indicate where thirty beads come to.

? If there are thirty beads to here, how many are there up to here?

Agree there are thirty-five.

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? **How many more beads do we need to make 40? What is the complement of 40?**

Establish there are five more to forty and the complement to one hundred of forty is sixty so the complement to one hundred of thirty-five is sixty-five.

Repeat, using the term 'partition'. Gradually remove the markers. If necessary, ask the child to count aloud, then count quietly, in order to build up their recognition of the partitioned groups.

Introduce numbers other than multiples of five. For example, identify thirty-seven beads.

? **What is the complement to one hundred of thirty-seven?**

On the bead string identify the three needed to total forty. Draw on the child's knowledge of the complement to one hundred of forty to establish that sixty-three is the complement of thirty-seven.

63 + 37 = 100

Repeat, helping the child to see and use the process of moving to the next multiple of ten, identifying the complement to one hundred of that number, and then combining these two numbers.

Explain that so far you have been partitioning one hundred and now you want to partition other numbers.

Show the child forty-six beads, and hide the rest.

? **How many beads are there?**

? **How can we partition these forty-six beads?**

Invite the child to offer suggestions. Record these together on your whiteboard. Remind the child that this time they have been finding complements to forty-six. Hide the bead string and your whiteboard.

? **What is the complement to forty-six of forty?**

Agree it is six.

46 = 40 + 6

? **What is the complement to forty-six of thirty? …of twenty? …of ten?**

Agree they are sixteen, twenty-six and thirty-six.

Repeat for other numbers, each time partitioning the numbers into multiples of ten and their complement.

If the child has difficulty with this, return to the bead string and invite the child to show you the partitioned numbers.

Encourage them to start from the forty and six and say forty plus six is forty-six, and then decrease the tens to thirty, etc., each time describing what they have done. As they say aloud the number of beads, you both record these number statements on whiteboards and compare answers.

Reveal the 100-bead string.

? **If we had three bead strings like this, how many beads would we have altogether?**

Agree there would be three hundred beads.

Say that you want the child to imagine that your bead string is the third one, so the first bead on your string is bead number two hundred and one.

With the child, count up in tens from two hundred to three hundred.
Start again but stop at two hundred and forty.
Move these beads to the left.

? **How many beads are there to the right?**

Agree there are sixty.

Explain that sixty is the complement to three hundred of two hundred and forty, and that three hundred has been partitioned into two hundred and forty and sixty.

Record 240 + 60 = 300 on your whiteboard.

Repeat with multiples of five, recording the number statements on your whiteboard.

Show the child forty-six beads, and hide the rest.

? **If this is still our third bead string, how many beads does this represent?**

Agree it represents two hundred and forty-six, and say that this time we want to partition two hundred and forty-six. Partition the beads into forty and six.

? **How have we partitioned the two hundred and forty-six?**

Establish that 240 + 6 = 246, and record this on the whiteboard.

Partition the beads into thirty and sixteen, etc., each time recording the number statement:

230 + 16 = 246

220 + 26 = 246

Stop at 200 + 46 = 246

Emphasise that it is helpful to be able to partition numbers in different ways, and not just into the hundreds, the tens and the units.

? **Look carefully at the whiteboard and choose something that we could tell the others about back in class.**

? **What does the word 'partition' mean?**

Spotlight 1

Has difficulty in partitioning, for example, 208 into 190 and 18, and 31 into 20 and 11

Opportunity for: solving real-life problems

Partitioning money

Time 10–15 minutes

Resources

- 10p, 5p and 1p coins
- Whiteboard

Key vocabulary

partition	complement	add	hundreds
split it into	total	subtract	tens
left	how many	represent	
right	plus	same as	

Teaching activity

'We're going to do some work with money today, partitioning money amounts to make them easier to add.'

Put the coins on the table, and on the whiteboard write 48p.

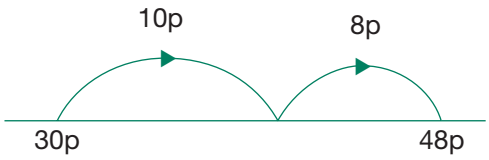
Note: If you are not sure of the child's ability to count money, you might want to check that now.

Place in a pile a number of 10p coins that total less than 40p, for example three 10p coins.

? How much is this?

Agree it is 30p and record this.

? Using the coins, can you show me how much more is needed to make 48p?



Place these coins in another pile.

? How much is this?

Agree it is 18p.

Write on the whiteboard, next to 30p, to complete the statement 30p + 18p = 48p.

Move 10p from the 30p pile to the 18p pile.

? How have we partitioned the 48p now?

Establish it is partitioned into 20p and 28p.

Ask the child to record this on the whiteboard under the first statement.

Invite the child to move another 10p coin and to record the result on the whiteboard.

Write another amount on the whiteboard and repeat the partitioning into a multiple of 10p and the complement. Each time, ask the child to record the partitioning as a number statement.

Ask the child to record number sentences without using the coins.

If the child has difficulty working out the amounts of money, invite them to count the coins. Once they have partitioned them correctly, if necessary ask them to check the total by counting on from one pile and using the coins in the other to make the total.

Keep the child moving only one 10p coin at a time. Ensure that they can record their statements correctly.

? What did you like doing today? What did you learn?

Note: If you are unsure of the child's ability to count a large number of items you might want to try asking the child to count a large collection of 1p coins (for example, one hundred and twenty-eight 1p coins). If the child is inaccurate and doesn't seem to have a clear idea of how to tackle the task you might want to do some of the counting activities in *1 YR +/–*.

Spotlight 2

Has difficulty in partitioning, for example, 208 into 190 and 18, and 31 into 20 and 11

Opportunity for: making mathematical patterns

Partitioning up to 100

Time 10–15 minutes

Resources

- Number line 0 to 100 marked in intervals of ten
- Place value (arrow) cards
- Whiteboard

Key vocabulary

partition	complement	add	hundreds
split it into	total	subtract	tens
left	how many	represent	
right	plus	same as	

Teaching activity

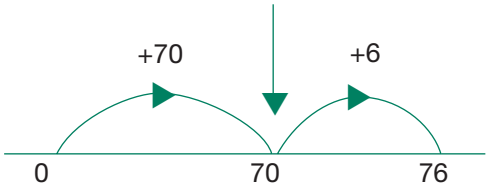
? Can you remember what partitioning means?

? Give me an example of a number you could partition.

'Today we are going to work with a number between seventy and eighty.'

'Let's start with seventy-six.'

Point to 70.



? Using seventy, how can we partition seventy-six?

Establish that the partitioning is into seventy and six, and record it on the whiteboard as follows:

70 + 6 = 76

Point to sixty.

? Using sixty, how can we partition seventy-six?

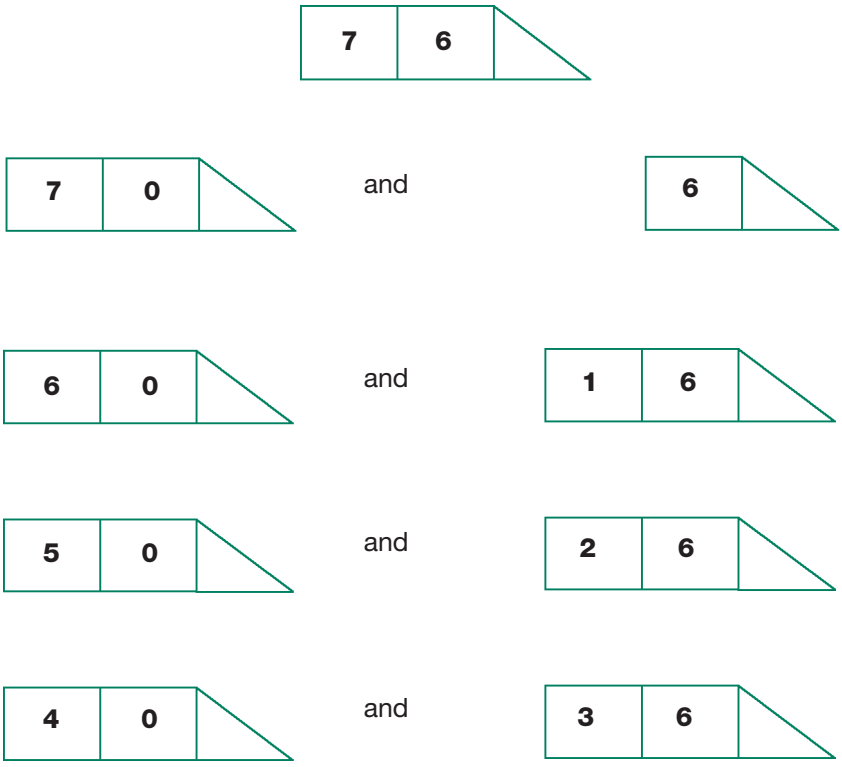
Continue, using the multiples of ten from fifty down to ten, recording each statement on the whiteboard.

70 + 6 = 76
60 + 16 = 76
50 + 26 = 76

Select another starting number and repeat.

If the child is finding this hard, repeat this lesson again next time, focusing on the partitioning on the number line. You can record the number patterns for the child and these can be taken back to class to be referred to again.

You might find it helpful to use place value cards to show the partitioning.



'Look carefully at our number pattern with seventy-six.'

? **What can you tell me about it?**

Spotlight 3

Has difficulty in partitioning, for example, 208 into 190 and 18, and 31 into 20 and 11

Opportunity for: reasoning about numbers

Partitioning up to three hundred

Time 15–20 minutes

Resources

- Number line to 300
- Whiteboard
- Three bead strings
- Place value (arrow) cards
- Sticky labels

Key vocabulary

partition	total	represent
split it into	how many	same as
left	plus	hundreds
right	add	tens
complement	subtract	

Teaching activity

'We are going to count in tens today, right up to three hundred!'

Point to 100 on the number line and, together, count up in tens to 300.

Ask the child to identify a number between one hundred and twenty and one hundred and thirty. Record this on the whiteboard, for example one hundred and twenty-six. On the number line put a marker at 126.

Point to one hundred and twenty.

? **From this point, how can we partition one hundred and twenty-six?**

Establish the partitioning is into one hundred and twenty and six, and on the whiteboard write:

120 + 6 = 126

Point to 110 and repeat the question, with the child recording the number statement on the whiteboard.

Continue, using the multiples of ten from one hundred down to ten.

Ensure that the child recognises the pattern in the partitioned numbers. Discuss the change in the number of digits when crossing the hundred boundary, that is from 100 + 26 = 126 to 90 + 36 = 126.

If the child is finding this hard, give plenty of support with a range of equipment to make the patterns clear. You could let the child choose something to help them from the mathematics shelves, or sticky labels on the bead strings might help.

Point to 200 on the number line and, together, count up in tens to three hundred.

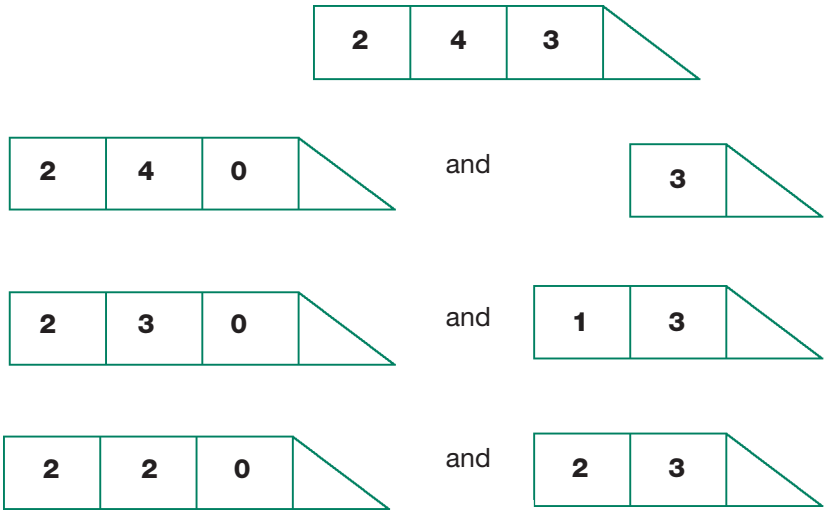
Ask the child to identify a number between two hundred and forty and two hundred and fifty. Record this on the whiteboard, for example two hundred and forty-three.

Point to 240.

? From this point how can we partition two hundred and forty-three?

Establish the partitioning is into two hundred and forty and three, and on the whiteboard write: 240 + 3 = 243.

Point to 230 and repeat the question, with the child recording the number statement on the whiteboard.



Continue, using the multiples of ten from two hundred and thirty to eighty.

Ensure that the child recognises the pattern in the partitioned numbers. Discuss the change when crossing the two hundred and one hundred boundaries, that is from 200 + 43 = 243 to 190 + 53 = 243 and 100 + 143 = 243 to 90 + 153 = 243.

? Do you think you are getting better at partitioning?

? Tell me about a pattern we made today.

? How could you partition the number three thousand, four hundred and fifty-six?

? About how many ways to partition that number do you think there are?

Spotlight 4

Has difficulty in partitioning, for example, 208 into 190 and 18, and 31 into 20 and 11

Opportunity for: developing mental images

Number line partitioning

Time 15–20 minutes

Resources

- Whiteboard
- Number lines
- Place value (arrow) cards
- Bead string or cubes

Key vocabulary

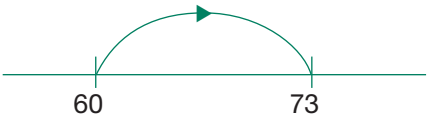
partition	plus	jumps
split it into	add	hundreds
complement	subtract	tens
total	represent	
how many	same as	

Teaching activity

'Today we are going to do some number line jumps.'

? Can you show me a number line jump on the whiteboard?

Follow on from what the child says. For example:



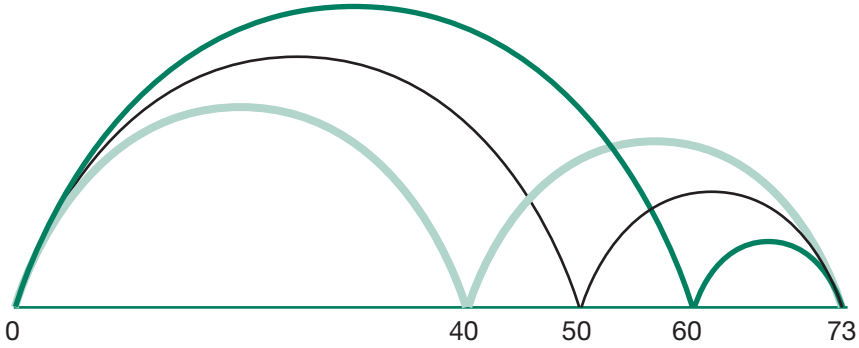
Say that this shows a jump from sixty to seventy-three.

? How big is the jump?

Establish it is thirteen and record on the whiteboard the step size thirteen and the number statement 73 = 60 + 13.

> If the child isn't sure about doing a number line jump, you need to choose another model to support the child, for example, place value cards.

Now start at 50 instead of 60 and show the jump in red.



? Is the jump the same size as before?

Agree it is bigger by ten.

If the child does not seem to understand that it is bigger by ten, use place value cards, a bead string, or cubes to help to model the numbers.

Establish the step size is twenty-three. Record this and the new statement 73 = 50 + 23.

Change the fifty to seventy and the seventy-three to eighty-seven.

Ask the child to identify the step size and record the number sentence.

Repeat, changing the numbers. For example, partition eighty-seven, starting with 80 + 7.

? **What have you noticed today about partitioning?**

Spotlight 5: a learning check

Has difficulty in partitioning, for example, 208 into 190 and 18, and 31 into 20 and 11

Opportunity for: explaining and discussing

Partitioning houses

Time 15–20 minutes

Resources

- *Houses* (Resource sheet 14)
- Bead strings
- Pairs of children
- Place value cards

Check: does the child use key vocabulary?

partition	total	represent
split it into	how many	same as
left	plus	hundreds
right	add	tens
complement	subtract	

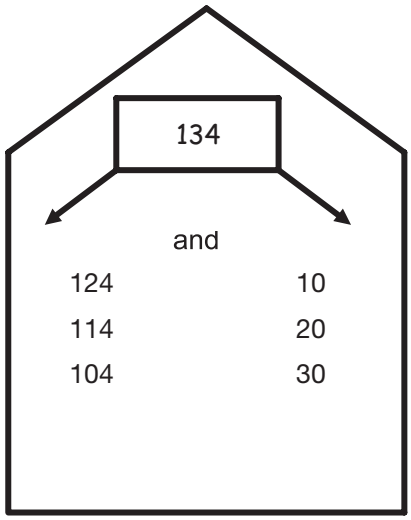
Teaching activity

'This game, **Partitioning houses**, will help you with your partitioning skills and that will help you with your calculating.'

Children can cooperate in pairs to play this game or they can race each other. Pairs share a resource sheet.

How to play

1. Someone chooses a number, for example, one hundred and thirty-four.
2. Players write one hundred and thirty-four on the roof of the house.
3. They choose something to help them, such as a bead string.
4. They write the partitioning down the sides of each house.



Variations

- At first you might choose to work with pairs, helping them, perhaps with place value cards.
- Choose some harder numbers, such as three hundred and sixty-nine.

Learning outcomes

By the end of this set of activities children should be able to:

- tackle related learning tasks with increased motivation and confidence;
- use and understand connected mathematical vocabulary;
- partition numbers into two parts;
- see the patterns in partitioning numbers;
- start to see how partitioning can help with calculating.