

Can only begin counting at one; inaccurately counts objects when rearranged; has no consistent recognition of small numbers of objects; lacks systematic approaches

Opportunity for: solving real-life problems

Resources

- Cubes, apples, toy cars, pennies, etc.
- Number line, floor number track
- Number cards (Resource sheets 1 and 2)
- 100-square

Key vocabulary

how many?	one before/after
count	count on
start at	count back
next two numbers	

Teaching activity

Time 10–15 minutes

Note: This set of activities is appropriate for children in the early stages of learning to count, but also for Key Stage 2 children who show some inaccuracies in their counting, resulting in erratic answers. (This was found even in Year 6 children during trialling.)

Explain to the child that the activity today will help them to count more accurately so that they get more of their answers correct.

? What do you know already about counting?

? How far do you think you can count?

Note how far the child can count in ones, watching for inconsistencies, for example, younger children not knowing ‘teen’ numbers, and older children not knowing what comes after one hundred or two hundred and not being able to count to one thousand, and so on.

On a floor number track (or table-top number line for older children) ask the child to select a number and stand on it (put their finger on it for a table-top number line).

? What number comes next/just before?

? Jump/count on as far as you can go. Now count back.

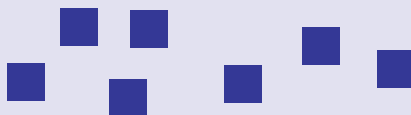
Observe carefully whether the child can recite in order, whether they can say one number word for each step and whether they can count on from any number.

If the child is getting the numbers out of sequence, you will need to go over counting by rote every day until the child can recite the numbers in order. This can be done in a variety of ways:

- counting objects;
- stepping along a floor number track;
- pointing to numbers in order on a 100-square;
- putting number cards in order;
- simply reciting the numbers when waiting in the dinner queue.

? Why do you think it is important to say the numbers in the same order each time?

If the child is unable to count one number word for each step, lay out a few toys or cubes to count, putting them close together randomly, and ask the child to count them.



Observe carefully what the child does.

If the child keeps needing to count from one each time, you will need to work on that over the next few weeks, giving repeated experiences with counting objects (see also 2 YR +/-).

You will need to be led by the responses the child makes. The rest of this teaching activity focuses on a range of ways to explore the strengths and weaknesses of the child's counting.

Put out some cubes/toys randomly. (For older children you would need to put out about twenty-eight or thirty-five or more cubes because some children's counting fails once they get beyond thirty or forty, or beyond one hundred.)

- ? What could you do with these cubes that might make counting them easier?** (*Put them in a line, move them as we count, and so on.*)
- ? When I ask you how many cubes there are, what do you need to do to answer my question?** (*Count them! Don't assume the child knows this!*)
- ? Make an estimate of the number of cubes. Is it near ten, or twenty, or one hundred?**
- ? Now count them. How many are there?**

Note: Watch out for children who count, for example, eight objects, then say 'there are nine', unaware that the last number in the count is the number in the set.

If the child counts inaccurately or unsystematically, show them some strategies for successful counting, for example:

- move each one as it is counted;
- touch each one as it is counted (not as reliable as moving each one);
- put the objects in some kind of pattern, maybe in twos, or fives, or tens; for older children familiar with arrays, they might need to be shown that thirty-five cubes could be arranged in seven rows of five, or three rows of ten and five more.

Repeat the counting with a few more toys or coins (things that cannot be linked together) and using more of them than last time.

If the child's counting skills break down with a larger number you will need to give repeated help with this, perhaps asking carers to count with the child each weekend – maybe counting a big jar of coins or how many cornflakes there are when just a few are poured into a bowl. (Warn them that they are not going to want to count a *full* bowl! Remind them that counting is made easier by putting things in groups of ten.)

One of the most successful ways to help children to count is to make sure you include as many senses in the counting tasks as you can. For example, include the child's movements, skipping or taking big strides around the playground, yelling out one number word for each step. At home a parent or carer might help by getting children to count coins dropped into an empty baked bean can or counting up and down the stairs.

'Let's record what you did today.'

Jack can recite numbers to thirty.
He can count eight cars correctly (date).

Targets:

He is going to learn to recite to one hundred.
He wants to be able to count thirty cars.

Spotlight 1

Can only begin counting at one; inaccurately counts objects when rearranged; has no consistent recognition of small numbers of objects; lacks systematic approaches

Opportunity for: *communicating mathematical ideas*

How many now?

Time 10–15 minutes

Resources

- Cubes, small toys, apples, buns

Key vocabulary

how many?

longer line

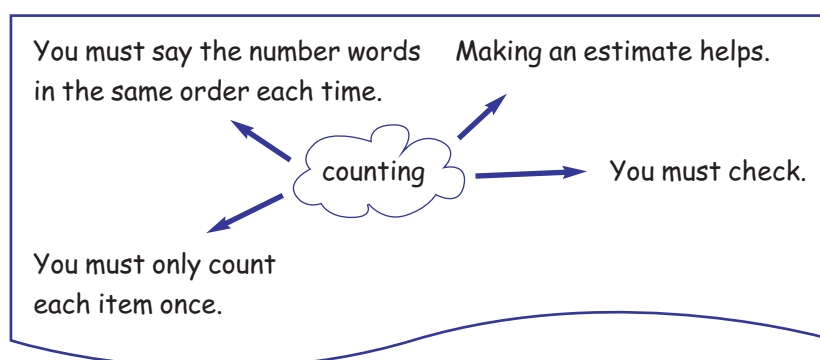
count

different pattern

same number

Teaching activity

‘We are going to do some more counting today and we are going to write down what you already know about counting and what you need to learn.’



Gradually add to this concept map as you work on the Spotlights.

Put out some items in a circle, perhaps five to nine items, but twenty-five to one hundred if appropriate.

? How many objects are there?

Observe carefully as the child counts.

If the child doesn't stop where they started but goes on round the circle, you will need to talk through working out where we start so that we don't count any of the objects twice.

? Where did you start? How will we remember you started with that one?

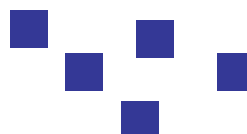
? Make an estimate of the number of objects. Why do you think that might help?

Put out about five objects in a row.



? How many objects?

Move the objects to a different arrangement.



? How many now?

Repeat this a few times. (Note that, to the child, the question 'how many now?' might seem to imply that there is a different number!)

If the child seems unsure that there are five each time and that all you have done is move them, you will need to repeat the activity a few times over a few weeks to develop the child's understanding.

? I moved them, but did I take any away or add any?

? There were five when we started, so do we still have just five? Count them.

? Now you move them – then count them. What happened?

You are looking to be able to write on the concept map, 'However you move or rearrange the objects, there will still be the same number of objects.'

Put out five objects in a line close together and ask the child to count them. (You might want to use about nine cubes for this with more experienced children.)



Move the same objects into a longer line.



? Are there still the same number of objects or are there more?

Repeat this.



If the child says there are more, be aware that the child might mean that there is a longer line – which there is! You need to clarify the language – the difference between there being a longer line, and there being the same number of objects.

? How many in the long line? Show me that many fingers.

? What will happen if I put them back in the shorter line? Are there still five? So are there still the same number – but just in a longer line?

? Now you move them to make a different pattern. Are there still five?

You might need to repeat this activity many times using different numbers, and equipment, for example with beads on a string, small world people, children standing in a line making the gap between them larger and larger – but still nine children.

? What shall we add to our concept map that is important to remember for next time?

Spotlight 2

Can only begin counting at one; inaccurately counts objects when rearranged; has no consistent recognition of small numbers of objects; lacks systematic approaches

Opportunity for: exploring mathematical ideas

Hoops, balls and bricks

Time 10–15 minutes

Resources

- Hoops, balls
- Small and large bricks
- Number cards (Resource sheets 1 and 2)

Key vocabulary

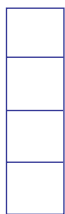
how many?	larger
count on	smaller
count back	taller
same	shorter
different	tally

Teaching activity

‘We are going to look at our concept map today to remind us what you have learned so far about counting, then we are going to do some work with these hoops, balls and bricks.’

- ?** Can you remember from the last session what happened when we moved things from a short line to a long line? (Help the child to talk about the number of things staying the same even when they were in a longer line.)

Build two towers (with different-sized bricks), both with the same number of bricks.



- ?** Which tower is taller?
- ?** How many bricks in the short tower? How many in the taller tower?
- ?** So are there more bricks in the taller tower?

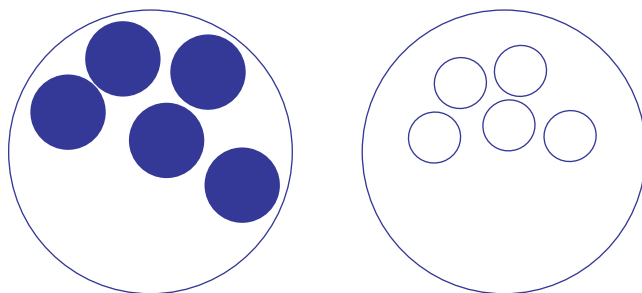
If the child is unsure about this, you might find number cards helpful – both towers need a 4 card.

Emphasise that there are the same number of bricks, but some of them are larger so those make a taller tower.

There are several important aspects related to counting and measuring that the child will need to understand, for example, taking long paces. Count how many of your paces from one side of the room to the other. Then ask the child to take ordinary sized steps across the room.

- ?** Why do you think it was only six of my paces but ten of yours? (You need to get to the idea that the smaller the pace, the more you need to measure the same distance.)

Lay out some hoops and small and large balls like this:



? What do you notice about the number of balls in each hoop?

Repeat with other items if needed, for example 1p and 2p coins in purses, bulbs in flower pots and so on, until the child is clear that the number can be the same even when it might look as if there is more of something.

If the child needs more support you might find that making a tally for each object can focus the child onto the number and away from the visual impression of size.

? What did you learn new today?



? Who has got the smallest hands? How many little hand spans across the table? How many of my big hand spans across the table? What is happening?

? If we covered the carpet with lots of these small rectangles of paper, would we need more of them or fewer of them than if we covered the carpet with these large pieces of paper?

Spotlight 3

Can only begin counting at one; inaccurately counts objects when rearranged; has no consistent recognition of small numbers of objects; lacks systematic approaches

Opportunity for: reasoning about numbers

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Harder counting

Time 10–15 minutes

Resources

- 2-D and 3-D shapes
- Items out of reach

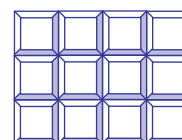
Key vocabulary

how many?	middle
count on	check
count back	

Teaching activity

‘You are getting good at counting, so today we are going to do some harder counting so that you will get even better at counting carefully.’

Ask the child to count some items that are out of reach, for example window panes or something you have put up for counting.

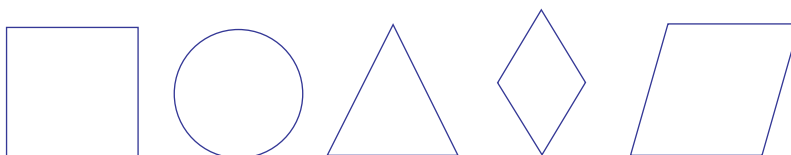


Note: We do want children to learn to count objects reliably with a ‘move and count’ strategy – that is usually our strategy when counting something like a large number of coins, but children need to be able to count reliably when they cannot touch the objects. But for some, this skill can take some time to develop. Often children lose count because they lack confidence and practice.

? How do you know if you are right? (*Encourage checking every time.*)

If the child cannot count out-of-reach items, just repeat the activity a few times a week in a spare moment, putting up display pictures such as a bunch of balloons, or laying 2-D shapes in a pattern on a desk – but not to be touched during counting.

Lay a line of different 2-D or 3-D shapes on the desk, explaining that this time they can ‘touch and count’. (With some children you might want to start with just three items, starting the count with the middle item. With others, you could set a challenge of about seventeen items ‘starting with the red triangle’.)



? Can you count these shapes, starting with the triangle?

? What could you do to be sure you are right?

If the child can do the activity with five items, you might want to try with seven or nine items.

If the child cannot yet do this task, continue giving wide experiences of other counting tasks and come back to this task in a month or two.

Add to your recording of what the child can do.

Spotlight 4

Can only begin counting at one; inaccurately counts objects when rearranged; has no consistent recognition of small numbers of objects; lacks systematic approaches

Opportunity for: developing mental images

Take a quick look

Time 10 minutes

Resources

- Cubes or counters
- Cloth or large piece of paper
- Dominoes, dice

Key vocabulary

how many?	random
count	guess
pattern	estimate

Teaching activity

‘We are going to do some clever counting today. I’m going to put some cubes on the table without you seeing, then I’m going to pull the cloth away just for a moment and you have to look quickly before I put the cloth back. Then you can shout out the number.’

Put out familiar dice patterns of cubes or counters, one at a time, being very encouraging when the child recognises how many just with a quick glance.



If the child struggles with this, use very small numbers, just two or three at first, until they develop some confidence.

If the child seems unfamiliar with dice/domino patterns, let them play games so that they develop familiarity with these patterns. Using ‘flash cards’ of these patterns with the whole class might ensure that all children will develop mental imagery that can support their recognition without needing to count for small numbers.

You can continue putting out cubes, asking the child to make an estimate once the numbers get a bit larger and when the cubes are put out randomly. Note for that child at what point it is harder to know how many cubes there are just with a quick glance. (For example, six in a dice pattern is easier than eight laid out randomly.)

This is a good context in which to reinforce understanding of estimating.

? Show me on these dominoes which number patterns you know now.

? What did you learn today?



Fill a jar with sweets, marbles or cherries and let children guess how many. Then, as a whole class, count them, taking the opportunity to reflect on any variety in strategies used.

Spotlight 5: a learning check

Can only begin counting at one; inaccurately counts objects when rearranged; has no consistent recognition of small numbers of objects; lacks systematic approaches

Opportunity for: explaining and discussing

Chink chink

Time 5–15 minutes

Resources

- Two jars or tins
- Small hard items such as 1p coins or draught pieces
- Large book or screen
- At least two children

Check: does the child use key vocabulary?

- | | |
|------------|-------|
| how many? | more |
| count on | fewer |
| count back | same |
| tally | check |

Teaching activity

‘This game, **Chink chink**, will help you with your counting.’

Choose numbers to suit your children. Perhaps numbers up to about five or seven would be best for some children. Use above ten, if appropriate.

Set up the two jars behind a large book propped up so that you can see the jars but the children can’t.

Children can cooperate to play the game, or you can play so that the child who calls out the correct number first is the winner. (Playing in the hall or playground so they can shout tends to make the game more fun.)

How to play

1. Drop some 1p coins one by one into each jar so that each jar contains the same number. (Less experienced children might need to see them and count them.)
2. With the jars out of sight, add a few items to the jars (showing your hands and showing or saying how many you are adding), for example one penny to one jar (making a satisfying ‘chink’ as it goes in) and three to the other jar.
3. You point to one of the jars and ask ‘how many?’ and the children must call out the total. (Some children might need to see the pennies to check the total they shout.)

Variations

- Just add coins to one jar at a time and ask how many. (It can help to encourage the child to tally one mark for each sound.)
- If you add coins to both jars you can use various questions to develop mathematical vocabulary.

? Are there more pennies in this jar or in this jar? How do you know?

- Extend the game by using larger numbers, and you might want to take some out of a jar as well as putting some in before asking how many.
- Dropping the coins irregularly makes it more difficult to count accurately.

Learning outcomes

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

- tackle related learning tasks with increased motivation and confidence;

Dan can count to 1000 in ones. (date)
He can start counting from the middle. (date)
He can start at 110 and count back in tens. (date)

'You are getting so good at counting!'



Showing a large collection of coins (or sweets in a jar), ask the children to discuss for two minutes with a partner what they would do to be sure they counted the coins correctly. (*You are looking for some understanding of the problem-solving skills for such a complex task.*)

Let some children do the task (perhaps a less confident child and a confident one working together) and explain how they did it and how they know they got the number right.

A harder task is to decide how a large bag of mixed coins might be counted accurately.

Misunderstands meaning of 'one more' and 'one less'; does not consistently identify the number before or after a given number

Opportunity for: solving problems

Resources

- Number track
- Number cards (Resource sheets 1 and 2)
- Paper clips
- Fish shapes
- Magnet on string
- Blue paper

Key vocabulary

- | | |
|----------|-------------------|
| one more | count on/back one |
| one less | how many? |
| next one | how many left? |

Teaching activity

Time 15 minutes

Put ten fish shapes on the table with paper clips on the nose of each fish.

'Today we are going to play a fishing game and you will be learning about numbers that are one more or one less.'

Let the child catch a fish with the magnet and put it alongside the number 1 on the number track.

? How many fish have you caught?

? If you catch another fish, how many fish will you have?

? What is one more than one?

If the child predicts wrongly, catch another fish and count the number of fish to check the answer.

Ensure that you say 'One more than one is two', and so on, and that the child repeats this.

'Catch another fish.'

? How many fish will you have then?

If the child predicts incorrectly, ask the child to count up from one with their fingers on the number track.

? 'What is one more than two?', and so on.

? Let's catch another fish. How many will we have then?

If the child counts from one each time, continue with this activity but you will need to repeat this kind of counting activity in different contexts, for example putting apples in a bowl or jumping along a floor number track, emphasising one more and one less. You need to be clear that: 'You don't need to count from one each time. We knew there were three fish, so one more makes four.' This can take some time to establish in the child's counting skills, and you might decide to do some more work using the set of activities in 1 YR +/-.

? If you catch one more fish, how many will you have then?

Continue catching all the fish, ensuring that the child is predicting what one more will be.

If the child does not seem to be grasping the idea, you might want to check that they can put number cards 0–10 or 0–20 in order. This needs to be practised before the child is likely to be able to understand one more and one less.

You can demonstrate the meaning of ‘one less’ in a similar way. You could put ten fish on a piece of blue paper for the pond, and mark the number track with a paper clip starting at 10.

Count the fish with the child and then let them catch one.

? How many fish are left in the pond?**? What is one less than ten?**

Let the child move the paper clip on the number track to one less than ten.

If the child cannot work out the answer, take all the fish out of the pond and put them along the number track.

? How many fish are there?

Then remove a fish and ask:

? How many are there now?

Put all the fish in the pond and ask:

? How many are there?

Ask again:

? How many will there be if I catch one?**? What do you think you have learned today?**

Spotlight 1

Misunderstands meaning of ‘one more’ and ‘one less’; does not consistently identify the number before or after a given number

Opportunity for: communicating mathematical ideas

Party stories

Time 15 minutes

Resources

- Number track
- Paper clips
- Bead string
- Number cards (Resource sheets 1 and 2)
- Cups, plates, spoons
- Food items

Key vocabulary

- | | |
|----------|-------------------|
| one more | count on/back one |
| one less | how many? |
| next one | how many left? |

Teaching activity

‘Today we are going to pretend that we are going to have a party and we are going to tell some stories about “one more” and “one less”. Let’s put some biscuits on a plate and see how many people could have one biscuit.’

Let the child count out an appropriate number of biscuits and put out the matching number card.

? If one more person came to the party, how many more biscuits would we need?

? What is one more than six?

? What if one person went home or didn’t want a biscuit?

? What is one less than six?

Help the child to find the numbers on the number track.

If the child is struggling to use the words ‘one more’ or ‘one less’, use another image such as spoons in a cup, using just small numbers.

If the child seems to grasp the idea, using food items, or beads on a string, extend the numbers up to or beyond ten, if appropriate.

‘Let’s imagine there are nine people at the party so we make nine hot dogs, but then another person comes.’

? How many more hot dogs would we need?

? What is one more than nine?

? What is one more than ten?

Use the bead string or party food items to challenge the child.

? How far can you count using the bead string?

? What is one more than/less than (a number the child can count to)?



- ? What do you think you did really well today?
- ? What would you like more practice with?
- ? What is one more than nineteen? ... twenty-nine? ... thirty-nine? ... ninety-nine? ... one hundred? ... one hundred and ninety-nine?
- ? What is one less than one? ... twenty? ... thirty? ... one hundred? ... one thousand?

Spotlight 2

Misunderstands meaning of 'one more' and 'one less'; does not consistently identify the number before or after a given number

Opportunity for: using mathematical symbols

Beanbags

Time 15 minutes

Resources

- Number track
- Hoop and beanbags
- Number cards (Resource sheets 1 and 2)

Key vocabulary

- | | |
|----------|-------------------|
| one more | count on/back one |
| one less | how many? |
| next one | how many left? |

Teaching activity

'Today we are going to play a beanbag game and we are going to think about numbers that are "one more".'

Put out a number track and make sure the child can count along it forwards and back.

Explain that the game is to throw beanbags into the hoop. Every time a beanbag lands in the hoop a point is scored. The score is marked with tallies, and also the paper clip is moved along the number track.

Ask the child to throw the beanbags into the hoop. Every time one lands in the hoop, change the score using tally marks and move the paper clip along the number track.

We have six beanbags in the hoop.



6

- ? If I throw one more beanbag into the hoop what will the score be now?
- ? What is one more than six? Can you find that number card?

If the child cannot say what the answer will be, use the number track. Ask the child to point to 6. Ask what the next number will be. Then ask what the new score will be.

If the child is still struggling, put a counter on each beanbag. Take the counters and put them on the number track.

? How many?

Add one more beanbag to the hoop with a counter. Take the counter and add to the number track.

? How many now?

If the child is ready to move on, let them count some beanbags into the hoop, perhaps using larger numbers, for example 12.

? Where is 12 on the number track?

? If you take out one of the beanbags, how many will be left in the hoop?

? What is one less than twelve?

If the child is struggling with this, you could ask them to lay out number cards to 12 and see if they can respond appropriately to questions about 'one less than'.

? What did you enjoy doing today?

? What do you think you have learned?

Spotlight 3

Misunderstands meaning of 'one more' and 'one less'; does not consistently identify the number before or after a given number

Opportunity for: solving problems

Dropping pennies

Time 10–15 minutes

Resources

- Tin or other container that will make a noise
- Fifteen 1p coins
- Whiteboard and pens
- Bead string
- Number track

Key vocabulary

- | | |
|----------|-------------------|
| one more | count on/back one |
| one less | how many? |
| next one | how many left? |

Teaching activity

'Today we are going to play a game with these 1p coins. Listen to what happens when I drop a 1p coin.'

Let the child practise dropping 1p coins and counting them. Tell the child to listen and count as you drop some coins into the tin. Drop six coins in and ask the child how many they counted.

? How many would there be if I dropped in one more coin?

If the child gives the right answer, drop in the other coin, then empty them out and get the child to count them to check the answer.

If the child is struggling, relate what they are doing to a bead string and/or a number track.

'Put seven coins in the container and write the number on your whiteboard. Drop one more coin into the container.'

? What is one more than seven?

The child then writes the answer on their whiteboard.

Put eight coins on the table and cover them with the whiteboard. Write '8' on the whiteboard. Then remove one coin from under the whiteboard.

? What is one less than eight?

The child writes the answer on their whiteboard.

Try choosing some numbers at random to challenge the child.

? What number comes after thirteen? ... fifteen? ... nineteen? ... twenty?

? What is one less than ten?

You might find that it helps to record with the child what they are learning, to help them to see their progress.

Ali can say 'one more' and 'one less' correctly for numbers up to ten. (date)

Spotlight 4

Misunderstands meaning of 'one more' and 'one less'; does not consistently identify the number before or after a given number

Opportunity for: solving problems

Number card game

Time 15 minutes

Resources

- Number cards (Resource sheets 1 and 2)
- Dotty cards (Resource sheet 9)
- Number track

Key vocabulary

- | | |
|----------|-------------------|
| one more | count on/back one |
| one less | how many? |
| next one | how many left? |

Teaching activity

'Today we are going to play a number card game to think about one more and one less.'

Place the number cards face up on the table and choose a card, for example 7.

? Now you choose a card that is one less than my card.

If the child gets it right they keep the card, but otherwise you keep it.

If the child is not choosing the right numbers, ask them to order the cards using the number track to help them, then try to do it again, this time without looking at the number track.

Now take two cards, for example 7 and 8, and ask the child to tell you two things about them. For example, ‘Seven is one less than eight and eight is one more than seven.’

If the child still needs more help, use the dotted cards, and ask the child to match each dotted card with a number that is one more (or one less), for example:

5

is one more than

Spotlight 5: a learning check

Misunderstands meaning of ‘one more’ and ‘one less’; does not consistently identify the number before or after a given number

Opportunity for: explaining and discussing

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Ten-counter race Time 5–15 minutes

Resources

- At least one other child
- Ten counters for each child
- Number track for each child
- One 2p coin per child
- Soft cloth or cardboard box

Check: can the child use key vocabulary?

- | | |
|----------|-------------------|
| one more | count on/back one |
| one less | how many? |
| next one | how many left? |

Teaching activity

‘This game, **Ten-counter race**, will help you with using the words “one more” and “one less” correctly.’

How to play

1. Each child lays their counters along their number track to 10.
2. They take turns to toss a coin, making it land quietly on the cloth or in the box.
3. If the coin lands on heads, they take one of their counters away and must say the right number sentence, in this case, ‘nine is one less than ten’.
4. If a player tosses tails, they do nothing.
5. The winner is the first person to get rid of all their coins.

Variations

- Another version of this game is to let pairs work together, ideally with two pairs, and they race the other pair to get rid of all their coins. In this game, each pair has a coin and they keep on tossing it as quickly as they can to race to get rid of all their counters.

Does not relate the combining of groups of objects to addition and/or does not interpret the counting of all of the objects as an answer to the question 'How many are there altogether?'

Opportunity for: solving real-life problems



Resources

- Plates and biscuits
- Key vocabulary written on cards

Key vocabulary

how many altogether?	plus
altogether	add
count	adding together
more	makes
two groups	

Teaching activity

Time 10–15 minutes

'Today we are going to work on adding two groups together using these biscuits, and we are going to use these words.'

Read the words on the key vocabulary cards to the child.

Arrange the biscuits on two plates and ask the child to tell a story using the key vocabulary, for example:

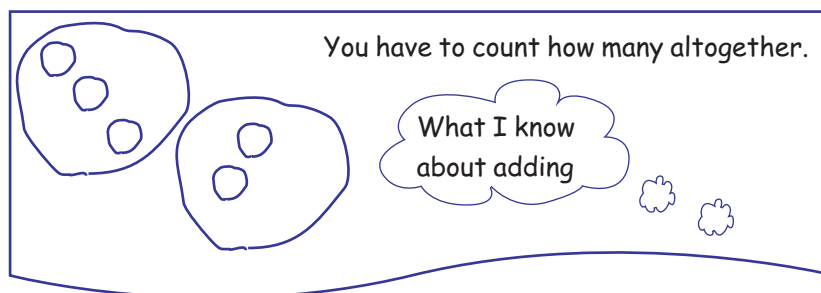
'Mary put five biscuits on a plate and her mum put three on a plate. There are eight biscuits *altogether*. Mary's three biscuits *plus* her mother's five biscuits make eight *altogether*.'

If the child finds that hard, repeat with smaller numbers. You could choose just two of the word cards, for example 'how many altogether?' and 'count', and focus just on those at first.

Repeat with different numbers.

? How many biscuits altogether?

Start a concept map with the child. It can be helpful to let the child draw what is going on as you add the two sets together. They tell you what their picture is showing. (This can reveal what the child understands.)



If you have time, play a clapping game where you clap a few claps, then a few more, then ask the child to tell you the total. Extend this to asking the child to do the second lot of claps.

Spotlight 1

Does not relate the combining of groups of objects to addition and/or does not interpret the counting of all of the objects as an answer to the question ‘How many are there altogether?’

Opportunity for: communicating mathematical ideas

How many now?

Time 10–15 minutes

Resources

- Beads
- Two pieces of card or paper
- Number cards (Resource sheets 1 and 2)

Key vocabulary

how many altogether?	plus
altogether	add
count	adding together
more	makes
two groups	

Teaching activity

‘Today we are going to do some adding with these beads.’

? Count seven beads. Are you sure you are right?

Use this opportunity to check the child’s counting skills.

Now split the beads into two groups, or let the child do that, for example three and four beads, then cover each group with a piece of paper.

? How many beads are there altogether?

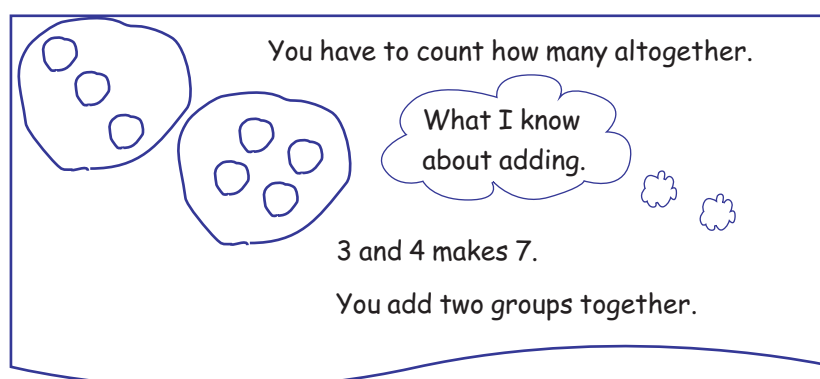
If the child cannot work out there are still seven, let them look under one piece of paper at a time, first the three, then the four.

? How can you work out how many altogether?

Watch carefully what the child does. Clarify that to answer the question ‘How many altogether?’ they have to add both of the groups.

If the child still finds this difficult, show the two groups and let the child talk about what they can see, using the key vocabulary words. Then combine the two groups.

Record some of the sentences the child can make on the concept map.



If you have time, do some clapping again.

Spotlight 2

Does not relate the combining of groups of objects to addition and/or does not interpret the counting of all of the objects as an answer to the question 'How many are there altogether?'

Opportunity for: exploring mathematical ideas

3 YR +/-

Pennies in purses

Time 5–15 minutes

Resources

- Some 1p coins
- Two purses
- Vocabulary words on cards
- Number line or number track

Key vocabulary

how many altogether?	add
altogether	adding together
count	makes
more	tally
two groups	count on
plus	

Teaching activity

Put an amount of money in each purse and ask the child to count the coins. Then, keeping the two amounts separate, ask the child to count how much money there is altogether.

Put all the money into one purse and ask the child:

? How much money is there altogether?

If the child is unsure, empty the purse and count the money.

You could record a number sentence using the vocabulary words.

5 pennies and 4 more pennies makes 9 pennies altogether.

If the child does not seem to understand the process of adding the two groups, you might want the child to make a tally for each set of coins to reinforce the counting.



? How many tally marks altogether?

If the child counts from one each time, you might need to do more work on counting (see 1 YR +/-).

Repeat with different amounts of money.

? What could we add to our concept map today?

Spotlight 3

Does not relate the combining of groups of objects to addition and/or does not interpret the counting of all of the objects as an answer to the question ‘How many are there altogether?’

Opportunity for: reasoning about numbers

Calculator adding

Time 10–15 minutes

Resources

- Calculator
- Number cards and symbol cards
(Resource sheets 1, 2 and 8)
- Counters or cubes
- Vocabulary on card

Key vocabulary

how many altogether?	plus
altogether	add
count	adding together
more	makes
two groups	count on

Teaching activity

‘Today we are going to use a calculator to do some adding.’

‘Show me if you can put a number sentence into the calculator.’

Watch the child very carefully to see what they do, especially whether they can identify the $+$ and $=$ keys.

If the child seems unfamiliar with a calculator, you will need to give them a while to play with it and explore what the keys do. They need to know about the cancel key and to be able to see that they can key in numbers, revealing them on the display.

? Can you read what it says on the display now?

Using the key vocabulary words, help the child to construct a number sentence with cards, with cubes and with words.

2	+	5	=	7
---	---	---	---	---

2 plus 5 more makes 7 altogether.
 If you add 2 and 5 together that makes 7.
 2 add 5 makes 7.
 2 more than 5 is 7.
 To add 2 and 5 you count how many altogether.

If the child is not yet using the vocabulary words fluently, you will need to repeat their use over the next few weeks. You could do that in short three-minute sessions with a calculator at registration time, asking the child to key in an addition number sentence each day and recording it with cubes or with cards. Emphasise that the two groups of cubes need to be pushed together and then counted so that you can find out how many altogether.

? What did you learn today?



Give all children time to explore what a calculator can do. They need to be able to use all four operation keys and be familiar with what those keys do.

Challenge some to create addition calculations with huge numbers, for example they might key in $23\,456 + 34\,567$.

? The answer to one of my addition calculations is 98 765. What could my numbers have been to give that answer? (If you don't say which two numbers, some children might make the answer with three or more numbers, for example you could make it with

1 + 1 + 1 + ... , keying in 1 98 765 times!)

Spotlight 4

Does not relate the combining of groups of objects to addition and/or does not interpret the counting of all of the objects as an answer to the question 'How many are there altogether?'

Opportunity for: developing mental images

Adding stories

Time 10 minutes

Resources

- Cubes or other small items
- Hoops or bits of paper
- Dice

Key vocabulary

how many altogether?	plus
count	add
more	adding together
two groups	makes

Teaching activity

'Today we are going to create some stories which include adding.'

You could choose a context to suit the child. For example, you could use a sports context: three goals scored in the first half and another four scored in the second half.

'There are three puppies in the basket and two want to climb in.'

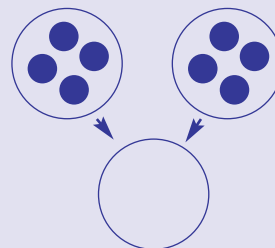
? How many altogether? Show me how you know that.

If the child needs more practice, you could use two hoops or bits of paper to show the two groups, then combine the groups.

? What could you do to find out how many altogether?

'Four biscuits and four more biscuits makes eight altogether.'

If the child needs more help, you might want to let them throw a dice twice and count out the right number of cubes. You could record the number sentences with them, for example $6 + 3 = 9$.



? If I have three buns on one plate and eight on the other, what could I do to find out how many I have altogether?

‘Let’s make a list of all the words we can think of that we use when we say an addition number sentence.’



‘Some kittens are black and some are tabby. Altogether there are eleven kittens.’

? How many black kittens and how many tabby kittens could there be?

Spotlight 5: a learning check

Does not relate the combining of groups of objects to addition and/or does not interpret the counting of all of the objects as an answer to the question ‘How many are there altogether?’

Opportunity for: explaining and discussing

Tiddlywinks

Time 5–15 minutes

Resources

- Two children
- Tiddlywinks game
- Two targets
- One-minute timer
- Vocabulary cards
- Number cards and symbol cards
(Resource sheets 1 and 2)

Check: does the child use key vocabulary?

how many altogether?	add
count	adding together
more	makes
two groups	count on
plus	

Teaching activity

‘This game, **Tiddlywinks**, will help you with your adding.’

How to play

1. Each player has a target.
2. Set the timer to ring after one minute.
3. Each player tries to get as many of their counters onto the target as they can in one minute.
4. After one minute, the players combine their groups of counters and find out how many altogether.
5. They work together to make an addition number sentence with the cards, for example $8 + 4 = 12$.

Variations

- Play the game on the floor using two hoops and beanbags.
- Play the game by tossing a dice to get the two numbers.

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;
- know that to add two numbers you combine the two groups and count all the objects;
- use a calculator to key in an addition number sentence, recognising the $+$ and $=$ keys.



Altogether makes

Time 10–15 minutes

Does not relate the combining of groups of objects to addition and/or does not interpret the counting of all the objects as an answer to the question ‘How many are there altogether?’

.....

Resources

- Blank loop track (Resource sheet 20)
- Dice, number cards or spinners (Resource sheet 12)
- Cubes
- Counters
- Stopwatch
- Rewards
- At least two children

Check: does the child use key vocabulary?

add	add both numbers
plus	makes
how many altogether?	equals

Teaching activity

‘Today we are going to play a game, **Altogether makes**, to help you to be able to add two numbers really well.’

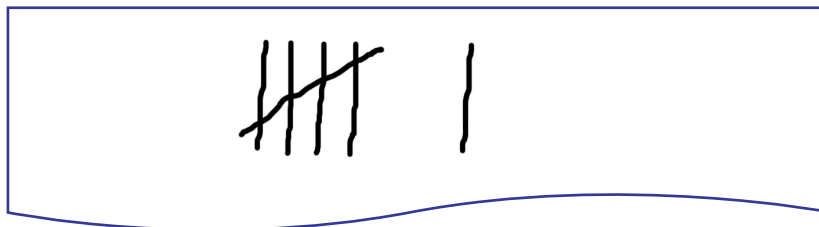
Prepare the blank loop track (Resource sheet 20) perhaps with some stickers or some decoration related to the child’s interests or a class theme.

Select dice, spinners or cards to practise with numbers appropriate for the child, for example two copies of the hexagon spinner from Resource sheet 12 could be filled with numbers from 1 to 6.

Children can cooperate in pairs to play, or they can compete.

How to play

1. Each player or pair puts their counter on the starting position. Timing can be started using the stopwatch if appropriate.
2. Players take turns to spin two numbers and add them together. The player makes the two numbers they have spun from cubes, counts the total, then moves their counter the number of spaces represented by the total.
3. Then the other player or pair spins two numbers and moves their counter.
4. Every time a player passes the start they win a reward or score three points. Scores can be recorded as tally marks.



5. Keep going round until it is time to stop. Look at the stopwatch to find out how long the game took. Next time the children should try to go faster, winning more points in the time.

Variations

- Play with another spinner or dice so that three numbers are added together.
- Play without winning points but race to be first to get round the track three times.
- Play with just numbers 1, 2, 3 and 4 using the round spinner.
- If children need help with recognising the + and = signs, they could use a calculator to enter their numbers.

Is not confident about when to stop counting when taking away (subtracting) in answer to the question 'How many are left?'

Opportunity for: developing mathematical ideas

Frogs and lily pads

Resources

- Green cubes to represent frogs
- Circles of green paper to represent lily pads
- 'Eggs' (table tennis balls) and egg boxes

Key vocabulary

how many left?	minus
count	subtract
count on	makes
count back	leaves
take away	

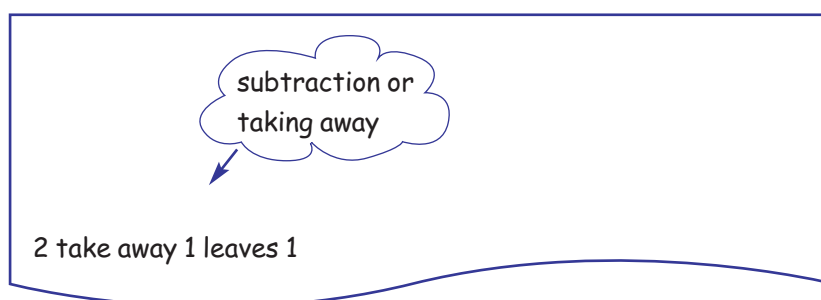
Teaching activity

Time 10–15 minutes

'Today we are going to do some subtraction using these frogs and lily pads.'

? What do you already know about subtraction/taking away?

You might want to start a concept map, or record in some way what the child already knows.



Select eight or nine 'frogs' (green cubes) and put each frog on a 'lily pad' (piece of green paper).

? Can you count the frogs?

? Can you count the lily pads?

? What can you tell me about these two numbers? *(They are the same.)*

If the child seems uncertain you might want to work with smaller numbers.

Ask the child to take away some frogs, talking you through what they are doing. Observe carefully what they do.

? How many frogs did you start with?

? How many frogs did you take away?

? How many frogs are left in the pond?

Encourage the child to count both the empty lily pads and the frogs that have been taken away so that they recognise that the numbers are the same.

If the child answers the first question incorrectly, ask how they could decide how many frogs there are altogether (so that they realise that the lily pads represent the initial number of frogs).

If they answer the second question incorrectly, ask them how they could find the answer. Get the child to count the number of lily pads that are empty (so that they realise that the number of frogs taken away and the number of empty lily pads are the same).

If the child answers the third question incorrectly, ask how they think they could find out how many frogs are left. Get them to count the number of frogs still sitting on lily pads (so that they make the connection between how many there are and how many are left).

Repeat the activity either with a different number of frogs and lily pads, or with egg boxes and ‘eggs’ (table tennis balls) using the spaces in the egg boxes and the ‘eggs’ as above.

- ? Show me the ones you took away.**
- ? Show me the ones that are left. How many are left?**
- ? Let’s write a number sentence about this. How many did we start with?**

11 eggs take away 3 eggs leaves 8 eggs.

- ? What shall we write down to remember for next time on the concept map?**

Make a note of the subtraction words the child knows and uses.

Spotlight 1

Is not confident about when to stop counting when taking away (subtracting) in answer to the question ‘How many are left?’

Opportunity for: communicating mathematical ideas

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How many left? **Time** 5–15 minutes

Resources

- Biscuits on a plate
- Vocabulary on cards
- Number line, floor number track
- Felt pens

Key vocabulary

- | | |
|----------------|----------|
| how many left? | minus |
| count | subtract |
| count on | makes |
| count back | leaves |
| take away | fewer |

Teaching activity

‘Today we are going to use lots of different words that mean taking away, and we are going to do our taking away using these biscuits.’

Put seven biscuits on the plate.

- ? How many biscuits?**

? Take some biscuits away and tell me how many you have taken away.

? How many are left?

Observe the child carefully to see if they can work out how many are left, counting the appropriate set of biscuits.

If the child is unclear about what to take away and doesn't respond appropriately to the question 'how many are left?', repeat the activity, modelling the language and the counting of how many are left.

'You had nine biscuits on your plate. If you take two away then there are seven left. I've got six biscuits. Watch me take away three of them.'

? How many are left?

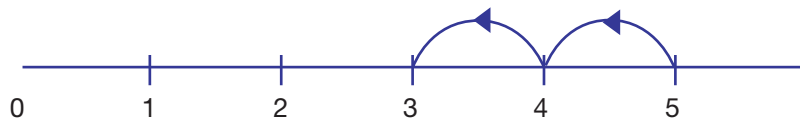
'Point to the ones that are left. Point to the ones we took away.'

? How many did we take away?

If the child is still confused you will need to repeat this kind of activity over a few days at registration time or another moment in the day, using a range of equipment, for example, felt pens.

? Five felt pens take away two, how many would be left?

You might find it helpful to relate the numbers to counting back on a number line or track.



Using the vocabulary cards, help the child to make some number sentences.

5 count back 2 means you land on 3.
 5 biscuits on a plate. If you eat 2 you are left with 3.
 5 take away 2 leaves 3.
 5 subtract 2 leaves 3.

If the child is not sure of the vocabulary, you will need to model it several times.

? Did you learn some new words today? Tell me the words you have learned.

Spotlight 2

Is not confident about when to stop counting when taking away (subtracting) in answer to the question ‘How many are left?’

Opportunity for: solving real-life problems

Musical chairs

Time 5–15 minutes

Resources

- Chairs or representations of chairs
- Vocabulary on cards
- Number cards (Resource sheets 1 and 2)

Key vocabulary

how many left?	minus
count	subtract
count on	makes
count back	leaves
take away	fewer

Teaching activity

? Have you ever played musical chairs at a party? Tell me how you know that it’s a taking away game.

Put seven chairs in a row and explain (or act out) that in a game of musical chairs you have to take away one chair each time.

? Tell me a story about what you have done.

If there were 7 chairs and I take away 1, there will be 6 left.
The next time if you take 1 away there will be 5 left.

Now ask the child to use a different number of chairs to help tell another story.

? Show me what you took away. How many did you take away?

? Show me the ones that are left. How many are left?

Use a range of stories to ensure that the child understands and uses the vocabulary correctly. For example, there could be nine children coming to the party, so nine chairs are around the table, but two children don’t arrive.

? How many chairs do we need to take away?

? How many are left?

You could make a number sentence with cards.

9

take away

2

leaves

7

? What shall we record today that is important to remember?

Spotlight 3

Is not confident about when to stop counting when taking away (subtracting) in answer to the question ‘How many are left?’

Opportunity for: solving real-life problems

Shopping

Time 10–15 minutes

Resources

- Small items labelled with prices
- Ten 1p coins

Key vocabulary

how many left?	subtract
count	makes
count on	leaves
count back	how much have you spent?
take away	how much change?

Teaching activity

‘We are going to do some shopping today so we are going to use these coins.’

Show the items for sale, for example sweets, apples, and so on. Help the child to read the labels if necessary.

balloons 8p each	pencils 6p each
lollies 9p each	sherbert dips 7p each

Give the child ten 1p coins and ask them to choose an item to buy.

? How much does it cost?

? How much change will you have left?

If the child struggles, help them through each stage, putting out the ten 1p coins. Act as the shopkeeper and take away the cost of the item, modelling the language for the child.

Repeat with different shopping items, using a range of vocabulary, recording some shopping number sentences with the child.



yo-yos 26p each

? How much would it cost to buy everyone in the class a yo-yo?

? How much change would be left from a £20 note?

Spotlight 4

Is not confident about when to stop counting when taking away (subtracting) in answer to the question ‘How many are left?’

Opportunity for: developing mental images

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Am I right?

Time 10 minutes

Resources

- Cubes
- Number cards 0–25 inc. and symbol cards (Resource sheets 1, 2 and 8)
- Vocabulary cards
- Dice
- Calculator

Key vocabulary

how many left?	minus
count	subtract
count on	makes
count back	leaves
take away	fewer

Teaching activity

‘We are going to play a taking away game today and I might not get the numbers right, so you will need to watch me very carefully and listen to what I say.’

Put the number cards 7 and above in a pile. Let the child take a card, read the number and put out that many cubes.

Then ask the child to throw the dice and take away that many cubes.

- ? How many are left?**
- ? Show me the cubes you started with.**
- ? So which ones did you take away?**
- ? So which ones were left?**

Make sure the child is confident that the answer to a subtraction calculation is the number left, not the number taken away.

Then you could take a card, throw the dice, but count the numbers wrongly. For example, if you took a 9 card and threw 3 on the dice you could say an incorrect number sentence such as:

‘I’ve got three cubes and I took away nine and it left six.’

Help the child to record correct number sentences, first using number cards and the – and = symbols, then using a range of words, challenging the child to extend their vocabulary.

9 take away 3 leaves 6.

9 minus 3 leaves 6.

6 is 3 fewer than 9.

If the child is still having difficulty, you might find that they respond better if you do the counting back on a number line or track, or if you use some equipment that you know they like, for example small objects or a bead string.

If they are unsure about the  key, let them key in some of the subtraction sentences on a calculator and record them with cards and symbols.

‘You know lots about taking away now. Let’s look at what we could add to your concept map.’



‘Write in words a number sentence with “fewer” in it.’

Spotlight 5: a learning check

Is not confident about when to stop counting when taking away (subtracting) in answer to the question ‘How many are left?’

Opportunity for: explaining and discussing

Two-minute dice dash

Time 5–15 minutes

Resources

- Cubes
- At least two children
- Dice
- Number line or track
- Two-minute timer

Check: does the child use key vocabulary?

- | | |
|----------------|----------|
| how many left? | minus |
| count | subtract |
| count on | makes |
| count back | leaves |
| take away | |

Teaching activity

‘This game, **Two-minute dice dash**, will help you with learning about subtracting.’

How to play

1. Two players cooperate to count out twenty cubes.
2. They take turns to throw the dice and take away the number of cubes on the dice.
So if 5 is thrown, the children must take away five cubes and say how many are left. In this case, ‘we have fifteen left’. They can use the number line or track to help with this.
3. They keep throwing the dice, racing to get rid of all the cubes in two minutes.

Variations

- If the children are still unclear about which cubes show how many are left, you can play the game slowly without the time limit.
- Two players or more can play against each other, each with a dice, racing to see who can get rid of their cubes first.
- If you can play in a space where noise doesn’t matter, you might want to let children shout ‘none left’ at the end of their game.

? Which cubes are the ones you have left?

? Which cubes did you take away this time?

? How many are left?

Encourage children to count back on a number line or track rather than counting the cubes from one each time.

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;
- confidently identify during a subtraction activity the starting number and the amount taken away and know which is the number left;
- understand that the ‘–’ symbol indicates taking away or subtraction.

- use and understand connected mathematical vocabulary;
- count confidently forwards and back in ones to thirty, one hundred, one thousand and beyond;
- count and tally using one number word for each 'step';
- count on from any number and not need to go back to one each time;
- know the last number in the count is the number of objects in the set;
- count irregular sounds;
- know the number remains the same however the objects are grouped;
- know not to count any objects twice;
- count objects without touching them;
- count objects starting in the middle;
- count a large number of objects reliably using a range of suitable problem-solving strategies to ensure they count correctly;
- estimate reasonably accurately and know how to check a count.

- Play the game the other way round so that they start with no counters and have to add one more each time they toss heads.
- A harder version of the game is to take one away, making the number one less each time heads is tossed and one more when tails is tossed.
- Play on a much longer number track or number line.

Picking numbers at random, assess the child's learning by selecting numbers they have used in the game, then extending to larger numbers.

? Tell me two things about number nineteen.

? I'm thinking of a number and it is one less than twenty-one. What is my number?

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;
- know what is one more and one less than numbers to ten, then twenty, then thirty and beyond.

Makes mistakes when counting using teen numbers and/or crossing boundaries

Opportunity for: exploring mathematical patterns

Resources

- Large digital clock or stopwatch that can be adjusted quickly and easily when both increasing and decreasing the display

Key vocabulary

what comes next?	count back	nine
pattern	forwards	ten
one before/after	backwards	eleven
count on	units changing	twelve

Teaching activity

Time 10–15 minutes

‘We are going to look at some number patterns that we can find on clocks and the ones you might see on the video counter when I show you a taped programme.’

Show the clock or stopwatch with the time set at:

00:01

(Alternatively, set the hours to represent the real time.)

With the child, count up in ones and change the time accordingly. Read the time as one minute or second, two minutes or seconds, and so on, whatever fits best with your timer.

Stop at:

00:09

Establish that it says nine minutes or seconds.

? What will the clock show after one more minute/second?

If the child recognises it will be ten, confirm the answer and move on.

If the child does not know, reset the clock to 00:01 and count together up to 00:10.

Emphasise the change from 09 to 10.

Repeat so that the child can predict what will happen.

Continue the count past 10 to 19, adjusting the clock with the count to show 00:19.

? What did the clock show before 19?

If the child recognises it was 18, repeat the question to identify 17, then 16, and so on back to 10. Emphasise the pattern in the teen numbers, with the 1 fixed and the units changing.

If the child does not know 18 is before 19, reset the clock to show 00:10.

Together count up to 19 adjusting the clock as before. For each of the numbers displayed say the numbers together twice.

For different teen numbers, hide the clock face and ask the child what number was shown. Repeat this hide-and-show approach, then ask the child to adjust the clock and carry out the hide-and-show with you as the learner.

Set the clock to show 00:19.

? What will the clock show after one more minute/second?

If the child recognises it will be 20, continue the count to 29, crossing the boundary to 30 and move on to 40 and 50. Emphasise the pattern in the digits and the cross from 29 to 30, 39 to 40, and 49 to 50.

Give the clock to the child and ask them to adjust the clock, moving backwards in ones and identifying the numbers displayed.

Emphasise the crossover from 50 to 49, 40 to 39, and 30 to 29.

If the child does not know that 20 is after 19, reset the clock to 00:09 and re-emphasise the change from 09 to 10 with the child.

Quickly count up to 19 and adjust the clock to show 00:20.

Say 'this is 20', and compare the patterns in the numbers from 09 to 10 and from 19 to 20. Count up to 29 and identify the common pattern in these numbers and the crossover from 29 to 30. Allow the child to adjust the clock and tell you the numbers displayed. Ask them to show you the number 19 and to say what the next number is and confirm it. Repeat using other numbers, with the child in charge of the clock.

? What shall we write down that is important to remember?



? Which number comes after 99? ... 999? ... 9999?

Spotlight 1

Makes mistakes when counting using teen numbers and/or crossing boundaries

Opportunity for: communicating mathematical ideas

.....

Cross the boundary

Time 10–15 minutes

Resources

- Three sets of number cards (Resource sheet 1)
- Number strip (stick together numbers from Resource sheets 1 and 2)
- Bead string
- 100-square
- Cubes

Key vocabulary

what comes next?	count back	nine
pattern	forwards	ten
one before/after	backwards	eleven
count on	units changing	twelve

Teaching activity

'We are going to look carefully at the numbers from zero to twenty today.'

? Can you count up to twenty?

? Can you find those numbers on the 100-square?

If the child is struggling with this counting, repeat it a few times before continuing.

Put the 0 card on the table.

? What number comes after zero when we count up?

? Find the right card and put it on top of the zero.

? Keep counting with the cards.

? What happens when we get to nine?

With two cards display ten.

1

0

? What is this number?

If the child needs help at this point let them look at the 100-square, then relate that to the 0 to 25 number strip.

They might also benefit from counting out nine cubes or beads on a bead string, then another one. You could also remind them of using 'ten trains' (or whatever Base 10 equipment you use).

Then they could continue adding a cube each time for the rest of this session.

Clarify that making ten means making two piles of cards.

? What comes next after ten?

Cover the zero to make eleven. Clarify that you have two piles of cards.

? What happens on a bead string after ten? (*The colour of beads changes.*)

? Can you count on using the cards?

Make sure the child realises that each time they must put the next card on top of the previous card in the units.

When they get to nineteen, stop them.

? What comes next?

Make the twenty with two cards and ask the child to count on from twenty-one, placing the appropriate card on top of the units.

Encourage the child to describe what changes and what stays the same as they count up and what happens as they cross the tens boundary.

? What is special about numbers nine and nineteen?

? What happens with the pattern when the units go from nine to the next number?

? What did you learn today that we could write down for next time?

Spotlight 2

Makes mistakes when counting using teen numbers and/or crossing boundaries

Opportunity for: discussing and explaining

.....

Up to fifty-five

Time 10–15 minutes

Resources

- Number strips 0–25, 26–35, 36–45, 46–55 (could be made from Resource sheets 1, 2, 3 and 4)
- 100-square
- Place value (arrow) cards

Key vocabulary

what comes next?	count back	bigger than
pattern	forwards	smaller than
one before/after	backwards	
count on	units changing	

Teaching activity

‘We are going to look at some of those special number boundaries again, like nine and nineteen that we talked about last time.’

Put out a number 9 place value card and display other cards, including the 10 and 20, on the table.

? What number comes after nine? ...nineteen?

Identify the boundaries for the child and the change from nine to ten and from nineteen to twenty. If the child needs more help, go back to the 0–25 number strip and count through each boundary, also making the numbers with place value cards.

Show the number strip 26–35.

26 27 28 29 30 31 32 33 34 35

? What number comes before twenty-seven?

? What number comes after twenty-seven?

Emphasise the change in the units digit, the 7, but not the tens digit, the 2. Show this on place value cards.

? What number comes after thirty-eight? ...thirty-nine?

Ensure the child sees that at this boundary the tens and the units digits change.

If the child is still unsure, you might need to go back and repeat this Spotlight using bead strings or whatever the child is familiar with for counting and place value.

Repeat with other number strips.

If the child is grasping what is going on, you could add some challenge by not showing all the number strips but asking the child to imagine the strip and tell you what happens at the boundary.

Help the child to use a wide range of the related vocabulary.

Note: You might need to return to this Spotlight over the next few weeks, perhaps using different equipment such as an abacus, if the child is still unsure about boundaries.

Choose a number such as fifty-nine and ask the child, without looking at any number strips or 100-square, to tell you a number smaller than fifty-nine and a number larger than fifty-nine.

? What should we write down today to remember for next time?

Spotlight 3

Makes mistakes when counting using teen numbers and/or crossing boundaries

Opportunity for: developing mental images

.....

Teen numbers

Time 10–15 minutes

Resources

- Place value cards
- Number cards 9–20 (Resource sheets 1 and 2)
- 100-square
- Coat-hanger and twenty pegs
- Bundles of straws or other Base 10 equipment
- Bead string

Key vocabulary

what comes next?	count back	nine
pattern	forwards	ten
one before/after	backwards	eleven
count on	units changing	twelve

Teaching activity

‘You are getting really good at understanding the patterns we have been looking at in counting when we get to a number that has nine in the units.’

? What number comes after 9? ... 19? ... 29? ... 39?

? Show me the numbers on the 100-square.

? Read me the numbers in the second row on the number square.

? Can you make ten with place value cards?

Support the child to read and name the teen numbers and make them with place value cards.

With the coat-hanger or straw bundles, help the child to show eleven, then twelve, then thirteen.

? Can you make these numbers with place value cards?

Demonstrate how the unit number changes and relate that to the coat-hanger, adding one more peg each time.

The bead string will show the ten in one colour and a unit added of another colour.

Help the child to count with the equipment up to twenty. Note if the child needs more support in doing this.

Hide all the equipment except the number cards 9–20.

? Can you pick the cards up in order and tell me the names of all the numbers?

If the child needs more help you might want to make an interactive display using Base 10 equipment that the child is familiar with, and other images, making each teen number.

? Can you tell me how thirteen is different from thirty?

Spotlight 4

Makes mistakes when counting using teen numbers and/or crossing boundaries

Opportunity for: reasoning about numbers

.....

In between

Time 10–15 minutes

Resources

- Number cards to 100 that end in 9 (9, 19, 29 and so on from Resource sheets 1, 2, 3, 4, 5, 6, and 7)
- 100-square

Key vocabulary

what comes next?	count back	bigger than
pattern	forwards	smaller than
one before/after	backwards	
count on	units changing	

Teaching activity

‘We are going to play a number game today with these cards, and we are thinking a bit more about what happens when the unit digit is nine.’

? Can you put these cards in order? (9, 19, 29, etc.)

59	29	79	99	9	69	39	89	49	19
----	----	----	----	---	----	----	----	----	----

Use a 100-square to support the child.

? Can you tell me a number that is bigger than forty-nine but smaller than fifty-nine?

Repeat, gradually building up speed.

When the child is confident, just point between two cards and ask the child to call out a number that goes between those two numbers.

If the child is finding this hard, you might want to make a display of the numbers with nine as the units digit, vertically as in a 100-square, and practise placing numbers using a 100-square to help. Do this over the next few days at odd moments. For example:

? Tell me a number between thirty-nine and forty-nine.

Say to the child that this time they are to point to a gap between two cards and you will say a number. Sometimes it will be a number between those on the two cards, but sometimes you will make a mistake. The child has to decide and say whether your number is in the gap or not. Encourage the child to ask the questions in full using the vocabulary ‘bigger than’ and ‘smaller than’.

? What have you learned today?

? What do you want more help with?



‘Write a number that comes between nine hundred and ninety-nine and nine thousand, nine hundred and ninety-nine.’

Spotlight 5: a learning check

Makes mistakes when counting using teen numbers and/or crossing boundaries

Opportunity for: discussing and explaining

.....

Run in the gap

Time 10–15 minutes

Resources

- Enlarged number cards ending in 9 (Resource sheets 1, 2, 3, 4, 5, 6 and 7)
- At least eleven children or the whole class

Check: does the child use key vocabulary?

what comes next?	units changing	nine	bigger than
pattern	count back	ten	smaller than
one before/after	forwards	eleven	
count on	backwards	twelve	

Teaching activity

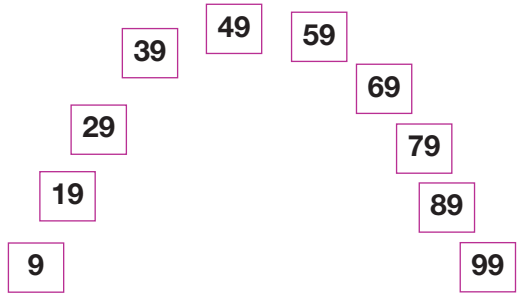
‘This game, **Run in the gap**, will help you with the work we have been doing on how the unit number nine changes when you count to the next number.’

This can be a whole-class game and can be played in a large space.

You might want children to hold hands in pairs, putting a less confident child with a more confident one.

How to play

1. Ten children hold a large number card each and stand in a horse-shoe shape.



2. Someone calls out a number, for example, ‘forty-five’, and one or more children must run between the gap where 45 would come, so between the child holding 39 and the child holding 49.
3. Everyone who runs between the right numbers wins ten points. Gradually gather speed.

Variations

- Extend the numbers up to two hundred, or further, using number cards 99, 999, 9 999, 99 999 and so on.
- Try playing it with some children hiding the number card they are holding.

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;
- name teen numbers and understand their place value;
- understand boundaries following numbers with nine in the units position;
- order numbers to one hundred and understand the value of the tens and units digits;
- name a number that is smaller or larger/bigger than a given number.

Has difficulty in remembering number pairs totalling between ten and twenty, resulting in calculation errors

Opportunity for: finding patterns



Resources

- Number track with numbers 1 to 20
- Number cards 1–20 (Resource sheets 1 and 2)
- Coat-hanger and twenty pegs

Key vocabulary

number pair	added to
number partner	plus
number facts	equals
more than	makes
less than	pattern
add	goes up in ones/twos

Teaching activity

Time 15 minutes

‘We are going to find some number patterns today. Starting from ten, we can find number pairs/partners such as five and five make ten.’

? Which other number pairs for ten do you know?

Follow on from what the child knows. With the child, count from one to twenty and back. Display the number track and point to a single-digit number, for example, seven.

? What do we add to seven to make nine?

Agree the answer is two.

? Now point to the number ten more than seven.

? What do we add to seventeen to make nineteen?

Agree the answer is again two.

Repeat, keeping the intervals small to help the child see the pattern.

If the child cannot respond quickly, start with an interval of one, for example, four to five and fourteen to fifteen, etc. Increase the interval to two and three to establish the pattern. If necessary, count out the interval with the child.

Turn the number track over and repeat the questioning. Encourage the child to say the number statements aloud:

‘Six add two is eight.

Sixteen add two is eighteen.’

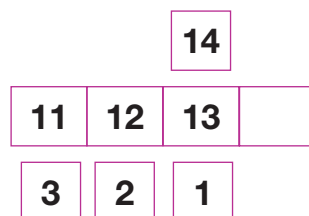
Reveal the number track and the number cards. From the cards select a teens number, for example fourteen, and place this above the track. Point to thirteen on the number track.

? What do we add to thirteen to make fourteen?

Agree it is one. Place the card with 1 below the 13 on the track and with the child say aloud:

‘Thirteen add one is fourteen.’

Point to 12 on the number track.



? What do we add to twelve to make fourteen?

Agree the answer is two. Place the card with 2 below the 12 on the track and recite the number statement together.

Repeat until the final statement has been made and ask the child to say the corresponding number statement:

‘One add thirteen is fourteen.’

? What can you tell me about the numbers on the track and the numbers on the cards?

Encourage the child to explain the pattern, using their own words to describe the increase and decrease in the numbers.

Point to a number less than 14 on the track, for example 11, and with the child say the number statement:

‘Eleven add three is fourteen.’

? What other statement could you make with these same numbers?

Establish that it could be: ‘Three add eleven is fourteen.’

Repeat the two statements represented by the track and cards and remove the two number cards 3 and 11.

Select another number less than fourteen and repeat, each time removing the two number cards until only one is left.

Show the child the coat-hanger with fourteen pegs on it. With the child, count out a group of two pegs, and move them to the right.

? How many pegs are on the left?

Establish there are twelve pegs and with the child say aloud the two associated number statements, turning the coat-hanger around as you do. Repeat, forming other groups of pegs from the fourteen.

If the child cannot identify the number of pegs in the group on the left, let them count out the pegs. Establish the number of pegs is twelve. Ask the child to find the 2 number card and place this card below the 12 on the number track and say aloud the statement: ‘twelve add two is fourteen’.

Turn the coat-hanger around and let the child place the 12 number card below the 2 and say the associated number statement aloud.

Return the coat-hanger to the original position and move one more peg to the right. Ask the child to identify the number of pegs on the left and find and place the appropriate number card on the track. Repeat, building the pattern as before.

Shuffle the number cards 1 to 13, place them face down and ask the child to turn over the top card. The card revealed is, for example, 9.

? What do we add to nine to make fourteen?

Agree the answer is five, and ask the child to place the 9 below the 5 on the number track. Encourage the child to say aloud the statement represented by the track and the cards. Repeat until all the cards have been turned over.

If the child cannot give the correct answer, give them the coat-hanger with the fourteen pegs to count out the groups of nine and five.

If time allows, repeat this activity choosing a different starting number.

‘Let’s write some number facts that it would be useful to remember.’

Spotlight 1

Has difficulty remembering number pairs totalling between ten and twenty, resulting in calculation errors

Opportunity for: communicating mathematics with symbols

.....

One more than ten

Time 10–15 minutes

Resources

- Coat-hanger with eleven pegs
- Large sheet of paper

Key vocabulary

number pair	added to
number partner	plus
number facts	equals
more than	makes
less than	pattern
add	goes up in ones/twos

Teaching activity

Show the child the coat-hanger and together count out the group of eleven pegs. Move one peg to the right-hand side.

? How many pegs are there altogether?

Confirm that there are still eleven pegs. Point to the group on the left of the hanger.

? How many pegs are there in this group?

Confirm that there are ten pegs.

If the child is wanting to count from one each time, you might need to do some more counting activities with the child (see 1 YR +/–).

With the child, record the sum on the large sheet of paper.

11

$10 + 1 = 11$

Move another peg to the right.

? How many pegs are there altogether?

Agree that there are eleven. Point to the group on the right.

? How many pegs are in this group?

Agree that there are two.

? How many pegs are in this group?

Agree that there are nine, and ask the child to record $9 + 2 = 11$ below the earlier statement.

Continue to move one peg to the right and identify and record the addition number statement each time, until one peg remains on the left-hand side.

Ask the child to describe the pattern in the written statements.

Together say the ten statements aloud: 'ten add one is eleven', and so on.

Now cover all but the top two statements and ask the child to say the ten statements aloud starting from $10 + 1 = 11$. As they say them, reveal the statements.

Cover up all but the bottom three statements and ask the child to say the ten statements aloud starting from $1 + 10 = 11$. Hide all the statements and ask the child to say them. Keeping the statements hidden, ask questions such as:

? Seven add what is eleven?

Give the child plenty of practice going over the statements and the pattern over the next few days, perhaps hanging up the coat-hanger and pegs with the number statements.

? What did you enjoy learning today?

? Do you think you are getting better at remembering number pairs?

Spotlight 2

Has difficulty remembering number pairs totalling between ten and twenty, resulting in calculation errors

Opportunity for: exploring relationships

2 Y2 +/–

Two more than ten

Time 10–15 minutes

Resources

- Large sheet of paper from Spotlight 1
- Bead string of twelve beads or cube ‘train’ of twelve cubes

Key vocabulary

number pair	plus
number partner	equals
number facts	makes
more than	pattern
less than	goes up in ones/twos
added to	

Teaching activity

‘Today we are going to do some more work on number pairs like we did last time with eleven.’

Return to the list of addition number statements for eleven, and say them aloud together. Ask the child to do so with the list partially hidden, then completely hidden.

Show the twelve beads or cubes and ask the child how they might start a list of number pairs for twelve just like the list for eleven.

Follow on from what the child says.

Let the child split the beads or cubes to make the number pairs and you can record for them.

$$11 + 1 = 12 \qquad 12$$

? What comes next?

Ask the child to move one more bead/cube to the right and confirm that the next number statement is $10 + 2 = 12$.

If the child has difficulty with this, encourage them to carry out each step using the beads, each time moving one more bead to the right. Emphasise the ‘one more, one less’ pattern in the groups formed and only count the beads in the group if the child cannot identify the changes in the numbers.

Once the list is complete let the child say each number statement. You might want to compare the patterns in this list with the patterns in the list for eleven in Spotlight 1.

Then ask the child to respond to you with the number pair or partner for twelve. For example:

If you say two the child must say ten.

If you say six the child must say six, each time making your number up to twelve.

Increase the speed at which you say your number, giving repeated practice with the numbers the child stumbles on.

? Do you feel more confident with number pairs to twelve? Tell me some pairs you can remember.

Spotlight 3

Has difficulty remembering number pairs totalling between ten and twenty, resulting in calculation errors

Opportunity for: seeing relationships

2 Y2 +/–

Patterns with twenty

Time 10–15 minutes

Resources

- Large sheet of paper from Spotlight 2
- Twenty counters or cubes
- Number cards 0–20 and +, – and = cards
(Resource sheets 1, 2 and 8)

Key vocabulary

number pair	plus
number partner	equals
number facts	makes
more than	pattern
less than	goes up in ones/twos
added to	

Teaching activity

‘We’re going to do some more number partners today.’

Play ‘number partners’ with the child for a few minutes, first playing with ten.

? What is the number partner of six when we are playing to ten? (Four)

‘Now we are going to play number partners with twenty.’

? So if we play to twenty, what do you think will be the number partner of six?

Help the child to see the relationship of the numbers to ten and the numbers to twenty.

10	=	6	+	4
20	=	16	+	4

With the coat-hanger or straw bundles, help the child to show 11, then 12, then 13.

Go over a few examples, always making the link from ten to twenty.

If the child needs support, use cubes or beads to make some of the number statements. You could make several ‘ten trains’ in red and have the units in blue to show the relationship clearly.

Play number partners to twenty again.

? What if I asked you to tell me a number partner for nineteen? Can you think what might go with one to make nineteen?

If the child needs help with that you might want to record a ‘one more’ pattern like the ones in Spotlights 1 and 2, or work out the numbers with cube ‘trains’.



‘Let’s play number partners to nineteen.
If I say eighteen you must say one.
If I say seven you must say twelve.’

Spotlight 4

Has difficulty remembering number pairs totalling between ten and twenty, resulting in calculation errors

Opportunity for: exploring patterns

Carry on up

Time 10–15 minutes

Resources

- Cubes

Key vocabulary

number pair	plus
number partner	equals
number facts	makes
more than	pattern
less than	goes up in ones/twos
added to	

Teaching activity

‘We are going to make some number pairs with eighteen today, but this time we are going to think about subtraction pairs as well as addition pairs.’

Ask the child to make a cube ‘train’ of ten red cubes and eight blue ones.

? Can you think of a subtraction calculation with eighteen?

If the child needs help you might suggest taking away just one cube.

? What is eighteen take away one?

$$18 - 1 = 17$$

$$18 - 2 = 16$$

$$18 - 3 = 15$$

Help the child to talk about the pattern as it develops.

? What is one less than sixteen?

? Can you see patterns in the numbers? Tell me about them.

When the list gets to eighteen subtract eighteen, explore where a zero could have fitted in at the start of the pattern, that is $18 - 0 = 18$.

Then ask the child to say some number partners for eighteen using addition facts, for example if $18 - 2 = 16$, then $16 + 2 = 18$.

Play number partners to eighteen.

If you say six the child must say twelve.

Give help in finding more patterns by asking questions in reverse. So for example, if you say two and the child says sixteen, you then say sixteen so the child will say two.

? What would you like extra practice with?

Now or at another time you might want to return to the lists of addition facts for eleven and twelve. Ask the child to say them quietly to themselves, then hide them and ask the child to say them aloud.

To give the child extra practice you could put up some of the lists of facts for the child to read through each day, or you could find odd moments to play 'number partners'.

? How could learning number facts like this help you to get more of your calculations right?

? Do you know any other number patterns? Tell me about them.

Spotlight 5: a learning check

Has difficulty remembering number pairs totalling between ten and twenty, resulting in calculation errors

Opportunity for: discussing and explaining

.....

Shout it out

Time 5–15 minutes

Resources

- Two sets of number cards 5–10 (Resource sheet 1)
- Two bags
- Two children

Check: does the child use key vocabulary?

number pair	added to
number partner	plus
number facts	equals
more than	makes
less than	pattern
add	goes up in ones/twos

Teaching activity

‘This game, **Shout it out**, will help you to practise some of the number pairs we have been working on.’

You might want to give the child you have been working with some preliminary work with the game so that when another child joins in, the child is more confident and therefore more likely to experience success.

Put one set of cards 5–10 in one bag and the second set in the second bag.

How to play

1. You take a number from each bag, concealing the numbers until you can turn them over so that both children can see them at the same time.
2. The children add the numbers mentally and shout out the number. If they are right they win ten points. (If both children are right, they can both win ten points. You don’t need to play the game too competitively.)
3. Put the number cards back in the bags.

Variations

- Play with two dice numbered 5–10.
- ↓ ● An easier game is to play with two 1–6 dice.
- Play the game the other way around. You show or say one number up to twenty, such as eighteen, and pairs of children can cooperate to make a number sentence to eighteen. This could be addition or subtraction.
- Choose a number, such as eighteen, then the child throws a dice and subtracts that number, shouting out the answer.

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;
- remember number facts of pairs totalling up to twenty;
- see relationships between number patterns and use those patterns to help with calculating.



Number pairs

Time 10–20 minutes

Has difficulty in remembering number pairs totalling between ten and twenty, resulting in calculation errors

Resources

- Blank loop track (Resource sheet 21)
- Dice, number cards or spinners (Resource sheet 13)
- Cubes
- Counters
- Stop watch
- Number lines
- At least two children

Check: does the child use key vocabulary?

- | | |
|----------------------|------------------|
| number pair | add both numbers |
| add | makes |
| plus | equals |
| how many altogether? | |

Teaching activity

‘Today we are going to play a game, **Number pairs**, to help you to remember number pairs between ten and twenty. Let’s look carefully at our spinners and look at the numbers we are going to add together.’

Select dice, spinners or cards to practise the numbers appropriate for the child, for example hexagon spinners from Resource sheet 13 could be filled in with numbers from 4 to 9 so that when two numbers are added together they make totals between 8 and 18.

Prepare the blank loop track (Resource sheet 21), perhaps with some coloured stickers or decoration to fit with the child’s interests or a class theme.

Children can cooperate to play this game, and they can time themselves aiming to get quicker as they have more practice.

How to play

1. Each player or pair puts their counter on the starting position. Timing can be started using the stop watch if appropriate, perhaps timing how long it takes to go three times round the track.
2. The first player or pair spins two numbers, maybe 7 and 6. They try to add these numbers in their heads, or use a number line or cubes as support.
3. The total of the two numbers represents the counter move on the track.
4. Then the other players spin two numbers and make their moves, and so on.
5. After three circuits have been completed, the time taken can be recorded. The next time, players can aim to achieve three circuits more quickly.

Variations

- Race around the track three times to see who is first.
- Play with harder numbers, making pairs up to twenty.
- Play with another spinner and add three numbers each time.

Counts up unreliably; still counting the smaller number to get one too many in the answer

Opportunity for: developing mathematical language

Resources

- Number lines or tracks, or a game board such as Ludo, including a number track
- Dice and counters
- Cubes

Key vocabulary

count on	one step forward
count up	same number
count back	one more
count down	how many steps
next one	

(Note: Many children, even those who seem to achieve above average, have the problem of sometimes counting the space they are on when they count along a number track or line. This error often will not show up in written work. It can be identified by observing children carefully as they play track games such as Ludo.)

Teaching activity

Time 10–15 minutes

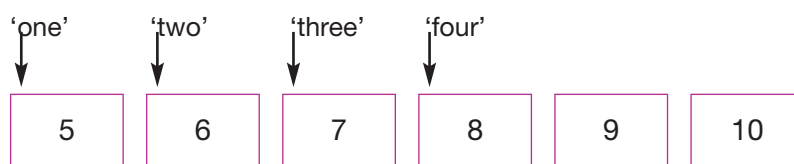
Explain to the child that you have noticed that they often get some addition and subtraction calculations wrong, often by one, and you are going to help them to work out what it is that they are doing wrong.

Using a number line or track, or a game board including a number track, ask the child to put a counter on a number and to count on the number of a dice throw.

? If you stand on four and the dice throw is three, how many do you have to count on?

Observe the child very carefully. You might need to let the child try several dice throws to check if they can count on consistently without counting the space they are on.

For example, a counter on five and a dice throw of four can mean that the child counts:



This will result in an answer of one less than five add four, but the child can be unaware of their error and, if games are played totally unsupervised, the error can get compounded repeatedly.

If the child is making this kind of counting-on error, encourage them to use some kind of number track or game and to make two of their fingers into a 'little person with two legs'. (Or do this activity outside on a playground number track.)

They 'stand' on a position such as four and you then tell them to 'take two steps'. They count 'one step' as they take one step with their fingers to 5.

Then their fingers take a second step to six.

'Four and two more is six.'

Emphasise: 'Don't count the position you are on! "Take one step" means to move to the next position!'



Try putting some counting-on tasks in different words.

? **How many hops from four to seven?**

? **If I stand my fingers on eight and count on two, which number do I end on?**

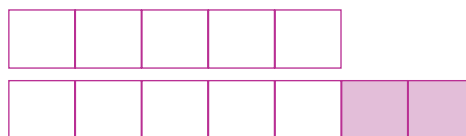
? **What if I stay on ten and count back two?**

? **If I am on six and I add on two, which number will I end up on?**

? **What is one more than seven?**

If the child needs more help with a wider range of words for counting on, note that for another time but move on.

With some cube 'trains', compare two numbers.



? **What is the difference between seven and five?**

Help the child to identify the two cubes that make the difference.

Count the cubes carefully.

? **Which number is more, seven or five?**

? **How do you know?**

? **How many more?**

Return to a number track.

'Put your counter/fingers on five and take two steps.'

'So you didn't count the fifth cube because that was the number you were on.'

? **Did you land on 7?**

? Can you make a number sentence about five and seven?

Record with the child some of the number sentences used in the session.

Five count on two is seven.
The difference between five and seven is two.
There are two steps from five to seven.

? What did you learn today about counting on and taking steps along a number line?

? Have you worked out why sometimes your answers are wrong?

? Why do think this might be?

 You might want to send some mathematics games home to play with parents or carers, or encourage any kind of board game. Alert parents or carers to watch out for 'counting the position they are on'.

Spotlight 1

Counts up unreliably; still counting the smaller number to get one too many in the answer

Opportunity for: developing mental images

The penny has dropped

Time 10–15 minutes

Resources

- Number track or line or *Space hops* (Resource sheet 11a)
- 1p coins and a tin tray
- Number cards (Resource sheet 1)
- *Count on cards* (Resource sheet 10)

Key vocabulary

- | | |
|------------|------------------|
| count on | one step forward |
| count up | same number |
| count back | one more |
| count down | how many steps |
| next one | |

Teaching activity

'We are going to do some more work with counting on so that you will find out more about why you sometimes get wrong answers when you are counting on.'

Let the child take a number card and 'stand' on that number. They should take a Count on card.

5

Count on 4



5

6

7

8

9

10

11

As the child counts on four and moves their fingers, you drop a penny on the tin tray, one penny for each 'step' they take.

(If you are doing this outside, you could use a drum beat for each step.)

Emphasise the match between one step and one coin dropping.

For most children it is taking that first step to the next number that is the focus of the problem. Emphasise that, as they hear the penny drop, they must take a step.

‘Remember not to count one and stay on the same position!’

‘When you count one that means you take one step!’

Do a few more examples.

‘Let’s make a picture of what we have done today.’

If the child is still having problems, you might find that allowing them to record what they have done in their own way can give both you and them insight into their conceptual error and their mental images.

Alongside the child’s recording you might want to write some of the sentences you have used in this session, and maybe stick the child’s picture onto the recording to keep for next time, so that you can build on their mental images.

7 count on 4 is 11.

1 step more than 8 is 9.

To get from 3 to 6 you have to take 3 steps.

Spotlight 2

Counts up unreliably; still counting the smaller number to get one too many in the answer

Opportunity for: developing mathematical language

3 Y2 +/–

Don't count where you stand!

Time 10 minutes

Resources

- Large foam number tiles or sheets of A4 paper
- *Count on cards* (Resource sheet 10)
- Number cards (Resource sheet 1) or dice

Key vocabulary

count on	one step forward
count up	same number
count back	one more
count down	how many steps?
next one	add one

Teaching activity

Make a number track on the floor with the paper (or do this activity outside on a painted or chalk number track).

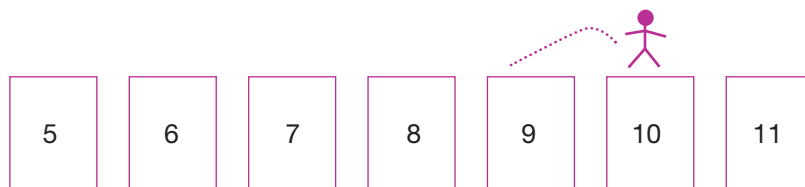
'Today we are going to do some adding and counting on again, so that you can practise taking the right number of steps when you count on.'

? Can you remember what it is that you might be doing wrong when you count on?

? What is the special thing about the first number you count on? (*The child should realise that they must take a step when they count on one.*)

Let the child take a number card or throw the dice to see which number they stand on, for example, 9.

Show them the Count on 1 card and ask them to do what the card says.



'Nine count on one is ten.'

'Nine add on one is ten.'

If the child does not move onto space ten when they count on one, you will need to repeat the activity with several different numbers.

Relate what they are doing to adding one.

'Stand on nine and add one.'

? How much more than nine is ten?

Encourage the child to identify what it is that they sometimes do wrong, for example they stay on the number 9 and say 'Count on one' and so on.

? How could you check that nine count on one is ten?

Encourage the child to check using a different method, for example counting on their fingers.

Once the child is confidently adding one, use a wider range of Count on cards, and continue to use a wide range of vocabulary.

? If you stand on six and the card says ‘Count on 2’, how many steps do you have to take?

? How can you check that you are right?

? So do you think you counted on correctly from six?

If the child is still counting the number they were standing on at the start, you could relate the counting on to counting on fingers to try to show the child that they are miscounting.

Go back to taking just one step, then try just two steps, then three steps, and so on.

? Is eight more than three?

? How many more?

? How did you work that out?

? Is there another way to do that?

If the child does not refer to counting up from three to eight, remind them how to do that.

? How do you think you are doing with this counting on? Do you think you are now getting more calculations right?

? What do you think helps you to get correct answers?

Spotlight 3

Counts up unreliably; still counting the smaller number to get one too many in the answer

Opportunity for: reasoning about numbers

3 Y2 +/–

Land on 10

Time 10–15 minutes

Resources

- Floor or playground number line
- *Count on cards* (Resource sheet 10)

Key vocabulary

count on	one step forward
count up	same number
count back	one more
count down	how many steps?
next one	

Teaching activity

‘We are going to play a game called **Land on 10** today. It’s about counting on the right number. You are going to get really good at counting on!’

Ask the child to take a face-down *Count on* card, for example *Count on 3*. Then tell the child to stand on position 7 (because you want the child to end up on position 10).

? Which number do you think you will end up on when you work out seven count on three?

Ask the child to count on three.

If the child is still counting the position they are on, they will not land on 10 but 9 when they ‘count on three’. Repeat the seven count on three, showing them their mistake.

‘Count on three or add three means you must take three steps. Don’t count the one you start on!’

Repeat the activity. For example, if the child takes the *Count on 1* card, you should ask them to stand on 9. Keep giving rewards for ending up on 10.

? How do I know which number to tell you to stand on?

? If you take the *Count on 5* card, where should I tell you to stand?

? How do you know that?

You might want to give the child some experience of using other models for counting on, such as fingers, number lines, or 100-squares.

(Note: 100-squares can be unsuitable for counting on because of the difficulties that children find with going from the end of one line to the start of another. 100-squares are ideal for counting on ten, or nine by counting on ten and hopping back one, and so on. But if children are regularly encouraged to do counting on using a 100-square, they tend to make errors. Number lines are much more efficient.)

? How many steps from six to ten?

? What if you count back from ten to six, how many steps?

? What is really important to remember for our next session?

Spotlight 4

Counts up unreliably; still counting the smaller number to get one too many in the answer

Opportunity for: using mathematical language

Cube jumps

Time 10–15 minutes

Resources

- Number cards (Resource sheet 1)
- Cubes in 'trains' to go with the number cards
- Character toys (or use counters or fingers)

Key vocabulary

count on	one step forward
count up	same number
count back	one more
count down	how many steps?
next one	difference between

Teaching activity

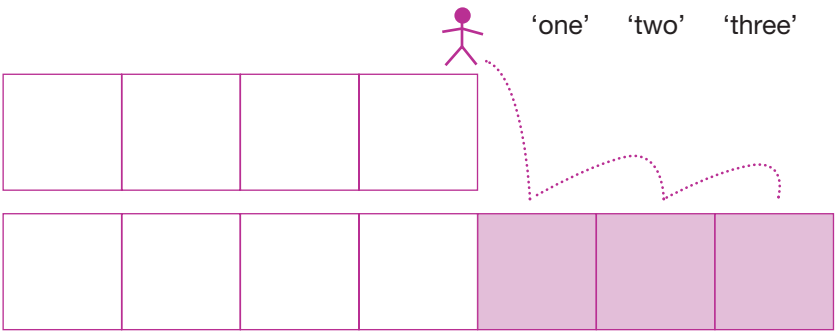
(Note: You can start with the cubes in number 'trains' to match the number cards you are using, but if you want to check the child's counting skills, make the cube 'trains' at the start of the activity.)

'Today we are going to find the difference between two numbers by counting up from the smaller number to the larger one.'

Ask the child to take two number cards, for example four and seven, and put appropriate cube 'trains' next to each other.

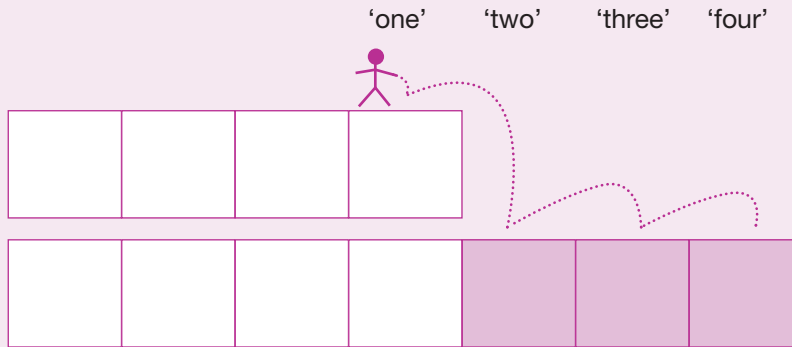
Then they put their toy on the smaller number, four in this example, and count on how many steps to get to the larger number. Or they could count with two fingers, as in previous Spotlights.

? How many steps to get from four to seven?



'Four count on three is seven.'

If the child continues to make the error of including their starting position in the count, it might help if you or the child drew the steps that they took when they made an incorrect answer; for example, they might have jumped like this:



‘Look, you did four hops. From four to seven should only be three hops.’

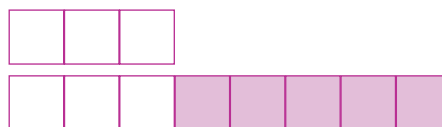
Go over the correct way to count up, as shown on page 7.

Repeat the activity with more numbers, for example two and five.

- ? Which is the smaller number, two or five?**
- ? So when we count up from the smaller number to get to the larger number, which number do we start on?**
- ? Which number do we end on?**
- ? How many steps is it to get from two to five?**
- ? How do you know you are right?**

‘Show me the difference between three and eight.’

‘Break off the difference.’



If the child needs a bit more experience of this, make ‘trains’ in two different colours, for example, yellow for the first smaller number, then a yellow ‘train’ exactly the same and a blue ‘difference’, and put these on display in class.

Label the cubes. For example: ‘The difference between two and seven is five.’

Some children are helped to understand difference by comparing ages. For example: ‘You are nine and Sophie is seven. What is the difference in your ages?’

Make sure the child can count up on a number line.

- ? Can you show me how to count up from six to nine?**
- ? How many steps did you take?**

- ? What is the difference between six and nine?
- ? If you count back from nine to six, how many steps do you take? (*Three.*)
- ? What is important to remember for next time?

Spotlight 5: a learning check

Counts up unreliably; still counting the smaller number to get one too many in the answer

Opportunity for: discussing and explaining

.....

Space hops

Time 10–20 minutes

Resources

- Space hops (Resource sheet 11a)
- At least one other child
- Count on cards (Resource sheet 10)
- Rewards
- Counters or small world astronauts

Check: does the child use key vocabulary?

- | | |
|------------|--------------------|
| count on | one step forward |
| count up | same number |
| count back | one more |
| count down | how many steps? |
| next one | difference between |

Teaching activity

This could be a playground game if you paint or chalk a track.

How to play

1. With some Count on cards face down, let the child start with their counter on the first planet (you can call this 'zero' to introduce this idea to the children) and choose a card to count on, for example, Count on 6.
2. Each player, every turn, must say how many steps they are going to take: 'I'm going to take six steps.' Then everyone should watch them very carefully.
3. If the player takes six steps correctly and lands on the right number, they can stay there. If they count incorrectly, they should go back to the space they started on!
4. Encourage children to challenge each other. For example, 'You were on the planet and you counted on six but you landed on 5, so you were wrong, you should have landed on 6.'
5. Players take turns to take a Count on card like this until someone gets to the planet at the end. That person then wins a reward.

? You've had two turns now, add on four and add on three. So how do you know you have taken the right number of steps if you are now on 7?

Variations

- Play with a wide range of cards, for example: Add on 3, Count up 4, Count 3 more, Jump on 5 and so on (reminding children that 'count up' means counting up to higher numbers, not necessarily counting by moving up the page or up a number line).
- ↑ ● Play with a mixture of Count on and a few Count back cards (using just small numbers for these). If a child has to count back and gets beyond zero, you can ask the child where they think their counter should stand. Some children can surprise us with their understanding of negative numbers. If a child isn't ready for that, just ask them to sit in the first spaceship until their next turn.
- ↑ ● Play so that you have to predict the number which you are going to land on. 'I'm on 3 and I have to count up six, so I predict I will land on 9, because if I count three add six on my fingers I get to 9.' If a player predicts correctly, they move on one more step.

If the child needs more support, ask them to make two towers with cubes, perhaps a tower of seven and a tower of five.

? What is the difference between the heights of the two towers?

Help the child to see the difference – the two extra cubes on the tower of seven.

Record for the child on a number line.



‘The difference between five and seven is two.’

$$7 - 2 = 5$$

$$7 - 5 = 2$$

$$2 + 5 = 7$$

$$5 + 2 = 7$$

? Which other number sentences could you have written?

Explore a range of number sentences as above, such as $6 + 10 = 16$, showing on the number line how these could work.

? Let’s record some of the words we are using on our ‘difference between’ word wall.

difference between	count up	addition
	count back	subtraction
		take away

? Why do you think the calculation works whether you do it as an addition or a subtraction?

(Be led by what the child says but cover the idea that whether you count on or back along a number line, you get the same answer.)

? Can you give me two numbers that have the difference of four?



? How many different number sentences do you think you could write that have a difference of four?

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;
- count on from a smaller number to a larger one accurately;
- identify any errors they are making and develop the confidence to check their own work.

Does not relate finding a difference and complementary addition to the operation of subtraction

Opportunity for: exploring mathematical language



Resources

- Cubes
- Wipe-clean number line

Key vocabulary

how many?	add
difference between	count on
take away	count up
subtract	count back

Teaching activity

Time 10–15 minutes

'We're going to make a word wall today. I'm going to write "difference between" on the first brick because those are the words that we are thinking about today.'

? Which other words do you think might go on a 'difference between' wall?

difference between	

Record two numbers, such as sixteen and ten.

? What is the difference between sixteen and ten?

If the child doesn't know how to work it out, draw a number line for them to see what they could do with that.

If they still can't work it out, show them how to hop along the line from 10 to 16 making six hops.

'I'm starting at 10 and I'm taking six hops to get to 16, so the difference between sixteen and ten is six.'

Try another example.

? What number sentence can you write to show the calculation you did?

They might record:

$16 - 10 = 6$, or $16 - 6 = 10$, $10 + 6 = 16$, $6 + 10 = 16$

? Can you explain how you worked it out?

Explore the method of working it out and show how to count up from the smaller number to the larger.

Spotlight 1

Does not relate finding a difference and complementary addition to the operation of subtraction

Opportunity for: communicating mathematical ideas

4 Y2 +/–

Two towers

Time 10–15 minutes

Resources

- Cubes
- Whiteboard

Key vocabulary

how many?	add
difference between	count on
take away	count up
subtract	count back

Teaching activity

‘Let’s look at our word wall again because today we are going to do some more work on what “difference between” means.’

Make two columns or towers each of twelve interlinking cubes. Show the child one tower of cubes.

? How many cubes are there in this tower?

Agree there are twelve cubes.

Show the child the second tower of cubes and place the two towers side by side.

? How many cubes make up the second tower? Did you need to count the cubes?

Establish that the towers are the same height or the columns the same length. We know that the number of cubes in each tower is the same so the second tower also has twelve cubes.

If the child has to confirm that there are the same number of cubes in the second tower by counting the cubes, repeat the activity.

For example, show a tower of eight cubes.

? How many cubes are there in this tower?

Agree there are eight cubes. Show the second tower then hide it.

? If the second tower is the same height, how many cubes will it have?

Agree it will have eight cubes too. Reveal the second tower.

? If we place the two towers side by side, what will happen?

Establish they will be the same height.

Repeat using other pairs of towers of equal height.

Place four loose cubes on the table and ask the child to add two cubes to each tower.

? Are the towers the same height? Did you have to count them?

Agree there was no need to count them, as they are the same height.

Establish the difference is one.

? Can you write down a number statement for the difference between the two towers?

Ensure that the child records on the whiteboard, and can interpret as a difference, the number statement: $14 - 13 = 1$.

If the child cannot record and interpret the number statement, remind them that the taller tower has fourteen cubes. We took away one cube.

? What is one less than fourteen?

? What is fourteen take away or subtract thirteen?

Remove a second cube from the shorter tower.

? How many cubes have we removed now?

Agree it is two.

? Record a number statement for this difference.

Remind the child there are still fourteen cubes in the taller tower. Ensure the child records on the whiteboard, and can interpret as a difference, the number statement: $14 - 12 = 2$

Show the difference of two with the cubes, and you or the child can record it on a number line.



‘There is a difference of two.’

? Can you think of some number sentences where there is a difference of two?

Repeat using other pairs of towers and larger differences. Ask the child to record various number statements where the difference remains the same.

? What have you learned today about ‘difference between’?

? What would happen if we kept adding the same number of cubes to each tower?

Establish that no matter how many more we added to each tower, if we add the same number of cubes to each, they will be the same height.

Introduce the word ‘difference’ into the description, saying that there will be no difference in their heights and the difference in the number of cubes is zero.

Say, ‘Suppose the towers were each fifty cubes high,’ and ask:

? What would be the difference in their heights?

Agree the difference would be zero.

Record on the whiteboard: $50 - 50 = 0$.

Ask the child to record some number sentences of their own where the difference is zero. Ask them to read their number statements using the vocabulary ‘difference’, ‘take away’ and ‘subtraction’.

? What could we add to our word wall? (For example, ‘You can have a difference of zero.’)

Spotlight 2

Does not relate finding a difference and complementary addition to the operation of subtraction

Opportunity for: exploring mathematical ideas

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Towers of fourteen

Time 10–15 minutes

Resources

- Cubes
- Whiteboard

Key vocabulary

- | | |
|--------------------|------------|
| how many? | add |
| difference between | count on |
| take away | count up |
| subtract | count back |

Teaching activity

Make two columns or towers of fourteen interlinking cubes. Show the child the two towers.

? Are there the same number of cubes in each tower? How can we check?

Establish that putting them side by side is sufficient and we do not need to know the number of cubes in each tower.

Say that there are fourteen cubes in each tower.

? Can you write down a number statement for the difference between the two towers?

Ensure the child records on the whiteboard, and can interpret as a difference, the number statement: $14 - 14 = 0$.

Remove a cube from one tower and put the towers side by side.

? What is the difference between the number of cubes in each tower now?

Spotlight 3

Does not relate finding a difference and complementary addition to the operation of subtraction

Opportunity for: developing mathematical language

Difference of five

Time 10–15 minutes

Resources

- Cubes including 'ten trains' and 'five trains'

Key vocabulary

how many?	add
difference between	count on
take away	count up
subtract	count back

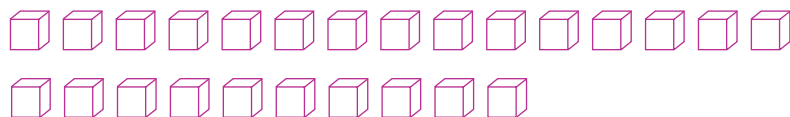
Teaching activity

'Today we are going to find some number sentences with a difference of five, but first I want you to make some towers or rows of cubes with a difference of zero.'

Follow on from what the child does, recording some number sentences if appropriate.

? Now can you make two rows of cubes with a difference of five?

Help the child to make, for example, a row of fifteen and a row of ten.



? What is the difference between fifteen and ten?

If the child needs help, make the cubes into towers if the child is more familiar with this and break off the difference to show both towers the same. Then help them to count the five cubes that make the difference.

Help the child to talk about their cubes using a range of the key vocabulary above.

? Why do you think you get the same answer whether you count up or count back?

? Which do you find easier, counting on or counting back?

? Have we used any more words that we could put on our word wall?

? What number sentence could we write to show this difference?

$$15 - 5 = 10$$

$$15 - 10 = 5$$

? Which two addition sentences could we write?

? Do you think we are taking away or we are adding when we find the difference between two numbers?

Explore the idea of addition being the opposite of subtraction, and subtraction the opposite of addition (or explain that one undoes the other one; for example, fifteen subtract five is ten, and adding the five back again brings you back to fifteen).

If the child is unsure about this, go over the sentences, showing that you can use both adding and subtracting, and you still use the same three numbers. Because adding undoes subtraction, you can get the right answer with adding or subtracting.

Do another example: 'The difference between twenty and twenty-five is five.'

- ? Tell me what to record to make two subtraction calculations and two addition calculations for the three numbers: twenty-five, twenty and five.
- ? Make another two rows where the difference is five. Is it going to work with really big numbers as well?
- ? Can you put lots of 'ten and five trains' together to make an enormous picture of numbers with a difference of five?

 'Write down any number between one thousand and two thousand. Then write a second number with a difference of five.' (Clarify that the second number could be five more, or five less, than the first number.)

Spotlight 4

Does not relate finding a different and complementary addition to the operation of subtraction

Opportunity for: developing mental images

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Counting back **Time** 10–20 minutes

Resources

- Cubes
- Number cards to suit the child (Resource sheets 1, 2 and 3)
- Number lines
- Dice

Key vocabulary

- | | |
|--------------------|------------|
| how many? | add |
| difference between | count on |
| take away | count up |
| subtract | count back |

Teaching activity

'Today we are going to do an activity with these cards and the dice. We are going to work on counting backwards.'

- ? Which do you find easiest, counting forwards or counting backwards?

Put a number card on an empty number line and ask the child to throw the dice, throwing, for example, 5.



‘Tell me a number that has a difference of five if we count back from seventeen.’

Write a number sentence, and draw in hops on the number line.

? If you shut your eyes can you ‘see’ the number line and the five hops?

? Shut your eyes again and try to ‘see’ a different picture of the difference between seventeen and twelve. What did you see?

If the child finds this difficult, explore with them which other equipment they might choose to show a difference between seventeen and twelve. This might be a bead string or cubes, etc.

Now use their choice of equipment for a few examples.

‘Let’s choose another number and you throw the dice to find another difference.’ For example, number is fifteen and a dice throw of two.



‘Let’s count back two: one step to fourteen, another step to thirteen.’

‘Let’s write a number sentence to go with that.’

$$15 - 2 = 13.$$

? Did we use any words we haven’t yet put on our word wall? (For example, ‘subtract’ or ‘take away’, or ‘count back’.)

‘Show me how to count forwards from thirteen to fifteen.’

? Can you make a number sentence to go with that? (For example, $13 + 2 = 15$.)

? Shut your eyes and see if you can see a picture in your head to go with thirteen add two. What is your picture?

If the child is unsure about the pictures in their head you might need to repeat this kind of activity with them, often asking them to close their eyes and ‘see the pictures in your head’.

It might help to ask the child to draw the pictures in their head. Be very affirming about their pictures, talking them through and helping them to develop these images over the next few weeks.

? If you had to find a difference of a big number, such as the difference between nineteen and seven, would you rather start at the seven and count up, or start at the nineteen and count back?

? Do you think you would get the same answer whichever way you did it?

If the child thinks the answer might be different you will need to work it out on a number line and repeat this Spotlight in different ways, perhaps with cubes or a bead string, or counting on fingers, etc.

Finish by looking at the word wall.

Clarify that subtraction can be worked out by adding.



? If two numbers have a difference of five, can they both be even numbers?

Spotlight 5: a learning check

Does not relate finding a difference and complementary addition to the operation of subtraction

Opportunity for: explaining and discussing

Kangaroo hops

Time 5–15 minutes

Resources

- Number cards to suit your children (Resource sheets 1, 2, 3 and 4)
- Dice
- Number lines
- At least two children

Check: does the child use key vocabulary?

- | | |
|--------------------|------------|
| how many? | add |
| difference between | count on |
| take away | count up |
| subtract | count back |

Teaching activity

‘This game, **Kangaroo hops**, will help you with finding differences.’

Lay about ten number cards face down on the table.

Children can cooperate in pairs.

How to play

1. The children pick up two numbers and place them on a number line.
2. They work out the difference between the two numbers and that is the number they score.



? How many hops does the kangaroo need to make to get from thirteen to nineteen?

? Would it be the same number of hops to get from nineteen back to thirteen?

? How do you know?

3. Children keep their score. They could tally this in sets of five.

Variations

- ↑ ● Children or pairs can compete, but the pair with the largest score only wins if they can say what the difference is between their score and the other pair.
- ↑ ● Play with the cards facing up. One child throws a dice and they have to pick up two cards with that difference. Children could make up their own way of scoring for this game.

Is insecure in making links between addition and subtraction and/or recognising inverses

Opportunity for: recognising relationships

Resources

- Cubes, bead string, 1p coins
- Number line, floor number track
- Two sets of number and symbol cards (Resource sheets 1, 2 and 8)
- Calculator

Key vocabulary

add	goes together
addition	inverse
subtract	opposite
subtraction	other way round
take away	larger
difference between	largest
leaves	smaller

Teaching activity

Time 10–15 minutes

Lay out some number and +, – and = cards.

‘We are going to make some number sentences today with the + and the – cards, and we are going to think about how those + and – cards are linked.’

? I’m going to key in $4 + 6 = 10$ on the calculator. If I give it to you, can you use the subtraction key to get back to 4?

? Can you make those number sentences with cards?

Help the child to set out:

4	+	6	=	10
10	–	6	=	4

Support this with cubes or a bead string or 1p coins.

‘Four 1p coins and six more makes ten altogether. If I take away the six again I get back to four.’

? Check your calculations, using a number line to help.

Support the child to do this.

Repeat with different numbers. Then go back to some of the cards you have laid out for addition and subtraction and move some of the cards around.

? Is this number sentence right? How do you know?

4	+	10	=	6
---	---	----	---	---

? What about this one?

4	–	6	=	10
---	---	---	---	----

Support the child reading the subtraction sentence.

? Why isn’t this subtraction correct?

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;
- find a difference by counting on and counting back, understanding that the answer will be the same however they work it out;
- write four related number sentences for ‘difference between’;
- understand that addition undoes subtraction.



Difference race

Time 15–20 minutes

4 Y2 +/–

Does not relate finding a difference and complementary addition to the operation of subtraction.

Resources

- Blank S-track (Resource sheet 11b)
- Counters
- 1–4 spinner (Resource sheet 13)
- Rewards
- At least two children (two pairs make a good number of players for this game)

Check: does the child use key vocabulary?

- count on
- count back
- how many?
- difference between
- take away
- subtract
- add

Teaching activity

‘Today we are going to play a game, **Difference race**, to help you understand more about what it means to find the difference between two numbers.’

Prepare the *Blank S-track* (Resource sheet 11b) by writing in each space a number of a size appropriate for the group of children, for example numbers 1–8 inclusive randomly around the track. Put a 4 on the starting space.

Players can cooperate in pairs, racing another pair.

How to play

1. Each pair or player puts their counter on the start.
2. The first pair or player spins the spinner and moves that many spaces.
3. That pair or player then declares the difference between their starting point and the number they have landed on.
4. If they are correct they can stay on the space, but if they are wrong they have to move back to where they started.
5. Race to get to the end first.

? Show me how you worked out that difference?

? What picture did you have in your head when you worked it out?

Variations

- Players can score the number of cubes representing their difference. The winner is the player to have the largest number of cubes.
- Play as in variation above, but the winner with the most cubes only wins if they can work out the difference between their number of cubes and those of the other players.
- Play with larger numbers on the track, for example numbers 3–15.

Learning outcomes

By the end of a set of related activities, children should be able to:

- tackle related learning tasks with increased motivation and confidence;
- use and understand connected mathematical vocabulary;
- explain how to find the difference between two numbers.

If the child needs support, work out the meaning with cubes.

? If I have four cubes, how would I take away six cubes?

Help the child to re-order the cards to make sense, using the cubes to illustrate what is going on.

Try another example.

? Is this going to work: $3 - 7 = 10$?

? How could you correct the calculation?

Help the child to use the key vocabulary above.

Again, work it out with cubes, focusing on the need to match the numbers and order of the calculation to the numbers and symbols.

Finish by choosing three more cards and asking the child to make an addition number sentence and a subtraction one.

Spotlight 1

Is insecure in making links between addition and subtraction and/or recognising inverses

Opportunity for: making connections

.....

Silly sentences

Time 10–15 minutes

Resources

- Cubes
- Number and symbol cards
(Resource sheets 1 and 2)

Key vocabulary

add	goes together
addition	inverse
subtract	opposite
subtraction	other way round
take away	larger
difference between	largest
leaves	smaller
altogether make	smallest

Teaching activity

‘I want you to make two different size rods of cubes that add up to twelve altogether. Then we are going to make some addition and subtraction sentences that use twelve.’

Help the child to record number sentences and to use appropriate vocabulary, for example ‘Twelve subtract four leaves eight’.

$$8 + 4 = 12$$

$$12 - 4 = 8$$

? Now can you make some silly number sentences using the cards?

4	–	12	=	8
---	---	----	---	---

? Read this number sentence and tell me why I think it is silly.

Help the child to use a range of the key vocabulary above.

Note: You might want to stick to the usual ways we tend to set out number sentences, but do remember to give children experience with different layouts such as $12 = 4 + 8$ (see the whole-class activity below).

‘So that we will remember them for next time, let’s record two correct addition and two correct subtraction sentences.’

$8 + 4 = 12$ $12 - 4 = 8$ $4 + 8 = 12$ $12 - 8 = 4$
--

 **? How many different ways can you find to make number sentences with twenty, eighteen and two?** (Clarify that there are four basic sentences – two addition and two subtraction – but you can rearrange cards. For example, you can rearrange $18 - 2 = 16$ to $16 = 18 - 2$.)

Spotlight 2

Is insecure in making links between addition and subtraction and/or recognising inverses

Opportunity for: exploring mathematical ideas

Make four

Time 10–15 minutes

Resources

- Recording from Spotlight 1
- Cubes

Key vocabulary

add	goes together
addition	inverse
subtract	opposite
subtraction	other way round
take away	largest number
difference between	largest
leaves	smaller
altogether make	

Teaching activity

Talk the child through the recording from last time.

‘Today we are going to write four sensible sentences that go with some cube “trains” you are going to make.’

Choose a number suitable for the child, such as sixteen, and ask the child to make a cube ‘train’ sixteen long.

Spotlight 4

Is insecure in making links between addition and subtraction and/or recognising inverses

Opportunity for: developing mental images

Round and rounds

Time 10 minutes

Resources

- Recording from Spotlight 3
- Number and symbol cards (Resource sheets 1, 2, 3 and 8)
- Access to counting equipment such as cubes or apples

Key vocabulary

add	goes together
addition	inverse
subtract	opposite
subtraction	other way round
take away	larger
difference between	largest
leaves	smaller
altogether make	

Teaching activity

? Look at what we did last time. Can you remember what we did?

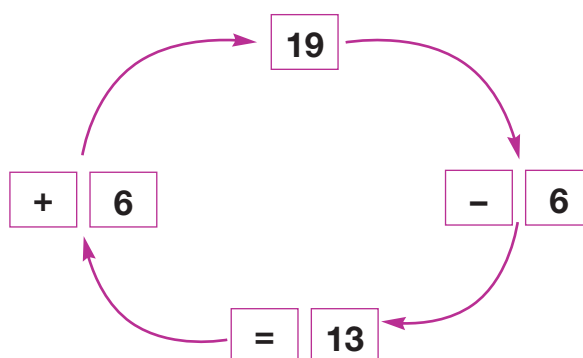
Again, take careful note of the child's vocabulary.

Ask the child to select some cards that go together, for example 19, 6 and 13.

If the child is likely to need lots of support you could choose some accessible numbers that the child is comfortable with.

If you think it might help the child, let them choose equipment to support their calculating.

Lay out the cards in a circle. Read diagram from the top.



'Nineteen subtract six makes thirteen, then if you add the six back on, you get back to nineteen where you started.'

Let the child choose three more numbers that go together and make another 'round and round' and read it to you. Take one example back to class.



? Why does this 'round and round' work?

? Can you go the other way round? (Yes, if you change the operations cards round as well.)

Spotlight 3

Is insecure in making links between addition and subtraction and/or recognising inverses

Opportunity for: exploring mathematical language

5 Y2 +/–

On the number line

Time 10–15 minutes

Resources

- Cubes or bead strings or coat hanger and pegs
- Number lines
- Number cards (Resource sheets 1, 2 and 3)

Key vocabulary

add	goes together
addition	inverse
subtract	opposite
subtraction	other way round
take away	larger
difference between	largest
leaves	smaller
altogether make	smallest

Teaching activity

‘We are going to make four sensible number sentences that go together today. You choose the numbers and I will record the sentences.’

Encourage the child to think for themselves what they could do. If they need help, put out some suitable number cards.

? Can you mark your starting number on the number line?

If the child needs help, let them choose a number and mark it on a number line and select equipment they like working with.

? If you close your eyes can you imagine some hops along the number line to get to a number bigger than your number, or smaller? (For example, if the child wants to start with seventeen, they could add four and work with twenty-one, or they could subtract six and work with eleven.)

? Which other number cards will you need if you hop that many? (For example, with seventeen hop forward four, they will need cards 17, 4 and 21.)

Focus on the vocabulary above as they need to talk about their hops. You could tick the words on the list once they are used, noting any that the child tends not to use.



(Keep your recordings for next time.)

? Have you learned any new words about number sentences that go together?

? Explain how you can choose the numbers to make the number sentences that go together.



‘Explain what you think it means to say addition undoes subtraction.’

Spotlight 5: a learning check

Is insecure in making links between addition and subtraction and/or recognising inverses

Opportunity for: explaining and discussing

5 Y2 +/–

Card triples

Time 5–15 minutes

Resources

- Number cards used in earlier Spotlights
- Three hoops or pieces of paper
- At least four players
- A scorer with a calculator

Check: does the child use key vocabulary?

add	goes together
addition	inverse
subtract	opposite
subtraction	other way round
take away	larger
difference between	largest
leaves	smaller
altogether make	smallest

Teaching activity

‘This game, **Card triples**, will help you with understanding how addition and subtraction number sentences go together.’

Lay out some cards that the child is familiar with in the three hoops – the largest numbers in one hoop and smaller ones in the two other hoops. For example, if 5 is in one hoop and 10 is in the other, you need to have 15 in the third hoop, but it adds interest to the game if you just put some numbers randomly.

Children can cooperate in pairs to play.

How to play

5	10	15	3	4	7
---	----	----	---	---	---

1. Pairs of children work together to take one number from each hoop that ‘go together’ to make a card triple. For example, they could take 3, 4 and 7.
2. They score the number of points for their largest number, in this instance, 7.
3. Then they must say one addition sentence that they can make with the three cards, for example $3 + 4 = 7$. Again, they score 7 if they are correct.
4. They must then make a subtraction sentence to score another 7.
5. The scorer notes the score and can use a calculator to help.
6. Then the other pair selects three cards and makes number sentences in the same way.
7. The pair with the highest score wins.

Variations:

- An easier game is for pairs just to collect card triples and justify why their cards go together.
- Play that first variation at speed, both pairs taking cards as quickly as they can until most of the cards are gone.

? Why has no-one taken that card?

- Extend the game by making a two-digit number with cards, for example 27, and making four related number sentences with that two-digit number, for example, $27 - 6 = 21$.

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;
- understand inverses, explaining how addition undoes subtraction;
- choose three related numbers and explain why they are related;
- understand an appropriate way to write an addition and subtraction sentence.

Does not readily use number patterns to support calculating, for example:

$$46 - 5 = 41,$$

$$\text{so } 46 - 15 = 31,$$

$$46 - 25 = 21, \text{ etc.}$$

Opportunity for: making patterns

Resources

- Cubes including ‘ten trains’
- Sticky notes
- Box
- 100-square

Key vocabulary

number pattern	plus
number sequence	one more
what comes next?	ten more
predict	increased by
subtract	decreased by
add	

Teaching activity

Time 10–15 minutes

‘We’re going to make some number patterns today.’

? Can you tell me a number pattern you can remember?

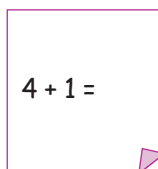
Prompt the child to talk about a pattern they have used recently, for example number bonds to ten:

$$1 + 9 = 10$$

$$2 + 8 = 10, \text{ and so on.}$$

‘Today we’re going to make some number patterns with this box, these cubes and the sticky notes.’

Show the child a sticky note like this.



Read it together using the vocabulary above.

? Find the right number of cubes for this calculation and put them in the box.

? Now stick the calculation on the box.

Write the calculation $14 + 1 =$ on a sticky note and put it on the front of the box.

? What is different in this calculation?

Clarify it is now fourteen, not four.

? How much has this calculation increased by?

? Increase the number of cubes in the box to match. How many more did you put in?

? Show me where four plus ten is on the 100-square. And where fourteen plus ten is.

If the child needs help to see that they must increase the cubes by ten you might find it helpful to get all the cubes out of the box and go through the addition again.

Repeat, writing $24 + 1 =$ on a sticky note and sticking it on the box.

Again, ask the child what has changed and how many cubes they need to add to the box.

Go on adding tens to the pattern: $34 + 1$, and so on. If the child grasps the idea of a pattern and can talk about what is happening, move on to another pattern.

If the child seems to have too little knowledge of adding tens, even using a 100-square, you might need to make a much easier pattern, just adding one each time, ending up with this pattern:

$$4 + 1 = 5$$

$$5 + 1 = 6$$

$6 + 1 = 7$, and so on.

Then you could move on to:

$$4 + 1$$

$$4 + 2$$

$4 + 3$, and so on.

‘Let’s record one of your patterns you made today. You choose one.’

You could let the child move the sticky notes or make a more permanent recording. You need to keep the recordings.

$$5 + 1 = 6$$

$$15 + 2 = 17$$

Spotlight 1

Does not readily use number patterns to support calculating, for example: $46 - 5 = 41$,
so $46 - 15 = 31$,
 $46 - 25 = 21$, etc.

6 Y2 +/–

Opportunity for: communicating mathematical ideas

Subtraction patterns

Time 10–20 minutes

Resources

- Wipe-clean 100-square
- Two colours of water-based pens
- Bead string
- Sticky notes

Key vocabulary

number pattern	plus
number sequence	one more
what comes next?	ten more
predict	increased by
subtract	decreased by
add	

Teaching activity

Start by showing the pattern recorded last time.

? Can you remember what we did last time? Remind me about it.

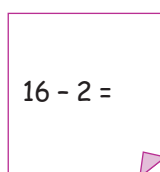
? Tell me about this pattern. How does this column of numbers change? (For example, *increases by one or ten each time.*)

‘Today we are going to make some subtraction patterns. Let’s start with: $6 - 2 =$ ’

Write this on a sticky note and display.

? Can you work that out? Now circle four on the 100-square.

? How is this calculation different?



Make sure the child can see that this starts with a number ten more than six.

? Circle the answer on the 100-square.

? What do you think I could write to keep the pattern going? ($26 - 2$)

? Circle the answer on the 100-square.

? Do you think you can predict the next calculation and the answer?

If the child can't predict, continue with the pattern, marking the answers on the 100-square, and prompt them to see the vertical pattern.

You might find it helpful to work out the calculations on a bead string, showing how each time the number starts with ten more, giving ten more in the answer.

? What could come next?

Help the child to talk about the vertical lines of numbers on the list of calculations, clarifying that the left-hand number goes up by ten each time, the two stays the same and the answer always ends in four. The tens in the answer go up one ten each time and make a vertical line on the 100-square.

$$\begin{array}{l} 6 - 2 = 4 \\ 16 - 2 = 14 \\ 26 - 2 = 24 \\ 36 - 2 = 34 \end{array}$$

Repeat with another pattern, such as:

$$\begin{array}{l} 63 - 3 \\ 63 - 13 \\ 63 - 23, \text{ and so on.} \end{array}$$

Or something much easier if the child is struggling, such as:

$$\begin{array}{l} 15 - 1 \\ 15 - 2 \\ 15 - 3, \text{ and so on.} \end{array}$$

Keep encouraging the child to predict what the next answer will be.

? If you knew that seventy-six subtract two was seventy-four, how could you use that to solve eighty-six subtract two or seventy-six subtract three?

? What did you enjoy today?

? Which mathematical pattern did you like?

$$\begin{array}{l} 76 - 2 = 74 \\ 86 - 2 = ? \\ 76 - 3 = ? \end{array}$$

Keep patterns for later work.

Spotlight 2

Does not readily use number patterns to support calculating, for example: $46 - 5 = 41$,
so $46 - 15 = 31$,
 $46 - 25 = 21$, etc.

6 Y2 +/–

Opportunity for: exploring mathematical ideas

Calculator patterns

Time 10–20 minutes

Resources

- Wipe-clean 100-square
- Water-based pens
- Calculators
- Number cards and symbol cards (Resource sheets 1, 2, 3 and 4)
- Place value (arrow) cards

Key vocabulary

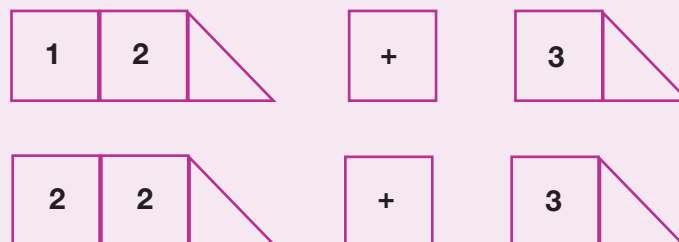
number pattern	plus
number sequence	one more
what comes next?	ten more
predict	increased by
subtract	decreased by
add	

Teaching activity

‘We’re going to make some more patterns today. Can you remember how a number pattern might start?’

Support the child to choose a number and either add or subtract another number.

If the child is finding making patterns hard to understand, you might want to use number cards or place value cards to make it clearer how the numbers change each time.



? Which tens place value card do we need next?

Clarify that the left-hand number is going up ten each time.

Circle the answers with a coloured pen on the 100-square.

If the child is still confused it might help if you write a series of calculations that do not form a pattern and ask the child why they think the calculations do not form a pattern.

Be led by the child’s response as they try to make a pattern.

You might find it helpful to use a calculator, both for motivational reasons and to give the child access to exploring patterns with larger numbers than they might otherwise use.

Ideally, work with a calculator that will operate a simple constant – most very basic calculators will do this. For example, key in:

9 6 – 1 0 =

and keep pressing the = key to get the pattern, 86, 76, 66, 56, and so on.

=

7 + 1 0 = and keep pressing the = to give 17, 27, 37, etc.

? What do you think you would get if you key in 7 + 1 1 ?

? Which number changes if you increase by ten?

? How do the units increase each time?

? Which pattern would you like to take back to class to try out on a friend to see whether they can spot the pattern?



‘Write the first three calculations in a pattern and see if your friend can predict the next pattern. Make your pattern as complicated as you want.’

Spotlight 3

Does not readily use number patterns to support calculating, for example: $46 - 5 = 41$,
so $46 - 15 = 31$,
 $46 - 25 = 21$, etc.

6 Y2 +/–

Opportunity for: reasoning and predicting

Guess my pattern

Time 10–20 minutes

Resources

- Calculator
- 100-square
- Cubes or bead string to support counting
- Place value (arrow) cards

Key vocabulary

number pattern	plus
number sequence	one more
what comes next?	ten more
predict	increased by
subtract	decreased by
add	

Teaching activity

‘Today I’m going to start a pattern so you can predict how to continue it, and you are going to make a pattern and I must predict how your one continues.’

Support the child in getting started, perhaps making a starting number with place value cards.



Note: You will need to judge the balance between making a pattern you are sure the child will be able to work out, and providing a challenge, perhaps with a pattern in a different format, for example, where some of the numbers are missing.

$$\begin{array}{rcl} 3 & + & \square = 14 \\ \square & + & \square = 25 \\ 25 & + & 11 = 36 \end{array}$$

? What comes next?

An easier one would be: $46 - 5$
 $46 - 15$
 $46 - 25$

Help the child to explain your pattern using the key vocabulary above. Look at the child’s pattern to see if you can predict what comes next and make a suggestion for their comment.

If the child’s pattern indicates they need more help to make up a pattern, return to lower numbers and the place value cards, and make sure the child can tell you how a number is changing as you work vertically down the pattern.



‘Make a number pattern that goes beyond one hundred.’

Spotlight 4

Does not readily use number patterns to support calculating, for example: $46 - 5 = 41$,
so $46 - 15 = 31$,
 $46 - 25 = 21$, etc.

Opportunity for: solving problems

If you know...

Time 10–20 minutes

Resources

- Patterns from other Spotlights
- At least two 100-squares (so you can go beyond 100)
- Water-based felt-tip pens

Key vocabulary

number pattern	plus
number sequence	one more
what comes next?	ten more
predict	increased by
subtract	decreased by
add	

Teaching activity

‘Today we will be using our patterns to help us with calculating.’

Look at an earlier pattern and choose one that has fairly large numbers. Cover the lower part of the pattern and ask the child to read out the pattern as far as they can see, for example:

$$56 + 15 = 71$$

$$56 + 25 = 81$$

? Can you predict what the answer is to $56 + 35$?

Reveal the answer and then repeat with another pattern.

? Can you see how patterns can help you with working out calculations?

The child might need a much easier pattern, such as: $1 + 9 = 10$

$$11 + 9 = 20$$

$$21 + 9 = 30$$

Talk through what is happening to the numbers vertically and look at the answers on a 100-square. Try to challenge the child to go beyond 100.

This is a challenging example:

? If you know $65 - 9$ is 56 and $56 - 9$ is 47, what is $47 - 9$?

Record the numbers carefully in a vertical format that shows the increases and decreases clearly.

? What happens to the tens in the left-hand column of numbers?

? What happens to the units in the left-hand column of numbers and in the answers?

? What did you learn today?

- ? Could you make a pattern for a friend to predict what comes next?
- ? How do you think number patterns can help you to get more calculations correct more quickly?

Spotlight 5: a learning check

Does not readily use number patterns to support calculating, for example: $46 - 5 = 41$,
so $46 - 15 = 31$,
 $46 - 25 = 21$, etc.

Opportunity for: explaining and discussing

.....

Down the ladder

Time 5–15 minutes

Resources

- Ladders (Resource sheet 12)
- Blank spinners (Resource sheet 13)
- Number cards 0–9 (Resource sheet 1)
- Pencil and paper clip
- Two 100-squares (one numbered from 101–200)
- Bead string
- Pair of children cooperating

Check: does the child use key vocabulary?

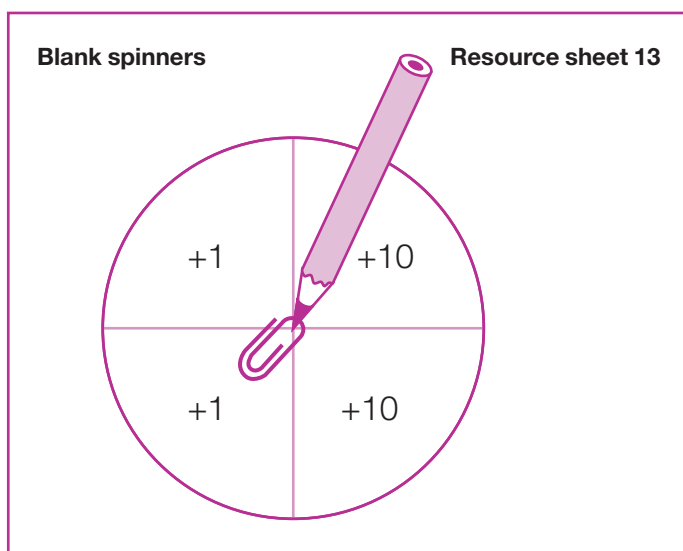
number pattern	plus
number sequence	one more
what comes next?	ten more
predict	increased by
subtract	decreased by
add	

Teaching activity

‘This game, **Down the ladder**, will help you with making patterns.’

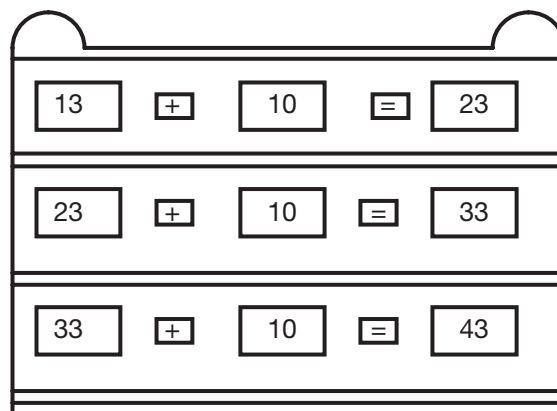
Copy the round spinner onto card, cutting along the horizontal line and leaving plenty of card for the child to hold on to. Write + 1, + 1, + 10 and + 10 on the spinner (or to suit your children).

The spinner works by a child trapping a paper clip in the centre of the spinner with a pencil point, and with the other hand they flick the paper clip round.



How to play

1. A pair of children make a two-digit number with the number cards, for example 13. They write that number in the first box at the top left hand of the ladder.
2. They spin the spinner to see what they must do with their number, for example + 10.
3. They add ten each time to the number going as far down the ladder as they can.



Variations

- You can make the game into a race by having two pairs of competing children. (Get the first line of each of their ladders completed before you start the race. This gives you time to support where this is needed.)

The first pair to get to the end of the ladder, or a previously decided finishing point (such as first pair to get a number beyond a hundred), wins.

- Change the numbers on the spinner, or use the hexagonal spinner perhaps with + 5, + 15, + 25, + 35, + 45, + 55, or some numbers to subtract.

? If we use numbers to subtract, what might we need to do for a starting number? (*Make it reasonably large.*)

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;
- predict a simple number pattern;
- make their own number pattern;
- understand that number patterns can help in calculating.

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;
- understand the structure of our Base 10 number system;
- understand how the magnitude of the digits changes depending on where the digit is placed;
- understand the role of zero as a place holder;
- understand and use columns, reading numbers appropriately;
- order and round amounts of money;
- add and subtract with money amounts;
- start to make estimates.

Has insecure understanding of the structure of the number system, resulting in addition and subtraction errors and difficulty with estimating

Opportunity for: developing mental images

Resources

- Two sets of number cards 0–9 (Resource sheet 1)
- 100-square
- Place value (arrow) cards
- Long number line (or masking tape)
- Sticky notes
- Bundles of straws or other Base 10 equipment
- 1p coins for counting

Key vocabulary

digit	column	order
larger/largest	estimate	
smaller/smallest	guess	
more than	nearer/nearest	
less than	before	
units	after	
ones/tens/hundreds/ thousands	rounding to the nearest ten/hundred	

Teaching activity

Time 15–20 minutes

‘We are going to be working with numbers today, deciding which numbers are larger or smaller, and we are going to order them on a long number line. This work will help you with estimating and with getting more calculations correct.’

Lay out the two sets of number cards 0–9 on the table.

? Can you make the numbers forty-three and thirty-four?

Support the child to make:

4	3	3	4
---	---	---	---

? Which is the larger number, forty-three or thirty-four?

If the child knows which is larger, move on.

If the child doesn't know which is larger, you could count with the child up to 100 on a 100-square, pointing out the thirties and the forties.

Then change the numbers to 40 and 30.

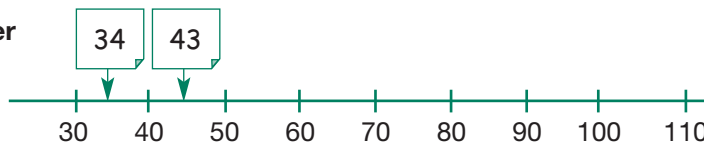
Count in tens with the child on the 100-square, establishing that if you had forty sweets, you would have more than thirty sweets because forty is more than thirty.

Then you will need to make some more two-digit numbers and repeat the activity before you move on.

Note: If the child seems to have problems crossing boundaries, see 1 Y2 +/- . If the child seems unsure of numbers, you might want to check that the child can count a large pile of coins so that you can assess their counting skills (see also 1 YR +/-).

Display a long number line, say up to four hundred. (You could stick masking tape on the floor or wall and write the numbers along it. You will need to use the number line throughout this set of activities.) Ask the child to position the numbers on the line with sticky notes or paper.

? Does thirty-four come before or after forty? So is thirty-four smaller or larger than forty? (And so on.)



If the child is struggling with this, position quite a few numbers, checking that they know how to write numbers such as fifty-seven and can distinguish this from seventy-five.

If the child seems not to understand, use the 100-square and/or place value cards to clarify tens and ones, positioning more numbers on the number line and making the link to a number line to thirty that the child is familiar with in class.

Make some of the numbers with Base 10 equipment such as bundles of straws, ten rods, or other familiar Base 10 equipment.

? How could you make forty-three with these straws?

If the child can do that confidently and name the number accurately, move on.

If the child is having problems with models of the structure of the number system, you do need to move on to assess their understanding of three-digit numbers and return to this in Spotlight 3.

With number cards, make two three-digit numbers.



? What are these numbers?

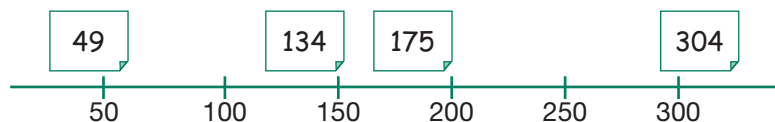
? Which is larger?

If the child is unclear, again use two zero cards to make one hundred and forty and one hundred and thirty.

Count in tens with the child from zero to one hundred and forty and back again, establishing that one hundred and thirty is smaller than one hundred and forty.

Position some three-digit numbers on the number line.

If the child is successful with this, move on to some early work on estimating, using a number line marked as an image to support the child's understanding.



? Is forty-nine closer to fifty or closer to one hundred?

? If you doubled forty-nine, would your answer be closer to fifty or closer to one hundred?

? Is one hundred and thirty-four closer to one hundred or closer to two hundred?

? What did you learn today that was new for you?

Note: Estimating is a theme through the Year 4 and Year 6 activities.

Spotlight 1

Has insecure understanding of the structure of the number system, resulting in addition and subtraction errors and difficulty with estimating

Opportunity for: making decisions

1
Y4
+/-

Your number, my number

Time 15–20 minutes

Resources

- Number line
- Three sets of digit cards (Resource sheet 1)
- Place value (arrow) cards

Key vocabulary

digit	ones/tens/hundreds/	order
larger/largest	thousands	before
smaller/smallest	column	after
more than	estimate	rounding to the nearest
less than	guess	ten/hundred
units	nearer/nearest	

Teaching activity

‘We’re going to play a game today with these digit cards, but first I want you to tell me what we did last time with this long number line.’

Follow on from what the child says, going over naming numbers on the number line and their order, including naming numbers in the three hundreds.

Then move on to the game with three-digit numbers, making these two three-digit numbers.

Your number

3		7
---	--	---

My number

3	6	7
---	---	---

Give the child a set of digit cards 0–9 and explain the game. Their number has a turned over card in the middle; your number is complete.

? What is my number?

? If you put the number nine on your turned-over card, what number will you make? (*Three hundred and ninety-seven*)

? Is that number larger or smaller than my number? (*Larger.*)

If the child needs more support, let them try different digit cards in the middle of their number, naming them and ordering them on the number line.

It might also help to make the numbers with place value cards, emphasising how many hundreds, tens and ones.

If you can, help them to see which of their numbers are smaller than yours and which are larger. Then mark your number on the number line and play the game.

To play the game, ask the child to follow each of these rules in order to make a new number:

? Make your number bigger than my number. (*For example, three hundred and eighty-seven.*)

- ? **Make your number smaller than my number.** *(For example, three hundred and twenty-seven.)*
- ? **Make your number the biggest it can be.** *(Three hundred and ninety-seven – not allowing the seven units to be changed.)*
- ? **Make your number the smallest it can be.** *(Three hundred and seven)*
- ? **Make your number as close to mine as you can.** *(It could be the same.)*
- ? **Which other card could you have chosen to make your number close to mine?** *(For example, three hundred and fifty-seven.)*

Record on a number line some of the numbers they make in response to the prompts and ask some estimating and rounding questions.

- ? **Is three hundred and eleven closer to three hundred or closer to four hundred?**
- ? **Which hundred is three hundred and eighty-nine closer to, three hundred or four hundred?**
- ? **If you had to estimate what three hundred and eleven and three hundred and twelve made altogether, would your estimate be six hundred or seven hundred?**

‘You are getting good at ordering numbers on the number line and deciding which hundred the numbers are close to.’

Note: Developing children’s estimation skills plays an important role in improving calculation skills.

Spotlight 2

Has insecure understanding of the structure of the number system, resulting in addition and subtraction errors and difficulty with estimating

Opportunity for: reasoning about numbers

1
Y
4
+
/
-

Place value on the calculator

Time 10–15 minutes

Resources

- Calculator each
- Large book or other screen
- Number line

Key vocabulary

digit	ones/tens/hundreds/	order
larger/largest	thousands	before
smaller/smallest	column	after
more than	estimate	rounding to the nearest
less than	guess	ten/hundred
units	nearer/nearest	

Teaching activity

‘Today we are going to do some more work on place value and where numbers go on the number line. We will particularly be thinking about any zeros that we see. So if you see a zero, tell me and I will record the number for later.’

? Can you see any numbers with zeros on the number line?

Follow what the child says, giving experience of reading numbers such as three hundred and six.

Prop up the large book so that you can enter numbers secretly.

? Now I want you to key in three hundred and forty-two into your calculator and I will do the same on mine. Does yours look the same as mine?

342

Then you add a one-digit number, such as 3, and show the child your calculator.

? What do you think I did to three hundred and forty-two to get to that number?

If the child isn't sure you will need to do some further adding and subtracting of one-digit numbers.

? Can you make your number the same as mine in one move? (Meaning an operation key, a number and the equals key.)

? What did you do to make your number the same as mine?

345

Repeat until the child understands how to add and subtract single-digit numbers.

Record any numbers you use that have a zero in them.

Then subtract all the tens from the number secretly.

305

Show the child your screen.

? What subtraction will take away the four? (Signal to the child that you have a number with a zero in and record that for later use.)

Many children at this point will subtract four, not realising they need to subtract forty.

If the child consistently subtracts one-digit numbers instead of tens and hundreds, make the number with place value cards, showing how many tens and hundreds.

Remember to name numbers with zeros in full.

Continue with subtracting the three hundred, then repeat with other numbers.

Make a collection of numbers with zeros in, recording them for next time.

Calculators can help enormously when exploring place value. If the child has struggled with this task, give them more calculator time during class when you can set small tasks, such as adding three hundred and one and three hundred and one.



'Enter nineteen thousand, four hundred and eighty-five into your calculator.'

19 485

? In one move, change it to eleven thousand, four hundred and eighty-five.

? What did you need to subtract?

Spotlight 3

Has insecure understanding of the structure of the number system, resulting in addition and subtraction errors and difficulty with estimating

Opportunity for: making connections

1
Y
4
+
/-

Hunt the zeros

Time 15–20 minutes

Resources

- Record of numbers with zeros from Spotlight 2
- Number line from earlier
- Large paper or whiteboard that you can keep for a while, prepared with some column names
- Place value (arrow) cards
- Money, including notes
- Bundles of straws and any other Base 10 equipment
- Number cards 0–9 (Resource sheet 1)

Key vocabulary

digit	estimate
larger/largest	guess
smaller/smallest	nearer/nearest
more than	order
less than	before
units	after
ones/tens/hundreds/	rounding to the nearest
thousands	ten/hundred
column	

Teaching activity

‘We’re going to find out where to put these zero numbers on the number line and on a big chart.’

Start to position and name the numbers with zeros, for example one hundred and two.

? Where will we put this number on the number line?

If the child has had problems naming and ordering numbers, go over some of the numbers already on the number line and add some more, checking that they can name them and position them.

On the whiteboard or large paper start to draw Base 10 place value columns, naming them. Place the chart horizontally so that the child can put items onto it.

Now, or at a later time in the lesson, choose a digit card, such as 3, and show how the magnitude of the numbers changes depending on where you put the 3. So, if you put it in the tens column it means three tens, thirty. If you put it in the units column, it means three units. Where you put it changes the value of the digit.

Talk through some of the equipment you have and ask the child which column these items might go in.

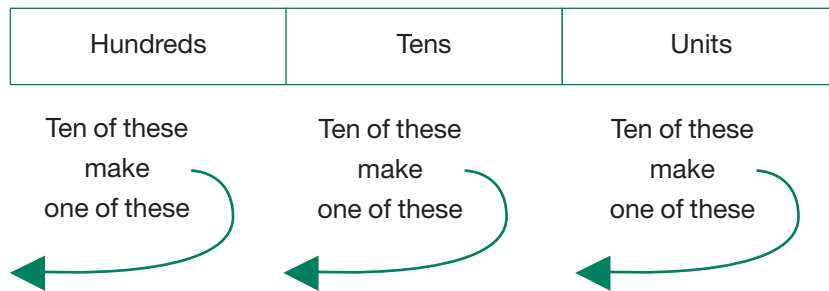
Hundreds of thousands	Tens of thousands	Thousands	Hundreds	Tens	Units (ones)
		1 0 0 0			

? Where shall we put the 1p coin? (The column on the right that is ones or units.)

? Where shall we put a 10p coin?

? What is ten times bigger than 10p? (One pound, one hundred pennies, and it goes in the hundreds column.)

You need to explain that each column just to the left of another column holds numbers ten times larger, that is:



Now ask the child to place some items onto the chart. So, for example:

- a bundle of ten straws goes in the tens column;
- a £10 note is a thousand pennies so it goes in the thousands column;
- a Base 10 equipment 'block' goes in the thousands column.

Put place value cards in appropriate columns, focusing particularly on the zeros.

You might find you need to repeat this session a few times with some children. You might find it helpful to put some number cards onto the columns to read numbers. For example, the digit nine in the tens column would mean ninety and we place a zero in the ones column as a place holder.

Explore some of the numbers on place value cards.

1	0	0	
---	---	---	--

? Tell me what each of the digits in this number is worth?

? Why do you think there are zeros? (To 'hold' the place in those two columns that are empty.)

Clarify that if one hundred didn't have the zeros, we would write '1', but we would call that 'one'!

10 means one ten and no ones.

100 means one hundred, no tens, no ones.

Return to naming the numbers with zeros.

? What did you learn today?

Note: You might want to take the place value columns and equipment back to class because some higher achievers don't always make connections to the structure of the number system, despite being able to calculate reasonably well.



? My number has six zeros and one digit 3. What could my number be? (This is likely to raise the issue of how appropriate a number such as 0000003 is.)

Spotlight 4

Has insecure understanding of the structure of the number system, resulting in addition and subtraction errors and difficulty with estimating

Opportunity for: solving real-life problems

1
Y
4
+
/-

Ordering money

Time 15–20 minutes

Resources

- Number cards 0–9
(Resource sheet 1)
- Money
- Number line
- Place value (arrow) cards
- Sticky notes

Key vocabulary

digit	ones/tens/hundreds	order
larger/largest	/thousands	before
smaller/smallest	column	after
more than	estimate	rounding to the nearest
less than	guess	ten/hundred
units	nearer/nearest	

Teaching activity

‘This lesson is about money amounts and which amounts are more or less than other amounts. We will be doing some estimating as well.’

? Which is more, 46p or 64p?

If the child is unsure about this you will need to make more two-digit amounts of money and order them on a number line.

With the sets of digit cards, select some 3s, 4s and zeros and work with the child to make some amounts of money, for example: 34p 43p 430p 403p 304p

You might find that place value cards help with this. You could write the amounts on sticky notes so that you can order them, or write the amounts straight onto the number line, for example:



? Now you mark in about where 100, 200, 300 and 400 go. Is 400 more or less than 403?

? What amount of money could I put between 304p and 403p? (For example, 320p.)

? What is that amount of money (for example, 403p) to the nearest pound/nearest hundred pennies?

? Would you round 403p to 400p, or is it nearer to 500p?

? What is 34p rounded to the nearest 10p?

Repeat with several rounding and ordering questions.

? If you added 43p and another 43p, would you have nearly £1 or nearly £2?

? What number would you add to 49p to make 100p?



? **How much would you add to 347p to make 367p?**

Ask more addition and subtraction questions.

? **What do you think you did well today?**

Spotlight 5: a learning check

Has insecure understanding of the structure of the number system, resulting in addition and subtraction errors and difficulty with estimating

Opportunity for: explaining and discussing

.....

Calculator zapping

Time 5–15 minutes

Resources

- Calculator each
- At least two children, or the whole class

Check: does the child use key vocabulary?

digit	ones/tens/hundreds	order
larger/largest	/thousands	before
smaller/smallest	column	after
more than	estimate	rounding to the nearest
less than	guess	ten/hundred
units	nearer/nearest	

Teaching activity

‘This game, **Calculator zapping**, will help you with understanding place value, and that will improve your estimating and your calculating.’

Each child needs a calculator.

How to play

1. Tell the children which number to key in, for example, ‘four hundred and fifty-nine’:

459

(Make sure everyone has it entered correctly.)

2. Now give an instruction to ‘zap’ a digit in one move. (One move is one operations key, one number and the equals key. See Spotlight 2.)

For example, if you wanted to zap the five in 459 you have to enter – 50 (not – 5).

So ask the children:

? How could you get rid of the five in one move with one subtraction?

Many children at this point will key in

–

5

, so you need to clarify why that doesn’t work.

3. Repeat with different numbers.

Variations

- Children can choose their own three-digit numbers and use the rule that they must zap the digits in descending order. So in the number 456, they must get rid of the 6 first.
- Zap digits in ascending order.
- Children play in pairs, one child challenging another. Let them explore large numbers!



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.

continued from previous page

? 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:

$$230 + 16 = 246$$

$$220 + 26 = 246$$

$$\text{Stop at } 200 + 46 = 246$$

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.

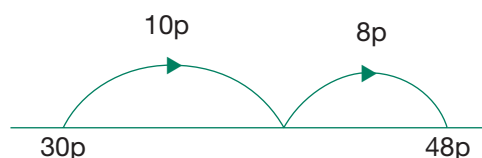
Place in a pile a number of 10p coins that total less than 40p, for example three 10p coins.

? 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

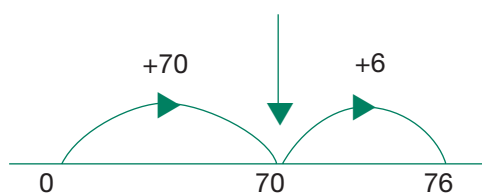
? Can you remember what partitioning means?

? 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.

$$\begin{aligned} 70 + 6 &= 76 \\ 60 + 16 &= 76 \\ 50 + 26 &= 76 \end{aligned}$$

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.



and



and



and



and



‘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.

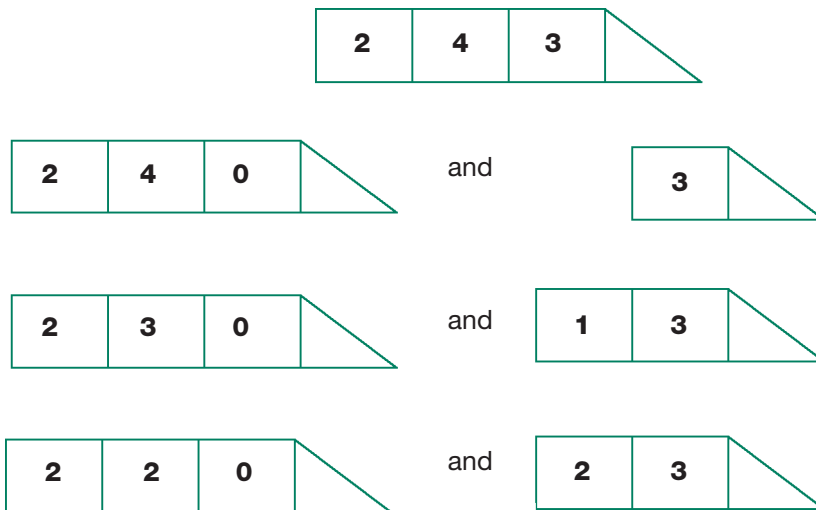
Ask the child to identify a number between two hundred and forty and two hundred and fifty. Record this on the whiteboard, for example two hundred and forty-three.

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

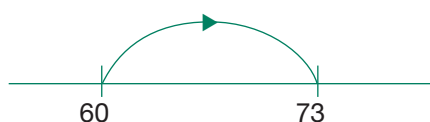
partition	plus	jumps
split it into	add	hundreds
complement	subtract	tens
total	represent	
how many	same as	

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:



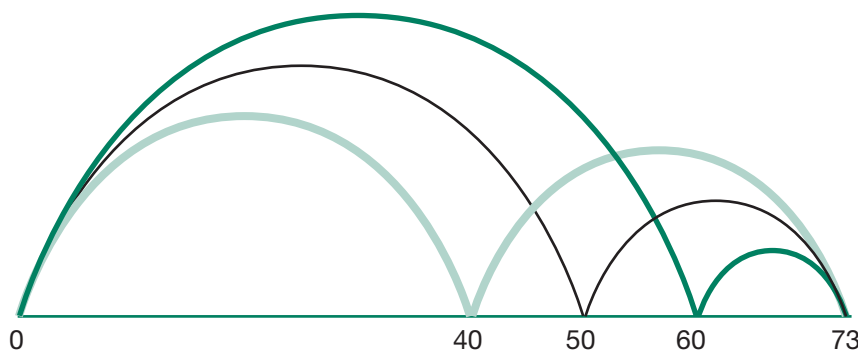
Say that this shows a jump from sixty to seventy-three.

? 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 $73 = 50 + 23$.

$$\begin{aligned}73 &= 60 + 13 \\73 &= 50 + 23 \\73 &= 40 + 33\end{aligned}$$

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.

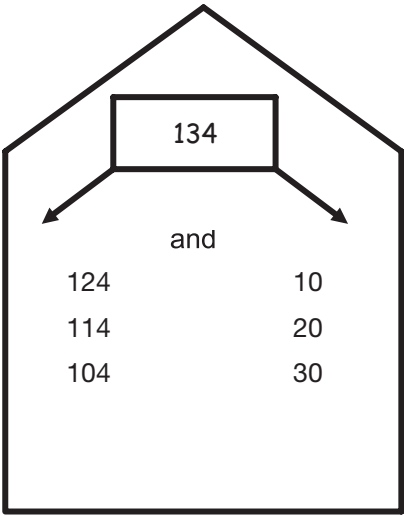
Variations

- 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.



Does not make sensible decisions about when to use calculations laid out in columns

Opportunity for: making decisions

Resources

- *Methods* (Resource sheet 15)
- *Calculations* (Resource sheet 16)
- Number line marked in tens to 100
- Sheets of coloured paper

Key vocabulary

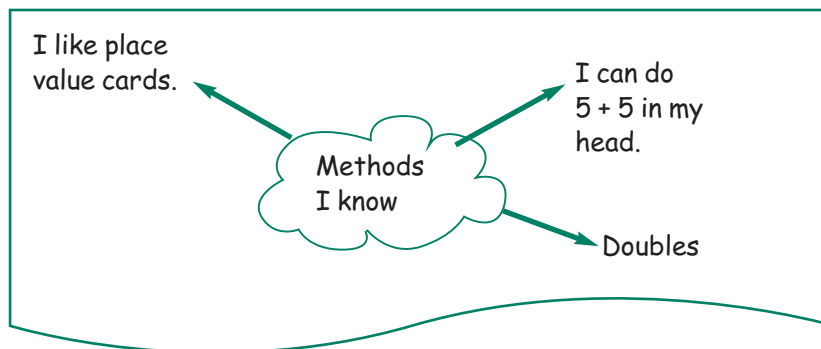
estimate	pattern	minus
calculate	add	difference between
check	plus	count up
mental method	subtract	count back
rounding	take away	columns

Teaching activity

Time 15–20 minutes

‘We are going to start some work looking at different methods that we can use to do calculations. Let’s start by making a concept map.’

? What do you know about using different methods to work out calculations?



Prompt the child with suggestions, for example:

? Can you sometimes work out calculations in your head? When can you?

? Do you sometimes use a number line? How do you use it?

? When do you like to use a calculator?

If the child is finding it hard to think of any different methods they use, you will need to give them some examples.

? How would you add 4 and 4? ...7 and 8? ...14 and 15? (They might use doubles.)

? What about adding 43 and 7?

? What about 5 and 5? (Are there some calculations they just know?)

? What would you do to work out 5 plus 49? (Watch out for children not putting the larger number first.)

? If you know that 25 add 9 is 34, what else do you know? (For example, that 34 subtract 9 is 25.)

Cut out the possible methods from *Methods* (Resource sheet 15) and lay them out on one side of the table. Help the child to choose three or four of the methods that they know they use, for example ‘changing the order of the numbers to make it easier’. Put each of their chosen methods on a piece of coloured paper.

On the other side of the table, lay out some or all of the calculations from *Calculations* (Resource sheet 16) and support the child in sorting some of these calculations onto the paper with an appropriate method for them.

? Which of these calculations can you do in your head?

Know by heart $6 + 4$	Find a small difference by counting back $101 - 3$
--	---

Encourage the child to do as many calculations as they can with a mental method, putting those calculations next to the method they used.

Note that some of the calculations relate to others – they are on the resource sheet in patterns.

? Can you find another calculation that looks a bit similar to this one?

For example, $101 - 1$ can be worked out by counting back. So can $101 - 2$ and $101 - 3$.

If the child is finding this hard, just focus on similar calculations, putting them in groups, and on calculations such as $17 + 3$ that the child may know by heart.

**? Are there any calculations here that you would want to write down to work them out?
Choose one to do.**

Observe and note carefully what the child does. They may have a preference for columns or for number lines, or some method of their own, or want equipment.

Note: Observing and analysing a child’s own method, or a half-remembered taught method, can highlight their problems and misconceptions, and also give you some basis for moving the child on.

? Tell me how you worked that out.

? Could you have done it another way?

? What shall we add to your concept map? (*For example, you could write up some of the mental methods that the child used.*)

Keep the concept map.

You might need to repeat this session if you feel the child needs more work to clarify their mental methods.

Spotlight 1

Does not make sensible decisions about when to use calculations laid out in columns

Opportunity for: developing mathematical ideas

3 Y4 +/–

Estimate first

Time 15–20 minutes

Resources

- Concept map from Spotlight 1
- *Calculations for estimating* (Resource sheet 17)
- Number line 0–700 marked in hundreds

Key vocabulary

estimate	pattern	minus
calculate	add	difference between
check	plus	count up
mental method	subtract	count back
rounding	take away	columns

Teaching activity

‘Let’s look at your concept map showing different methods that we can use for working out calculations. Today we are particularly going to look at making estimates before you calculate.’

Put the number line 0–700 on the desk or floor and count along it with the child. Put out some or all of the calculations from *Calculations for estimating* (Resource sheet 17).

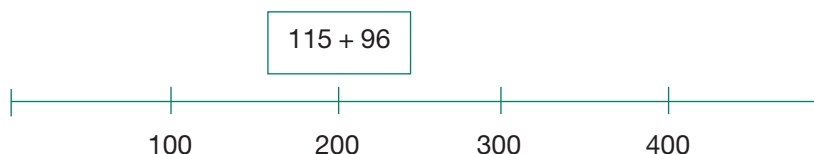
? Can you see a calculation where you think you know roughly what the answer is?

‘This is called making an estimate.’

Let the child choose some calculations and estimate their answers to the nearest hundred. For example:

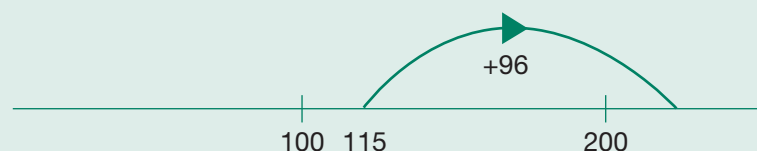
? Can you estimate one hundred and fifteen add ninety-six to the nearest hundred? ($115 + 96$ is about 200.)

‘So an estimate of one hundred and fifteen add ninety-six is about two hundred.’



? How did you work that out?

If the child can’t explain, you could provide support using a number line.



Place as many of the calculations from *Calculations for estimating* (Resource sheet 17) as you have time for onto the 0–700 number line, supporting the child to work some of them out.

? Are there any calculations that you find hard to do in your head, so you would want to write them down?

Examples might be:

$321 + 178$ (makes about 500) and $135 + 153$ (makes about 300).

? How would you work them out with paper and pencil?

Observe and note carefully what the child does. They might have a preference for columns or number lines or their own method. Keep encouraging them to show you what they can do, even if they make errors – it can be best not to correct those errors just yet, in order to see if the child can follow through their chosen written method.

? What shall we add to your concept map?

Depending on how the child responds, you might want to come back to this activity again.

Spotlight 2

Does not make sensible decisions about when to use calculations laid out in columns

Opportunity for: finding patterns

3 Y4 +/−

Finding patterns

Time 15–20 minutes

Resources

- *Harder calculations* (Resource sheet 18)
- *Methods* (Resource sheet 15)

Key vocabulary

estimate	pattern	minus
calculate	add	difference between
check	plus	count up
mental method	subtract	count back
rounding	take away	columns

Teaching activity

‘Today we are going to look at some more calculations and at how you can do them by finding patterns and by estimating, but first I’m going to ask you a question.’

? Would you need to write down either of these to work them out?

$231 + 10$ or $251 + 579$

? Why?

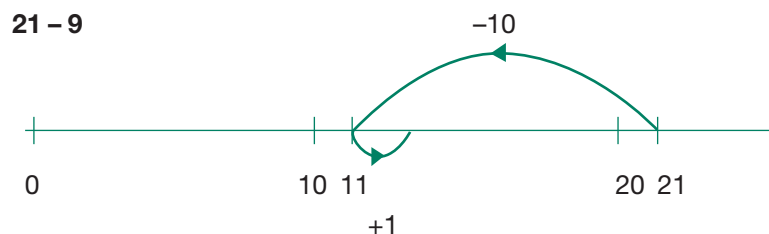
Guide the child towards the idea that the first one is easier and can be done mentally.

Spread out some or all of the calculations from *Harder calculations* (Resource sheet 18) on the table, plus some or all of the methods from *Methods* (Resource sheet 15).

Note: Some children might choose methods which are not on the resource sheet.

? Can you find some calculations that go together because you might work them out in a similar way?

Support the child with choosing some calculations that could be worked out using methods which the child has demonstrated they use. For example, twenty-one subtract nine, which could be worked out by subtracting ten on a number line then hopping on one step.



$$21 - 10 = 11$$

$$11 + 1 = 12$$

$$\text{so } 21 - 9 = 12$$

Put the calculations in related groups and discuss the methods that could be used to work them out.



Then choose some calculations to **estimate, calculate and check**.

If the child is struggling with this, you might need to focus on just one of the patterns, then estimate those and work them out.

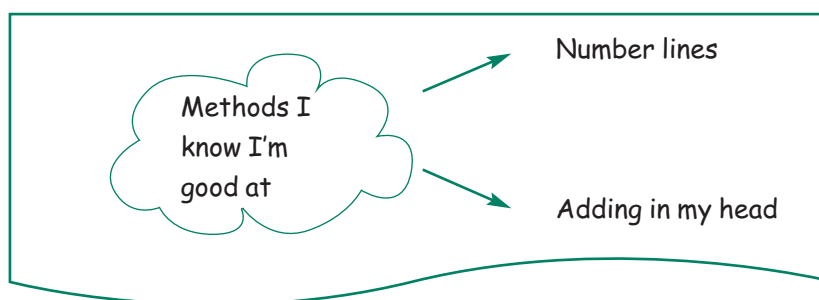
Note: Don't assume that a lower-achieving child is not capable of using a range of mental methods!

? Would you do any of these calculations by putting the numbers in columns because they are hard to work out mentally?

? Can you estimate it first, write it down and work it out?

Again, observe and make notes.

? Which mental methods do you think you are good at? You could write those on your concept map.



Spotlight 3

Does not make sensible decisions about when to use calculations laid out in columns

Opportunity for: trying different strategies

3 Y4 +/–

In my head?

Time 15–20 minutes

Resources

- *Estimate, calculate, check* (Resource sheet 19)

Key vocabulary

estimate	pattern	minus
calculate	add	difference between
check	plus	count up
mental method	subtract	count back
rounding	take away	columns

Teaching activity

For this activity you will need to look back in your notes to find and write down some calculations which the child could do in their head, and some that would be just a bit too hard for that. (Take care with examples that cross boundaries.)

You could use: $57 + 63$
 $172 + 28$
 $120 - 38$

but use ones to suit the child.

Sort the calculations into ones that the child can do in their head and ones they can't.

? Now choose one calculation you can't do mentally and we will work it out by estimating, calculating and then checking.

Using *Estimate, calculate, check* (Resource sheet 19), write the calculation in the top box. You might want to share the recording of this with the child. Remind the child to estimate first.

? Can you make an estimate?

? Which way will you work it out?

? Can you do it another way? That often helps us.

? Now can you check it?

? Were you near your estimate?

What shall we write down that was important today?



Always estimate
 Try two methods
 Always check

Try a calculation such as five hundred and sixty-three subtract two hundred and seventy-eight, using the following process:

Always estimate.
 Try two methods.
 Always check.

Spotlight 4

Does not make sensible decisions about when to use calculations laid out in columns

Opportunity for: solving real-life problems

At the café

Time 15–20 minutes

Resources

- Café (Resource sheet 20)
- Money
- Empty number line
- 100-square

Key vocabulary

estimate	pattern	minus
calculate	add	difference between
check	plus	count up
mental method	subtract	count back
rounding	take away	columns

Teaching activity

‘Today we are going to look at a café menu and learn more about calculating with money.’

Show the child the café menu (Resource sheet 20) and point to an item.

? How much does that cost?

? **What amount of money is that close to?** (*All the prices end in nine, so all can be rounded to the nearest 10p or pound.*)

If the child cannot round these amounts of money, you might find that it helps to make a money number line and also to count out in money, for example, 99p to see how close it is to 100p. You could use a 100-square to support this.

If the child seems to need considerable help with money, make a note of this but move on.

Let the child choose some food and drink.

Record the bill vertically.

? How shall we add up how much we have to pay?

Let the child spend some time looking at the amounts and suggesting a method, such as getting out the money then adding it up.

Remember to get the child to make an estimate!

? Have we spent as much as £1? ... £2? ... more?

If the child has a method of calculating, you could show them that one way to check is to round up the amounts.

£1.99	is almost	£2
£2.99	is almost	£3
59p	is almost	<u>60p</u>
Total	is about	£5.60

? Tell me something useful about working with money that you have learned.



‘Buy six things from the café menu and work out the change from £20.’

Spotlight 5: a learning check

Does not make sensible decisions about when to use calculations laid out in columns

Opportunity for: explaining and discussing

3 Y4 +/–

Doing odd jobs

Time 10–20 minutes

Resources

- Blank loop track (Resource sheet 21)
- Café (Resource sheet 20)
- Money
- Rewards
- At least two children

Check: does the child use key vocabulary?

estimate	pattern	minus	cost
calculate	add	difference between	change
check	plus	count up	almost
mental method	subtract	count back	
rounding	take away	columns	

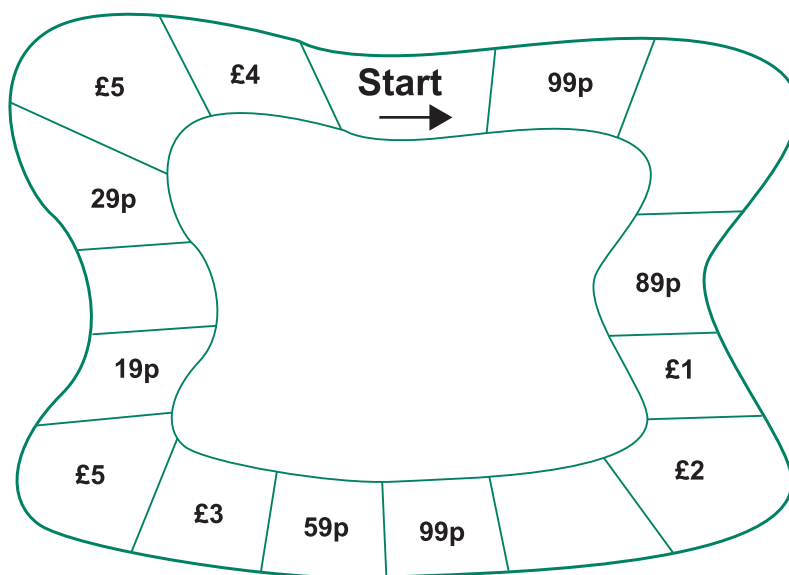
Teaching activity

‘This game, **Doing odd jobs**, will help you with estimating and calculating with money.’

This game can be played with pairs cooperating, or as a race.

Set the scene: the players are helping lots of people by cleaning windows or doing gardening, for which they get paid.

Prepare the *Blank loop track* (Resource sheet 21) by putting money amounts into some of the spaces.



How to play

1. The players throw a dice to see how many spaces to move around the track. They then write down the amounts of money they land on, and keep a running total.
2. The pairs should work together to add up their amounts of money.
3. When everyone has been once round the track, they check their total.



Estimate
Calculate
Check

(Keep this as a really short game, or supervise carefully so that children are rounding up to the nearest 10p or £1, otherwise the amounts get huge.)

4. If the pair get their amount right, they win a reward.

Variations

- Instead of using the track game, give each pair an amount of money, such as £5, and use *Café* (Resource sheet 20). The players then work together to choose a meal from the café menu. They write their bill and work out how much they need to pay and how much change they will get. If they are right, they win a reward.
- Let children make their own shopping game on the blank loop track.

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;
- make sensible decisions about when to use a mental method and when to use a written method;
- recognise their own strengths with the mental methods they use;
- estimate a calculation;
- work out a calculation using a range of mental and written methods;
- check a calculation, comparing it with their estimate;
- add up amounts of money using a vertical list and rounding to the nearest 10p or £1.

Notes:

Notes:



Has difficulty with adding three numbers in a column, except by adding the first two and then the last one

Opportunity for: developing mental images

Resources

- Place value (arrow) cards
- Several cards with + signs (Resource sheet 8)
- Individual whiteboards
- Standard 1–6 dice
- Dice marked 1, 1, 2, 2, 3, 3 (or use hexagonal spinner on Resource sheet 13)

Key vocabulary

add	partition
plus	combine
column	most significant digit first
tens	estimate
ones	calculate
units	check
how many altogether?	

Teaching activity

Time 15–20 minutes

‘Today we are going to do an activity that will help you when you need to add more than two numbers together, where the numbers might be a bit hard to work out in your head. We’re going to write these additions in columns, like this...’

Show the child one example:

$$\begin{array}{r} 23 \\ + 34 \\ \hline 32 \end{array}$$

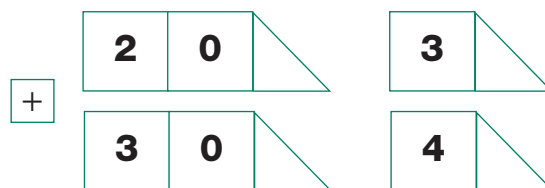
Give the child a set of place value cards.

? Now make thirty-four and twenty-three.

? Tell me how you would add these two numbers together.

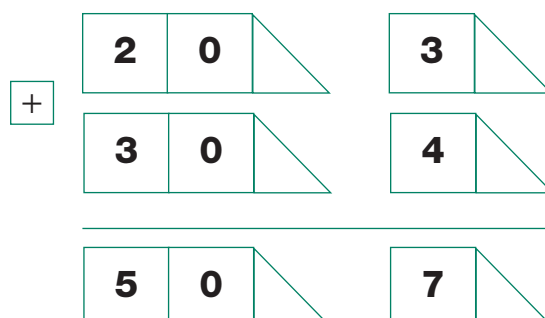
If the child cannot explain, prompt them to partition and recombine using place value cards.

Organise the two-digit numbers shown on the arrow cards and the addition sign cards into a vertical format:



? How can you add the two numbers together now?

Ask the child to put place value cards representing their answer below the cards already on the table in vertical format.



Recombine the 50 and the 7 to show 57 as:



Show $23 + 34 + 32$ using place value cards and addition sign cards:



? How did you find this total using column addition?

Encourage the child to show their total using place value cards, talking through the process of partitioning each number into a multiple of ten and a units part, totalling the tens and units parts and recombining.

? Could you have done that in your head?

? What would you estimate the answer to be? So do you think your answer is right?

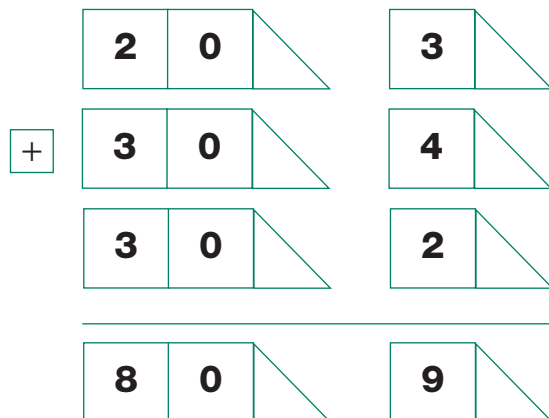


Encourage the child to estimate first, then calculate, then check.

If the child does not demonstrate understanding of adding all the tens parts and all the units parts, repeat with further examples of addition of three two-digit numbers, horizontally.

Remind the child that addition can be written in a vertical format, which can be more efficient.

Take the same three numbers, 23, 34 and 32, and arrange them, using place value cards and addition signs, in an expanded format, sliding them into position from the horizontal layout:



Recombine the 80 and 9 to show 89 as:



Demonstrate the recording of this as:

$$\begin{array}{r}
 20 + 3 \\
 + 30 + 4 \\
 \hline
 30 + 2 \\
 80 + 9 \\
 \hline
 89
 \end{array}$$

Question the child about the match to the written recording of each part of the card layout.

Using the dice (or spinner) marked with 1, 1, 2, 2, 3, 3, ask the child to generate three two-digit numbers, and make each number using place value cards.

? How would the column addition for your three numbers look using place value cards?

Ensure that the child displays the addition in a vertical format, as above (if necessary, moving the cards from the horizontal to the vertical format to show the connection).

? Show how you can write this calculation on your whiteboard.

? Read your calculation to me.

If the child has difficulty recording on their whiteboard, demonstrate with the current example and then repeat with the child generating three new numbers as above and following through the process with place value cards.

Using the standard 1–6 dice, generate three two-digit numbers. The intention is that the three numbers will this time generate an addition calculation requiring crossing of tens boundaries.

Repeat the sequence above using place value cards and addition signs to display an expanded format. Then support the child to record this on their whiteboard, for example:

$$\begin{array}{r}
 60 + 5 \\
 + 20 + 7 \\
 \hline
 30 + 4 \\
 110 + 16 \\
 126
 \end{array}$$

? What would you like more practice with?

Spotlight 1

Has difficulty with adding three numbers in a column, except by adding the first two and then the last one

Opportunity for: solving real-life problems

I can add money

Time 15–20 minutes

Resources

- 10p and 1p coins
- Individual whiteboards
- Place value (arrow) cards

Key vocabulary

add	units	estimate
plus	how many altogether?	calculate
column	partition	check
tens	combine	
ones	most significant digit first	

Teaching activity

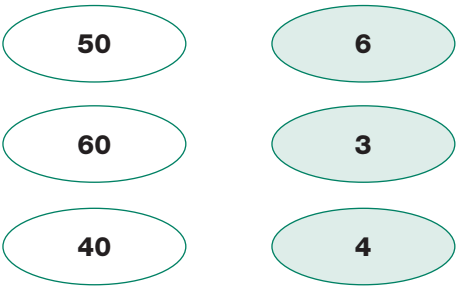
Explain to the child that this activity is going to help them learn about adding more than two numbers together more efficiently and writing down how they do it.

Ask the child to choose three two-digit numbers and jot them down.

? How can you make each of your three numbers from our collection of 10p and 1p coins?

If the child is finding that hard, relate the numbers to place value cards.

Once the child has done this using 10p and 1p coins, support them in arranging the three piles of coins into expanded addition format, for example:



Ask the child to record their numbers in expanded format on a whiteboard, and then slide the piles of 10p coins together and the piles of 1p coins together to create two piles of coins.

? How many pence in the 10p pile?

? How many pence in the 1p pile?



Ask the child to record their total piles of coins on their whiteboard as:

$$\begin{array}{r} 50 + 6 \\ + 60 + 3 \\ 40 + 4 \\ \hline 150 + 13 \end{array}$$

? What is the total?

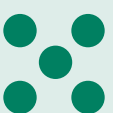
If the child has difficulty in identifying the total, support them in changing the 13p into a 10p coin and three 1p coins. Add the additional 10p coin to the pile of fifteen, and encourage the child to revisit the question.

Support the child in finishing their recording of this calculation:

$$\begin{array}{r} 50 + 6 \\ + 60 + 3 \\ 40 + 4 \\ \hline 150 + 13 \\ \hline 163 \end{array}$$

Repeat the activity using other groups of three two-digit numbers.

If the child is struggling with this, you could relate the coins to a place value board.

Tens	Units
	
5	6

5	0	
---	---	--

6		
---	--	--

? What did you learn today about adding three numbers together?

Spotlight 2

Has difficulty with adding three numbers in a column, except by adding the first two and then the last one

Opportunity for: solving real-life problems

Picture frame

Time 15–20 minutes

Resources

- Tape measures (Resource sheet 22)
(Two copies)
- Real picture frame (or framed picture)
- Scissors

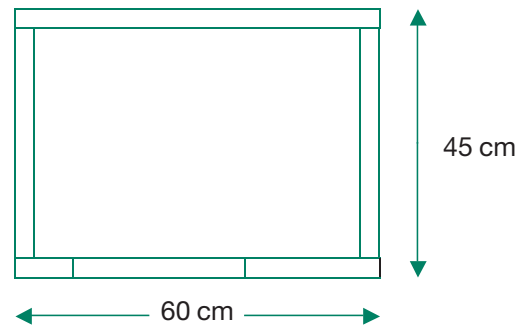
Key vocabulary

add	units	estimate
plus	how many altogether?	calculate
column	partition	check
tens	combine	
ones	most significant digit first	

Teaching activity

Explain to the child that this activity is going to help them learn about adding more than two numbers together more efficiently and writing down how they do it.

Set the scene, explaining that Brian needs a length of 60 cm of wood made from strips of wood to complete the final side of the picture frame he has been making.



There are only short pieces of wood left and he has to select from these to make the rest of his frame, because there is no saw available either! He must use the minimum number of lengths to make the frame.

Use a real picture frame (or framed picture) and tape measures from Resource sheet 21 to illustrate the problem.

Record the lengths of wood available: 20 cm, 23 cm, 13 cm, 21 cm, 19 cm

? Which of these lengths of wood together make a total length of 60 cm?

‘Cut the lengths of wood available from the tape measures on Resource sheet 21.’

? Where is 13 cm on the tape measure?

? Where is 21 cm on the tape measure?

Cut 13 cm from the start of the first tape measure and 21 cm from the start of another.

Ask the child to cut the other three lengths from the start of three further tape measures.

? Which pieces of wood do you think Brian should use to finish off his picture frame?

Support the child, if necessary, in lining up the tape measure strips end on. Identify the tens parts first (to help with a first estimate of the total length of the strips) and then add on the additional units.

If the child has difficulty with this, cut the units parts from the strips to enable the multiples of ten to be matched first and added first.

? Can you write a vertical addition to check your choice?

Support the child in matching the parts of the strips to the parts of the calculation.

$$\begin{array}{r}
 20 \\
 20 + 1 \\
 10 + 9 \\
 \hline
 50 + 10 \\
 60
 \end{array}$$

If time allows, repeat with different total lengths and short lengths from which to select.

? Would you like to show this task to the others in your class and see whether they can solve it?

Let children explore the problem, explaining whether different solutions can be found.



? How do you know which lengths are good ones to choose to make 60 cm?

Spotlight 3

Has difficulty with adding three numbers in a column, except by adding the first two and then the last one

Opportunity for: reasoning about numbers

.....

Why did that happen?

Time 15–20 minutes

Resources

- Partitioning (Resource sheet 23)
- Place value (arrow) cards
- Cards with + signs

Key vocabulary

add	units	estimate
plus	how many altogether?	calculate
column	partition	check
tens	combine	
ones	most significant digit first	

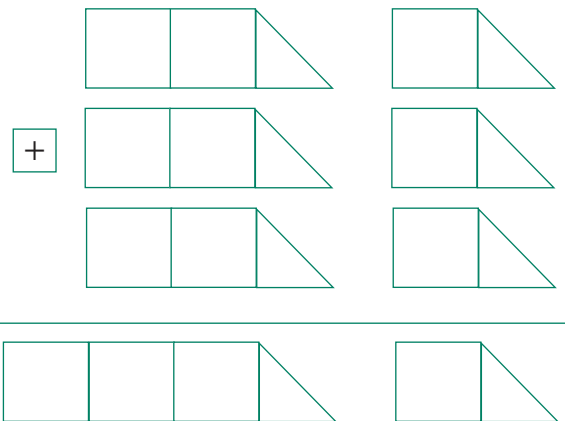
Teaching activity

Explain to the child that this activity is going to help them learn about adding more than two numbers together more efficiently and writing down how they do it.

Ask the child to select three tens place value cards and three units cards and make three two-digit numbers from them, for example 24, 53 and 15.

If you want to make sure the child doesn't have to cross boundaries, you might want to give three numbers rather than letting the child choose, for example 21, 32 and 34.

Ask them to arrange the cards in column format for expanded addition, inserting an addition sign card where necessary (as in the initial teaching activity above). For example:



? How can you add your numbers and find out the place value cards you need to place under the line?

Encourage the child to work as independently as possible but, if they have difficulties, indicate the tens place value cards (and possibly also the hundreds cards) for a first total, followed by the units cards.

Ensure that they recombine to find a final total.

Keep a note of the first total, or you or the child could record the total on *Partitioning* (Resource sheet 23). Ask the child to make three new numbers using the same place value cards. Repeat the activity, asking the child to find the new total.

? What do you notice?

Ask the child to make another three numbers with the original place value cards and carry out the addition again.

When three totals have been obtained from the place value cards, ask:

? Why do the numbers keep adding to the same total?

Focus the child on the fact that the same tens numbers are being used and the same units numbers.

? Will it make a difference to the total if we change the order of the numbers?

? So what do you know about changing the order of numbers when you add?

? Are you surprised by that?

Spotlight 4

Has difficulty with adding three numbers in a column, except by adding the first two and then the last one

Opportunity for: using trial and improvement methods

What goes in the space?

Time 15–20 minutes

Resources

- Partitioning (Resource sheet 23)
- Sticky notes
- Place value (arrow) cards

Key vocabulary

add	units	estimate
plus	how many altogether?	calculate
column	partition	check
tens	combine	
ones	most significant digit first	

Teaching activity

Explain to the child that this activity is going to help them learn about adding more than two numbers together more efficiently and writing down how they do it.

Record the following:

30	+	4
+	+	7
50	+	
90	+	14

On individual sticky notes, write 10, 3, 1, 14, 40, 24, 114 and 104.

Display the sticky notes on the table.

Ask the child to select sticky notes to fill in the blanks in the addition. They must explain why they make their choices. Point to each space that the child has covered and ask them:

- ? Why did you put that number there?
- ? What should the total of that column come to altogether?
- ? How do you know?
- ? Which is the column with the tens? How many more tens do you need?
- ? Explain to me how you know that is the missing number.

If the child is struggling, keep working with them, using place value cards in support.

Repeat the activity using the following calculations, plus sets of sticky notes from which the child can select to fill in the blanks.

	50	+	4
+		+	
	60	+	2
	110	+	15

Sticky notes: 9, 70, 0, 8, 1, 40, 125 and 145.

Ask the child to explain their choice of number for each position.

	70		
+		+	4
	20	+	7
	120	+	
	131		

Sticky notes: 11, 30, 20, 12, 4, 50, 130, 13 and 120.

Ask the child to explain their choice of number for each position.

If time allows, ask the child to make up another for you to try!

The child could record completed calculations on *Partitioning* (Resource sheet 22), and they could use this recording to help them to make a calculation containing some blanks for a friend back in class.



‘Make a calculation with missing numbers for your friend to solve.’

Spotlight 5: a learning check

Has difficulty with adding three numbers in a column, except by adding the first two and then the last one

Opportunity for: explaining and discussing

Smallest possible

Time 10–20 minutes

Resources

- *Partitioning* (Resource sheet 23)
- Set of number cards 1–9 from Resource sheet 1 for each pair or player
- At least two children
- Stopwatch
- Place value (arrow) cards

Check: does the child use key vocabulary?

add	units	estimate
plus	how many altogether?	calculate
column	partition	check
tens	combine	
ones	most significant digit first	

Teaching activity

‘This game, **Smallest possible**, will help you with your adding in columns.’

Children could cooperate in pairs or race in pairs, or individual children could race each other.

How to play

1. Place the number cards face down in a pile.
2. The first player or pair must take two cards, look at them carefully and make the smallest two-digit number that they can. For example, if the cards are 3 and 7, they can make thirty-seven, which is smaller than seventy-three. This will be their first number.
3. Then the other pair takes two cards and make the smallest number that they can.
4. When each pair or player has made three two-digit numbers, the stopwatch should be started and each pair add up their numbers as fast as they can.
5. When they are sure their calculation is right, they should stop the stopwatch and write down their personal best time.
6. They then play again to try to beat their time.



Encourage the children to remember to estimate first and check at the end.

Variations



- You can add more support to the game by using tens and units place value cards face up, rather than number cards, and helping children to write in their numbers on *Partitioning* (Resource sheet 23).
- For a challenge, make the largest numbers possible.

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 a two-digit number into tens and units to prepare for column addition;
- add three two-digit numbers by adding the tens column first and then the units and be able to recombine the number to make a total;
- check an answer to see if it is reasonable.