

ALPHALEARN STUDYLAB

STD 6

MATHEMATICS

Ganita Prakash — Publication-Grade Practice Worksheets

Concept Builder • Concept Mastery • Exam Mastery

Based on CBSE / NCERT Curriculum | Answer Keys Included

STD 6 — MATHEMATICS

Publication-Grade Practice Worksheets | AlphaLearn Studylab

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CHAPTER 1

Patterns in Mathematics

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Class 6 Mathematics — Chapter 1: Patterns in Mathematics
WORKSHEET 1 — PRACTICE PROBLEMS

Name: _____ Date: _____

Class: _____ Roll No: _____

Total Marks: 30 Score: _____ / 30

Section A: Number Sequences (12 Marks)

Q1. Write the next 3 numbers in each sequence: (1 mark each)

a) 1, 3, 5, 7, 9, _____, _____, _____

b) 1, 4, 9, 16, 25, _____, _____, _____

c) 1, 3, 6, 10, 15, _____, _____, _____

d) 1, 2, 3, 5, 8, 13, _____, _____, _____

Q2. Write the name of each sequence: (1 mark each)

a) 2, 4, 6, 8, 10, 12 ... → _____

b) 1, 8, 27, 64, 125 ... → _____

c) 1, 2, 4, 8, 16, 32 ... → _____

d) 1, 3, 9, 27, 81 ... → _____

Section B: Relations Among Sequences (10 Marks)

Q3. Add the following odd numbers and write what kind of number you get: (2 marks)

a) $1 + 3 + 5 =$ _____ → This is a _____ number

b) $1 + 3 + 5 + 7 + 9 =$ _____ → This is a _____ number

Q4. Fill in the blanks — Adding up and down pattern: (3 marks)

$1 + 2 + 1 =$ _____

$1 + 2 + 3 + 2 + 1 =$ _____

$1 + 2 + 3 + 4 + 3 + 2 + 1 =$ _____

These all give _____ numbers.

Q5. Find the sum: (5 marks)

a) Sum of first 5 odd numbers = _____

b) Sum of first 7 odd numbers = _____

c) Sum of first 10 odd numbers = _____

d) Sum of first 100 odd numbers = _____

e) $1 + 3 + 5 + \dots + 99 =$ _____ (How many odd numbers is this? _____)

Section C: Patterns in Shapes (8 Marks)

Q6. Count and write the number sequence: (4 marks)

a) Number of sides in Regular Polygons (starting from triangle): ____, ____, ____, ____, ____, ____, ____, ____

b) Number of corners in each Regular Polygon above: ____, ____, ____, ____, ____, ____, ____, ____

c) Number of small squares in Stacked Squares: 1, ____, ____, ____, ____

d) Number of small triangles in Stacked Triangles: 1, ____, ____, ____, ____

Q7. For Koch Snowflake, number of line segments are 3, 12, 48, ... (4 marks)

a) What is the next number? ____

b) Write this as a multiplication pattern: $3, 3 \times _, 3 \times _ \times _, \dots$

c) Each shape has ____ times more segments than the previous one.

d) This is related to which number sequence? _____

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Class 6 Mathematics — Chapter 1: Patterns in Mathematics
WORKSHEET 2 — CONCEPT SUMMARY + QUESTIONS

Name: _____ Date: _____

Class: _____ Roll No: _____

Total Marks: 25 Score: _____ / 25

 Concept Summary

Mathematics	Search for patterns and their explanations
Number Theory	Branch that studies patterns in whole numbers
Triangular Numbers	1, 3, 6, 10, 15, 21 ... (dots form triangles)
Square Numbers	1, 4, 9, 16, 25 ... (sum of consecutive odd numbers)
Virahanka Numbers	1, 2, 3, 5, 8, 13 ... (each = sum of previous two)
Geometry	Branch that studies patterns in shapes (1D, 2D, 3D)

 Questions Based on Concepts

Q1. Fill in the blanks using the concept summary above: (5 marks)

- a) Mathematics is the search for _____ and their _____.
- b) The branch of Mathematics that studies whole number patterns is called _____.
- c) Dots arranged in a triangle shape give _____ numbers.
- d) The Virahanka sequence rule is: each number = _____ + _____.
- e) The branch that studies shape patterns is called _____.

Q2. Give ONE real-life example for each: (5 marks)

- a) Pattern in nature: _____
- b) Pattern in technology: _____
- c) Pattern in buildings: _____
- d) Pattern used in science: _____
- e) Pattern in everyday life: _____

Q3. Match the sequence with its correct name: (5 marks)

- 1, 8, 27, 64, 125 ... → a) Even numbers
- 2, 4, 6, 8, 10 ... → b) Powers of 2
- 1, 3, 6, 10, 15 ... → c) Cube numbers
- 1, 2, 4, 8, 16 ... → d) Triangular numbers
- 1, 2, 3, 5, 8, 13 ... → e) Virahanka numbers

Q4. Answer in 2-3 lines: (10 marks)

- a) Why is 36 a special number? (Hint: it is both triangular and square) (4 marks)
- b) How do pictures help us understand number sequences? Give one example. (3 marks)
- c) What is a hexagonal number? Write the first four. (3 marks)

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Class 6 Mathematics — Chapter 1: Patterns in Mathematics
WORKSHEET 3 — MULTIPLE CHOICE QUESTIONS (MCQ)

Name: _____ Date: _____

Class: _____ Roll No: _____

Total Marks: 20 Score: _____ / 20

Circle the correct answer. Each question carries 1 mark.

Section A: Number Sequences (10 Marks)

1. Which branch of Mathematics studies patterns in whole numbers?

A) Geometry B) Number Theory C) Algebra D) Statistics

Answer: _____

2. What is the next number in: 1, 3, 6, 10, 15, ____?

A) 18 B) 20 C) 21 D) 25

Answer: _____

3. Which of the following is a Virahanka (Fibonacci) number?

A) 7 B) 9 C) 13 D) 15

Answer: _____

4. What do you get when you add the first 4 odd numbers (1+3+5+7)?

A) 14 B) 16 C) 18 D) 20

Answer: _____

5. The sequence 1, 4, 9, 16, 25 is called:

A) Triangular numbers B) Cube numbers C) Square numbers D) Even numbers

Answer: _____

6. Powers of 2 starting from 1 are: 1, 2, 4, 8, ____?

A) 10 B) 12 C) 14 D) 16

Answer: _____

7. What is the 6th triangular number?

A) 15 B) 21 C) 28 D) 36

Answer: _____

8. $1+2+3+2+1 = ?$ This is which square number?

A) 4 B) 9 C) 16 D) 25

Answer: _____

9. Which number is BOTH a triangular number AND a square number?

A) 16 B) 25 C) 36 D) 49

Answer: _____

10. Virahanka sequence rule is: each term = ?

A) Previous term + 2 B) Previous two terms added C) Previous term $\times$ 2 D) Previous term + 3

Answer: _____

Section B: Shape Sequences (10 Marks)

11. How many sides does a Heptagon have?

A) 6 B) 7 C) 8 D) 9

Answer: ____

12. In the Complete Graphs sequence, K4 has how many lines?

A) 4 B) 5 C) 6 D) 7

Answer: ____

13. The sequence of Stacked Squares gives which number sequence?

A) Triangular numbers B) Cube numbers C) Square numbers D) Even numbers

Answer: ____

14. In Koch Snowflake, to get the next shape you replace each line with a:

A) Triangle B) Square C) Speed bump shape D) Hexagon

Answer: ____

15. How many line segments does the 1st Koch Snowflake shape have?

A) 3 B) 6 C) 9 D) 12

Answer: ____

16. Number of line segments in Koch Snowflake goes: 3, 12, 48, ... What is next?

A) 96 B) 144 C) 192 D) 200

Answer: ____

17. In Regular Polygons, number of sides = number of:

A) Diagonals B) Corners C) Angles only D) Lines inside

Answer: ____

18. Number of triangles in Stacked Triangles gives which sequence?

A) Triangular numbers B) Square numbers C) Even numbers D) Cube numbers

Answer: ____

ANSWER KEY — Chapter 1: Patterns in Mathematics

Worksheet 1 — Practice Problems: Detailed Answer Key

Section A

Q1. a) 11, 13, 15 (odd numbers) b) 36, 49, 64 (square numbers) c) 21, 28, 36 (triangular numbers) d) 21, 34, 55 (Virahanka numbers)

Q2. a) Even numbers b) Cube numbers c) Powers of 2 d) Powers of 3

Section B

Q3. a) $1+3+5 = 9 \rightarrow$ square number (3^2) b) $1+3+5+7+9 = 25 \rightarrow$ square number (5^2)

Q4. $1+2+1 = 4$; $1+2+3+2+1 = 9$; $1+2+3+4+3+2+1 = 16$. These all give square numbers.

Q5. a) 25 (5^2) b) 49 (7^2) c) 100 (10^2) d) 10000 (100^2) e) 2500 (50^2) — this is the sum of 50 odd numbers

Section C

Q6. a) 3, 4, 5, 6, 7, 8, 9, 10 b) 3, 4, 5, 6, 7, 8, 9, 10 (same as sides — a regular polygon has equal sides and corners) c) 1, 4, 9, 16, 25 (square numbers) d) 1, 4, 9, 16, 25 (square numbers — each new triangular layer adds an odd number of small triangles, and consecutive odd numbers add up to squares)

Q7. a) 192 (48×4) b) 3, 3×4 , $3 \times 4 \times 4$ c) 4 times more d) Powers of 4 (multiplying by 4 each time)

Worksheet 2 — Concept Summary + Questions: Detailed Answer Key

Q1. a) patterns; explanations b) Number Theory c) triangular d) previous two numbers (sum of previous two) e) Geometry

Q2. *Sample correct answers (accept any valid real-life example):*

a) Pattern in nature — spiral arrangement of seeds in a sunflower / petals of a flower

b) Pattern in technology — repeating pixel grids on a screen / binary code (0s and 1s)

c) Pattern in buildings — repeating tile or brick arrangements on a floor or wall

d) Pattern used in science — arrangement of atoms in a crystal / the repeating pattern of the periodic table

e) Pattern in everyday life — the repeating 7-day week / the sequence of traffic light colours

Q3. 1,8,27,64,125 $\rightarrow$ c) Cube numbers | 2,4,6,8,10 $\rightarrow$ a) Even numbers | 1,3,6,10,15 $\rightarrow$ d) Triangular numbers | 1,2,4,8,16 $\rightarrow$ b) Powers of 2 | 1,2,3,5,8,13 $\rightarrow$ e) Virahanka numbers

Q4. a) 36 is special because it is both a triangular number ($1+2+3+4+5+6+7+8 = 36$, the 8th triangular number) AND a perfect square ($6^2 = 36$) — very few numbers have both properties.

b) Pictures help us see patterns instantly instead of just calculating them. For example, arranging dots in a triangle shape immediately shows why 1, 3, 6, 10, 15 are called triangular numbers — you can literally see the triangle growing.

c) Hexagonal numbers follow the rule $n(2n-1)$. The first four hexagonal numbers are: 1, 6, 15, 28.

Worksheet 3 — MCQ: Answer Key

Section A: 1-B, 2-C (21), 3-C (13), 4-B (16), 5-C, 6-D (16), 7-B (21), 8-B ($9 = 3^2$), 9-C (36), 10-B

Section B: 11-B (7), 12-C (6), 13-C, 14-C, 15-A (3), 16-C (192), 17-B, 18-B