

Patterns That Keep Going

Generate, notice, and explain why.

CCSS.Math.Content.4.OA.C.5 "Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. For example, given the rule "Add 3" and the starting number 1..."

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Read each rule. Circle the starting number and underline the amount to add. Use the answer spaces to generate and explain the patterns.

Three pattern rules

Rule A

Start at 2. Add 3 each time. Write the first six numbers, counting 2 as the first number.

Rule B

Start at 7. Add 4 each time. Write the first six numbers, counting 7 as the first number.

Rule C

Start at 3. Add 5 each time. Write the first six numbers, counting 3 as the first number. A classmate predicts that every number in this pattern will end in 3 or 8.

2 ANSWER WITH EVIDENCE _____ Use the passage

- 1 Generate the first six numbers for Rule A. Label each odd or even. Describe the feature you notice, then explain why adding 3 keeps that feature going.

- 2** Generate the first six numbers for Rule B. What odd/even feature is not written in the rule? Explain why it continues even after the numbers you wrote.

- 3** Generate the first six numbers for Rule C. Test the classmate's prediction. Explain why the last-digit feature will continue; use what happens when you add 5 twice.

- 4** Now change only Rule A's starting number to 9. Generate the first six numbers. Which odd/even feature stays the same, and what changes? Explain.

3

YOUR TURN

Your own words

Create an addition pattern: choose a starting whole number from 1 to 9 and add 2 or 4 each time. State the rule, generate six numbers, and identify an odd/even feature not stated in the rule. Explain why that feature will continue.

Create and explain

Leave a line between your sequence and explanation. A list of examples checks the feature; explain what each addition does to show why it continues.

PART 1 • READ AND MARK

Read each rule. Circle the starting number and underline the amount to add. Use the answer spaces to generate and explain the patterns. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	Generate the first six numbers for Rule A. Label each odd or even. Describe the feature you notice, then explain why adding 3 keeps that feature going.	2, 5, 8, 11, 14, 17: even, odd, even, odd, even, odd. Parity alternates. Adding 3 is adding an even pair and one more: the pair keeps odd/even status and the extra one switches it.
2	Generate the first six numbers for Rule B. What odd/even feature is not written in the rule? Explain why it continues even after the numbers you wrote.	7, 11, 15, 19, 23, 27. Every number is odd. Adding 4 adds two pairs, so an unpaired one stays unpaired: odd plus even remains odd.
3	Generate the first six numbers for Rule C. Test the classmate's prediction. Explain why the last-digit feature will continue; use what happens when you add 5 twice.	3, 8, 13, 18, 23, 28. The prediction holds: the last digit alternates between 3 and 8. Two additions of 5 add 10, returning to the same last digit; between those additions, a number ending in 3 becomes one ending in 8.
4	Now change only Rule A's starting number to 9. Generate the first six numbers. Which odd/even feature stays the same, and what changes? Explain.	9, 12, 15, 18, 21, 24. Odd and even still alternate because each step adds the odd number 3. The first number is now odd, so the positions of odd and even numbers switch.

PART 3 • YOUR TURN (SAMPLE ANSWER)**One possible pattern**

Start at 6. Add 4 each time. First six numbers: 6, 10, 14, 18, 22, 26. All the numbers are even, although the rule does not say so. Adding 4 adds two pairs, so the total can still be grouped into pairs with none left over. That is why every later number will also be even.

TEACHER ASSESSMENT NOTES

Accept correct rules, generated numbers, and informal explanations using pairs, odd/even reasoning, or equivalent grade-four language. Do not require algebraic notation. Merely repeating the rule or checking six numbers does not explain why a feature will continue.