Pattern Builders

Generate number lists and growing shapes.

4.PAR.3.1 · Generate both number and shape patterns that follow a provided rule.

Name _____ Date _____

The big idea

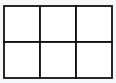
A rule tells how to create each new term or shape. Keep the starting value and repeat the same rule at every step. In a growing tile pattern, count all tiles at each stage to form a matching number pattern.

Worked example

Start with a rectangle of 2 rows and 3 tiles in each row. Rule: add one column of 2 tiles on the right each time. What comes next?

1. Stage 2 has 2 rows of 4 tiles: 8 tiles.
2. Stage 3 has 2 rows of 5 tiles: 10 tiles.

The first three tile counts are 6, 8, 10. Each new shape gains 2 tiles.



Write number patterns on the lines. Draw separate, clearly labeled stages in each blank box; show every square tile. You may sketch with a pencil and ruler.

1. Add the same amount

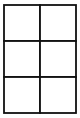
Start at 4. Rule: add 6 each time. Write the first five terms, including 4. Explain how you found term 5.

2. Multiply each time

Start at 3. Rule: multiply by 2 each time. Write the first five terms. How is this different from adding 2?

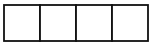
3. Grow by a column

Stage 1 is shown. Rule: add one column of 3 tiles on the right each time. Draw stages 2 and 3 in the box. Write tile counts for stages 1, 2, 3.



4. Grow by a row

Stage 1 is shown. Rule: add one row of 4 tiles below each time. Draw stages 2 and 3. Write the three tile counts.



5. Theater rows

The first theater row has 12 seats. Each next row has 4 more seats. Generate the seat counts for rows 1 through 5. Which row has 24 seats?

6. Garden tile border

A gardener starts with the 2-by-2 square shown. Rule: add one column of 2 tiles to the right at each stage. Draw stages 2 and 3. Write tile counts for stages 1 through 4 without drawing stage 4.



7. Connect numbers and shapes

Start with 1 row of 3 square tiles. Rule: add one row of 3 tiles below each time. Draw stages 1, 2, 3. Write the first five tile counts. Explain why the rule adds 3 to each count.

What to accept

Check that students generate both number and shape patterns. Tile drawings need distinct square cells and the stated row/column growth; artistic precision is not required. Read row-by-column dimensions consistently. Accept correct labeled sketches, not number lists alone for drawing tasks.

1. Add the same amount

4, 10, 16, 22, 28. Add 6 four times to 4.

2. Multiply each time

3, 6, 12, 24, 48. Each term doubles; adding 2 would give 3, 5, 7, 9, 11.

3. Grow by a column

Draw 3 rows by 3 columns, then 3 rows by 4 columns. Counts: 6, 9, 12.

4. Grow by a row

Draw 2 rows by 4 columns, then 3 rows by 4 columns. Counts: 4, 8, 12.

5. Theater rows

12, 16, 20, 24, 28; row 4 has 24 seats.

Apply the +4 rule between successive seat counts.

6. Garden tile border

Draw 2 by 3, then 2 by 4. Counts: 4, 6, 8, 10.

Add two tiles at each stage, keeping two rows.

7. Connect numbers and shapes

Draw 1 by 3, 2 by 3 and 3 by 3. Counts: 3, 6, 9, 12, 15. Each new row contains 3 tiles.