



WORKSHEET 9

Year 6 Mathematics: Number & Patterns

Number Patterns & Rules

Focus: Sequences and Term-to-Term Rules

Name: _____ Date: _____

Understanding Number Patterns

Number Patterns are sequences of numbers that follow a rule.

Term-to-Term Rule: Describes how to get from one number to the next.

- Example: 2, 5, 8, 11, 14... (Rule: Start at 2, add 3 each time)
- Example: 20, 17, 14, 11... (Rule: Start at 20, subtract 3 each time)

Patterns with Rational Numbers: Patterns can include decimals and fractions!

- Example: 0.5, 1.0, 1.5, 2.0... (Rule: Add 0.5 each time)
- Example: $\frac{1}{2}$, 1, $1\frac{1}{2}$, 2... (Same pattern!)

Key Tip: Look at the difference between consecutive terms to find the rule!

Section 1: Finding the Next Numbers (Fluency)

1. Find the next two numbers in the sequence:

2, 6, 10, 14, ----, ----

What is the rule?

Answer: _____



2. Find the next two numbers in the sequence:

50, 45, 40, 35, _____, _____

What is the rule?

Answer: _____

3. Find the next two numbers in the sequence (decimals):

0.5, 1.0, 1.5, 2.0, _____, _____

What is the rule?

Answer: _____

4. Find the next two numbers in the sequence:

3, 9, 15, 21, _____, _____

What is the rule?

Answer: _____

5. Find the next two numbers in the sequence:

100, 90, 80, 70, _____, _____

What is the rule?

Answer: _____

6. Find the next two numbers in the sequence (decimals):

1.2, 2.4, 3.6, 4.8, _____, _____

What is the rule?

Answer: _____



PATTERN PRO!



Pattern Panda

Why did the number pattern go to school?

To learn its next term!

Section 2: Missing Terms (Reasoning)

7. Fill in the missing number:

3, 6, _____, 12, 15

Answer: _____

8. Fill in the missing number:

5, 10, 15, _____, 25, 30

Answer: _____

9. Fill in the missing number:

50, _____, 30, 20, 10

Answer: _____

10. Write a pattern that starts at 10 and subtracts 2.5 each time. Write the first 5 terms.

Answer: _____



11. Write a pattern that starts at 3 and adds 4 each time. Write the first 6 terms.

Answer: _____

12. Complete the pattern with fractions:

$\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, \text{-----}, \text{-----}$

Answer: _____

SEQUENCE SUPERSTAR!



Sequence Squirrel

What did one number say to the other in the pattern?

"You're next in line!"

Section 3: Visual Growing Patterns (Challenge)

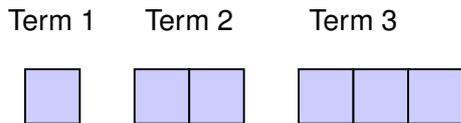
13. Look at this growing pattern:

Term 1	Term 2	Term 3	Term 4
●	●●●	●●●●●	Draw here

How many dots will Term 4 have?

Answer: _____

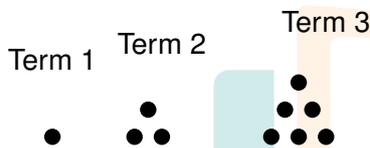
14. Look at this pattern of squares:



How many squares will Term 5 have? What is the rule?

Answer: _____

15. This pattern represents triangle numbers:



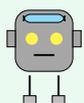
How many dots will Term 4 have? (Hint: Term 1 has 1, Term 2 has 3, Term 3 has 6...)

Answer: _____

16. Create your own growing pattern. Draw Terms 1, 2, and 3, and describe the rule.

Rule: _____

VISUAL PATTERN CHAMPION!



Pattern Detective

Why did the pattern go to the detective?

Because it wanted to find its missing term!



Fantastic Work! Check your answers on the next page.





ANSWER KEY

Worksheet 9: Sequences and Term-to-Term Rules

Section 1: Finding the Next Numbers

1. 18, 22 (Rule: Add 4 each time)
2. 30, 25 (Rule: Subtract 5 each time)
3. 2.5, 3.0 (Rule: Add 0.5 each time)
4. 27, 33 (Rule: Add 6 each time)
5. 60, 50 (Rule: Subtract 10 each time)
6. 6.0, 7.2 (Rule: Add 1.2 each time)

Section 2: Missing Terms

7. 9 (Pattern: 3, 6, 9, 12, 15 - adding 3 each time)
8. 20 (Pattern: 5, 10, 15, 20, 25, 30 - adding 5 each time)
9. 40 (Pattern: 50, 40, 30, 20, 10 - subtracting 10 each time)
10. 10, 7.5, 5, 2.5, 0 (Start at 10, subtract 2.5)
11. 3, 7, 11, 15, 19, 23 (Start at 3, add 4)
12. $1, 1\frac{1}{4}$ or $\frac{5}{4}, \frac{3}{2}$ (Adding $\frac{1}{4}$ each time)

Section 3: Visual Growing Patterns

13. Term 4 will have 7 dots (Pattern: 1, 3, 5, 7 - odd numbers, adding 2 each time)
14. Term 5 will have 5 squares (Rule: Term number = number of squares)
15. Term 4 will have 10 dots (Triangle numbers: 1, 3, 6, 10 - add one more than previous addition)
16. Student's own pattern (Check that the rule is consistent)



WORKSHEET 10

Year 6 Mathematics: Number & Patterns

Number Patterns & Rules

Focus: Function Machines and Input/Output

Name: _____

Date: _____

Understanding Function Machines

Function Machines take an input number, apply a rule, and produce an output number.



Finding the Rule: Compare multiple input-output pairs.

- If Input 2 gives Output 6, and Input 3 gives Output 9, the rule is "Multiply by 3"
- If Input 2 gives Output 5, and Input 3 gives Output 6, the rule is "Add 3"

Working Backwards: If you know the output and the rule, you can find the input!

Section 1: Follow the Machine (Fluency)

1. Use this function machine:



If the Input is 4, what is the Output?



Answer: _____

2. Using the same machine (Multiply by 3), if the Input is 10, what is the Output?

Answer: _____

3. Use this function machine:



If the Input is 8, what is the Output?

Answer: _____

4. Use this function machine:



If the Input is 20, what is the Output?

Answer: _____

5. Use this function machine:



If the Input is 18, what is the Output?

Answer: _____



6. Complete the table for the rule "Multiply by 5":

Input	Output
3	
6	
10	

Answers: _____

FUNCTION MASTER!



Machine Mouse

What did the function machine say to the number?

"Come on in, I'll transform you!"

Section 2: Find the Machine's Rule (Reasoning)

7. Look at these input-output pairs. What is the rule?

Input: 2 → Output: 5

Input: 3 → Output: 6

Input: 4 → Output: 7

Rule: _____

8. Look at these input-output pairs. What is the rule?

Input: 5 → Output: 10

Input: 6 → Output: 12

Input: 7 → Output: 14



Rule: _____

9. Look at these input-output pairs. What is the rule?

Input: 10 → Output: 5

Input: 8 → Output: 4

Input: 12 → Output: 6

Rule: _____

10. Look at these input-output pairs. What is the rule?

Input: 3 → Output: 12

Input: 5 → Output: 20

Input: 7 → Output: 28

Rule: _____

11. Complete the table by finding the rule first:

Input	Output
2	8
4	16
6	?
10	?

Rule: _____ **Missing outputs:** _____

12. Create your own function machine. Write the rule and give 3 input-output pairs.

Rule: _____

Input-Output Pairs: _____



RULE DETECTIVE!



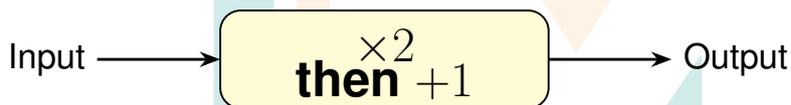
Detective Cat

Why was the function machine good at hide and seek?

Because it always knew the rule for finding things!

Section 3: Multi-Step Rules (Challenge)

13. This machine has a two-step rule: "Multiply by 2, then add 1"



If the Input is 5, what is the Output?

Answer: _____

14. This machine has a two-step rule: "Add 3, then multiply by 2"

If the Input is 4, what is the Output?

Answer: _____

15. Working Backwards: The Output is 20. The rule was "Multiply by 4".
What was the Input?

Answer: _____

16. Working Backwards: The Output is 15. The rule was "Add 7". What was the Input?



Answer: _____

17. Working Backwards: The Output is 12. The rule was "Multiply by 3, then subtract 3". What was the Input?

(Hint: Work backwards step by step - first undo the subtraction, then undo the multiplication)

Answer: _____

18. Challenge: A function machine uses the rule $y = 2x + 5$ where x is the input and y is the output.

If $x = 6$, what is y ?

Answer: _____

ALGORITHM GENIUS!



Algorithm Champion

What do you call a function machine that tells jokes?

A fun-ction machine!

Outstanding Work! Check your answers on the next page.



ANSWER KEY

Worksheet 10: Function Machines and Input/Output

Section 1: Follow the Machine

1. Output: 12 ($4 \times 3 = 12$)
2. Output: 30 ($10 \times 3 = 30$)
3. Output: 15 ($8 + 7 = 15$)
4. Output: 15 ($20 - 5 = 15$)
5. Output: 9 ($18 \div 2 = 9$)
6. Outputs: 15, 30, 50 (Multiply each input by 5)

Section 2: Find the Machine's Rule

7. Rule: Add 3 (Each output is 3 more than the input)
8. Rule: Multiply by 2 (Each output is double the input)
9. Rule: Divide by 2 (Each output is half the input)
10. Rule: Multiply by 4 (Each output is 4 times the input)
11. Rule: Multiply by 4; Missing outputs: 24, 40
12. Student's own function machine (Check that rule is applied consistently)

Section 3: Multi-Step Rules

13. Output: 11 ($5 \times 2 = 10$, then $10 + 1 = 11$)
14. Output: 14 ($4 + 3 = 7$, then $7 \times 2 = 14$)
15. Input: 5 (Work backwards: $20 \div 4 = 5$)
16. Input: 8 (Work backwards: $15 - 7 = 8$)
17. Input: 5 (Work backwards: $12 + 3 = 15$, then $15 \div 3 = 5$)
18. $y = 17$ ($y = 2 \times 6 + 5 = 12 + 5 = 17$)



Exceptional Achievement!

You've mastered Number Patterns & Rules!
From sequences to function machines!

