CLASS VIII – MATHEMATICS

Chapter Test: A Story of Numbers

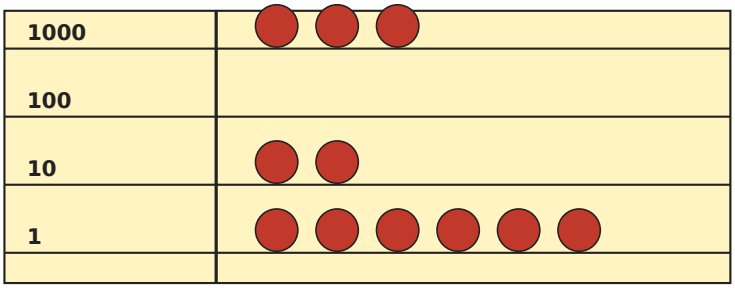
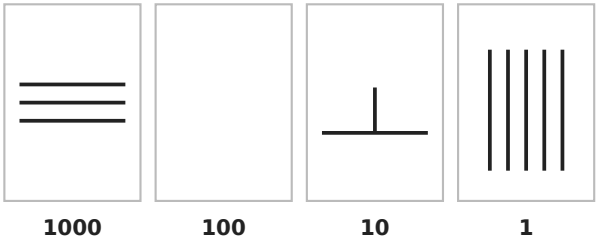
(Ganita Prakash, Grade 8, Part I – Chapter 3)

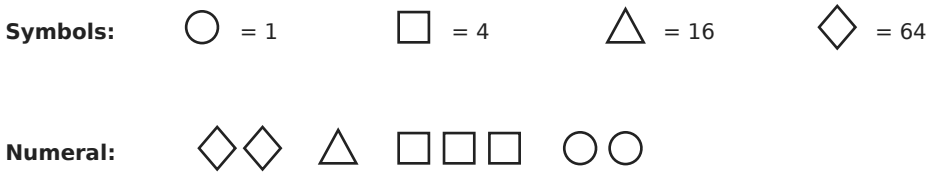
Time: 1½ Hours **M. M.: 40**

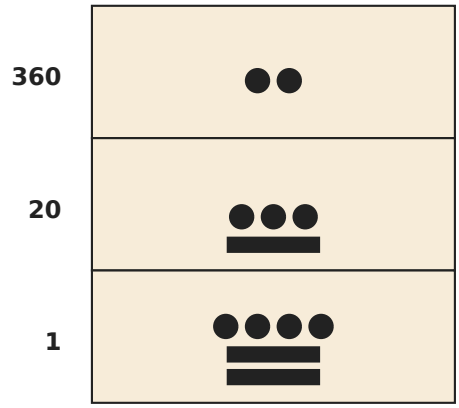
General Instructions:

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, 2 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	A number system whose landmark numbers are the powers of a number n is called a (A) tally system (B) Roman system (C) base-n number system (D) one-to-one mapping	**[1]**
2	The number represented by the Roman numeral MMDCLXVII is (A) 2567 (B) 2667 (C) 2767 (D) 3667	**[1]**
3	The Roman numeral for 1,350 is (A) MDCCCL (B) MCCLL (C) CCCML (D) MCCCL	**[1]**
4	The 6th landmark number of a base-3 number system (starting with 1 as the first) is (A) 243 (B) 81 (C) 729 (D) 18	**[1]**
5	Which civilisation used a seashell-like symbol as a placeholder and had landmark numbers 1, 20, 360, ...? (A) Mayan (B) Egyptian (C) Roman (D) Chinese	**[1]**
6	The base of the Mesopotamian (Babylonian) number system was (A) 10 (B) 60 (C) 20 (D) 5	**[1]**
7	In the Egyptian number system, the product of any two landmark numbers is (A) another landmark number (B) a number that has no symbol (C) always 1 (D) impossible to find	**[1]**
8	In a place value system, the digit 0 is needed because it (A) has no use (B) is used only to write 10 (C) holds an empty place so the numeral can be read without confusion (D) stands for negative numbers	**[1]**

Q. No.	Section – A	Marks
9	The abacus in Fig. 1 shows the number  Fig. 1: Abacus (every counter has the value of the line it sits on) (A) 326 (B) 3,260 (C) 3026 (D) 30,026	**[1]**
10	The Chinese rod numeral in Fig. 2 has columns for thousands, hundreds, tens and ones. Digits 1 to 5 use that many rods, and a single rod placed across the others stands for 5. The number shown is  Fig. 2: A Chinese rod numeral (a blank column means no rods) (A) 365 (B) 3065 (C) 3605 (D) 30065	**[1]**

Q. No.	Section – B	Marks
11	A base-4 number system uses the symbols given in Fig. 3.  Fig. 3: A base-4 numeral (i) Find the number represented by the numeral in Fig. 3. [1] (ii) Show how 100 is written in this system (state how many of each symbol are needed). [1]	**[2]**
12	(A) Write 2,386 in Roman numerals. **OR** (B) Write MMDCCLXXIII in Hindu numerals.	**[2]**
13	In a base-6 number system the first landmark number is 1. Write the first four landmark numbers and use them to express 250 as a sum of landmark numbers. [1 + 1]	**[2]**

Q. No.	Section – C	Marks
14	The Mayan numeral in Fig. 4 is written with symbols placed one above the other. A dot stands for 1 and a bar stands for 5.  Fig. 4: A Mayan numeral (position values shown on the left) (i) Find the number represented by the numeral. [2] (ii) Describe how 400 would be written in the Mayan system. [1]	**[3]**
15	(A) Two numbers are written in the Egyptian system. The first has 6 hundreds, 7 tens and 8 ones; the second has 5 hundreds, 5 tens and 9 ones. Without first converting to Hindu numerals, add them by grouping the symbols, and then write the sum as a Hindu numeral. **OR** (B) In the Egyptian system a number has 3 hundreds, 4 tens and 5 ones. Using the rule for multiplying with landmark numbers, find its product with 100 and state how many of each landmark symbol the answer needs.	**[3]**
16	(A) Write 200 in the base-5 system whose landmark numbers are 1, 5, 25, 125, ... Show your grouping step by step. **OR** (B) In a base-5 system a numeral has the digits 1, 3, 0, 2 (from left to right) standing for 125s, 25s, 5s and 1s. Find the number in the Hindu system.	**[3]**
17	Add the Roman numerals CCLXXIII and CCCLXXXII without converting them to Hindu numerals. Show how you count and regroup the symbols, and write the sum in Roman numerals.	**[3]**

Q. No.	Section – D	Marks
18	(A) A clay tablet from ancient Mesopotamia records the number of sacks of grain. The numeral on the tablet is shown in Fig. 5. It is written in base 60, with the right-most group counting ones, the next group counting 60s and the next counting 3600s.  Fig. 5: A numeral on a clay tablet (i) Write the value of each of the three groups together with its landmark number. [2] (ii) Find the number of sacks. [1] (iii) Why did later Mesopotamians introduce a special placeholder symbol? [1] **OR** (B) Using the symbols of Fig. 5, the number 3,725 is to be written on a tablet. (i) Express 3,725 in terms of 3600, 60 and 1. [2] (ii) Describe how the groups will be drawn. [1] (iii) Explain why writing 3,605 in the same style can be confusing. [1]	**[4]**
19	(A) In a base-5 system (landmark numbers 1, 5, 25, 125, ...), the first number has 3 twenty-fives, 2 fives and 4 ones, and the second number has 2 twenty-fives, 4 fives and 3 ones. Add the two numbers by regrouping in base 5, and write the sum using the landmark numbers. Verify your answer by converting both numbers and the sum into Hindu numerals. [4] **OR** (B) In a base-5 system a number has 2 twenty-fives, 3 fives and 0 ones. (i) Find its value in the Hindu system. [1] (ii) Multiply it by 5 using the landmark-number rule and write the result in base 5; check with the Hindu value. [2] (iii) State a simple rule for multiplying a number by n in a base-n system. [1]	**[4]**
20	**Case Study:** Anil is making a project on the history of numbers. He notes down these points. The Bakhshali manuscript (about the 3rd century CE) has the earliest known numbers written with ten digits, including 0 shown as a dot. Aryabhata (499 CE) did detailed calculations with the Indian ten-symbol system. Around 800 CE the system reached the Arab world, where scholars like Al-Khwārizmī called the numerals ‘Hindu numerals’. Later, European scholars learnt them from the Arab world and began calling them ‘Arabic numerals’. (i) What name did Arab scholars like Al-Khwārizmī use for these numerals? [1] (ii) Why did Europeans call them ‘Arabic numerals’? [1] (iii) State one feature of the Hindu system that makes it more efficient than the Roman system. [1] (iv) In the numeral 3026, what job does the digit 0 do? [1]	**[4]**

— End of Question Paper —