CLASS VIII – MATHEMATICS

Chapter Test: Number Play

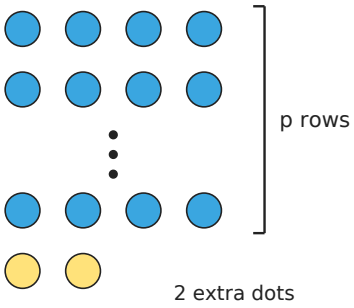
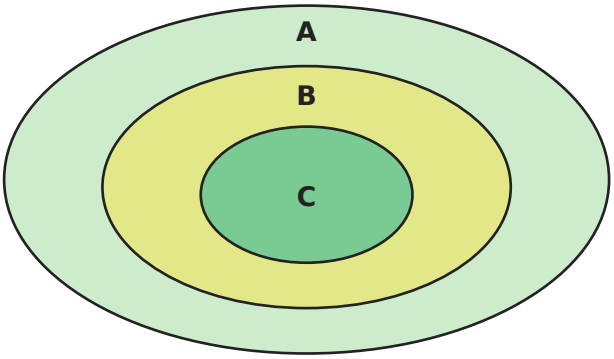
(Ganita Prakash, Grade 8, Part I – Chapter 5)

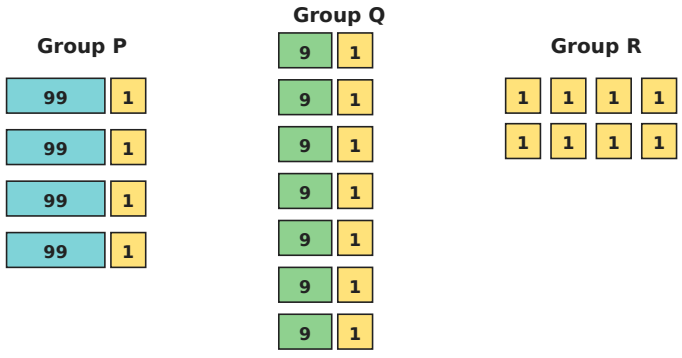
Time: 1½ Hours **M. M.: 40**

General Instructions:

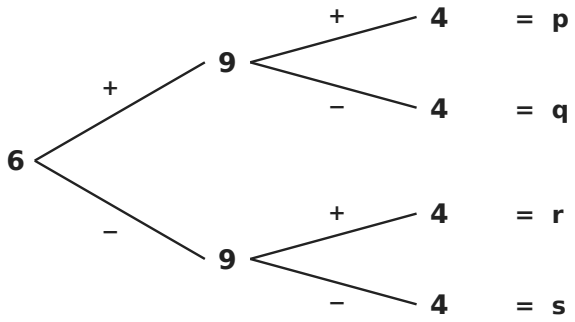
1. This paper contains 20 questions. All questions are compulsory.
2. This paper is divided into 4 sections: **A, B, C** and **D**.
3. In **Section A**, Questions no. 1 to 10 are Multiple Choice Questions carrying 1 mark each.
4. In **Section B**, Questions no. 11 to 13 are Very Short Answer type questions carrying 2 marks each.
5. In **Section C**, Questions no. 14 to 17 are Short Answer type questions carrying 3 marks each.
6. In **Section D**, Questions no. 18 to 20 are Long Answer / Case-based questions carrying 4 marks each.
7. There is no overall choice. However, an internal choice has been provided in 1 question of Section B, 3 questions of Section C and 2 questions of Section D.
8. Figures are only for reference and are not drawn to scale. Questions 9, 10, 11, 14 and 18 are figure-based.
9. Show all the steps of your working.
10. Use of calculator is **not** allowed.

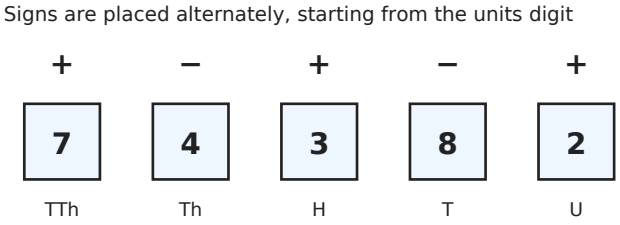
Q. No.	Section – A	Marks
1	The sum of four consecutive natural numbers is 42. The smallest of these numbers is (A) 8 (B) 9 (C) 10 (D) 11	**[1]**
2	Which of the following expressions gives an even number for all integer values of m and n? (A) $6m - 4n$ (B) $3m + 5n$ (C) $m^2 + 1$ (D) $4m + 3n$	**[1]**
3	Which expression represents all numbers that leave a remainder of 4 when divided by 7? (A) $7k - 4$ (B) $4k + 7$ (C) $7k + 4$ (D) $4k - 7$	**[1]**
4	Which of the following numbers is divisible by 9? (A) 2,347 (B) 6,031 (C) 8,114 (D) 5,382	**[1]**
5	The remainder when 4,287 is divided by 9 is (A) 0 (B) 6 (C) 7 (D) 3	**[1]**
6	Which of the following numbers is divisible by 11? (A) 3,728 (B) 3,727 (C) 3,729 (D) 3,730	**[1]**
7	If a number is divisible by both 8 and 12, it must also be divisible by (A) 96 (B) 24 (C) 48 (D) 20	**[1]**
8	The digital root of 7,865 is (A) 8 (B) 2 (C) 6 (D) 5	**[1]**

Q. No.	Section – A	Marks
9	The dots in Fig. 1 are arranged in rows of 4, with p full rows and one more row of 2 dots. The number of dots is  Fig. 1: Dots arranged in rows of 4 (A) 4p (B) 4p + 2 (C) 2p + 4 (D) 4p − 2	**[1]**
10	Fig. 2 shows a Venn diagram of the multiples of 5, 10 and 30. The regions A, B and C represent, respectively, the multiples of  Fig. 2: Multiples of 5, 10 and 30 (A) 30, 10, 5 (B) 10, 5, 30 (C) 5, 10, 30 (D) 5, 30, 10	**[1]**

Q. No.	Section – B	Marks
11	In Fig. 3, each long block labelled 99 comes with a unit tag 1, and each short block labelled 9 comes with a unit tag 1. Group R has loose unit tags.  Fig. 3: A number built from blocks (i) Find the number represented in Fig. 3. [1] (ii) Use the figure to find the remainder when this number is divided by 9. [1]	**[2]**

Q. No.	Section – B	Marks
12	(A) Without calculating, state whether each is even or odd, giving a reason: (i) 487 + 215 (ii) 36 × 59 (iii) 714 − 303. **OR** (B) Show that 6m + 4n is always even for any integers m and n. Give one value of x for which x^2 + 4 is odd.	**[2]**
13	Write an algebraic expression for all numbers that leave a remainder of 3 when divided by 5 and a remainder of 3 when divided by 6. Find the two smallest such numbers that are greater than 3.	**[2]**

Q. No.	Section – C	Marks
14	Fig. 4 shows all the expressions obtained by placing '+' and '−' signs before 9 and 4 in 6 ± 9 ± 4, where each path ends in a value p, q, r or s.  Fig. 4: Tree of all expressions from 6, 9 and 4 (i) Find the values of p, q, r and s. [2] (ii) What do you notice about the parity of all four values? Give a reason. [1]	**[3]**
15	(A) Using the alternating-sign shortcut, check whether 4,719 is divisible by 11, and find the remainder when 9,245 is divided by 11. **OR** (B) Find the multiple of 9 that is closest to 8,000. Show your steps.	**[3]**
16	(A) Solve the cryptarithm PQ × 6 = QQQ, where different letters stand for different digits and P ≠ 0. Show your reasoning. **OR** (B) If the number 52x4 is a multiple of 9, find the digit x. Then find the remainder when this number is divided by 11.	**[3]**
17	(A) Is the statement "The sum of a multiple of 4 and a multiple of 6 is a multiple of 4" always true, sometimes true or never true? Justify with examples and algebra. **OR** (B) Is the statement "If a number is divisible by both 6 and 8, it must be divisible by 48" always, sometimes or never true? Justify with examples and the LCM.	**[3]**

Q. No.	Section – D	Marks
18	(A) Fig. 5 shows the number 74,382 with alternating signs placed from the units digit.  Fig. 5: The number 74,382 with alternating signs (i) Evaluate the alternating sum shown in Fig. 5. [1] (ii) Is 74,382 divisible by 11? Explain why this method works, using the place values 1, 10, 100, 1000, ... [2] (iii) Use the same method to find the remainder when 74,385 is divided by 11. [1] **OR** (B) A number has digital root 7. (i) Show that the digital root of the number plus 20 is 9. [1] (ii) Find the digital root of twice the number. [1] (iii) Can the number be divisible by 3? Give a reason. [1] (iv) Write one 3-digit number with digital root 7. [1]	**[4]**
19	(A) Mala says, “I have a number that leaves a remainder of 3 when divided by 4, a remainder of 5 when divided by 6 and a remainder of 8 when divided by 9.” (i) Find the smallest such number, with reasons. [2] (ii) Write an algebraic expression for all such numbers. [1] (iii) Find the smallest 3-digit number of this kind. [1] **OR** (B) (i) Show, using algebra, that the sum of any three consecutive even numbers is divisible by 6. [2] (ii) Show that the product of two consecutive integers is always even. [2]	**[4]**
20	**Case Study:** Meena works at a stationery shop and checks her bills using digital roots (the single digit obtained by adding the digits repeatedly), a method found in Aryabhata II’s *Mahāsiddhānta*. One bill shows 3,486 + 5,279 = 8,765. Another shows 4,728 × 6 = 28,378. (i) Find the digital roots of 3,486, 5,279 and 8,765. [1] (ii) Show that the digital roots support the first bill. [1] (iii) Show that the second bill must have a mistake. [1] (iv) Give one wrong value of 4,728 × 6 that would still pass the digital root check, and say what this tells us about the check. [1]	**[4]**

— End of Question Paper —