

## Number Patterns and Sequences

A sequence is a list of numbers that follows a rule. Find the rule first — usually “add  $n$ ,” “subtract  $n$ ,” or “multiply by  $n$ ” — and the next numbers come easily.

Pattern type	Example
Add a fixed amount	2, 5, 8, 11, ... (add 3)
Subtract a fixed amount	30, 25, 20, 15, ... (subtract 5)
Multiply by a fixed amount	2, 4, 8, 16, ... (multiply by 2)

### Key Concepts

1. A **sequence** is a list of numbers. The *rule* tells you how to get from one number to the next.
2. To find the rule, look at the difference (or ratio) between consecutive numbers. If you keep getting the same answer, that’s the rule.
3. Most Grade 3 patterns use addition or subtraction. A few are multiplication patterns (each term doubles, triples, etc.).
4. Once you know the rule, apply it again and again to extend the sequence.

### Worked Examples

① Find the next two numbers: 6, 12, 18, 24, ...

 Look at the gaps:  $12 - 6 = 6$ ,  $18 - 12 = 6$ ,  $24 - 18 = 6$ . The rule is “add 6.” Apply it:  $24 + 6 = 30$ , then  $30 + 6 = 36$ . The next two numbers are 30 and 36.


 **Answer:** 30, 36

② Find the rule: 75, 65, 55, 45, ...

 Look at the gaps:  $75 - 65 = 10$ ,  $65 - 55 = 10$ , and so on. The numbers are getting smaller by 10 each time, so the rule is “subtract 10.”

 **Answer:** Subtract 10

③ Find the next number: 3, 6, 12, 24, ...

 Try addition first:  $6 - 3 = 3$ , but  $12 - 6 = 6$  — not the same. So it’s not “add  $n$ .” Try multiplication:  $6 \div 3 = 2$ ,  $12 \div 6 = 2$ ,  $24 \div 12 = 2$ . The rule is “multiply by 2.” Next number:  $24 \times 2 = 48$ .

 **Answer:** 48

### Practice Problems

Find the next two numbers (or the rule).

1. 5, 10, 15, 20, \_\_, \_\_ \_\_\_\_\_

4. 100, 95, 90, 85, \_\_, \_\_ \_\_\_\_\_

2. 80, 70, 60, 50, \_\_, \_\_ \_\_\_\_\_

5. 4, 8, 16, 32, \_\_, \_\_ \_\_\_\_\_

3. 7, 14, 21, 28, \_\_, \_\_ \_\_\_\_\_

6. 9, 18, 27, 36, \_\_, \_\_ \_\_\_\_\_

7. 50, 46, 42, 38, \_\_\_, \_\_\_ \_\_\_\_\_

10. 200, 175, 150, 125, \_\_\_, \_\_\_ \_\_\_\_\_




8. 11, 22, 33, 44, \_\_\_, \_\_\_ \_\_\_\_\_

11. 6, 12, 18, 24, \_\_\_, \_\_\_ \_\_\_\_\_

9. 1, 3, 9, 27, \_\_\_, \_\_\_ \_\_\_\_\_

12. 64, 56, 48, 40, \_\_\_, \_\_\_ \_\_\_\_\_

**Study Tips**

-  Compute the gap between two consecutive terms, then check that it stays the same. If it does, you found the rule.
-  If the gaps change, try *multiplying* or *dividing*. Patterns that grow fast (like 3, 6, 12, 24) are usually multiplication patterns.
-  Always double-check your rule by applying it to all the terms given, not just the first two.

**Word Problems**

1. Maya saves \$5 every week. After week 1 she has \$5, after week 2 she has \$10. How much will she have after week 6?

Answer: \_\_\_\_\_

2. A frog jumps 3 feet each time. After 1 jump it is at 3 feet, after 2 jumps at 6 feet. Where is it after 8 jumps?

Answer: \_\_\_\_\_

**Answer Key — with Friendly Explanations****Practice Problems**

1. Rule: add 5.  $20 + 5 = 25$ ,  $25 + 5 = 30$ .

 **Answer:** 25, 30

2. Rule: subtract 10.  $50 - 10 = 40$ ,  $40 - 10 = 30$ .

 **Answer:** 40, 30

3. Rule: add 7.  $28 + 7 = 35$ ,  $35 + 7 = 42$ .

 **Answer:** 35, 42

4. Rule: subtract 5.  $85 - 5 = 80$ ,  $80 - 5 = 75$ .

 **Answer:** 80, 75

5. Rule: multiply by 2.  $32 \times 2 = 64$ ,  $64 \times 2 = 128$ .

 **Answer:** 64, 128

6. Rule: add 9.  $36 + 9 = 45$ ,  $45 + 9 = 54$ .

 **Answer:** 45, 54

7. Rule: subtract 4.  $38 - 4 = 34$ ,  $34 - 4 = 30$ .

 **Answer:** 34, 30

8. Rule: add 11.  $44 + 11 = 55$ ,  $55 + 11 = 66$ .

 **Answer:** 55, 66

9. Rule: multiply by 3.  $27 \times 3 = 81$ ,  $81 \times 3 = 243$ .

 **Answer:** 81, 243

10. Rule: subtract 25.  $125 - 25 = 100$ ,  $100 - 25 = 75$ .

 **Answer:** 100, 75

11. Rule: add 6.  $24 + 6 = 30$ ,  $30 + 6 = 36$ .

 **Answer:** 30, 36

12. Rule: subtract 8.  $40 - 8 = 32$ ,  $32 - 8 = 24$ .

 **Answer:** 32, 24

**Word Problems**

1. \$5 each week for 6 weeks:  $6 \times 5 = 30$ .

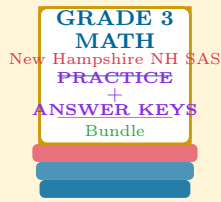
 **Answer:** \$30

2. 3 feet each jump for 8 jumps:  $8 \times 3 = 24$ .

 **Answer:** 24 feet

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