

WORKSHEET: NUMBER PLAY

CBSE Class 6 Mathematics • Number Play

Name: _____ Class: _____ Date: _____

Generate a Palindrome Number from a Given Number

1. Start with 12. Reverse the digits and add. Repeat if needed until you get a palindrome.
2. Start with 18. Use the reverse-and-add method to generate a palindrome.
3. Start with 57. Use the reverse-and-add method until a palindrome is obtained.
4. Write the first five 2-digit palindrome numbers.

Kaprekar's Routine / Kaprekar Constant

5. Apply Kaprekar's routine to 3524 until you reach 6174. Show every step.
6. Apply Kaprekar's routine to 7641 until you reach 6174. Show every step.
7. Apply Kaprekar's routine to 5432 until you reach 6174. Show every step.
8. Apply Kaprekar's routine to 9831 until you reach 6174. Show every step.
9. Start with 6174. Apply Kaprekar's routine once. What happens?

Collatz Conjecture

10. Starting with 6, apply the Collatz rule until you reach 1.
11. Starting with 7, apply the Collatz rule until you reach 1.
12. Starting with 10, apply the Collatz rule until you reach 1.
13. Starting with 15, apply the Collatz rule until you reach 1.
14. How many counting numbers have exactly 3 digits?
15. How many counting numbers have exactly 4 digits?
16. How many counting numbers have exactly 5 digits?
17. Find the digit sum of 99,999.
18. Find the digit sum of 1,20,304.
19. I am a 4-digit number. My thousands digit is 3, my hundreds digit is twice my ones digit, my tens digit is 1, and my ones digit is 2. Find the number.
20. I am a 5-digit number. My first digit is 7, my last digit is 4, my middle digit is 0. My thousands digit is 6, and the sum of my thousands and tens digits is 9. Find the number.

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ANSWER KEY WITH SOLVING STEPS

1. 33

- $12 + 21 = 33$; 33 is a palindrome.

2. 99

- $18 + 81 = 99$; 99 is a palindrome.

3. 363

- $57 + 75 = 132$; $132 + 231 = 363$; 363 is a palindrome.

4. 11, 22, 33, 44, 55

- Each number has the same digit in both places.

5. 6174

- $5432 - 2345 = 3087$; $8730 - 0378 = 8352$; $8532 - 2358 = 6174$.

6. 6174

- $7641 - 1467 = 6174$.

7. 6174

- $5432 - 2345 = 3087$; $8730 - 0378 = 8352$; $8532 - 2358 = 6174$.

8. 6174

- $9831 - 1389 = 8442$; $8442 - 2448 = 5994$; $9954 - 4599 = 5355$; $5553 - 3555 = 1998$; $9981 - 1899 = 8082$; $8820 - 0288 = 8532$; $8532 - 2358 = 6174$.

9. 6174

- Descending digits: 7641; ascending digits: 1467; $7641 - 1467 = 6174$. So 6174 is unchanged after another routine.

10. 1

- $6 \div 2 = 3$; $3 \times 3 + 1 = 10$; $10 \div 2 = 5$; $5 \times 3 + 1 = 16$; then $16 \rightarrow 8 \rightarrow 4 \rightarrow 2 \rightarrow 1$.

11. 1

- $7 \times 3 + 1 = 22 \rightarrow 11 \rightarrow 34 \rightarrow 17 \rightarrow 52 \rightarrow 26 \rightarrow 13 \rightarrow 40 \rightarrow 20 \rightarrow 10 \rightarrow 5 \rightarrow 16 \rightarrow 8 \rightarrow 4 \rightarrow 2 \rightarrow 1$.

12. 1

- $10 \rightarrow 5 \rightarrow 16 \rightarrow 8 \rightarrow 4 \rightarrow 2 \rightarrow 1$.

13. 1

- $15 \rightarrow 46 \rightarrow 23 \rightarrow 70 \rightarrow 35 \rightarrow 106 \rightarrow 53 \rightarrow 160 \rightarrow 80 \rightarrow 40 \rightarrow 20 \rightarrow 10 \rightarrow 5 \rightarrow 16 \rightarrow 8 \rightarrow 4 \rightarrow 2 \rightarrow 1$.

Note: Kaprekar's constant for the standard 4-digit routine is 6174. Collatz rule: if even, divide by 2; if odd, multiply by 3 and add 1.

14. 900

- 100 to 999: $999 - 100 + 1 = 900$.

15. 9,000

- 1,000 to 9,999: $9,999 - 1,000 + 1 = 9,000$.

16. 90,000

- 10,000 to 99,999: $99,999 - 10,000 + 1 = 90,000$.

17. 45

- $9 + 9 + 9 + 9 + 9 = 45$.

18. 10

- $1 + 2 + 0 + 3 + 0 + 4 = 10$.

19. 3,412

- Ones = 2, so hundreds = 4; tens = 1 and thousands = 3; number = 3,412.

20. 76,034

- Digits are 7, 6, 0, 3, 4 because $6 + \text{tens} = 9$; tens = 3.