



# Year 4 Mathematics

## Number Patterns Workshop

### Worksheet 25: Identifying & Extending Rules

Name: \_\_\_\_\_ Date: \_\_\_\_\_

#### Section 1: Fluency - Simple Addition/Subtraction Patterns

Find the pattern rule and extend the sequence.

1. Find the rule and write the next three numbers:

12, 17, 22, 27, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

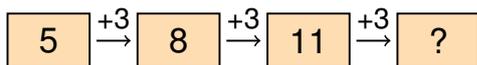
Rule: \_\_\_\_\_

2. What is the pattern rule? Continue the sequence:

45, 40, 35, 30, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

Rule: \_\_\_\_\_

3. Look at this pattern box:



Next number: \_\_\_\_\_

4. Complete this pattern:



100, 90, 80, 70, \_\_\_\_\_, \_\_\_\_\_

Rule: \_\_\_\_\_

5. Extend the sequence:

7, 14, 21, 28, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

Rule: \_\_\_\_\_

6. What comes next?

50, 45, 40, 35, \_\_\_\_\_, \_\_\_\_\_

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

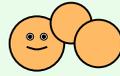
7. Find the missing numbers in this pattern:

3, 8, 13, \_\_\_\_\_, 23, \_\_\_\_\_

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

8. Create a pattern starting at 20 with the rule '+6'. Write the first five numbers:

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



## Pattern Pro!

*Why was the math teacher so good at patterns?  
Because they always knew what was coming next!*





## Section 2: Reasoning - Odd/Even Patterns

Explore special properties of number patterns.

9. If a pattern starts at an even number and the rule is '+2', will there ever be an odd number in the pattern? Why?

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

Explanation: \_\_\_\_\_

10. Look at this pattern: 5, 10, 15, 20, 25...

Are all these numbers odd or even? What do you notice?

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

11. A pattern starts at 3 and uses the rule '+3'. List the first six numbers:

Numbers: \_\_\_\_\_

Are they all odd, all even, or mixed? \_\_\_\_\_

12. True or False: If you start with an odd number and add 5 each time, all numbers in the pattern will be even.

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

13. Look at the pattern: 2, 5, 8, 11, 14...

What is the rule? \_\_\_\_\_



Will 20 appear in this pattern? Explain.

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

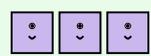
14. A number pattern follows the rule 'subtract 4' starting from 50. Write the first five numbers:

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

15. Which number does NOT belong in this pattern? Circle it and explain why.

8, 12, 16, 19, 24, 28

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



**Reasoning Rockstar!**

*Why did the odd numbers form a club?  
Because they didn't want to be even!*



### Section 3: Fluency - Multiplication Patterns

Create and extend patterns using multiplication rules.

16. Follow the rule 'multiply by 2' starting from 3. Write the first five numbers:

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

17. What is the pattern rule?

4, 8, 16, 32, 64

Rule: \_\_\_\_\_

18. Complete this doubling pattern:

5, 10, 20, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

19. Follow the rule 'multiply by 3' starting from 2. Write the first four numbers:

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

20. Look at this pattern:

100, 50, 25, \_\_\_\_\_

What is the rule? \_\_\_\_\_

Next number: \_\_\_\_\_



21. Create a pattern that starts at 1 and uses the rule 'multiply by 5'. Write the first four numbers:

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

22. Which pattern rule was used?

7, 14, 28, 56

Rule: \_\_\_\_\_

23. Challenge: Start with 2. First add 3, then multiply the result by 2. Repeat this for three steps. What numbers do you get?

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



### **Multiplication Master!**

*Why do multiplication patterns grow so fast?  
Because they keep doubling down on success!*

**Brilliant work! You're a pattern expert!**



# Answer Key

## Worksheet 25: Identifying & Extending Rules

### Section 1: Fluency - Simple Addition/Subtraction Patterns

1. Numbers: **32, 37, 42**

Rule: **+5 or add 5**

2. Numbers: **25, 20, 15**

Rule: **-5 or subtract 5**

3. Next number: **14**

4. Numbers: **60, 50**

Rule: **-10 or subtract 10**

5. Numbers: **35, 42, 49**

Rule: **+7 or add 7**

6. Answer: **30, 25**

7. Answer: **18, 28**

8. Answer: **20, 26, 32, 38, 44**

### Section 2: Reasoning - Odd/Even Patterns

9. Answer: **No, there will never be an odd number.**

Explanation: **When you add 2 to an even number, you always get another even number. Even + Even = Even.**

10. Answer: **They alternate between odd and even: 5 (odd), 10 (even), 15 (odd), 20 (even), 25 (odd). The pattern alternates.**

11. Numbers: **3, 6, 9, 12, 15, 18**

Are they odd/even/mixed? **Mixed - they alternate**

12. Answer: **False**

Explanation: They will alternate between odd and even.



13. Rule: **+3 or add 3**

Will 20 appear? **No, because the pattern goes 2, 5, 8, 11, 14, 17, 20...**

**Actually YES, 20 does appear! It's the 7th term.**

14. Answer: **50, 46, 42, 38, 34**

15. Answer: **19 does not belong**

Explanation: **The pattern rule is +4, so it should be: 8, 12, 16, 20, 24, 28.**

**The number 19 breaks the pattern.**

### Section 3: Fluency - Multiplication Patterns

16. Answer: **3, 6, 12, 24, 48**

17. Rule:  **$\times 2$  or multiply by 2 or double**

18. Numbers: **40, 80, 160**

19. Answer: **2, 6, 18, 54**

20. Rule:  **$\div 2$  or divide by 2 or halve**

Next number: **12.5** or accept **12**

21. Answer: **1, 5, 25, 125**

22. Rule:  **$\times 2$  or multiply by 2 or double**

23. Answer: **2, 10, 26, 58**

Working: Start 2  $\rightarrow (2+3)\times 2 = 10 \rightarrow (10+3)\times 2 = 26 \rightarrow (26+3)\times 2 = 58$



# Year 4 Mathematics

## Number Patterns Workshop

### Worksheet 26: Algorithms & Visual Patterns

Name: \_\_\_\_\_

Date: \_\_\_\_\_

#### Section 1: Fluency - Following a Step-by-Step Algorithm

Follow the instructions carefully to create number sequences.

1. Follow this algorithm:

**Step 1:** Start at 100

**Step 2:** Subtract 10

**Step 3:** Repeat Step 2 four more times

What numbers are in your sequence?

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

2. Follow this algorithm:

**Step 1:** Start at 5

**Step 2:** Add 7

**Step 3:** Repeat Step 2 three times

Write your sequence:

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

3. Algorithm:

**Step 1:** Write down 3

**Step 2:** Multiply the number by 2



**Step 3:** Write down the answer

**Step 4:** Repeat Steps 2-3 twice more

What is your sequence?

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

4. Follow these steps:

**Step 1:** Start at 50

**Step 2:** Subtract 5

**Step 3:** Add 2

**Step 4:** Repeat Steps 2-3 three times

Write the first five numbers in your sequence:

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

5. Create a sequence using this algorithm:

**Step 1:** Start at 2

**Step 2:** Add 4

**Step 3:** Repeat Step 2 five times

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

6. Algorithm:

**Step 1:** Begin with 80

**Step 2:** Divide by 2

**Step 3:** Repeat Step 2 three times

What numbers do you get?



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

7. Follow this pattern-building algorithm:

**Step 1:** Write 10

**Step 2:** Add 10 to get the next number

**Step 3:** Do this until you have six numbers

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

8. Complex algorithm:

**Step 1:** Start with 1

**Step 2:** Multiply by 3

**Step 3:** Add 1

**Step 4:** Repeat Steps 2-3 twice

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



### Algorithm Ace!

*Why did the algorithm go to school?*

*To learn step-by-step success!*



## Section 2: Visual Modeling - Geometric Number Patterns

Explore patterns using visual representations.

9. Look at this growing pattern of squares:

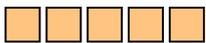
**Shape 1:**



**Shape 2:**



**Shape 3:**



How many squares are in each shape? Shape 1: \_\_\_\_\_ Shape 2: \_\_\_\_\_ Shape 3: \_\_\_\_\_

What is the pattern rule? \_\_\_\_\_

How many squares will be in Shape 5?

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

10. Look at this dot pattern:

**Pattern 1:** ●

**Pattern 2:** ●●● (arranged in a triangle)

**Pattern 3:** ●●●●●● (6 dots in triangle)

Count: Pattern 1 = \_\_\_\_\_ dot, Pattern 2 = \_\_\_\_\_ dots, Pattern 3 = \_\_\_\_\_ dots

How many dots will be in Pattern 4?

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



11. Look at this growing rectangle pattern:



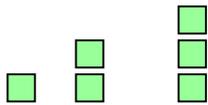
How many squares in Step 1? \_\_\_\_\_ Step 2? \_\_\_\_\_

What is the rule? \_\_\_\_\_

How many squares will be in Step 4?

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

12. Draw the next shape in this pattern:



How many squares did you draw? \_\_\_\_\_



### Visual Pattern Virtuoso!

*Why did the square love patterns?*

*Because it always fit perfectly into place!*



### Section 3: Challenge - Creating Your Own Pattern

Design and explain your own number patterns.

**13.** Create a number pattern that uses a 'multiply by 3' rule. Start with the number 2.

Write the first five numbers:

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

**14.** Design your own pattern that starts at 100 and decreases. Write your rule and the first six numbers:

Rule: \_\_\_\_\_

Numbers: \_\_\_\_\_

**15.** Create a pattern where each number is 8 more than the previous number. Start at 15.

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

**16.** Make up a two-step pattern rule (e.g., add 5, then subtract 2). Write your rule and create a sequence:

Rule: \_\_\_\_\_

Sequence: \_\_\_\_\_

**17.** Create a pattern that starts at 1 and follows the rule 'multiply by 4'. Write five numbers:



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

**18.** Design an algorithm that creates a pattern of even numbers starting from 6. Write your algorithm:

Test your algorithm. What are the first five numbers?

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

**19.** Super Challenge: Create a pattern where you alternate between two different rules. For example:  $+10$ , then  $\div 2$ .

Start number: \_\_\_\_\_

Rules: \_\_\_\_\_

Your pattern: \_\_\_\_\_

**20.** Write your own word problem that involves a number pattern:

Solution: \_\_\_\_\_



## Sequence Star!

*Why did the pattern creator win an award?  
Because their ideas were always in perfect order!*

**Exceptional work! You're a pattern master!**





# Answer Key

## Worksheet 26: Algorithms & Visual Patterns

### Section 1: Fluency - Following a Step-by-Step Algorithm

1. Answer: **100, 90, 80, 70, 60, 50**

2. Answer: **5, 12, 19, 26, 33**

3. Answer: **3, 6, 12, 24**

4. Answer: **50, 47, 45, 42, 40**

Working:  $50 \rightarrow (50-5+2) = 47 \rightarrow (47-5+2) = 44 \dots$  Wait:  $50 \rightarrow -5 = 45 \rightarrow +2 = 47 \rightarrow -5 = 42 \rightarrow +2 = 44 \rightarrow -5 = 39 \rightarrow +2 = 41$

Correction: **50, 45, 47, 42, 44**

5. Answer: **2, 6, 10, 14, 18, 22**

6. Answer: **80, 40, 20, 10, 5**

7. Answer: **10, 20, 30, 40, 50, 60**

8. Answer: **1, 4, 13, 40**

Working:  $1 \rightarrow (1 \times 3) + 1 = 4 \rightarrow (4 \times 3) + 1 = 13 \rightarrow (13 \times 3) + 1 = 40$

### Section 2: Visual Modeling - Geometric Number Patterns

9. Shape 1: **1** Shape 2: **3** Shape 3: **5**

Pattern rule: **Add 2 each time (odd numbers)**

Shape 5: **9 squares**

10. Pattern 1 = **1** dot, Pattern 2 = **3** dots, Pattern 3 = **6** dots

Pattern 4: **10 dots**

(This is a triangular number sequence: 1, 3, 6, 10, 15...)

11. Step 1: **2 squares** Step 2: **4 squares**

Rule:  **$\times 2$  or double or multiply by 2**

Step 4: **8 squares** (2, 4, 8, 16...)

12. Answer: **4 squares** (arranged vertically)



The pattern is 1, 2, 3, 4... (adding one more square each time)

### Section 3: Challenge - Creating Your Own Pattern

13. Answer: **2, 6, 18, 54, 162**

14. Rule: **Accept any valid decreasing rule (e.g., -10, -15,  $\div 2$ )**

Example: **Rule: -10, Numbers: 100, 90, 80, 70, 60, 50**

15. Answer: **15, 23, 31, 39, 47, 55**

16. Accept any valid two-step rule and correct sequence

Example: **Rule: +10 then -3, Sequence: 5, 12, 9, 16, 13, 20**

17. Answer: **1, 4, 16, 64, 256**

18. Algorithm example: **Step 1: Start at 6, Step 2: Add 2, Step 3: Repeat**

Numbers: **6, 8, 10, 12, 14**

19. Accept any valid alternating pattern

Example: **Start: 4, Rules: +10 then  $\div 2$ , Pattern: 4, 14, 7, 17, 8.5**

20. Accept any reasonable word problem with a pattern and correct solution

## Outstanding Achievement!

You've mastered number patterns and algorithms!

Keep creating and exploring patterns in mathematics!