Number Play

Standard difficulty · 20 questions · 40 marks · Time: 34 minutes

Name: _____ Date: _____ Score: ____ / 40

Show your working for Sections B and C. Answers are on the last page — try every question first!

Section A — Choose the correct answer — 8 × 1 = 8 marks

1. Which of these numbers has a digit sum of 13?
   (a) 562 **(b)** 281 **(c)** 942 **(d)** 924

2. Which of these numbers is a palindrome?
   (a) 8389 **(b)** 8374 **(c)** 8338 **(d)** 8399

3. In the Collatz sequence, which number comes after 168?
   (a) 169 **(b)** 505 **(c)** 336 **(d)** 84

4. A number that reads the same from left to right and from right to left is called a:
   (a) supercell **(b)** square **(c)** prime **(d)** palindrome

5. Kaprekar's routine: arrange the digits of 9032 largest-first and smallest-first, then subtract. The result is:
   (a) 6723 **(b)** 9171 **(c)** 9081 **(d)** 288

6. 42966 rounded to the nearest thousand is:
   (a) 43000 **(b)** 43001 **(c)** 44000 **(d)** 42000

7. Which is the best estimate of 49 × 21?
   (a) 100 **(b)** 800 **(c)** 1200 **(d)** 1000

8. In the row 30, 55, 81, 97, 83, 78, which number is a supercell (larger than each of its neighbours)?
   (a) 55 **(b)** 81 **(c)** 97 **(d)** 30

Section B — Short answer — 8 × 2 = 16 marks

9. Reverse the digits of 84 and add, again and again, until you get a palindrome. Which palindrome do you reach?

10. Write the Collatz sequence that starts at 170, until you reach 1.

11. Using each of the digits 4, 5, 8, 3, 0 once, write the largest and the smallest 5-digit numbers.

12. Which numbers from 14 to 47 have a digit sum of 13?

13. Start Kaprekar's routine with 5320. Write each subtraction until you reach 6174.

14. Add 1394 and 4911 in your head by adding the thousands, hundreds, tens and ones separately.

15. Estimate 76 × 42 by rounding each number to the nearest ten. Then find the exact answer.

16. Using each of the digits 1, 0, 5, 7 once, make the largest 4-digit even number.

Section C — Word problems — 4 × 4 = 16 marks

17. A school has 509 students and each gives Rs 34 for a trip. Estimate the total, then find the exact amount.

18. Ananya picks 64, reverses its digits and adds, and keeps going until the answer is a palindrome. How many additions does Ananya make, and what is the palindrome?

19. These are the marks of 8 children sitting in a row: 45, 85, 18, 47, 50, 30, 43, 42. A child is a "supercell" if their marks are higher than those of each neighbour. How many supercells are there, and who are they?

20. Rohan starts at 5 and follows the Collatz rule (halve an even number; for an odd number, multiply by 3 and add 1). How many steps does it take to reach 1, and what is the largest number on the way?

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Answer key

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Q	Answer	Working
1	**(a) 562**	5 + 6 + 2 = 13
2	**(c) 8338**	8338 reads the same both ways
3	**(d) 84**	168 is even: 168 ÷ 2 = 84
4	**(d) palindrome**	—
5	**(c) 9081**	9320 − 0239 = 9081
6	**(a) 43000**	the hundreds digit is 9
7	**(d) 1000**	about 50 × 20
8	**(c) 97**	97 is larger than the numbers on both sides of it
9	**363 after 2 steps**	84 + 48 = 132; 132 + 231 = 363
10	**170, 85, 256, 128, 64, 32, 16, 8, 4, 2, 1**	halve an even number; 3 times an odd number, plus 1
11	**largest 85430, smallest 30458**	largest: digits in decreasing order; smallest: a 5-digit number cannot start with 0
12	**none**	0 numbers
13	**7 steps**	5320 − 0235 = 5085; 8550 − 0558 = 7992; 9972 − 2799 = 7173; 7731 − 1377 = 6354; 6543 − 3456 = 3087; 8730 − 0378 = 8352; 8532 − 2358 = 6174
14	**6305**	5 thousands, then the rest: 6305
15	**about 3200; exactly 3192**	80 × 40 = 3200
16	**7510**	an even number ends in 0, 2, 4, 6 or 8: keep the smallest even digit for the end
17	**about Rs 15,000; exactly Rs 17,306**	500 × 30 = 15000; 509 × 34 = 17306
18	**2 additions; 121**	64 + 46, 110 + 11
19	**3: 85, 50, 43**	compare each number with the numbers next to it
20	**5 steps; largest 16**	5 → 16 → 8 → 4 → 2 → 1

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