Patterns in Mathematics

Practice Worksheet 1 — Fill in the Blanks | MCQ | True/False | Solve

Name:	**Class:**	**Section:**
Date:	**Roll No.:**	**Marks: ____ / 20**

1. Fill in the Blanks

1. The sequence 1, 4, 9, 16, 25, ... is called the sequence of _____ numbers.

2. The next number in the pattern 1, 3, 6, 10, 15, _____ is the 6th triangular number.

3. Adding the first 5 odd numbers (1 + 3 + 5 + 7 + 9) gives the square number _____.

4. A regular polygon with 6 equal sides and 6 equal angles is called a _____.

5. The branch of Mathematics that studies patterns in whole numbers is called _____.

2. Multiple Choice Questions

1. Which of the following is a sequence of triangular numbers?

(a) 1, 4, 9, 16 (b) 1, 3, 6, 10 (c) 1, 2, 4, 8 (d) 1, 3, 5, 7

2. The next term in the pattern 2, 4, 6, 8, 10, ___ is:

(a) 11 (b) 12 (c) 14 (d) 13

3. The sequence 1, 2, 3, 5, 8, 13, 21, ... is known as:

(a) Powers of 2 (b) Cubes (c) Virahānka numbers (d) Even numbers

4. The shape sequence whose number of sides follows 3, 4, 5, 6, 7, ... is called:

(a) Complete graphs (b) Regular polygons (c) Koch snowflake (d) Stacked squares

5. The sequence 1, 8, 27, 64, 125, ... is the sequence of:

(a) squares (b) cubes (c) triangular numbers (d) powers of 3

3. True or False

1. Number theory is the branch of mathematics that studies patterns in shapes. (True / False)

2. 36 is both a triangular number and a square number. (True / False)

3. The sum of the first n odd numbers is always a square number. (True / False)

4. A hexagon has 5 sides. (True / False)

5. The Powers of 2 sequence is 1, 2, 4, 8, 16, 32, ... (True / False)

4. Solve the Following

1. Write the next three terms of the sequence: 1, 3, 6, 10, 15, __, __, __

2. Find the sum of the first 6 odd numbers using the pattern rule you have learnt.

3. How many dots are needed to form the 5th triangular number? Show the pattern rule you used.

4. The Regular Polygon sequence starts with a triangle (3 sides). What is the name of the regular polygon with 8 sides?

5. The Virahānka sequence begins 1, 1, 2, 3, 5, 8, 13, ... Find the next two terms and state the rule.

Answer Key — Worksheet 1

1. Fill in the Blanks

1. squares (square numbers)
2. 21
3. 25
4. hexagon
5. number theory

2. Multiple Choice Questions

1. (b) 1, 3, 6, 10
2. (b) 12
3. (c) Virahānka numbers
4. (b) Regular polygons
5. (b) cubes

3. True or False

1. False
2. True
3. True
4. False
5. True

4. Solve the Following

1. 21, 28, 36 (each term adds the next counting number: +6, +7, +8)
2. 1+3+5+7+9+11 = 36 (since sum of first n odd numbers = n^2, here $6^2 = 36$)
3. 15 dots (Triangular numbers: 1, 3, 6, 10, 15 — the 5th term is 15)
4. Octagon
5. 21, 34 (Rule: each term is the sum of the two terms before it)

Patterns in Mathematics

Practice Worksheet 2 — Fill in the Blanks | MCQ | True/False | Solve

Name:	**Class:**	**Section:**
Date:	**Roll No.:**	**Marks: ____ / 20**

1. Fill in the Blanks

1. Adding the All 1's sequence (1, 1, 1, 1, ...) repeatedly gives the _____ numbers.

2. The sequence 1, 3, 9, 27, 81, ... is called the sequence of Powers of _____.

3. The shape sequence made of little squares stacked to form bigger squares is called _____ Squares.

4. In a Complete Graph K4 (4 points, every pair joined by a line), the number of lines is _____.

5. The number of dots needed to form the 4th square number is _____.

2. Multiple Choice Questions

1. What is the 6th triangular number?

(a) 15 (b) 21 (c) 28 (d) 10

2. Which sequence is 1, 7, 19, 37, ...?

(a) Cubes (b) Hexagonal numbers (c) Squares (d) Triangular numbers

3. How many lines (edges) does K3 (Complete Graph with 3 points) have?

(a) 2 (b) 3 (c) 4 (d) 6

4. The pattern 1 + 2 + 3 + 2 + 1 equals:

(a) 6 (b) 9 (c) 7 (d) 8

5. Which of these is NOT a regular polygon?

(a) Rectangle with unequal sides (b) Square (c) Equilateral triangle (d) Regular pentagon

3. True or False

1. Cube numbers are formed by multiplying a number by itself twice more (n × n × n). (True / False)

2. The Koch Snowflake has the same number of line segments at every stage. (True / False)

3. The odd number pattern is formed by adding 2 to the previous term. (True / False)

4. A quadrilateral is a shape with 5 sides. (True / False)

5. Geometry is the branch of Mathematics that studies patterns in shapes. (True / False)

4. Solve the Following

1. Find the 7th term of the sequence of Powers of 2: 1, 2, 4, 8, 16, 32, __

2. Add pairs of consecutive triangular numbers: 1+3, 3+6, 6+10, 10+15. Write the sequence you get.

3. The 4th shape of the Stacked Triangles pattern contains 16 small triangles (n^2 rule). How many small triangles will the 5th shape contain?

4. Multiply the 4th triangular number (10) by 6 and add 1. What number do you get, and which sequence does it belong to?

5. State the rule for forming Virahānka numbers and find the 9th term of 1, 1, 2, 3, 5, 8, 13, 21, __

Answer Key — Worksheet 2

1. Fill in the Blanks

1. counting
2. 3
3. Stacked
4. 6
5. 16

2. Multiple Choice Questions

1. (b) 21
2. (b) Hexagonal numbers
3. (b) 3
4. (b) 9
5. (a) Rectangle with unequal sides

3. True or False

1. True
2. False
3. True
4. False
5. True

4. Solve the Following

1. 64 (each term is double the previous term)
2. 4, 9, 16, 25 — these are square numbers
3. 25 small triangles ($5^2 = 25$)
4. $10 \times 6 + 1 = 61$, which is a hexagonal number (1, 7, 19, 37, 61, ...)
5. Rule: add the two previous terms. The 9th term is 34

Patterns in Mathematics

Practice Worksheet 3 — Fill in the Blanks | MCQ | True/False | Solve

Name:	Class:	Section:
Date:	Roll No.:	Marks: ____ / 20

1. Fill in the Blanks

1. The sequence 1, 2, 4, 8, 16, 32, ... is the sequence of _____ of 2.

2. The pattern 1 + 2 + 3 + 4 + 3 + 2 + 1 gives the square number _____.

3. A regular shape with 9 equal sides is called a _____.

4. The number of dots in the 3rd cube number (1, 8, 27, ...) is _____.

5. Number sequences that increase or decrease by the same fixed amount each time show a(n) _____ pattern.

2. Multiple Choice Questions

1. Which number is both a triangular number and a perfect square?

(a) 21 (b) 36 (c) 45 (d) 28

2. The sum of the first 5 odd numbers (1+3+5+7+9) equals:

(a) 15 (b) 20 (c) 25 (d) 30

3. Which sequence is 1, 4, 9, 16, 25, ...?

(a) Cubes (b) Squares (c) Triangular numbers (d) Hexagonal numbers

4. A regular polygon with 10 sides is called a:

(a) Nonagon (b) Decagon (c) Octagon (d) Heptagon

5. 1 + 3 + 5 + 7 = ?

(a) 14 (b) 15 (c) 16 (d) 18

3. True or False

1. The Koch Snowflake pattern is formed by replacing each line segment with a small ‘speed bump’. (True / False)

2. The All 1's sequence (1, 1, 1, 1, ...) never changes value. (True / False)

3. Adding counting numbers up and down (like 1+2+1) never gives square numbers. (True / False)

4. K5 (Complete Graph with 5 points) has a line joining every pair of points. (True / False)

5. The even number pattern 2, 4, 6, 8, ... increases by 3 each time. (True / False)

4. Solve the Following

1. Find the sum of the first 10 odd numbers using the rule sum = n^2.

2. Multiply the 3rd triangular number (6) by 6 and add 1. Which sequence does the answer belong to?

3. Find the number of edges in K6 (Complete Graph with 6 points) using the rule n(n−1)/2.

4. Add the first four powers of 2: 1 + 2 + 4 + 8. Then add 1 to your answer. What do you notice?

5. Write the next three terms of the hexagonal number sequence: 1, 7, 19, 37, __, __, __

Answer Key — Worksheet 3

1. Fill in the Blanks

1. Powers
2. 16
3. nonagon
4. 27
5. arithmetic

2. Multiple Choice Questions

1. (b) 36
2. (c) 25
3. (b) Squares
4. (b) Decagon
5. (c) 16

3. True or False

1. True
2. True
3. False
4. True
5. False

4. Solve the Following

1. $10^2 = 100$
2. $6 \times 6 + 1 = 37$, a hexagonal number (1, 7, 19, 37, ...)
3. $6 \times 5 \div 2 = 15$ edges
4. 1+2+4+8 = 15, and 15+1 = 16, which is the next power of 2 (2^4)
5. 61, 91, 127