

Number Play — Word Problems (Difficult)

Set 1

Name: _____

Class: 6

Section: _____

Date: _____

Solve the following word problems. Show all your working. [20 Marks]

1. A cinema hall sold tickets for three shows in a day — Morning: 1,245; Afternoon: 2,876; Evening: 3,150. Find the total tickets sold, then round your final answer to the nearest hundred.

2. A stationery company manufactured 45,000 pens in January and 38,750 in February. First estimate the difference by rounding both numbers to the nearest thousand, then calculate the exact difference between them.

3. The population of a town is 68,432. Round this population to the nearest ten-thousand and to the nearest thousand. Which rounded value would be more useful in a short news headline, and why?

4. A wholesaler has 4 boxes of pencils with 2,500 pencils in each box. He sells 8,350 pencils in one week. Estimate the pencils remaining by rounding the total and the sold amount to the nearest thousand, then find the exact number remaining.

5. Train A carries 15,678 passengers a week and Train B carries 21,345 passengers a week. Round both numbers to the nearest hundred and state which train carries more passengers after rounding.

6. Two city departments collected fees of ₹56,789 and ₹63,215 in a year. Which amount is larger, and what is the exact difference between them? Also estimate the difference by rounding both to the nearest thousand.

7. A new stadium is built with a seating capacity equal to the smallest possible 5-digit palindrome number. How many seats does it have? If the organisers expand the stadium to the very next 5-digit palindrome capacity, how many additional seats are added?

8. In a national spelling bee, 90,000 students enter the first round nationwide, only 900 reach the second round, and only 9 reach the finals. By what factor does the number of students reduce at each stage? Explain using place value.

9. A charity uses the digits 4, 8, 1, 6, and 3 (each exactly once) to print donation-box codes. Find the largest and smallest possible 5-digit codes, and calculate the difference between them.

10. A courier company's packages in a delivery row were: Zone P = 3,780, Zone Q = 5,346, Zone R = 2,910. A zone is a "hotspot" (supercell) if it received more packages than its immediate neighbour(s) in the row. Identify the hotspot zone(s).

Answer Key — Set 1

1. $1,245 + 2,876 + 3,150 = 7,271$; rounded to the nearest hundred = 7,300.
2. Rounded: 45,000 stays 45,000; $38,750 \rightarrow 39,000$. Estimated difference = $45,000 - 39,000 = 6,000$.
Exact difference = $45,000 - 38,750 = 6,250$.
3. Nearest ten-thousand = 70,000; nearest thousand = 68,000. The ten-thousand value (70,000) is more useful for a quick headline since it is simpler to read; the thousand value is better for detailed reports.
4. Total pencils = $4 \times 2,500 = 10,000$. Sold $\approx 8,350 \rightarrow$ rounds to 8,000. Estimated remaining = $10,000 - 8,000 = 2,000$. Exact remaining = $10,000 - 8,350 = 1,650$.
5. Train A: $15,678 \rightarrow 15,700$. Train B: $21,345 \rightarrow 21,300$. Train B carries more passengers even after rounding.
6. ₹63,215 is larger. Exact difference = $63,215 - 56,789 = 6,426$. Rounded to nearest thousand: $63,000 - 57,000 = 6,000$.
7. Smallest 5-digit palindrome = 10,001. The next 5-digit palindrome is 10,101. Additional seats = $10,101 - 10,001 = 100$.
8. $90,000 \rightarrow 900$ is a reduction by a factor of 100 (two zeros removed); $900 \rightarrow 9$ is also a reduction by a factor of 100. Each stage cuts the number of students to one-hundredth of the previous stage.
9. Largest code = 86,431. Smallest code = 13,468. Difference = $86,431 - 13,468 = 72,963$.
10. Zone P's only neighbour is Zone Q ($3,780 < 5,346$ — not a hotspot). Zone Q's neighbours are P and R ($5,346 > 3,780$ and $5,346 > 2,910$ — hotspot). Zone R's only neighbour is Q ($2,910 < 5,346$ — not a hotspot). Only Zone Q is a hotspot.

Number Play — Word Problems (Difficult)

Set 2

Name: _____ Class: 6 Section: _____ Date: _____

Solve the following word problems. Show all your working. [20 Marks]

1. A teacher assigns roll number 4738 to a student for a Kaprekar "number-magic" classroom activity. Perform Kaprekar's process starting from 4738 and find how many rounds it takes to reach the Kaprekar constant, 6174. Show every round.

2. A digital display board in a mall shows a Collatz sequence for fun, starting at 25. Write out the complete sequence until it reaches 1, and count the number of steps taken.

3. A stadium gate gives a "lucky entry" bonus to any 4-digit ticket number whose digit sum is exactly 18. Write three different 4-digit ticket numbers that qualify for the bonus.

4. A league match code is formed using the digits 7, 2, 9, and 4 (each used once). Find the difference between the largest and smallest 4-digit numbers formed. Is this difference greater than or less than 5,085, the difference Pratibha got using the digits 2, 3, 4, 7?

5. Two 5-digit stadium ticket numbers add up to exactly 1,00,000. If one of the ticket numbers is 63,482, find the other ticket number.

6. A digital clock on a railway platform currently shows the palindromic time 10:01. How many minutes will it take for the clock to show the next palindromic time?

7. A school's ID-number generator accepts only 5-digit numbers between 20,000 and 60,000 in which every digit is odd. Find the largest and smallest possible ID numbers that this generator can produce.

8. On a factory production display, numbers in a row are: 4,200, 7,650, 3,980, 8,100, 2,500. Considering only immediate left/right neighbours in the row, identify every "supercell" (a number greater than all its immediate neighbours).

9. Two years' profits (in ₹ thousand) of a company are 5-digit palindromes. Last year's profit was 43,534. This year's profit is exactly ₹1,000 more. Find this year's profit and check whether it is also a palindrome.

10. A printer wants to avoid printing any palindromic page numbers between 100 and 200 due to a numbering error. How many palindromic numbers lie in this range? List all of them.

Answer Key — Set 2

1. $4738 \rightarrow 8743 - 3478 = 5265$ (round 1) $\rightarrow 6552 - 2556 = 3996$ (round 2) $\rightarrow 9963 - 3699 = 6264$ (round 3) $\rightarrow 6642 - 2466 = 4176$ (round 4) $\rightarrow 7641 - 1467 = 6174$ (round 5). It takes 5 rounds.
2. $25 \rightarrow 76 \rightarrow 38 \rightarrow 19 \rightarrow 58 \rightarrow 29 \rightarrow 88 \rightarrow 44 \rightarrow 22 \rightarrow 11 \rightarrow 34 \rightarrow 17 \rightarrow 52 \rightarrow 26 \rightarrow 13 \rightarrow 40 \rightarrow 20 \rightarrow 10 \rightarrow 5 \rightarrow 16 \rightarrow 8 \rightarrow 4 \rightarrow 2 \rightarrow 1$. This takes 23 steps.
3. Sample answers (many are possible): 9,180 ($9+1+8+0=18$); 4,590 ($4+5+9+0=18$); 3,627 ($3+6+2+7=18$).
4. Largest = 9,742, Smallest = 2,479. Difference = $9,742 - 2,479 = 7,263$, which is greater than 5,085.
5. $1,00,000 - 63,482 = 36,518$.
6. Next palindromic time after 10:01 is 11:11, which is 1 hour 10 minutes = 70 minutes later.
7. Largest = 59,999 (first digit 5 keeps it under 60,000, remaining digits 9). Smallest = 31,111 (first digit must be odd and at least 20,000, so smallest usable first digit is 3; remaining digits 1).
8. 7,650 (greater than 4,200 and 3,980) and 8,100 (greater than 3,980 and 2,500) are supercells.
9. This year's profit = $43,534 + 1,000 = 44,534$. Reversed, 44,534 becomes 43,544, which is different — so 44,534 is NOT a palindrome.
10. There are 10 palindromic numbers between 100 and 200: 101, 111, 121, 131, 141, 151, 161, 171, 181, 191.

Number Play — Word Problems (Difficult)

Set 3

Name: _____

Class: 6

Section: _____

Date: _____

Solve the following word problems. Show all your working. [20 Marks]

1. A relay signal tower passes on a number following the Collatz rule, starting at 21. Write the full sequence until it reaches 1, and state how many steps it takes.

2. A charity wants to arrange donation slabs (in ₹) in a number pattern (like a pyramid of rows) that adds up to exactly ₹340, similar to the patterns explored in the chapter. Design one such pattern and show that it totals ₹340.

3. A parking garage assigns passes as one 5-digit number and two 3-digit numbers. Find such numbers whose sum is exactly 19,842.

4. At a school fair, two players alternately add a number from 1 to 3 to a running score starting at 0. The player who reaches exactly 30 first wins a prize. What winning strategy should the first player use?

5. A weather station runs a fun Collatz-sequence display starting at 40. Trace the full sequence down to 1 and count the number of steps.

6. A number-plate maker uses the digits 5, 0, 7, and 2 (each once, and the plate cannot start with 0) to create the greatest and smallest possible 4-digit plate numbers. Find both numbers and their sum.

7. In a relay race, Team A's time-code is 3456. Team B's time-code is formed by reversing the digits of Team A's code. Find Team B's code, state which code is larger, and compare the digit sums of both codes.

8. A "lucky number" checker uses Kaprekar's process on entry codes. Verify whether starting number 1000 eventually reaches the Kaprekar constant 6174, showing every round (remember to treat any 3-digit result as a 4-digit number with a leading zero).

9. A lift's number display shows 5-digit numbers using each of the digits 0, 2, 4, 6, and 8 exactly once, and the number must lie between 30,000 and 70,000. Find the largest and the smallest such numbers.

10. A number puzzle reads: "I am a 5-digit palindrome. I am an odd number. My tens digit is double my units digit. My hundreds digit is double my tens digit." Which number satisfies all these clues?

Answer Key — Set 3

1. $21 \rightarrow 64 \rightarrow 32 \rightarrow 16 \rightarrow 8 \rightarrow 4 \rightarrow 2 \rightarrow 1$. This takes 7 steps.
2. Sample answer: five equal rows of ₹68 each — $68 + 68 + 68 + 68 + 68 = ₹340$. (Many other valid patterns are possible, e.g., a pyramid built from smaller equal parts.)
3. Sample answer: $19,000 + 400 + 442 = 19,842$. (Other combinations are also valid.)
4. The first player should say '2' first. After that, whatever number (1, 2, or 3) the opponent adds, the first player adds a number so that the two numbers added in that round always total 4. This lets the first player land on 2, 6, 10, 14, 18, 22, 26, and finally 30 — winning the game.
5. $40 \rightarrow 20 \rightarrow 10 \rightarrow 5 \rightarrow 16 \rightarrow 8 \rightarrow 4 \rightarrow 2 \rightarrow 1$. This takes 8 steps.
6. Largest = 7,520; Smallest = 2,057 (cannot start with 0). Sum = $7,520 + 2,057 = 9,577$.
7. Team B's code = 6,543. Since $6,543 > 3,456$, Team B's code is larger. Digit sum of Team A's code = $3+4+5+6 = 18$; digit sum of Team B's code = $6+5+4+3 = 18$ — both digit sums are equal, since reversing digits does not change their sum.
8. $1000 \rightarrow$ largest 1000, smallest $0001=1 \rightarrow 1000-1=999$, written as 0999 (round 1) $\rightarrow 9990-0999(=999)=8991$ (round 2) $\rightarrow 9981-1899=8082$ (round 3) $\rightarrow 8820-0288(=288)=8532$ (round 4) $\rightarrow 8532-2358=6174$ (round 5). Yes, it reaches 6174 in 5 rounds.
9. Smallest = 40,268; Largest = 68,420.
10. The number is 12,421 (twelve thousand four hundred twenty-one) — it is a palindrome, odd, and its tens digit (2) is double its units digit (1), while its hundreds digit (4) is double its tens digit (2).