# 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.'
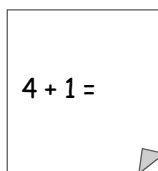
**?  Can you tell me a number pattern you can remember?**

Prompt the child to talk about a pattern they have used recently, for example number bonds to ten:
1 + 9 = 10
2 + 8 = 10, 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.

4 + 1 =

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.

*Opportunity for: communicating mathematical ideas*

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## 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.**
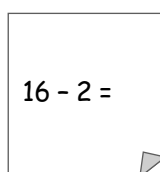
**?**  **Tell me about this pattern. How does this column of numbers change?** *(For example, increases by one or ten each time.)*

'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?**

16 − 2 =

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.

$$6 - 2 = 4$$
$$16 - 2 = 14$$
$$26 - 2 = 24$$
$$36 - 2 = 34$$

Repeat with another pattern, such as:

63 – 3
63 – 13
63 – 23, and so on.

Or something much easier if the child is struggling, such as:

15 – 1
15 – 2
15 – 3, and so on.

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?**

$$76 - 2 = 74$$
$$86 - 2 = ?$$
$$76 - 3 = ?$$

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.

*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)
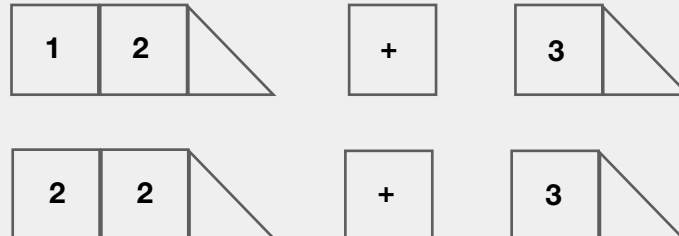- Place value (arrow) cards

### 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.

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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.

| 1 | 2 | | + | 3 |

| 2 | 2 | | + | 3 |

**?** **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.

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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.

*Opportunity for: reasoning and predicting*

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## Guess my pattern

**Time** 10–20 minutes

### Resources

- Calculator
- 100-square
- Cubes or bead string to support counting
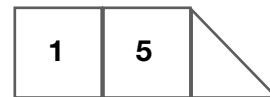- Place value (arrow) cards

### 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.

| 1 | 5 | |
|---|---|---|

*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.

$$3 \ + \ \boxed{\phantom{0}} \ = \ 14$$

$$\boxed{\phantom{0}} \ + \ \boxed{\phantom{0}} \ = \ 25$$

$$25 \ + \ 11 \ = \ 36$$

### ? **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*

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## 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*

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## 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
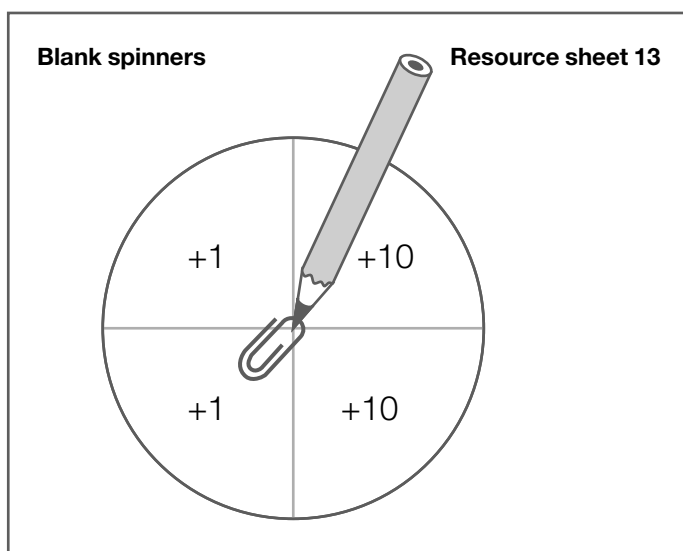
### Check: does the child use key vocabulary?

| | |
|---|---|
| number pattern | plus |
| number sequence | one more |
| what comes next? | ten more |
| predict | increased by |
| subtract | decreased by |
| add | |

### Teaching activity

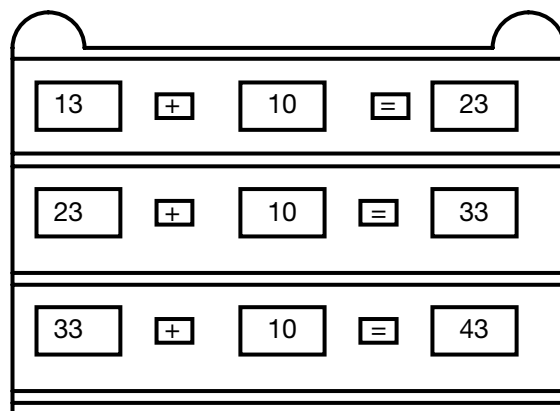'This game, **Down the ladder**, will help you with making patterns.'

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.



Blank spinners                                                          Resource sheet 13

### 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.

**Notes:**