

Day 1: Number Sequences & Patterns Worksheet

Topic: Recognizing arithmetic, geometric, alternating, and multi-step number patterns

Worked Examples & Strategy Review

a) Common Difference (Arithmetic Sequence)

3, 6, 9, 12, ...

Solution: The missing number is 15. The common difference between each term is +3.

b) Multiple Operations working together

5, 5, 15, 75, 525, ...

Solution: The missing number is 4725. Multiply by increasing odd integers:

$$5 \times 1 = 5 \quad \rightarrow \quad 5 \times 3 = 15 \quad \rightarrow \quad 15 \times 5 = 75 \quad \rightarrow \quad 75 \times 7 = 525 \quad \rightarrow \quad 525 \times 9 = 4725$$

c) Alternating Sequences (Interleaved Rules)

1, 9, 3, 6, 5, ...

Solution: The missing number is 3.

- Odd positions (1st, 3rd, 5th, ...): 1, 3, 5, ... (increases by 2)
- Even positions (2nd, 4th, 6th, ...): 9, 6, 3, ... (decreases by 3)

Problem 1: Find the next number in the pattern:

7, 14, 21, 28, 35, ____

- (A) 39
- (B) 41
- (C) 42
- (D) 40

Problem 2: Find the next number in the sequence:

6, 13, 6, 18, 6, ____

- (A) 23
- (B) 6
- (C) 24
- (D) 22

Problem 3: Determine the next term:

10, 15, 5, 25, 20, ____

- (A) -25
- (B) -40
- (C) 70
- (D) 45

Problem 4: What comes next in the sequence?

20, 2, 18, 4, 16, ____

- (A) 6
- (B) 10
- (C) 2
- (D) 20

Problem 5: Find the next number in the pattern:

24, 12, 36, 9, 48, ____

- (A) 7.25
- (B) 8
- (C) 6
- (D) 7

Problem 6: Determine the next term:

11, 11, 22, 66, 264, ____

- (A) 1400
- (B) 528
- (C) 1320
- (D) 1540

Problem 7: Find the next number:

2, 5, 1, 6, 0, ____

- (A) -5
- (B) 5
- (C) 7
- (D) -4

Problem 8: Find the missing term:

100, 108, 92, 124, 60, ____

- (A) 124
- (B) 100
- (C) 188
- (D) 120

Problem 9: What number comes next in this pattern?

2, 4, 8, 16, ____

- (A) 22
- (B) 24
- (C) 30
- (D) 32
- (E) 36

Problem 10: What number is missing from the sequence below?

3, 6, 9, 12, ____, 18

- (A) 13
- (B) 14
- (C) 15
- (D) 16
- (E) 17

Problem 11: Find the next two numbers in the sequence:

1, 5, 2, 6, 3, 7, 4, ____, ____

- (A) 8, 5
- (B) 4, 8
- (C) 2, 3
- (D) 7, 9

Problem 12: Find the missing number in the following sequence:

28, 33, 31, 36, ____, 39

- (A) 30
- (B) 32
- (C) 33
- (D) 34

Problem 13: Find the missing number in the sequence:

1, 10, 3, 8, ____, 6, 7, 4, 9, 2

- (A) 8
- (B) 9
- (C) 5
- (D) 11

Problem 14: What comes next in the prime number sequence?

2, 3, 5, 7, 11, 13, 17, 19, ____, 29

- (A) 23
- (B) 22
- (C) 25
- (D) 30

Problem 15: Find the missing term in the sequence:

916, 015, ____, 213, 312, 411

- (A) 123
- (B) 332
- (C) 113
- (D) 114

Problem 16: Find the next number in the pattern:

25, 5, 36, 6, 81, 9, 121, ____

- (A) 11
- (B) 12
- (C) 15
- (D) 13

Problem 17: What comes next in the series?

1, 2, 3, 5, 7, 10, 13, ____

- (A) 13
- (B) 15
- (C) 17
- (D) 19

Problem 18: What is the next term in the sequence?

1, 2, 6, 24, 120, ____

- (A) 240
- (B) 520
- (C) 740
- (D) 720

Problem 19: Determine the next term in the pattern:

15, 25, 30, 50, 60, 100, ____

- (A) 110
- (B) 120
- (C) 130
- (D) 140

Problem 20: In a number sequence, Giorgi erased three numbers, which are marked with $\square$:

$\square$, 39, $\square$, 63, 75, $\square$, 99, 111, ...

Find the sum of the three erased numbers.

- (A) 155
- (B) 160
- (C) 165
- (D) 170
- (E) 175

Problem 21: Find the next term in the pattern:

1, 3, 7, 15, 31, ____

- (A) 48
- (B) 57
- (C) 63
- (D) 65

Problem 22: What number should replace the asterisk (*) in the sequence below?

7, 17, 37, 77, *, 317, ...

- (A) 147
- (B) 157
- (C) 167
- (D) 177

Problem 23: Consider the pattern:

1, 1, 2, 3, 5, 8, 13, ...

Find the **sum of the next three terms** in this sequence.

- (A) 95
- (B) 104
- (C) 110
- (D) 118

Problem 24: Find the next term in the sequence:

1, 4, 9, 18, 35, ...

- (A) 68
- (B) 66
- (C) 70
- (D) 72

Problem 25:

1, 2, 2, 3, 3, 4, 4, 4, 5, 5, 5, 6, 6, 6, 7, 7, 7, 7, 8, 8, 8, 8, 9, 9, 9, 9, ...

Derive the sum of the next 5 terms following the four 9s shown above.

- (A) 50
- (B) 48
- (C) 52
- (D) 46

Problem 26: Find the next term in the sequence:

99, 92, 86, 81, 77, ...

- (A) 74
- (B) 73
- (C) 72
- (D) 75

Problem 27: Find the next term in the sequence:

0, 4, 2, 6, 4, 8, ...

- (A) 6
- (B) 10
- (C) 8
- (D) 12

Problem 28: Find the next term in the sequence:

8723, 3872, 2387, ...

- (A) 7238
- (B) 2738
- (C) 8237
- (D) 7382

Problem 29: (*New York Times Puzzle*) Find the next term in the sequence:

2, 3, 3, 5, 10, 13, 39, 43, 172, 177, ...

- (A) 885
- (B) 182
- (C) 708
- (D) 354

Problem 30: Find the next term in the sequence:

5, 7, 12, 19, 31, 50, ...

- (A) 81
- (B) 88
- (C) 75
- (D) 83

Problem 31: Find the next term in the sequence:

4, 7, 15, 29, 59, 117, ...

- (A) 235
- (B) 234
- (C) 236
- (D) 237

Problem 32: Find the next term in the sequence:

126, 63, 190, 95, 286, 143, 430, 215, 646, 323, 970, ...

- (A) 485
- (B) 2911
- (C) 486
- (D) 1940

Problem 33: Find the next term in the sequence:

31, 94, 47, 142, 71, 214, 107, 322, 161, ...

- (A) 484
- (B) 80.5
- (C) 482
- (D) 323

Problem 34: Find the next term in the sequence:

2, 4, 5, 10, 12, 24, 27, ...

- (A) 54
- (B) 30
- (C) 51
- (D) 29

Problem 35: Find the next term in the sequence:

3, 8, 15, 24, 35, ...

- (A) 48
- (B) 46
- (C) 50
- (D) 49

Problem 36: Find the next term in the sequence:

7, 5, 8, 4, 9, 3, ...

- (A) 10
- (B) 2
- (C) 11
- (D) 1