NumberWonders Fibonacci and Pattern Puzzle Pack v1

Pilot release - direct download edition

This pack helps grades 4-8 learners build sequence fluency, pattern reasoning, and rule-explanation skills through Fibonacci-focused puzzles and visual tasks.

Estimated Time: 10 sessions x 30-45 min

Format: Printable worksheet + puzzle board pack

Audience: Classrooms, clubs, homeschool enrichment

License: One classroom or one household

Fibonacci | Sequences | Visual patterns | Reasoning | Answer key included

Teacher Quick Start

1. Use one worksheet as warmup and one as challenge each session.
2. Ask students to state the pattern rule in words before calculating.
3. Compare two different valid methods after each puzzle.
4. Use the challenge board tasks for stations or homework.

Facilitation tip: Require one sentence of justification for every sequence answer. This boosts transfer and confidence.

Worksheet Index

Worksheet 1: Fibonacci Basics

Complete each sequence using F(n)=F(n-1)+F(n-2).

1) 0, 1, 1, 2, 3, __, __, __

2) 1, 1, 2, 3, 5, __, __

3) 2, 3, 5, 8, 13, __, __

4) 5, 8, 13, 21, __, __

5) 13, 21, 34, __, __, __

6) 34, 55, 89, __, __

7) 3, 5, 8, 13, __, __

8) 8, 13, 21, 34, __, __

Worksheet 2: Is It Fibonacci?

Mark Yes/No and justify your answer for four numbers.

1) 21: Yes / No

2) 22: Yes / No

3) 34: Yes / No

4) 35: Yes / No

5) 55: Yes / No

6) 56: Yes / No

7) 89: Yes / No

8) 90: Yes / No

Worksheet 3: Recursive and Explicit Clues

Find the next terms and identify the rule style.

1) 4, 7, 11, 18, 29, __, __

2) 2, 6, 12, 20, 30, __, __

3) 1, 4, 9, 16, 25, __, __

4) 3, 6, 12, 24, 48, __, __

5) 5, 9, 14, 23, 37, __, __

6) 10, 7, 11, 8, 12, 9, __, __

Worksheet 4: Pattern Machines

Use each rule machine to fill outputs.

Input n	Rule	Output
1	2n + 1	__
2	2n + 1	__
3	2n + 1	__
4	n^2 + 1	__
5	n^2 + 1	__
6	n^2 + 1	__
7	Fibonacci index n	__
8	Fibonacci index n	__

Worksheet 5: Visual Dot Patterns

Count dots by pattern, then predict figure 6.

Pattern A counts by +3 each step starting at 2: figure 1..5 = _____

Pattern B is square numbers: figure 1..5 = _____

Pattern C follows Fibonacci: figure 1..7 = _____

For Pattern A, figure 6 = ____ ; Pattern B figure 6 = ____ ; Pattern C figure 8 = ____

> Extension: Draw a dot sketch for one of the sequences and explain the growth.

Worksheet 6: Golden Ratio Approximations

Compute each ratio F(n+1)/F(n) and observe the trend.

1) 2/1 = _____

2) 3/2 = _____

3) 5/3 = _____

4) 8/5 = _____

5) 13/8 = _____

6) 21/13 = _____

7) 34/21 = _____

8) 55/34 = _____

What value do these seem to approach? _____

Worksheet 7: Number Pattern Puzzles

Find the missing number or expression.

1) 7, 10, 13, 16, __

2) 3, 6, 12, 24, __

3) 1, 1, 2, 3, 5, 8, __

4) 2, 5, 10, 17, 26, __

5) 81, 27, 9, 3, __

6) 4, 9, 16, 25, 36, __

7) 2, 4, 7, 11, 16, __

8) 5, 9, 14, 20, 27, __

Worksheet 8: Word Problems with Sequences

Build an equation and solve.

1. A rabbit model follows Fibonacci births: 1,1,2,3,5,... How many in month 8?
2. A staircase pattern adds 2 tiles each step starting with 3. How many at step 12?
3. A club doubles members every week starting at 4. How many after 6 weeks?
4. A square garden grows by one ring each season. If side lengths are 1,3,5,7,... what is side at season 10?

Worksheet 9: Pattern Proof Starters

Complete each explanation sentence.

1) This sequence is arithmetic because _____

2) This sequence is geometric because _____

3) Fibonacci differs from arithmetic because _____

4) To verify a term belongs to a sequence, I should _____

5) A visual model helps because _____

6) If two rules fit early terms, we can decide by _____

Worksheet 10: Fibonacci Challenge Board

Solve any 8 tasks.

1) Write Fibonacci terms from F1 to F12.

2) Find two consecutive Fibonacci numbers whose ratio is closest to 1.62.

3) Build a sequence with rule a(n)=a(n-1)+3 starting from 2.

4) Build a sequence with rule a(n)=2a(n-1) starting from 3.

5) Which grows faster after 10 terms: Fibonacci or powers of 2?

6) Write an explicit formula for sequence 5,9,13,17,...

7) Give one real-world pattern that is approximately Fibonacci-like.

8) Create a 6-term puzzle sequence for a partner to solve.

9) Decide whether 144 is Fibonacci and justify.

10) Explain one common mistake when extending sequences.

Answer Key

Worksheet 1

1) 5,8,13 2) 8,13 3) 21,34 4) 34,55 5) 55,89,144 6) 144,233 7) 21,34 8) 55,89

Worksheet 2

1 Yes 2 No 3 Yes 4 No 5 Yes 6 No 7 Yes 8 No

Worksheet 3

1) 47,76 2) 42,56 3) 36,49 4) 96,192 5) 60,97 6) 13,10

Worksheet 4

2n+1 outputs: 3,5,7 ; n^2+1 outputs for 4,5,6: 17,26,37 ; Fibonacci index 7 and 8: 13,21

Worksheet 5

Pattern A: 2,5,8,11,14 ; Pattern B: 1,4,9,16,25 ; Pattern C: 1,1,2,3,5,8,13 ; next values A6=17, B6=36, C8=21

Worksheet 6

1) 2.00 2) 1.50 3) 1.67 4) 1.60 5) 1.625 6) 1.615 7) 1.619 8) 1.618 ; approaches about 1.618

Worksheet 7

1) 19 2) 48 3) 13 4) 37 5) 1 6) 49 7) 22 8) 35

Worksheet 8

1) 21 2) 25 3) 256 4) 19

Worksheet 9

Open responses. Key points: arithmetic has constant difference, geometric has constant ratio, Fibonacci uses two previous terms.

Worksheet 10

Sample outcomes: F1..F12 = 1,1,2,3,5,8,13,21,34,55,89,144 ; ratio close to 1.62 from 55/34, 89/55, etc.; 144 is Fibonacci (F12).