Generating Number Patterns

Generating Number Patterns: Find, Fix, and Work Backward

Name _____ **Date** _____ **Score** _____ / 8

QUICK REVIEW

Step 0 is the starting value. Apply the rule once for each step. Pair values from the same step. In (A, B), read A horizontally and B vertically.

Worked example

A list starts at 5 and adds the same amount each time. The fourth term is 14. Find the add rule and the second term.

1. From term 1 to term 4 there are 3 additions and a total increase of $14 - 5 = 9$.

2. Each addition is $9 \div 3 = 3$, so term 2 is $5 + 3 = 8$.

Answer: Add 3; second term 8.

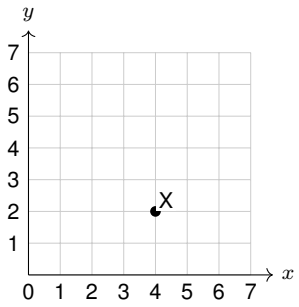
Practice Problems

Show your thinking.

1. A starts at 1 and adds 4. B starts at 2 and adds 3. A student writes $(5, 2)$ after one step. Fix the pair and explain the error.

2. The starting pair is $(4, 2)$. After two steps it is $(10, 10)$. Each list has a fixed add rule. Find both rules and the pair at step 1.

3. A starts at 1 and adds 1. B starts at 2 and adds 2. The mark X is meant to show step 1. Explain its error and plot the correct points for steps 1 and 2.



4. A hidden starting number increases by 5 each step. After three steps it is 19. Recover the start and the number after one step.

5. Start with $(2, 5)$ and add 4 to both lists at each step. Zara says B pulls 4 farther ahead every step. Test her claim for the next two pairs.

6. A starts at 3 and adds 3. B starts at 4 and adds 2. One table entry is wrong. Identify it, fix it, and verify the next row.

Step	A	B
0	3	4
1	6	6
2	9	9
3	12	10

7. B is always twice A. At steps 2 and 3, B is 20 and 28. A adds a fixed amount each step. Recover A at those two steps and its starting value.

8. A list starts with 7 as term 1 and adds 2. A student uses $7 + 5 \times 2 = 17$ for term 5. Find the correct fifth term.

Answer Key

1. $(5, 5)$; B also needs one addition.
2. A adds 3, B adds 4; step 1: $(7, 6)$.
3. X swaps the axes. Plot $(2, 4)$ and $(3, 6)$.
4. Start 4; step 1 is 9.
5. $(6, 9), (10, 13)$; the gap stays 3.
6. Step 2, B: change 9 to 8. Step 3 is $(12, 10)$.
7. A: 10 at step 2, 14 at step 3; start 2.
8. 15; only 4 additions.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

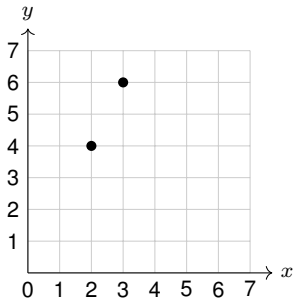
1. Step 0 is $(1, 2)$. After one addition, A is $1 + 4 = 5$ and B is $2 + 3 = 5$.
2. The pair is $(5, 5)$, not A at step 1 paired with B at step 0.

Problem 2

1. A gains $10 - 4 = 6$ over two steps, so $6 \div 2 = 3$ per step.
2. B gains $10 - 2 = 8$, so $8 \div 2 = 4$ per step.
3. Add once to the start: $(4 + 3, 2 + 4) = (7, 6)$.

Problem 3

1. Step 1: A is $1 + 1 = 2$ and B is $2 + 2 = 4$, so move 2 right and 4 up, not to $(4, 2)$.
2. Step 2: $(2 + 1, 4 + 2) = (3, 6)$. Plot both points with A first.



Problem 4

1. Three steps add $3 \times 5 = 15$. Undo them: $19 - 15 = 4$.
2. Add once: $4 + 5 = 9$. Check $4 + 3 \times 5 = 19$.

Problem 5

1. Adding 4 to each gives $(6, 9)$ and then $(10, 13)$.
2. The gaps are $5 - 2 = 9 - 6 = 13 - 10 = 3$; Zara is not correct.

Problem 6

1. From step 1, the next A is $6 + 3 = 9$ and next B is $6 + 2 = 8$.
2. Use the corrected row: $(9 + 3, 8 + 2) = (12, 10)$, matching step 3.

Problem 7

1. Halve B: $20 \div 2 = 10$ and $28 \div 2 = 14$.
2. A adds $14 - 10 = 4$. Undo two steps from 10: $10 - 2 \times 4 = 2$.

Problem 8

1. Term 1 is already 7, so term 5 takes $5 - 1 = 4$ additions.
2. $7 + 4 \times 2 = 15$. The proposed 17 comes after 5 additions, at term 6.

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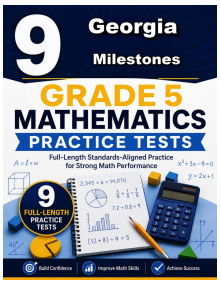

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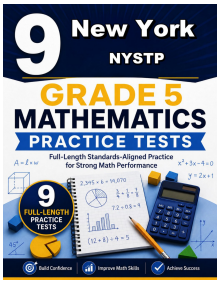

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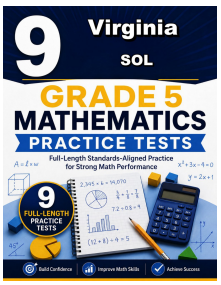

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