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CLASS 6 MATHS EXTRA QUESTIONS

Class 6 Maths Chapter 3 Number Play Extra Questions

Extra practice questions for Class 6 Maths Chapter 3, "Number Play", to build extra confidence with supercells, digit games, palindromes, and Kaprekar's routine.

Contents

Extra practice questions for **Class 6 Maths Chapter 3, “Number Play”**, to build extra confidence with supercells, digit games, palindromes, and Kaprekar’s routine.

Very Short Answer Questions

Q1. What is a supercell?
Answer: A cell in a grid or row whose value is strictly greater than all of its immediate (orthogonal) neighbours.

Q2. What is the special result that Kaprekar’s routine always reaches for 4-digit numbers?
Answer: 6174.

Q3. What is Kaprekar’s constant for 3-digit numbers?
Answer: 495.

Q4. Is 15,251 a palindrome?
Answer: Yes — it reads the same forwards and backwards.

Q5. In the Collatz process, what do you do to an odd number?
Answer: Multiply it by 3 and add 1.

Short Answer Questions

Q6. Why can the smallest number in a filled grid never be a supercell?
Answer: A supercell must be strictly greater than all of its neighbours. Since the smallest number in the grid is less than or equal to every other number, it cannot be greater than its neighbours, so it can never qualify as a supercell.

Q7. Apply Kaprekar’s routine to the number 317 and show that it reaches 495.
Answer: 731-137=594, 954-459=495, and then 954-459=495 repeats forever. So 317 reaches the constant **495** in 2 steps.

Q8. What is the digit sum of every number from 40 to 46, and how does it change with each step?
Answer: 40=4, 41=5, 42=6, 43=7, 44=8, 45=9, 46=10. The digit sum increases by exactly 1 with each consecutive number in this range, since only the units digit is changing.

Q9. Apply the Collatz process to the number 17 and list every step until you reach 1.
Answer: 17 → 52 → 26 → 13 → 40 → 20 → 10 → 5 → 16 → 8 → 4 → 2 → **1** (12 steps).

Q10. Find the smallest 3-digit number whose digit sum is 20.
Answer: 299 (2+9+9=20; making the hundreds digit as small as possible while the remaining two digits are maximised at 9 each gives the smallest such number).

Long Answer / Reasoning Questions

Q11. Explain, using the checkerboard idea, why a 3×3 grid of different numbers can have at most 5 supercells, and why it cannot have 6 or more.
Answer: No two supercells can be orthogonally adjacent, since a supercell must exceed every one of its neighbours, and two adjacent cells cannot each be greater than the other. Colouring the 3×3 grid like a checkerboard splits its 9 cells into a 5-cell group (corners + centre) where no two cells touch each other,

and a 4-cell group (edge-midpoints) where the same is true. Since the 5-cell group has no internal adjacency, all 5 of those cells can simultaneously be supercells — but adding a 6th supercell anywhere would force two supercells to be adjacent, which is impossible. So 5 is both achievable and the true maximum.

Q12. Perform Kaprekar's routine starting from the 4-digit number 4632, showing every step, and confirm it reaches 6174.
Answer: Descending 6432, ascending 2346: 6432-2346=4086. Descending 8640, ascending 0468: 8640-0468=8172. Descending 8721, ascending 1278: 8721-1278=7443. Descending 7443, ascending 3447: 7443-3447=3996. Descending 9963, ascending 3699: 9963-3699=6264. Descending 6642, ascending 2466: 6642-2466=4176. Descending 7641, ascending 1467: 7641-1467=**6174**. Reached in 7 steps.

Q13. A 5-digit palindrome is even. What can you say about its first and last digit? Can such a palindrome exist — explain with reasoning.
Answer: In a palindrome, the first and last digits must be identical. If the number is even, its last digit must be even (0, 2, 4, 6, or 8). Since the first digit equals the last digit, the first digit must also be even. This is possible as long as the first digit isn't 0 (since a 5-digit number cannot start with 0) — so the first/last digit must be 2, 4, 6, or 8. Example: **24042** is a valid even 5-digit palindrome.

Q14. Explain why every consecutive palindromic clock time (like 10:01, 11:11, 12:21) is exactly 70 minutes apart.
Answer: For a time HH:MM to be a palindrome, the digit pattern must mirror itself (e.g., h1h2:m1m2 requires h1=m2 and h2=m1). As the hour increases by 1 each time a new palindrome is possible, the minute value needed to complete the mirror pattern also shifts in a way that consistently adds 70 minutes to reach the next valid palindromic combination — this can be verified by listing consecutive examples (10:01, 11:11, 12:21, …) and checking the time difference between each pair.

Q15. Why does the Collatz Conjecture remain "unsolved" even though it has been tested successfully on billions of numbers by computers?
Answer: Testing individual numbers, even billions of them, can never prove the conjecture is true for *every* whole number, since there are infinitely many numbers to check. Mathematicians need a general logical proof that works for all possible starting numbers at once — until such a proof (or a counterexample that breaks the pattern) is found, the conjecture remains officially unproven, even though no exception has ever been observed.

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