









Topic: Patterns and algebra

Describing number patterns

Lesson concepts

-  Number — Counting
-  Number — Names and symbols
-  Number — Quantity
-  Patterns — Describing patterns
-  Patterns — Continuing patterns
-  Patterns — Growing patterns

Today students will:

- ▶ identify the rule in a counting sequence
- ▶ connect representations of number patterns.

Resources

Digital

Learning object — Hundred board

Find and prepare

Card

Calculator

Materials to represent counting sequences
(for example, buttons, pasta shells, dried beans)

Sheets

Number symbols 0–100

Hundred board 0–99

Number lines (blank)

Key terms

addition (add), decrease, increase,
number pattern, numeral, sequence,
skip counting, subtraction

For definitions and explanations of terms,
please see the [Glossary](#).

Lesson

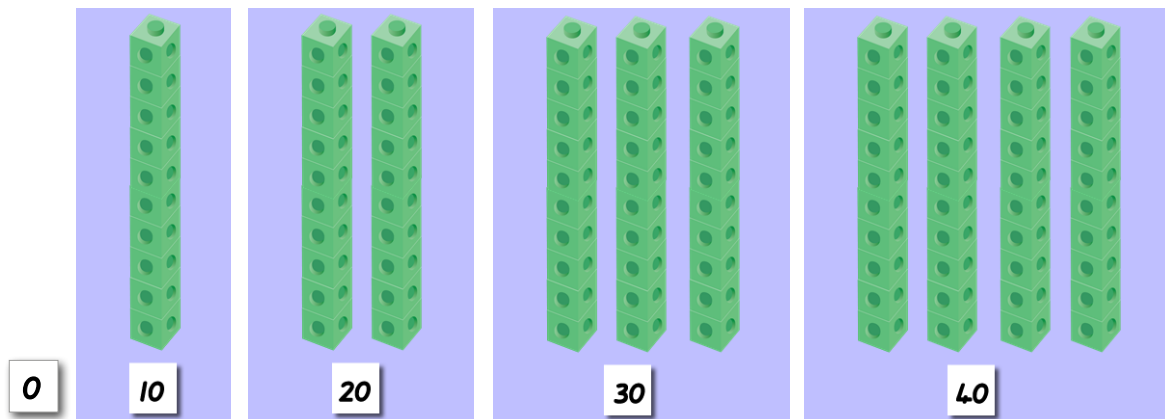
Introduce the lesson

Explain to students

- Today we will continue to explore number patterns and identify the rule in the counting sequences we make.

Identify the pattern of a counting sequence

- Ask students to:
 - show a 10s counting sequence to 100
 - place the corresponding [Number symbols 0–100](#) cards below the sequence



- place 0 on the left
- say aloud the counting sequence while pointing to each representation (that is, say, '0, 10, 20, 30, 40 ... 100').

Focus questions

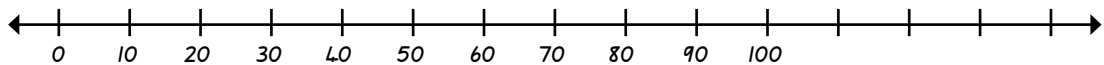
- Q. *What is the starting number?*
A. 0
- Q. *By how much is each number increasing, or getting bigger, each time?*
A. By 10
- Q. *What is the pattern rule for this sequence?*
A. Start at 0 and add 10 each time.
- Q. *What do you notice about the numbers in this sequence?*
A. All end in 0 and they increase by 10 each time.
- Q. *How do you know what will come next in the sequence?*
A. For example: 10 more than 40

Explain to students

‘ The rule of the counting sequence tells us ‘where the sequence starts’ and ‘how much the number is increasing by’. The rule of your growing pattern is start at 0 and add 10 more to each number in the sequence. ’

- Ask students to:
 - show the sequence on the [Hundred board 0–99](#)
 - show the sequence on [Number lines \(blank\)](#).

0	1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68	69
70	71	72	73	74	75	76	77	78	79
80	81	82	83	84	85	86	87	88	89
90	91	92	93	94	95	96	97	98	99



Focus questions

- Q. *What is the counting sequence?*
A. A 10s counting sequence
- Q. *What is the rule of the counting sequence?*
A. Start at 0 and add 10 each time.
- Q. *What is the number before/after 50 in this counting sequence?*
A. 40/60
- Q. *In which representation did you find it easier to see the 10s counting sequence? Explain.*
A. Answers will vary.

- Have students repeat the activity with different starting points, for example:

10s counting sequence starting at 30 and continuing to 80

2s counting sequence starting at 6 and continuing to 24

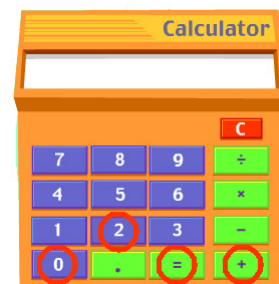
1s counting sequence starting at 46 and continuing to 67

Connect representations of number patterns

Explain to students

- ‘ The growing patterns that you have used can be seen as repeated addition, that is, adding the same number over and over. The 10s counting sequence is the same as adding 10 each time, for example, when you start at 0 and add 10, then add another 10 to get to 20.
- Calculators can be used to show the repeated addition. ’

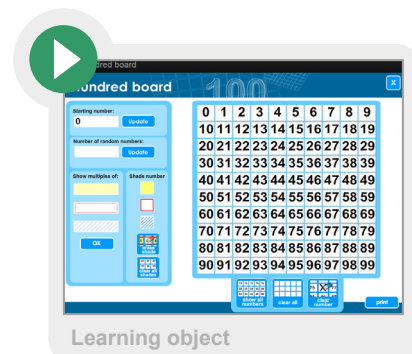
- Give students a calculator and allow them time to explore it.
- Ask students to:
 - identify and locate the number keys
 - identify and locate the ‘+’ and ‘=’ symbols.
- Show students how to use the ‘constant function’ to show the numbers that belong to the 2s counting sequence by following these instructions:
 - press 0 to display it on the screen
 - key in ‘+ 2’
 - then press ‘=’ (2 should be displayed)
 - press ‘=’ again (4 should be displayed)
 - continue pressing ‘=’ key to identify the next number in the counting sequence.



Highlight to students

- ‘ The repeated part is the pattern rule, for example, + 2.
- This is repeated every time you press the ‘=’ sign. ’

- Highlight the 2s counting pattern to 50 on the **Learning object — Hundred board**.
- Use the constant function on the calculator to show the same 2s counting pattern and check that the numbers highlighted on the hundred board match the calculator screen.
- Ask students to complete the activity again using the:
 - 1s counting sequence
 - 10s counting sequence.



Focus questions

Q. *What counting patterns did we use?*

A. 1s, 2s and 10s counting patterns

Q. *What was the starting number for each counting pattern?*

A. 0

Q. *How many did we add to each number to get the next number in the counting sequence?*

A. 1, 2 or 10

Q. *Which keys on the calculator did you press to show the rule?*

A. + 1, + 2, + 10

Q. *What key do we keep pressing to show the numbers in the counting sequence?*

A. =

Q. *How did you know that the number pattern you made on the calculator was the same as the patterns shown on the hundred board?*

A. The numbers were the same.

Identify patterns created by skip counting from different starting points

- Refer students to the 2s counting pattern on the hundred board.

0	1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68	69
70	71	72	73	74	75	76	77	78	79
80	81	82	83	84	85	86	87	88	89
90	91	92	93	94	95	96	97	98	99

Highlight to students

- ☞ We have highlighted a 2s counting pattern. The numbers that are not highlighted also show a 2s counting pattern. It's still a 2s counting pattern, but the starting number has changed from 0 to 1. Let's read them together.

- Read the 2s counting pattern to 49, starting from 1 (that is, 1, 3, 5, 7, 9 ... 49).

Reinforce to students

Two more is added to the next number, but the numbers are different because the starting number is different.

- Ask students to use the 'constant function' to show the 2s counting sequence starting from 1 by:
 - pressing '1' to display it on the screen
 - keying in '+ 2'
 - pressing '=' (3 should be displayed)
 - pressing '=' again (5 should be displayed)
 - continuing to press '=' key to identify the next numbers in the counting sequence
 - using the calculator's constant function to check the numbers against the non-highlighted numbers on the hundred board.

Explain to students

Two more is added to the next number, but the numbers are different because the starting number is different.

- Ask students to:
 - choose and highlight a number from 3 to 9 (for example, 4)

0	1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68	69
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80	81	82	83	84	85	86	87	88	89
90	91	92	93	94	95	96	97	98	99

- identify and highlight the number 10 more than (4) in the 10s counting sequence (that is, 14)
- continue the counting pattern (that is, by highlighting 24 ... 84, 94) on the hundred board
- press (4) on the calculator
- key in '+ 10'
- then press '=' (14 should be displayed)
- press '=' again (24 should be displayed)
- continue pressing '=' key to identify the next number in the counting sequence
- check the numbers against the hundred board display.

Use number patterns

- Present a problem that requires students to predict the next number in a sequence.

For example:

My clever hen lays more eggs every day.

On Monday, I collected two eggs.

On Tuesday, I collected four eggs.

On Wednesday, I collected six eggs.

How many do you think will I collect on Thursday?.

- Have students:
 - represent the problem with materials
 - record the number sequence
 - identify the number pattern and rule
 - use the rule to identify the answer.

Focus questions

Q. *What pattern did you notice?*

A. 2s counting sequence; each time there were 2 more

Q. *What was the starting number?*

A. 2

Q. *How did you work out the answer?*

A. I skip counted in 2s.

- Repeat this with the following example.

Each child had 10 pencils in their pencil holder.

Jill placed her holder on the table.

Then Sam, James and Jenny put theirs on the table.

How many pencils were on the table?

How many will there be if Trish puts her container on the table?