

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

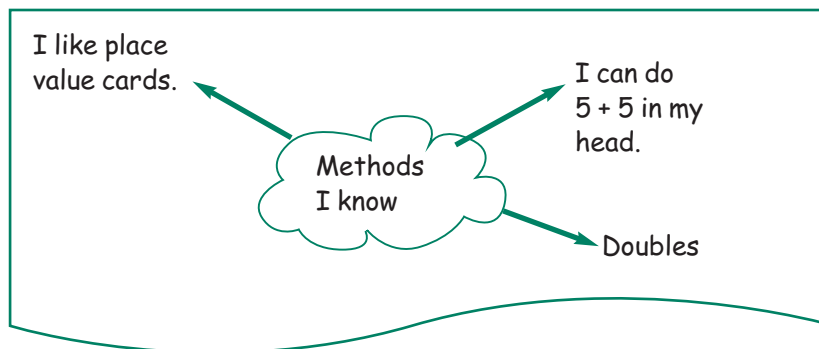
estimate	pattern	minus
calculate	add	difference between
check	plus	count up
mental method	subtract	count back
rounding	take away	columns

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?

<div>Know by heart</div> <div>$6 + 4$</div>	<div>Find a small difference by counting back</div> <div>$101 - 3$</div>
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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).

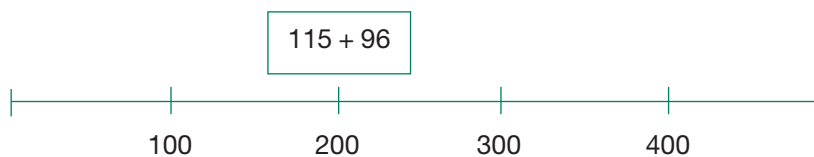
? Can you see a calculation where you think you know roughly what the answer is?

‘This is called making an estimate.’

Let the child choose some calculations and estimate their answers to the nearest hundred. For example:

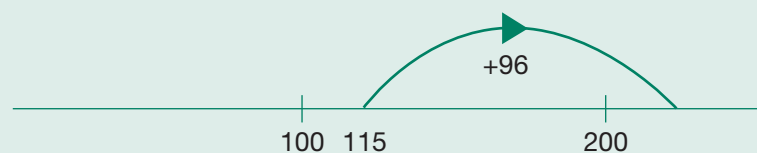
? Can you estimate one hundred and fifteen add ninety-six to the nearest hundred? ($115 + 96$ is about 200.)

‘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?

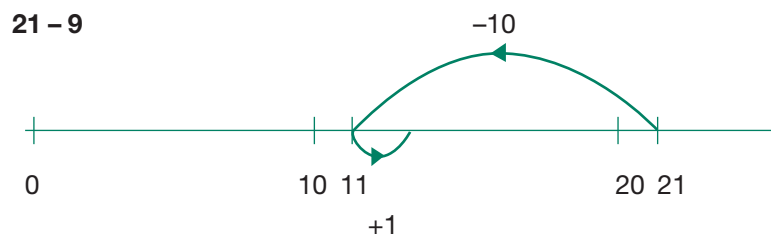
Guide the child towards the idea that the first one is easier and can be done mentally.

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.

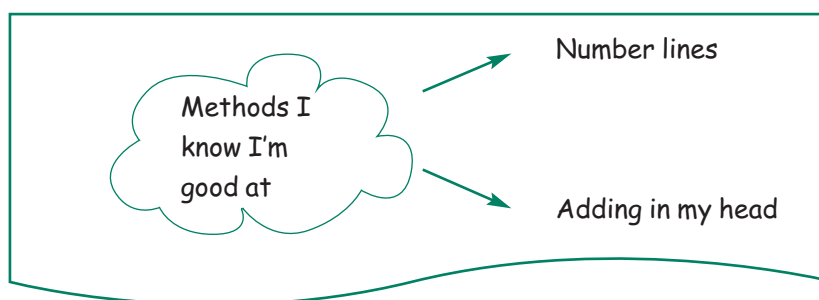
Note: Don't assume that a lower-achieving child is not capable of using a range of mental methods!

? 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	

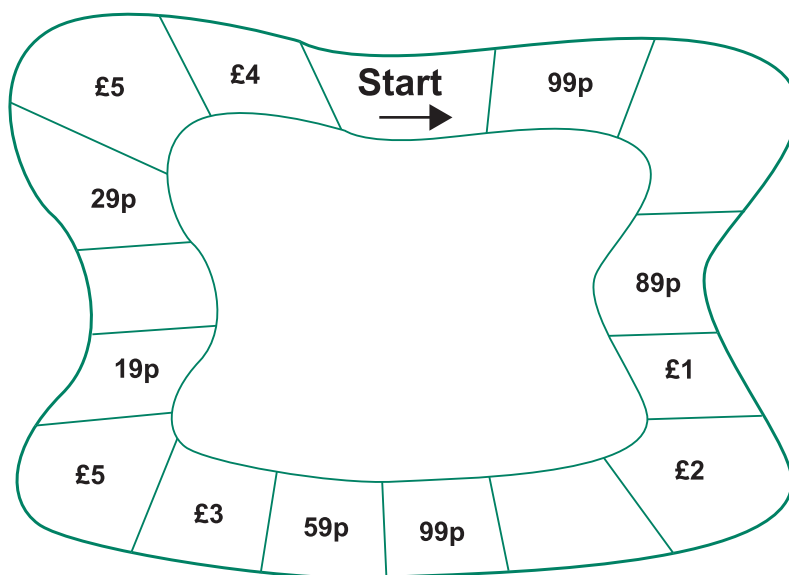
Teaching activity

‘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:

