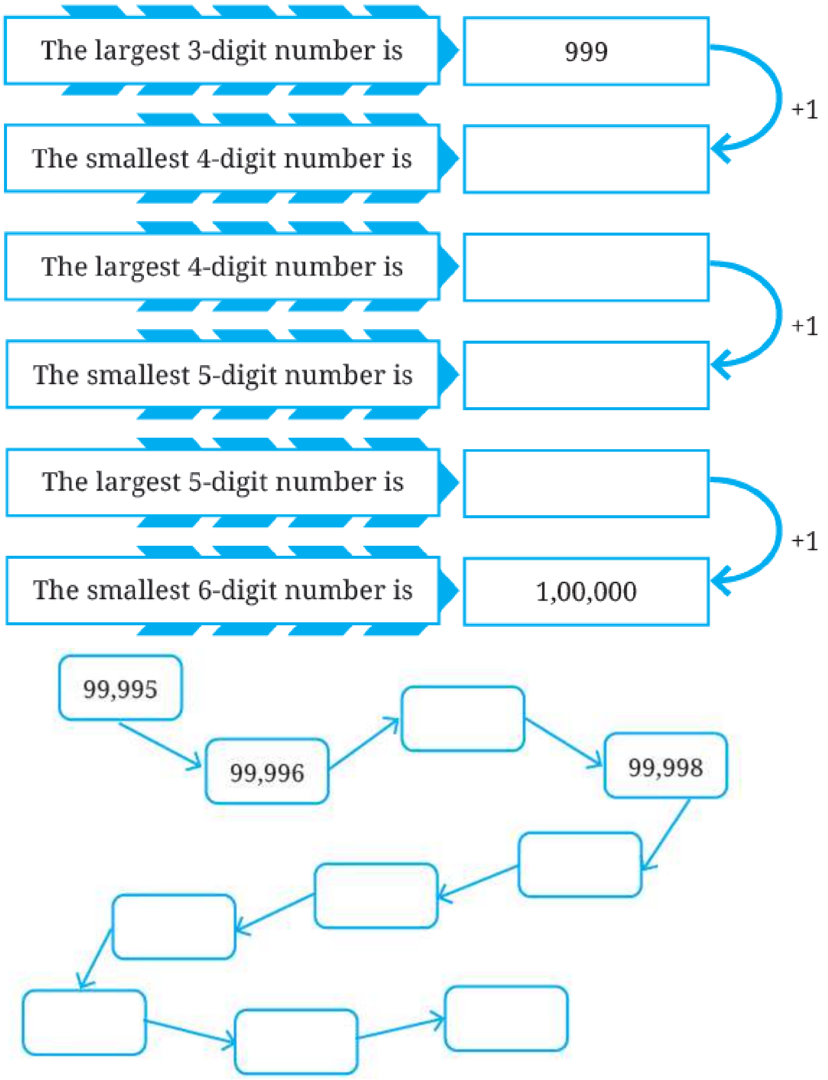
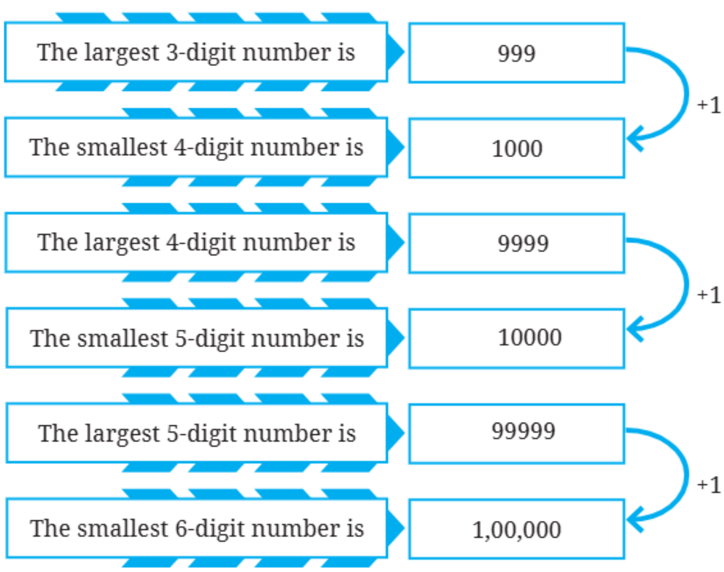
GSEB Solutions Mathematics Class 7 Chapter 1 Large Numbers Around Us

Page No. 2

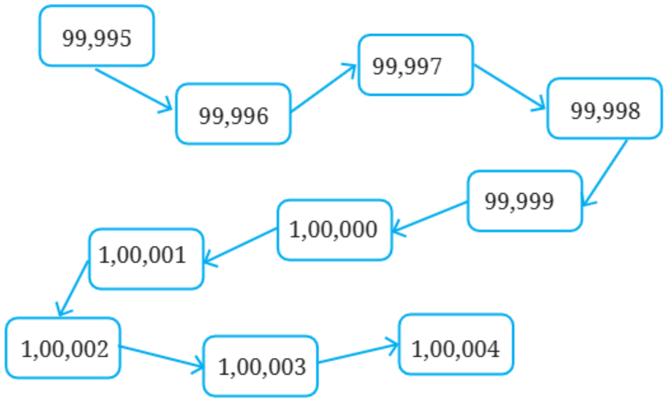
Q: But how much is one lakh? Observe the pattern and fill in the boxes given below.



Ans:



1,00,000 is read as “One Lakh”



Q1: Roxie suggests, "What if we ate 2 varieties of rice every day? Would we then be able to eat 1 lakh varieties of rice in 100 years?" Will they be able to taste all the lakh varieties in a 100-year lifetime?
Ans: To find out, calculate the number of rice varieties eaten in 100 years.

- Number of days in a year = 365 (ignoring leap years).
- Number of days in 100 years = 365 × 100 = 36,500 days.
- Varieties eaten per day = 2.
- Total varieties in 100 years = 36,500 × 2 = 73,000.
- One lakh = 100,000.
  Since 73,000 is less than 100,000, they **cannot** eat 1 lakh varieties in 100 years.

Q2: What if a person ate 3 varieties of rice every day? Will they be able to taste all the lakh varieties in a 100-year lifetime? Find out.
Ans: Now, calculate for 3 varieties per day.

- Number of days in 100 years = 365 × 100 = 36,500 days.
- Varieties eaten per day = 3.
- Total varieties in 100 years = 36,500 × 3 = 109,500.
- One lakh = 100,000.
  Since 109,500 is more than 100,000, they **can** eat 1 lakh varieties in 100 years.

Q3: Choose a number for y. How close to one lakh is the number of days in y years, for the y of your choice?
Ans: To get the number of days in y years, we have 365 × y years.
For 1,00,000 days we have 1,00,000 ÷ 365 ~ 273 years.
Thus, we have 365 × y = 365 × 273 ~ 99645 days (closest to 1 lakh)

Page No. 3
Figure it Out

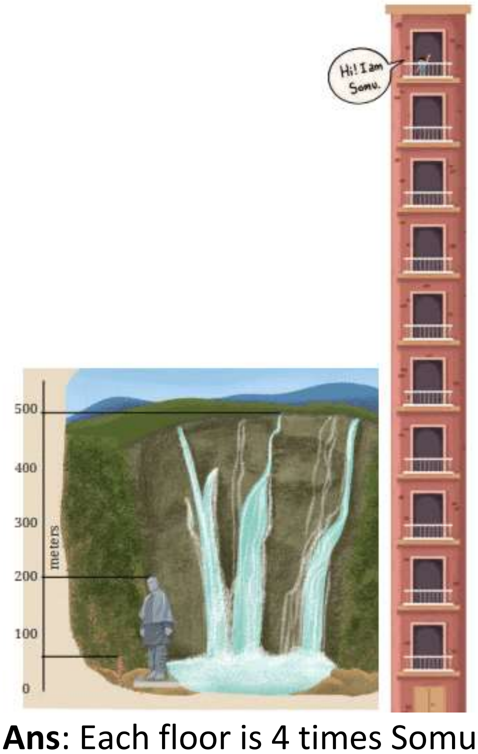
Q1: According to the 2011 Census, the population of the town of Chintamani was about 75,000. How much less than one lakh is 75,000?
Ans: One lakh = 1,00,000.
Difference = 1,00,000 - 75,000 = 25,000.

The population is 25,000 less than one lakh.

Q2: The estimated population of Chintamani in the year 2024 is 1,06,000. How much more than one lakh is 1,06,000?
Ans: One lakh = 1,00,000.
Difference = 1,06,000 - 1,00,000 = 6,000.
The population is 6,000 more than one lakh.

Q3: By how much did the population of Chintamani increase from 2011 to 2024?
Ans: Population in 2011 = 75,000. Population in 2024 = 1,06,000.
Increase = 1,06,000 - 75,000 = 31,000.
The population increased by 31,000.

Q: Look at the picture below. Somu is 1 metre tall. If each floor is about four times his height, what is the approximate height of the building?



Ans: Each floor is 4 times Somu's height. Somu's height = 1 metre.
So, height of 1 floor = 4 × 1 = 4 metres.
The building has about 10 floors (from the picture).
Height of the building = 4 × 10 = 40 metres.
The approximate height is **40 metres**.

Q1: Which is taller — The Statue of Unity or this building? How much taller?
_____________m.
Ans: The Statue of Unity is about 180 m
Height of Somu's building = 40 metres.
The Statue of Unity is taller.
Difference = 180 − 40 = 140 metres.
It is **140 metres** taller.

Q2: How much taller is the Kunchikal waterfall than Somu's building? ___ m.
Ans: Height of the Kunchikal waterfall = about 450 metres.
Height of Somu's building = 40 metres.
Difference = 450 − 40 = 410 metres.
It is **410 metres** taller.

Q3: How many floors should Somu's building have to be as high as the waterfall? ____________ .
Ans: Height of the Kunchikal waterfall = about 450 metres.
Height of 1 floor = 4 metres.
Number of floors = 450 ÷ 4 = 112.5.
Since we can't have half a floor, it should have about **113 floors**.

Page No. 4
Reading and Writing Numbers

Q1: How do you view a lakh — is a lakh big or small?
Ans: A lakh (1,00,000) can be seen as both big and small depending on context. It's big for things like the number of rice varieties (a lot) or days (274 years). It's small for things like stadium seating (fits in one stadium), humans have (80,000 to 1,20,000) hairs on their tiny head, or fish laying eggs (1000 + at once). It depends on what you compare it to.

Q2: Write each of the numbers given below in words:
(a) 3,00,600
Ans: Three lakh six hundred.
(b) 5,04,085
Ans: Five lakh four thousand eighty-five.
(c) 27,30,000
Ans: Twenty-seven lakh thirty thousand.
(d) 70,53,138
Ans: Seventy lakh fifty-three thousand one hundred thirty-eight.

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Q: Write the corresponding number in the Indian place value system for each of the following:
(a) One lakh twenty-three thousand four hundred and fifty-six
Ans: 1,23,456
(b) Four lakh seven thousand seven hundred and four
Ans: 4,07,704
(c) Fifty lakhs five thousand and fifty
Ans: 50,05,050

(d) Ten lakhs two hundred and thirty-five
Ans: 10,00,235
Land of Tens
In the <u>Land of Tens</u>, there are special calculators with special buttons.
Q1: The Thoughtful Thousands only has a +1000 button. How many times should it be pressed to show:

(a) Three thousand?_____________?
Ans: 3,000 ÷ 1,000 = 3 times.
(b) 10,000?_____________?
Ans: 10,000 ÷ 1,000 = 10 times.
(c) Fifty-three thousand?_____________?
Ans: 53,000 ÷ 1,000 = 53 times.
(d) 90,000?_____________?
Ans: 90,000 ÷ 1,000 = 90 times.
(e) One Lakh?_____________?
Ans: 1,00,000 ÷ 1,000 = 100 times.
(f) _____________? 153 times
Ans: 153 × 1,000 = 1,53,000.
(g) How many thousands are required to make one lakh?
Ans: 1,00,000 ÷ 1,000 = 100 thousands.

Q2: The Tedious Tens only has a +10 button. How many times should it be pressed to show:

(a) Five hundred?______________
Ans: 500 ÷ 10 = 50 times.
(b) 780?______________
Ans: 780 ÷ 10 = 78 times.

(c) 1000?______________
Ans: 1,000 ÷ 10 = 100 times.
(d) 3700?______________
Ans: 3,700 ÷ 10 = 370 times.
(e) 10,000?______________
Ans: 10,000 ÷ 10 = 1,000 times.
(f) One lakh?______________
Ans: 1,00,000 ÷ 10 = 10,000 times.
(g) ______________? 435 times
Ans: 435 × 10 = 4,350.

Q3: The Handy Hundreds only has a +100 button. How many times should it be pressed to show:

(a) Four hundred? ____________ times
Ans: 400 ÷ 100 = 4 times.
(b) 3,700? ____________
Ans: 3,700 ÷ 100 = 37 times.
(c) 10,000? ____________
Ans: 10,000 ÷ 100 = 100 times.
(d) Fifty-three thousand? ____________
Ans: 53,000 ÷ 100 = 530 times.
(e) 90,000? ____________
Ans: 90,000 ÷ 100 = 900 times.
(f) 97,600? ____________
Ans: 97,600 ÷ 100 = 976 times.
(g) 1,00,000? ____________
Ans: 1,00,000 ÷ 100 = 1,000 times.
(h) ____________? 582 times
Ans: 582 × 100 = 58,200.
(i) How many hundreds are required to make ten thousand?
Ans: 10,000 ÷ 100 = 100 hundreds.
(j) How many hundreds are required to make one lakh?
Ans: 1,00,000 ÷ 100 = 1,000 hundreds.
(k) Handy Hundreds says, "There are some numbers which Tedious Tens and Thoughtful Thousands can't show but I can." Is this statement true? Think and explore.
Ans: Yes, the statement is true.

- Handy Hundreds can show numbers like **100, 200, 300**, etc., by pressing the key **once for every 100**.

- Tedious Tens can also show these numbers, but it needs **more presses**. For example, to make 100, we need **10 presses** of 10.
- Thoughtful Thousands **cannot show** numbers like 100 or 200, because it counts only in **multiples of 1000** (like 1000, 2000, 3000...).

So, Handy Hundreds can show some numbers (like 100 or 900) that Thoughtful Thousands **cannot**, and that Tedious Tens **can show but with more effort**.

Q4: Find a different way to get 5072 and write an expression for the same.
Ans: (5 × 1000) + (0 × 100) + (7 × 10) + (2 × 1) = 5072
We break the number based on the **place values** of each digit:

- 5 is in the **thousands place** → 5 × 1000 = 5000
- 0 is in the **hundreds place** → 0 × 100 = 0
- 7 is in the **tens place** → 7 × 10 = 70
- 2 is in the **ones place** → 2 × 1 = 2

Now, add all:
5000 + 0 + 70 + 2 = **5072**

Figure it Out

Q: For each number given below, write expressions for at least two different ways to obtain the number through button clicks. Think like Chitti and be creative.
(a) 8300
Ans: Way 1: (8 × 1,000) + (3 × 100) = 8,000 + 300 = 8,300.
Way 2: (83 × 100) = 8,300.
(b) 40629
Ans: Way 1: (4 × 10,000) + (6 × 1,00) + (2 × 10) + (9 × 1) = 40,000 + 6,00 + 20 + 9 = 40,629.
Way 2: (406 × 100) + (29 × 1) = 40,600 + 29 = 40,629.
(c) 56354
Ans: Way 1: (5 × 10,000) + (6 × 1,000) + (3 × 100) + (5 × 10) + (4 × 1) = 50,000 + 6,000 + 300 + 50 + 4 = 56,354.
Way 2: (563 × 100) + (5 × 10) + (4 × 1) = 56,300 + 50 + 4 = 56,354.
(d) 66666
Ans: Way 1: (6 x 10000) + (6 x 1000) + (6 x 100) + (6 x 10) + 6 = 66666
Way 2: 70000 - 3334 = 66666
(e) 367813
Ans: Way 1: (3 x 100000) + (6 x 10000) + (7 x 1000) + (8 x 100) + 10 + 3 = 367813
Way 2: 400000 - 32187 = 367813

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Q1: Creative Chitti has some questions for you:
(a) You have to make exactly 30 button presses. What is the largest 3-digit number you can make? What is the smallest 3-digit number you can make?
Ans: We can use three types of button presses:

- +100 adds 100

- +10 adds 10
- +1 adds 1

  Each press counts as one button press. Total allowed: **30 presses**.

Largest 3-digit number:
To get the largest number, we should use as many +100 presses as possible, followed by +10, then +1.
Let's press each button 9 times:

- 9 × +100 = 900
- 9 × +10 = 90
- 9 × +1 = 9

  Total = 900 + 90 + 9 = **999**

Number of presses used = 9 + 9 + 9 = 27
Remaining 3 presses cannot increase the number without making it a 4-digit number.

Largest 3-digit number = 999
Smallest 3-digit number:
To get the smallest number, we should use:

- 1 × +100 = 100

  Remaining presses = 29
  Use 29 × +1 = 29
  Total = 100 + 29 = **129**

Smallest 3-digit number = 129
(b) 997 can be made using 25 clicks. Can you make 997 with a different number of clicks?
Ans: One way: (9 × 100) + (9 × 10) + (7 × 1) = 900 + 90 + 7 = 997 (25 clicks).
Another way: (99 × 10) + (7 × 1) = 990 + 7 = 997 (106 clicks).
Yes, 997 can be made with a different number of clicks.

Q2: How can we get the numbers (a) 5072, (b) 8300 using as few button clicks as possible?
(a) 5072
Ans: (5 × 1,000) + (7 × 10) + (2 × 1) = 5,000 + 70 + 2 = 5,072 (14 clicks).
This is minimal as each place value uses the largest possible button.
(b) 8300
Ans: (8 × 1,000) + (3 × 100) = 8,000 + 300 = 8,300 (11 clicks).
This is minimal as each place value uses the largest possible button.

Q3: Is there another way to get 5072 using less than 23 button clicks? Write the expression for the same.
Ans: Given method: 23 clicks (not specified).
Minimal method: (5 × 1,000) + (7 × 10) + (2 × 1) = 5,000 + 70 + 2 = 5,072 (14 clicks).
This uses fewer than 23 clicks.

Figure it Out

Q1: For the numbers in the previous exercise, find out how to get each number by making the smallest number of button clicks and write the expression.
Ans: (Already answered in Q2 above for 5072 and 8300. For others from Page 6, Q2):

- **8300**: (8 × 1,000) + (3 × 100) = 8,300
  Clicks: 8 + 3 = 11 clicks.
- **40629**: (4 × 10,000) + (6 × 1,00) + (2 × 10) + (9 × 1) = 40,629
  Clicks: 4 + 6 + 2 + 9 = 21 clicks
- **56354**: (5 × 10,000) + (6 × 1,000) + (3 × 100) + (5 × 10) + (4 × 1) = 56,354
  Clicks: 5 + 6 + 3 + 5 + 4 = 23 clicks.

Q2: Do you see any connection between each number and the corresponding smallest number of button clicks?
Ans: Yes, there is a connection.
Examples:

- **5072**
  Place values: 5 (thousands), 0 (hundreds), 7 (tens), 2 (ones)
  Smallest clicks = 5 (+1000) + 7 (+10) + 2 (+1) = **14 clicks**
- **8300**
  Place values: 8 (thousands), 3 (hundreds), 0 (tens), 0 (ones)
  Smallest clicks = 8 (+1000) + 3 (+100) = **11 clicks**

Conclusion:
The minimum number of button clicks equals the **sum of the digits** in the number's **place value form**, using the **largest possible button for each digit**.

Q3: If you notice, the expressions for the least button clicks also give the Indian place value notation of the numbers. Think about why this is so.
Ans: Yes, the expressions for the least button clicks reflect the **Indian place value notation** because:

- To minimize button presses, we use the **biggest available button** for each digit:
  - +1000 for thousands,
  - +100 for hundreds,
  - +10 for tens,
  - +1 for ones.

This is the same as how numbers are written in **Indian place value format**, where each digit represents a value in its specific place.
Example:

- **5072** = (5 × +1000) + (0 × +100) + (7 × +10) + (2 × +1)
  This directly shows the Indian place value: **5000 + 70 + 2**

Also read: Flashcards: Large Numbers Around Us

Page No. 8 & 9

Q1: How many zeros does a thousand lakh have?
Ans: Thousand lakh = 1,000 × 1,00,000 = 1,00,00,00,000
It has 8 zeros.

Q2: How many zeros does a hundred thousand have?
Ans: Hundred thousand = 1,00,000 (same as 1 lakh).
This has 5 zeros.

Figure it Out

Q1: Read the following numbers in Indian place value notation and write their number names in both the Indian and American systems:
(a) 4050678
Ans: Indian: 40,50,678 → Forty lakh fifty thousand six hundred seventy-eight.
American: 4,050,678 → Four million fifty thousand six hundred seventy-eight.
(b) 48121620
Ans: Indian: 4,81,21,620 → Four crore eighty-one lakh twenty-one thousand six hundred twenty.
American: 48,121,620 → Forty-eight million one hundred twenty-one thousand six hundred twenty.
(c) 20022002
Ans: Indian: 2,00,22,002 → Two crore twenty-two thousand two.
American: 20,022,002 → Twenty million twenty-two thousand two.
(d) 246813579
Ans: Indian: 24,68,13,579 → Twenty-four crore sixty-eight lakh thirteen thousand five hundred seventy-nine.
American: 246,813,579 → Two hundred forty-six million eight hundred thirteen thousand five hundred seventy-nine.
(e) 345000543
Ans: Indian: 34,50,00,543 → Thirty-four crore fifty lakh five hundred forty-three.
American: 345,000,543 → Three hundred forty-five million five hundred forty-three.
(f) 1020304050
Ans: Indian: 1,02,03,04,050 → One Arab two crore three lakh four thousand fifty.
American: 1,020,304,050 → One billion twenty million three hundred four thousand fifty.

Q2: Write the following numbers in Indian place value notation:
(a) One crore one lakh one thousand ten
Ans: 1,01,01,010
(b) One billion one million one thousand one
Ans: 1,001,001,001 (1 billion = 100 crore, 1 million = 10 lakh).
(c) Ten crore twenty lakh thirty thousand forty
Ans: 10,20,30,040

(d) Nine billion eighty million seven hundred thousand six hundred
Ans: 9,080,700,600 (9 billion = 900 crore, 80 million = 80 lakh).

Q3: Compare and write '<', '>' or '=':
(a) 30 thousand ______ 3 lakhs
Ans: 30,000 < 3,00,000 → <.
(b) 500 lakhs ______ 5 million
Ans: 500 lakhs = 5,00,00,000; 5 million = 50,00,000.
5,00,00,000 > 50,00,000 → >.
(c) 800 thousand ______ 8 million
Ans: 800,000 < 8,000,000 → <.
(d) 640 crore ______ 60 billion
Ans: 640 crore = 6,400,000,000 , 60 billion = 60,000,000,000
640 crore < 60 billion → **<.**

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Q1: Think and share situations where it is appropriate to (a) round up, (b) round down, (c) either rounding up or rounding down is okay and (d) when exact numbers are needed.
Ans: (a) **Round up**: Ordering food for a party (e.g., 732 people, order 750 sweets to ensure enough).
(b) **Round down**: Estimating cost for simplicity (e.g., ₹470 item, say ₹450 to avoid overestimating).
(c) **Either okay**: Estimating population for general discussion (e.g., 76,068 as 75,000 or 76,000).
(d) **Exact needed**: Financial transactions (e.g., paying ₹470 exactly) or scientific measurements.

Page No. 11

Nearest Neighbours
With large numbers it is useful to know the nearest thousand, lakh or crore. For example, the nearest neighbours of the number 6,72,85,183 are shown in the table below.

Nearest thousand	6,72,85,000
Nearest ten thousand	6,72,90,000
Nearest lakh	6,73,00,000
Nearest ten lakh	6,70,00,000
Nearest crore	7,00,00,000

Q1: Similarly, write the five nearest neighbours for these numbers:
(a) 3,87,69,957
Ans: Nearest thousand: 3,87,70,000
Nearest ten thousand: 3,87,70,000
Nearest lakh: 3,88,00,000
Nearest ten lakh: 3,90,00,000
Nearest crore: 4,00,00,000
(b) 29,05,32,481
Ans: Nearest thousand: 29,05,32,000
Nearest ten thousand: 29,05,30,000
Nearest lakh: 29,05,00,000
Nearest ten lakh: 29,10,00,000
Nearest crore: 29,00,00,000

Q2: I have a number for which all five nearest neighbours are 5,00,00,000. What could the number be? How many such numbers are there?
Ans: The number could be between 4,99,99,501 and 5,00,00,499 as rounding to the nearest thousand, ten thousand, lakh, ten lakh, or crore all yield 5,00,00,000.

Q3: Roxie and Estu are estimating the values of simple expressions.

(1) 4,63,128+4,19,682
Roxie: "The sum is near 8,00,000 and is more than 8,00,000."
Estu: "The sum is near 9,00,000 and is less than 9,00,000."
(a) Are these estimates correct? Whose estimate is closer to the sum?
Ans: Exact sum = 4,63,128 + 4,19,682 = 8,82,810.
Roxie: Near 8,00,000 and more → Correct (8,82,810 > 8,00,000).
Estu: Near 9,00,000 and less → Correct (8,82,810 < 9,00,000).
Difference: |8,82,810 - 8,00,000| = 82,810; |8,82,810 - 9,00,000| = 17,190.
Estu's estimate is closer.
(b) Will the sum be greater than 8,50,000 or less than 8,50,000? Why do you think so?
Ans: Sum = 8,82,810 > 8,50,000. The numbers are large, and their sum exceeds 8,50,000.
(c) Will the sum be greater than 8,83,128 or less than 8,83,128? Why do you think so?
Ans: Sum = 8,82,810 < 8,83,128. The exact sum is slightly less.
(d) Exact value of 4,63,128 + 4,19,682 = _______________
Ans: 8,82,810.

(2) 14,63,128 – 4,90,020
Roxie: "The difference is near 10,00,000 and is less than 10,00,000."
Estu: "The difference is near 9,00,000 and is more than 9,00,000."
(a) Are these estimates correct? Whose estimate is closer to the difference?
Ans: Exact difference = 14,63,128 - 4,90,020 = 9,73,108.
Roxie: Near 10,00,000 and less → Correct (9,73,108 < 10,00,000).
Estu: Near 9,00,000 and more → Incorrect (9,73,108 > 9,00,000, but not near 9,00,000).

Difference: |9,73,108 - 10,00,000| = 26,892; |9,73,108 - 9,00,000| = 73,108.
Roxie's estimate is closer.

(b) Will the difference be greater than 9,50,000 or less than 9,50,000? Why do you think so?

Ans: Difference = 9,73,108 > 9,50,000. The difference is large enough to exceed 9,50,000.

(c) Will the difference be greater than 9,63,128 or less than 9,63,128? Why do you think so?

Ans: Difference = 9,73,108 > 9,63,128. The exact difference is slightly more.

(d) Exact value of 14,63,128 – 4,90,020 = _______________

Ans: 9,73,108.

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Observe the populations of some Indian cities in the table below.

Rank	City	Population (2011)	Population (2001)
1	Mumbai	1,24,42,373	1,19,78,450
2	New Delhi	1,10,07,835	98,79,172
3	Bengaluru	84,25,970	43,01,326
4	Hyderabad	68,09,970	36,37,483
5	Ahmedabad	55,70,585	35,20,085
6	Chennai	46,81,087	43,43,645
7	Kolkata	44,86,679	45,72,876
8	Surat	44,67,797	24,33,835
9	Vadodara	35,52,371	16,90,000
10	Pune	31,15,431	25,38,473
11	Jaipur	30,46,163	23,22,575
12	Lucknow	28,15,601	21,85,927
13	Kanpur	27,67,031	25,51,337
14	Nagpur	24,05,665	20,52,066
15	Indore	19,60,631	14,74,968
16	Thane	18,18,872	12,62,551
17	Bhopal	17,98,218	14,37,354
18	Visakhapatnam	17,28,128	13,45,938
19	Pimpri-Chinchwad	17,27,692	10,12,472
20	Patna	16,84,222	13,66,444

From the information given in the table, answer the following questions by approximation:

Q1: What is your general observation about this data? Share it with the class.
Ans: The population of most cities increased from 2001 to 2011. Some cities like Bengaluru and Hyderabad grew a lot, while others like Kolkata grew less or decreased.

Q2: What is an appropriate title for the above table?
Ans: "Population of Major Indian Cities (2001 and 2011)".

Q3: How much is the population of Pune in 2011? Approximately, by how much has it increased compared to 2001?
Ans: Pune 2011: 31,15,431. Pune 2001: 25,38,473.
Increase ≈ 31,15,000 - 25,38,000 = 5,77,000 (approx.).

Q4: Which city's population increased the most between 2001 and 2011?
Ans: Bengaluru: 84,25,970 - 43,01,326 = 41,24,644 (largest increase).

Q5: Are there cities whose population has almost doubled? Which are they?
Ans: Check if 2011 population ≈ 2 × 2001 population:
Bengaluru: 84,25,970 ÷ 43,01,326 ≈ 1.96 (almost doubled).
Hyderabad: 68,09,970 ÷ 36,37,483 ≈ 1.87 (close).
Cities: Bengaluru, Hyderabad.

Q6: By what number should we multiply Patna's population to get a number/population close to that of Mumbai?
Ans: Patna 2011: 16,84,222. Mumbai 2011: 1,24,42,373.
Factor ≈ 1,24,42,000 ÷ 16,84,000 ≈ 7.4.
Multiply by about 7.4.
Page No. 14
Roxie and Estu are playing with multiplication. They encounter an interesting technique for multiplying a number by 10, 100, 1000, and so on.
Roxie evaluated 116 × 5 as follows:

$$116 \times 5 = \overset{58}{\cancel{116}} \times \frac{10}{\cancel{2}} = 58 \times 10 = 580.$$

Estu evaluated 824 × 25 as follows:

$$824 \times 25 = \overset{206}{\cancel{824}} \times \frac{100}{\cancel{4}} = 20600.$$

Q: Using the meaning of multiplication and division, can you explain why multiplying by 5 is the same as dividing by 2 and multiplying by 10?
Ans: Multiplying by 5 means adding a number to itself 5 times.
Dividing by 2 means splitting a number into 2 equal parts, and multiplying by 10 means adding a zero or multiplying by 10.
If you take a number and divide it by 2, you get half of it.
Then, multiplying that half by 10 gives you 5 times the original number because 1/2 × 10 = 5.
So, dividing by 2 and multiplying by 10 is the same as multiplying by 5.

Figure it Out

Q1: Find quick ways to calculate these products:
(a) 2 × 1768 × 50
Ans: First, multiply 2 × 50 = 100. Then, multiply 100 × 1768 = 176800.
So, 2 × 1768 × 50 = 176800.
(b) 72 × 125 [Hint: 125 = 1000 ÷ 8]
Ans: Use the hint: 125 = 1000 ÷ 8. So, 72 × 125 = 72 × (1000 ÷ 8).
First, 72 × 1000 = 72000. Then, 72000 ÷ 8 = 9000.
So, 72 × 125 = 9000.
(c) 125 × 40 × 8 × 25
Ans: First, group the numbers: (125 × 8) × (40 × 25).
125 × 8 = 1000, and 40 × 25 = 1000.
Then, 1000 × 1000 = 1000000.
So, 125 × 40 × 8 × 25 = 10,00,000.

Q2: Calculate these products quickly.
(a) 25 × 12 = ______
Ans: 25 × 12 = 25 × (10 + 2) = (25 × 10) + (25 × 2) = 250 + 50 = 300.
So, 25 × 12 = 300.
(b) 25 × 240 = ______
Ans: 25 × 240 = 25 × (24 × 10) = (25 × 24) × 10.
25 × 24 = 25 × (20 + 4) = (25 × 20) + (25 × 4) = 500 + 100 = 600.
Then, 600 × 10 = 6000.
So, 25 × 240 = 6000.
(c) 250 × 120 = ______
Ans: 250 × 120 = (25 × 10) × (12 × 10) = (25 × 12) × (10 × 10).
25 × 12 = 300
Then, 300 × 100 = 30000.
So, 250 × 120 = 30000.
(d) 2500 × 12 = ______
Ans: 2500 × 12 = (25 × 100) × 12 = (25 × 12) × 100.
25 × 12 = 300. Then, 300 × 100 = 30000.
So, 2500 × 12 = 30000.

(e) ______ × ______ = 120000000

Ans: Let’s find two numbers. Notice 120000000 = 12 × 10000000.
2500 × 48000 = (25 × 100) × (48 × 1000) = (25 × 48) × (100 × 1000).
25 × 48 = 1200, then 1200 × 100000 = 120000000.
So, 2500 × 48000 = 120000000.

How Long is the Product?

Q3: In each of the following boxes, the multiplications produce interesting patterns. Evaluate them to find the pattern. Extend the multiplications based on the observed pattern.

11 × 11 = 111 × 111 = 1111 × 1111 =	66 × 61 = 666 × 661 = 6666 × 6661 =
3 × 5 = 33 × 35 = 333 × 335 =	101 × 101 = 102 × 102 = 103 × 103 =

Ans:

11 × 11 = 121 111 × 111 = 12321 1111 × 1111 = 1234321 11111 × 11111 = 123454321 111111 × 111111 = 12345654321	66 × 61 = 4026 666 × 661 = 440226 6666 × 6661 = 44402226 66666 × 66661 = 4,444,022,226 666666 × 666661 = 444440222226
3 × 5 = 15 33 × 35 = 1155 333 × 335 = 111555 3333 × 3335 = 11115555 33333 × 33335 = 1111155555	101 × 101 = 10201 102 × 102 = 10404 103 × 103 = 10609 104 × 104 = 10816 105 × 105 = 11025

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Q4: Observe the number of digits in the two numbers being multiplied and their product in each case. Is there any connection between the numbers being multiplied and the number of digits in their product?

Ans: If two numbers have m and n digits, their product has at most
m + n digits (if the product is large) or
m + n − 1 digits (if smaller).
Example: 11×1111 × 11 (2 + 2 = 4 digits, but 121 is 3 digits).
1111×11111111 × 1111 (4 + 4 = 8 digits, 1234321 is 7 digits).

Q5: Roxie says that the product of two 2-digit numbers can only be a 3- or a 4-digit number. Is she correct?

Ans: Yes. Smallest product: 10×10=100 (3 digits).
Largest product: 99×99=9801 (4 digits).
All products are either 3 or 4 digits.

Q6: Should we try all possible multiplications with 2-digit numbers to tell whether Roxie's claim is true? Or is there a better way to find out?

Ans: No need to try all. Check the smallest (10×10=100, 3 digits) and largest (99×99=9801, 4 digits).
All other products are between these, so only 3 or 4 digits.

She explains her reasoning: "We want to know about the number of digits in the product of two 2-digit numbers. To know the smallest such product I took 10 × 10, so all other products will be greater than 100.

To know the greatest such product I multiplied the smallest 3-digit numbers (100 × 100) to get 10,000; so the product of all the 2-digit multiplications will be less than 10,000."

Q7: Can multiplying a 3-digit number with another 3-digit number give a 4-digit number?

Ans: No. Smallest 3 digit numbers when multiplied with each other: 100 =10,000 (5 digits).
Products are at least 5 digits.

Q8: Can multiplying a 4-digit number with a 2-digit number give a 5-digit number?

Ans: Yes. Example: 1000×10=10,000 (5 digits).
But it can be 6 digits (e.g., 9999×99=9,89,901).

Q9: Observe the multiplication statements below. Do you notice any patterns? See if this pattern extends for other numbers as well.

1-digit	×	1-digit	=	1-digit	or	2-digit
2-digit	×	1-digit	=	2-digit	or	3-digit
2-digit	×	2-digit	=	3-digit	or	4-digit
3-digit	×	3-digit	=	5-digit	or	6-digit
5-digit	×	5-digit	=		or	
8-digit	×	3-digit	=		or	
12-digit	×	13-digit	=		or	

Ans:

1-digit	×	1-digit	=	1-digit	or	2-digit
2-digit	×	1-digit	=	2-digit	or	3-digit
2-digit	×	2-digit	=	3-digit	or	4-digit
3-digit	×	3-digit	=	5-digit	or	6-digit
5-digit	×	5-digit	=	**9-digit**		**10-digit**
8-digit	×	3-digit	=	**10-digit**	or	**11-digit**
12-digit	×	13-digit	=	**24-digit**	or	**25-digit**

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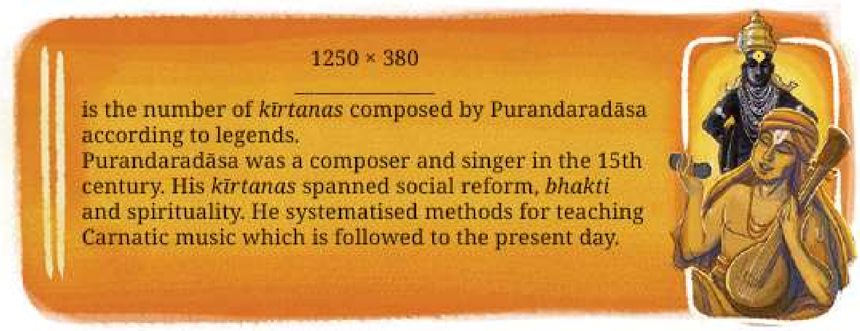
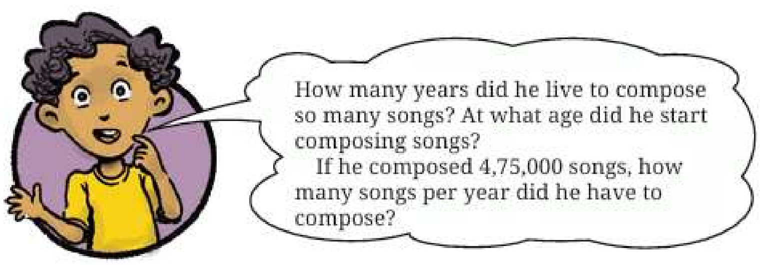




Ans: Let's **assume** this:

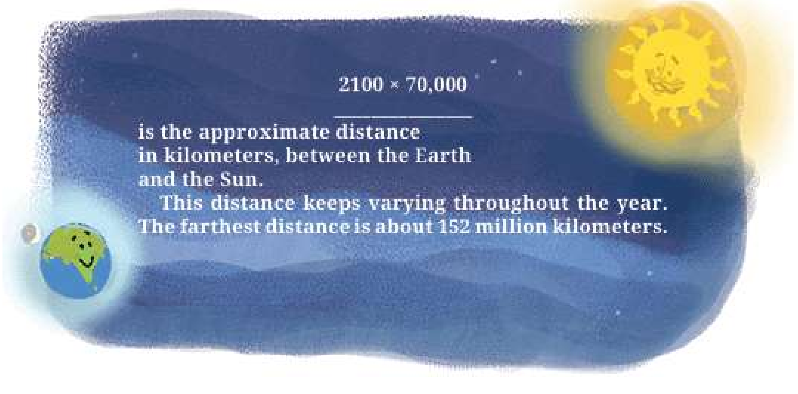
- He lived for **95 years**
- He started composing songs at **age 25**

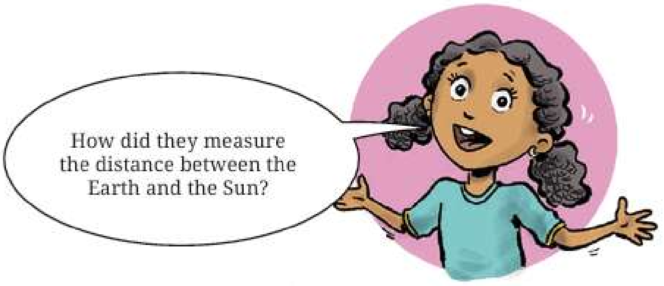
So, number of composing years = 95 − 25 = 70 years

He composed **4,75,000 songs in 70 years**

4,75,000 ÷ 70 = 6785.71 songs per year (approx.)

So, he composed about 6,786 songs every year!





Ans: Scientists cannot use a tape measure to find how far the Sun is! Instead, they used smart methods and mathematics:

1. Astronomical Unit (AU):

One **AU** is the average distance between the Earth and the Sun.

1 AU = **150 million kilometres**.

2. Parallax Method:

Scientists looked at the Sun or planets from two different places on Earth and measured the slight shift in position (called **parallax**). Using triangle math, they calculated the distance.

3. Radio Signals from Spacecraft:

Spacecraft sent signals back to Earth. By measuring the **time it took** for the signal to return and knowing the **speed of light**, scientists found the distance.

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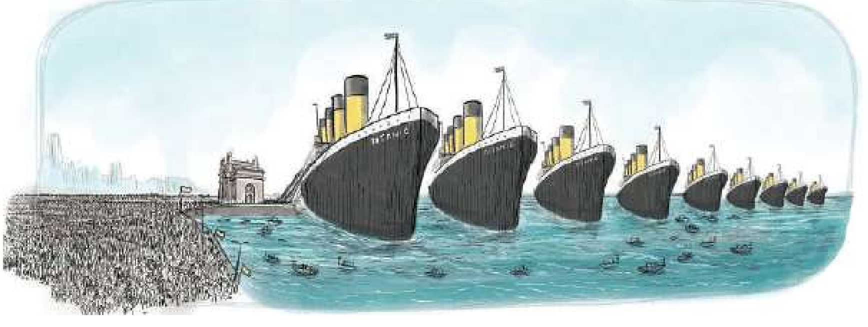
Q1: The RMS Titanic ship carried about 2500 passengers. Can the population of Mumbai fit into 5000 such ships?



Ans: Mumbai population = 1,24,42,373.

One ship = 2,500 passengers. 5,000 ships = 5,000 × 2,500 = 1,25,00,000.

1,24,42,373 < 1,25,00,000. Yes, Mumbai's population can fit.

Q2: Inspired by this strange question, Roxie wondered, "If I could travel 100 kilometers every day, could I reach the Moon in 10 years?" (The distance between the Earth and the Moon is 3,84,400 km.)

Ans:

- In 1 year: 100 × 365 = 36,500 km.
- In 10 years: 36,500 × 10 = 3,65,000 km.
- Moon distance = 3,84,400 km.
  3,65,000 < 3,84,400, so she cannot reach the Moon in 10 years.

Q3: Find out if you can reach the Sun in a lifetime, if you travel 1000 kilometers every day. (You had written down the distance between the Earth and the Sun in a previous exercise.)
Ans: Sun distance = 14,70,00,000 km.
Lifetime = assume 70 years.
Distance travelled = 1,000 × 365 × 70 = 2,55,50,000 km.
2,55,50,000 < 14,70,00,000. No, you cannot reach the Sun.

Q4: Make necessary reasonable assumptions and answer the questions below:
(a) If a single sheet of paper weighs 5 grams, could you lift one lakh sheets of paper together at the same time?
Ans: Weight = 1,00,000 × 5 = 5,00,000 grams = 500 kg.
Average person can lift ~50 kg. 500 kg is too heavy, so no, you cannot lift it.
(b) If 250 babies are born every minute across the world, will a million babies be born in a day?
Ans: Babies per day = 250 × 60 × 24 = 3,60,000.
3,60,000 < 1,000,000. No, a million babies are not born in a day.
(c) Can you count 1 million coins in a day? Assume you can count 1 coin every second.
Ans: Time taken to count 1 coin = 1 second.
In a single day, we can count 86,400 coins.
[Total seconds in a day = 24 × 60 × 60 = 86,400 seconds]
Thus, we cannot count 1 million coins in a day at the rate of 1 coin per second, since it would take approximately 1,000,000 ÷ 86,400 ~ 12 days to complete the task.

Page No. 19
Figure it Out

Q1: Using all digits from 0 – 9 exactly once (the first digit cannot be 0) to create a 10-digit number, write the —
(a) Largest multiple of 5
Ans: Largest number: 9876543210 (ends in 0, divisible by 5).
(b) Smallest even number
Ans: Smallest number: 1023456798 (ends in 2, even).

Q2: The number 10,30,285 in words is Ten lakhs thirty thousand two hundred eighty five, which has 43 letters. Give a 7-digit number name which has the maximum number of letters.
Ans: 77,77,777 (Seventy-seven lakhs seventy-seven thousand seven hundred seventy-seven).
This has 61 letters, making it one of the longest 7-digit numbers.

Q3: Write a 9-digit number where exchanging any two digits results in a bigger number. How many such numbers exist?
Ans: Number must be smallest possible: 123456789.
Any swap (e.g., 213456789) is larger.

Q4: Strike out 10 digits from the number 12345123451234512345 so that the remaining number is as large as possible.
Ans: Keep highest digits: 5544332211 (10 digits, largest possible).

Q5: The words 'zero' and 'one' share letters 'e' and 'o'. The words 'one' and 'two' share a letter 'o', and the words 'two' and 'three' also share a letter 't'. How far do you have to count to find two consecutive numbers which do not share an English letter in common?
Ans: The problem involves finding two consecutive numbers whose English names share no common letters.
Here, zero and one share "e" and "o".
one (1) and two (2) share "o".
two (2) and three (3) share "t".
…………………………….
Nineteen and twenty share: 't', 'e', 'n'
……………. and so on.
Therefore, there are no consecutive numbers that do not share a letter in common.

Q6: Suppose you write down all the numbers 1, 2, 3, 4, …, 9, 10, 11, ... The tenth digit you write is '1' and the eleventh digit is '0', as part of the number 10.
(a) What would the 1000th digit be? At which number would it occur?
Ans: Digits: 1-9 (9 digits), 10-99 (2 × 90 = 180 digits), 100-999 (3 × 900 = 2700 digits).
1000th digit is in 100-999 range. After 9 + 180 = 189 digits, at number 99.
1000 - 189 = 811 digits into 100-999.
Each number (100 to 999) has 3 digits, so 811 ÷ 3 = 270 numbers (810 digits) + 1 digit.
Number 370 (100 + 270), digits: 3, 7, 0. 811th digit = 3, 1000th digit = 3.
(b) What number would contain the millionth digit?
Ans: Let's calculate: 1–9: 9 × 1 = 9 digits
10–99: 90 × 2 = 180 digits
100–999: 900 × 3 = 2700 digits
1000–9999: 9000 × 4 = 36,000 digits
10000–99999: 90,000 × 5 = 450,000 digits
100000–999999: 900,000 × 6 = 5,400,000 digits
So, the millionth digit must lie within the 100000–999999 range (6-digit numbers).
Let's subtract the earlier ranges first:
Total digits before 6-digit numbers:
9 + 180 + 2700 + 36000 + 450000 = 488,889 digits
Digits remaining to reach 1,000,000:
1,000,000 - 488,889 = 511,111 digits
Each 6-digit number = 6 digits →
511111 ÷ 6 = 85,185 full numbers = 511,110 digits, with 1 digit left
Start of 6-digit numbers: 100000
85,185th number = 100000 + 85184 = 185184
So, the millionth digit is the first digit of number 185185

(c) When would you have written the digit '5' for the 5000th time?
Ans:
Single-digit numbers (1-9): 1 (only 5)
Two-digit numbers (10-99)

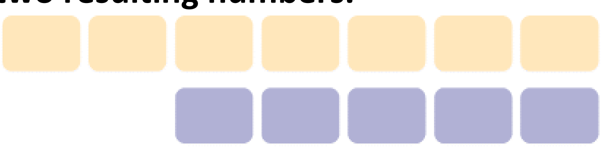
- (15, 25, 35,..., 95), totaling 9 occurrences.
- 50, 51, 52, ..., 59, totaling 10 occurrences.

Thus, 19 occurrences of the digit 5 in the range 10-99.
Total occurrences so far: 1 + 19 = 20
Three-digit numbers (100-999)
(i) Units position: Numbers like 105, 115, ..., 995 contribute 10 occurrences per 100 numbers. Across 900 numbers, there are 90 occurrences.
(ii) Tens position: Numbers like 150-159, 250-259, ..., 950-959 also contribute 10 occurrences per 100 numbers, and 90 occurrences in all.
(iii) Hundreds position: Numbers like 500-599 contribute 100 occurrences in this range.
Thus, 90 (units) + 90 (tens) + 100 (hundreds) = 280 occurrences
Total occurrences so far: 20 + 280 = 300
Four-digit numbers (1000-9999)
Now it gets more intense! Here, 5 appears in four positions (units, tens, hundreds, thousands):
(i) Units position: Every 10 numbers, e.g., 1005, 1015, ..., 9995 = 900 occurrences total.
(ii) Tens position: 1050-1059, 1150-1159, ..., 9950-9959. That's 900 occurrences total.
(iii) Hundreds position: 1500-1599,2500-2599,..., 9500-9599 = 900 occurrences total.
(iv) Thousands position: 5000-5999 = 1000 occurrences
Adding these up: 900 (units) + 900 (tens) + 900 (hundreds) + 1000 (thousands) = 3700 occurrences
Total occurrences so far: 300 + 3700 = 4000
Numbers starting from 10000 onward
For the 5000th number, we require 5000 – 4000 = 1000 more numbers that lie in 10001-10999.
(v) Among 10000-10999, one digit 5 appears in 100 numbers (e.g., 10005, 10015,....., 10995).
The digit 5 appears in 100 numbers (e.g., 10050-10059, ..., 10950-10959).
The digit 5 appears in 100 numbers (e.g., 10500-10599).
Total 4000 + 300 = 4300
In 11000-11999
5 at unit place = 100
5 at tens place = 100
5 at a hundred place = 100
Total 4300 + 300 = 4600
In 12000-12999
4600 + 300 = 4900
In 13000- 13999
Unit = 100

Total = 5000
Final number = 13995

Q7: A calculator has only '+10,000' and '+100' buttons. Write an expression describing the number of button clicks to be made for the following numbers:
(a) 20,800
Ans: (2 × 10,000) + (8 × 100) = 20,000 + 800 = 20,800 (10 clicks).
(b) 92,100
Ans: (9 × 10,000) + (21 × 100) = 90,000 + 2,100 = 92,100 (30 clicks).
(c) 1,20,500
Ans: (12 × 10,000) + (5 × 100) = 1,20,000 + 500 = 1,20,500 (17 clicks).
(d) 65,30,000
Ans: (653 × 10,000) = 65,30,000 (653 clicks).
(e) 70,25,700
Ans: (702 × 10,000) + (57 × 100) = 70,20,000 + 5,700 = 70,25,700 (759 clicks).

Q8: How many lakhs make a billion?
Ans: 1 billion = 1000 million = 1000 × 10 lakhs = 10,000 lakhs.
Q9: You are given two sets of number cards numbered from 1 – 9. Place a number card in each box below to get the (a) largest possible sum (b) smallest possible difference of the two resulting numbers.



Ans: **(a)** To get the largest possible sum, use the largest digits in both sets.

- First set (5 boxes): 9, 8, 7, 6, 5 (number: 98765)
- Second set (4 boxes): 9, 8, 7, 6 (number: 9876)
- Sum: 98765 + 9876 = 108641

(b) To get the smallest possible difference, make the numbers as close as possible.

- First set (5 boxes): 1, 0, 0, 0, 0 (number: 10000, using 1 and assuming remaining as 0 for simplicity)
- Second set (4 boxes): 9, 9, 9, 9 (number: 9999)
- Difference: 10000 - 9999 = 1

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Q10: You are given some number cards: 4000, 13000, 300, 70000, 150000, 20, 5. Using the cards get as close as you can to the numbers below using any operation you want. Each card can be used only once for making a particular number.
(a) 1,10,000: Closest I could make is 4000 × (20 + 5) + 13000 = 1,13,000
Ans: Given: 1,13,000 (close).

Another try: 150000 − 40000 = 1, 10,000 (exact, but 40000 not a card).
Best: 1,13,000.

(b) 2,00,000:

Ans: 1,50,000 + 70,000 – 4000 × 5 = 2,00,000

(c) 5,80,000:

Ans: 70,000 × 5 + 1,50,000 + 4,000 × 20 = 5,80,000

(d) 12,45,000

Ans: 70,000 × 20 – 1,50,000 – 4,000 – 300 × 5 = 12,44,500
This gives us 12,44,500, which is very close to 12,45,000.

(e) 20,90,800

Ans: 13,000 × 300 – 70,000(20 + 5) – 1,50,000 + 4,000 = 20,04,000

Q11: Find out how many coins should be stacked to match the height of the Statue of Unity. Assume each coin is 1 mm thick.

Ans: Statue of Unity = 180 metres = 180,000 mm.
Coins = 180,000 ÷ 1 = 1,80,000 coins.

Q12: Grey-headed albatrosses have a roughly 7-feet wide wingspan. They are known to migrate across several oceans. Albatrosses can cover about 900 – 1000 km in a day. One of the longest single trips recorded is about 12,000 km. How many days would such a trip take to cross the Pacific Ocean approximately?

Ans: Distance = 12,000 km. Speed = 950 km/day (average).
Days = 12,000 ÷ 950 ≈ 12.63.
Approximately 13 days.

Q13: A bar-tailed godwit holds the record for the longest recorded non-stop flight. It travelled 13,560 km from Alaska to Australia without stopping. Its journey started on 13 October 2022 and continued for about 11 days. Find out the approximate distance it covered every day. Find out the approximate distance it covered every hour.

Ans: Daily: 13,560 ÷ 11 ≈ 1,232.73 km/day.
Hourly: 1,232.73 ÷ 24 ≈ 51.36 km/hour.

Q14: Bald eagles are known to fly as high as 4500 – 6000 m above the ground level. Mount Everest is about 8850 m high. Aeroplanes can fly as high as 10,000 – 12,800 m. How many times bigger are these heights compared to Somu's building?

Ans: Somu's building = 40 m (from Page 3).

- Eagles (5,250 m avg): 5,250 ÷ 40 = 131.25 times.
- Everest: 8,850 ÷ 40 = 221.25 times.
- Aeroplanes (11,400 m avg): 11,400 ÷ 40 = 285 times.