3 NUMBER PLAY

3.2 Supercells

Q1. Colour or mark the supercells in the table below.

Ans. Students color the cells that are greater than all adjacent ones.

6828	670	9435	3780	3708	7308	8000	5583	52

Q2. Fill the table below with only 4-digit numbers such that the supercells are exactly the coloured cells.

Ans. Trial and error to place 4-digit numbers so that only specified cells are supercells.

5346	7689	1123	1258	1086	1021	1360	9635	9921

Q3. Fill the table below such that we get as many supercells as possible. Use numbers between 100 and 1000 without repetitions.

199	165	368	219	499	323	688	524	998

Q4. Out of the 9 numbers, how many supercells are there in the table above?

_____5_____

Q5. Find out how many supercells are possible for different numbers of cells.

Do you notice any pattern? What is the method to fill a given table to get the maximum number of supercells? Explore and share your strategy.

Ans. The pattern is, for increase in every two cells 1 super cell increases.

Strategy: Place high numbers surrounded by lower values.

6. Can you fill a supercell table without repeating numbers such that there are no supercells? Why or why not?

Ans. No, when we fill numbers a maximum number can be on the edge which is supercell.

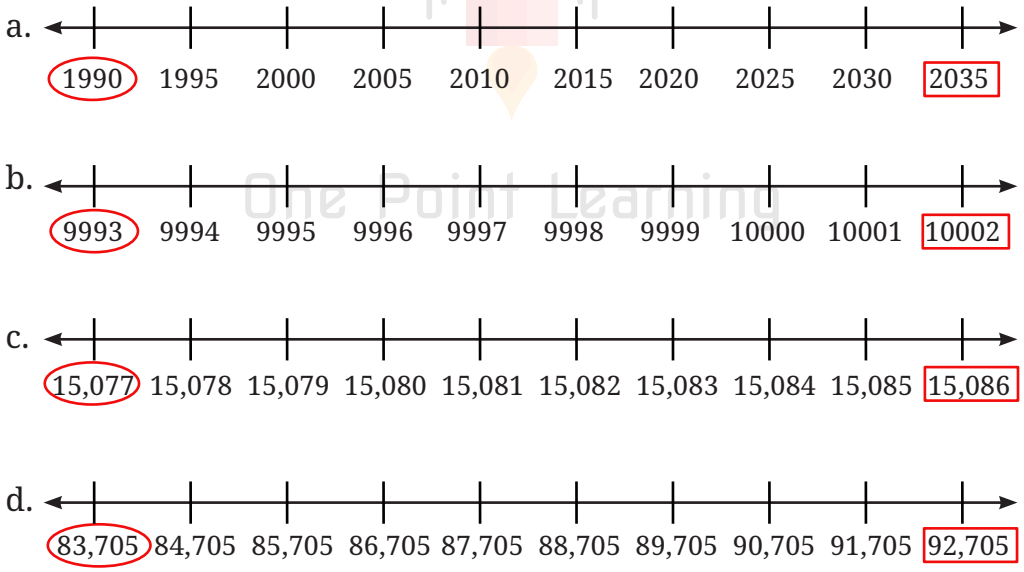
7. Will the cell having the largest number in a table always be a supercell? Can the cell having the smallest number in a table be a supercell? Why or why not?

Ans. Yes the largest number will be the supercell as it will always be surrounded by smaller number. Smallest number can not be a supercell as it's adjecent will always larger than it.

3.3 Patterns of Numbers on the Number Line

Identify the numbers marked on the number lines below, and label the remaining positions.

Put a circle around the smallest number and a box around the largest number in each of the sequences above.



3.4 Playing with Digits

We start writing numbers from 1, 2, 3 … and so on. There are nine 1-digit numbers.

Q. Find out how many numbers have two digits, three digits, four digits, and five digits.

Ans.

Two-digit numbers: 90 (10–99)

Three-digit: 900 (100–999)

Four-digit: 9000

Five-digit: 90,000

Q1. Digit sum 14

a. Write other numbers whose digits add up to 14.

b. What is the smallest number whose digit sum is 14?

c. What is the largest 5-digit whose digit sum is 14?

d. How big a number can you form having the digit sum of 14? Can you make an even bigger number?

Ans.

a. 59, 68, 95, 77, etc.

b. 59

c. 95,000

d. No fixed largest — try 99950000000 etc.

Q2. Find out the digit sums of all the numbers from 40 to 70.

Share your observations with the class.

Ans. Do it yourself

Q3. Calculate the digit sums of 3-digit numbers whose digits are consecutive (for example, 345). Do you see a pattern? Will this pattern continue?

Ans. 123: 1+2+3 = 6; 234: 2+3+4 = 9; 345: 3+4+5 = 12; 456 = 15
567:5+6+7 = 18; 678:6+7+8 = 21; 789: 7+8+9 = 24.

Consecutive digit sums form an increasing pattern.

3.5 Pretty Palindromic Patterns

Q. Write all possible 3-digit palindromes using these digits

Ans. 3-digit palindromes using 1, 2, 3:

111, 121, 131, 212, 222, 232, 313, 323, 333

Q. Will reversing and adding numbers repeatedly, starting with a 2-digit number, always give a palindrome? Explore and find out.

Ans.

12 + 21 = 33 (Palindrome!)

23 + 32 = 55 (Palindrome!)

38 + 83 = 121 (Palindrome!)

68 + 86 = 154

19 + 91 = 110

110 + 011 = 121 (Palindrome!)

154 + 451 = 605

605 + 506 = 1111 (Palindrome!)

Based on our exploration, it appears that reversing and adding numbers repeatedly does not always guarantee that you will eventually reach a palindrome.

3.7 Clock and Calendar Numbers

Q. Try and find out all possible times on a 12-hour clock of each of these (4:44, 10:10, 12:21) types.

Ans. Palindromic times: 1:01, 2:02, ..., 12:21

Q. Find some other dates of this (20/12/2012) form from the past.

Ans. Palindromic dates: 20/11/2011, 20/10/2010

Figure it Out

Q 1. Pratibha uses the digits '4', '7', '3' and '2', and makes the smallest and largest 4-digit numbers with them: 2347 and 7432. The difference between these two numbers is 7432 – 2347 = 5085. The sum of these two numbers is 9779. Choose 4 - digits to make:

a. the difference between the largest and smallest numbers greater than 5085.

Ans. Difference greater than 5085

We want the difference between the largest and smallest 4-digit numbers made from 4 digits to be more than 5085.

Let's try digits: 9, 1, 0, 2

Smallest number = 0129 → valid 4-digit number is 1029

Largest number = 9210

Difference = 9210 - 1029 = 8181 (greater than 5085)

Answer: 9, 1, 0, 2

b. the difference between the largest and smallest numbers less than 5085.

Ans. Difference less than 5085

Try digits: 3, 4, 5, 6

Smallest = 3456

Largest = 6543

Difference = 6543 - 3456 = 3087 (less than 5085)

Answer: 3, 4, 5, 6

c. the sum of the largest and smallest numbers greater than 9779.

Ans. Sum greater than 9779

Try digits: 9, 8, 0, 1

Smallest = 0189 → valid is 1089

Largest = 9810

Sum = 1089 + 9810 = 10899

Answer: 9, 8, 0, 1

d. the sum of the largest and smallest numbers less than 9779.

Ans. Sum less than 9779

Try digits: 1, 2, 3, 4

Smallest = 1234

Largest = 4321

Sum = 1234 + 4321 = 5555

Answer: 1, 2, 3, 4

Q 2. What is the sum of the smallest and largest 5-digit palindrome? What is their difference?

Ans. 5-digit palindromes

Smallest 5-digit palindrome = 10001

Largest 5-digit palindrome = 99999

Sum = 10001 + 99999 = 110000

Difference = 99999 - 10001 = 89998

Answer: Sum = 110000, Difference = 89998

Q 3. The time now is 10:01. How many minutes until the clock shows the next palindromic time? What about the one after that?

Ans. Next palindromic times after 10:01

Palindromic times are like: 10:01, 11:11, 12:21, etc.

From 10:01, the next palindromic time is 11:11

Difference = 70 minutes

After 11:11, next is 12:21

Difference = also 70 minutes

First palindromic time: 11:11 → 70 minutes

Next palindromic time: 12:21 → 70 minutes after that

4. How many rounds does the number 5683 take to reach the Kaprekar constant?

Ans.
Let's calculate: 5683
Descending: 8653
Ascending: 3568
8653 – 3568 = 5085

Round 1: 5683 → 5085
Desc: 8550
Asc: 0558
8550 – 558 = 7992

Round 2: 5085 → 7992
Desc: 9972
Asc: 2799
9972 – 2799 = 7173

Round 3: 7992 → 7173
Desc: 7731
Asc: 1377
7731 – 1377 = 6354

Round 4: 7173 → 6354
Desc: 6543
Asc: 3456
6543 – 3456 = 3087

Round 5: 6354 → 3087
Desc: 8730
Asc: 0378
8730 – 378 = 8352

Round 6: 3087 → 8352
Desc: 8532
Asc: 2358
8532 – 2358 = 6174

Answer: 6 rounds