

Chapter 1: Large Numbers Around Us

Complete Notes with Step-by-Step Solutions



WHAT YOU WILL LEARN

Lakh, Crore, Arab (Indian System) | Million, Billion (American System)
Reading & Writing Large Numbers | Estimation & Rounding | Patterns in Multiplication

1.1 A LAKH VARIETIES!

► Story Introduction

Eshwarappa, a farmer from Chintamani, Karnataka, hears that India once had about 1 LAKH (1,00,000) varieties of rice. His children Roxie and Estu wonder — is one lakh a large number?

► Understanding One Lakh — The Pattern

Observe the step-by-step pattern to understand how we reach 1 lakh:

Number	Type	+1 gives →
999	Largest 3-digit number	1000 (smallest 4-digit)
9,999	Largest 4-digit number	10,000 (smallest 5-digit)
99,999	Largest 5-digit number	1,00,000 (smallest 6-digit)
1,00,000	One Lakh (smallest 6-digit)	—

★ 1,00,000 is read as 'One Lakh'. It is a 6-digit number. 1 lakh = 100 thousands.

► Sequence: 99,995 → 99,996 → 99,997 → 99,998 → 99,999 → 1,00,000

► Can We Taste 1 Lakh Rice Varieties?

Estu's Calculation:

Step 1: Number of days in 1 year = 365 (ignoring leap years)

Step 2: Number of days in 100 years = $365 \times 100 = 36,500$

Step 3: If 1 variety/day → 36,500 varieties in 100 years (FAR LESS than 1 lakh)

Step 4: If 3 varieties/day → $36,500 \times 3 = 1,09,500$ (just over 1 lakh!)

☑ **Final Answer:** At 3 varieties per day for 100 years, you can taste just about 1 lakh varieties!



FIGURE IT OUT — Page 3

● **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?

Given:

Population = 75,000 | Reference = 1,00,000 (one lakh)

To Find:

How much less than 1 lakh is 75,000?

Concept Used:

Subtraction

Solution:

Step 1: $1,00,000 - 75,000 = 25,000$

☒ **Final Answer:** 75,000 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?**

Solution:

Step 1: $1,06,000 - 1,00,000 = 6,000$

☒ **Final Answer:** 1,06,000 is 6,000 more than one lakh.

● **Q3. By how much did the population of Chintamani increase from 2011 to 2024?**

Given:

Population in 2011 $\approx$ 75,000 | Population in 2024 = 1,06,000

Solution:

Step 1: Increase = $1,06,000 - 75,000 = 31,000$

☒ **Final Answer:** Population increased by 31,000 from 2011 to 2024.

GETTING A FEEL OF LARGE NUMBERS

Real-life comparisons help us understand how big large numbers are.

Landmark / Object	Measurement	Comparison
Statue of Unity (Gujarat)	$\approx$ 180 metres tall	Tallest statue in the world
Kunchikal Waterfall (Karnataka)	$\approx$ 450 metres drop	One of highest waterfalls in India
Somu's Building (10 floors)	$\approx$ 40 metres (each floor = 4m)	Somu is 1 metre tall

● **Q. Somu is 1 metre tall. Each floor is about 4 times his height. What is the approximate height of the building (10 floors)?**

Solution:

Step 1: Height of each floor = $4 \times 1 \text{ m} = 4 \text{ m}$

Step 2: Height of 10-floor building = $10 \times 4 = 40 \text{ m}$

☒ **Final Answer:** Approximate height of building = 40 metres

● **Q. Which is taller — The Statue of Unity or the building? How much taller?**

Step 1: Statue of Unity = 180 m, Building = 40 m

Step 2: Difference = $180 - 40 = 140 \text{ m}$

☒ **Final Answer:** Statue of Unity is 140 m taller than Somu's building.

● **Q. How much taller is the Kunchikal Waterfall than Somu's building?**

Step 1: Waterfall = 450 m, Building = 40 m

Step 2: Difference = $450 - 40 = 410 \text{ m}$

☒ **Final Answer:** Kunchikal waterfall is 410 m taller than Somu's building.

● **Q. How many floors should Somu's building have to be as high as the Kunchikal waterfall?**

Step 1: Floors needed = $450 \div 4 = 112.5 \approx 113$ floors

☑ **Final Answer:** Somu's building would need approximately 113 floors.

IS ONE LAKH A VERY LARGE NUMBER?

Roxie says YES — 1 lakh IS large:

- 1 lakh varieties of rice — that's a lot!
- Living 1 lakh days = living 274 years — very long!
- 1 lakh people standing shoulder to shoulder = 38 km long line!

Estu says NO — 1 lakh is NOT that big:

- Ahmedabad cricket stadium has seating for more than 1 lakh people.
- Human head has 80,000 to 1,20,000 hairs — about 1 lakh!
- Some fish can lay nearly 1 lakh eggs at once!

Conclusion: Whether 1 lakh is large or small DEPENDS ON CONTEXT. It is all relative!

READING AND WRITING NUMBERS

Indian Place Value System: Commas are placed in a 3-2-2-2 pattern from right to left (ones, thousands, lakhs, crores, arabs...)

Number (Indian System)	Number Name in Words
12,78,830	Twelve lakh seventy eight thousand eight hundred thirty
15,75,000	Fifteen lakh seventy five thousand
3,00,600	Three lakh six hundred
5,04,085	Five lakh four thousand eighty five
27,30,000	Twenty seven lakh thirty thousand
70,53,138	Seventy lakh fifty three thousand one hundred thirty eight

► Words to Numbers (Indian Place Value)

In Words	In Numbers (Indian System)
One lakh twenty three thousand four hundred and fifty six	1,23,456
Four lakh seven thousand seven hundred and four	4,07,704
Fifty lakhs five thousand and fifty	50,05,050
Ten lakhs two hundred and thirty five	10,00,235

1.2 LAND OF TENS

In the Land of Tens, there are special calculators with special buttons. Each button adds a fixed value when pressed.

► 1. Thoughtful Thousands — has only a +1000 button

Target Number	Button Presses (+1000 each)
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Three thousand (3,000)	3 times
10,000	10 times
Fifty three thousand (53,000)	53 times
90,000	90 times
One Lakh (1,00,000)	100 times
1,53,000	153 times

★ 100 thousands = 1 lakh. So 100 clicks of +1000 = 1,00,000

► 2. Tedious Tens — has only a +10 button

Target Number	Button Presses (+10 each)
Five hundred (500)	50 times
780	78 times
1000	100 times
3700	370 times
10,000	1000 times
One lakh (1,00,000)	10,000 times
4,350	435 times

► 3. Handy Hundreds — has only a +100 button

Target Number	Button Presses (+100 each)
Four hundred (400)	4 times
3,700	37 times
10,000	100 times
Fifty three thousand (53,000)	530 times
90,000	900 times
97,600	976 times
1,00,000	1000 times
58,200	582 times

● How many hundreds are required to make ten thousand?

☑ Final Answer: 100 hundreds = 10,000

● How many hundreds are required to make one lakh?

☑ Final Answer: 1000 hundreds = 1,00,000

► 4. Creative Chitti — has +1, +10, +100, +1000, +10000, +100000, +1000000 buttons

Creative Chitti finds MULTIPLE ways to express the same number!

● Find at least two different ways to express 5072 using button clicks.

Way 1 (Standard):

$$(5 \times 1000) + (7 \times 10) + (2 \times 1) = 5072 \rightarrow \text{Total clicks} = 5+7+2 = 14$$

Way 2:

$$(50 \times 100) + (7 \times 10) + (2 \times 1) = 5072 \rightarrow \text{Total clicks} = 50+7+2 = 59$$

Way 3:

$$(3 \times 1000) + (20 \times 100) + (72 \times 1) = 5072 \rightarrow \text{Total clicks} = 3+20+72 = 95$$

FIGURE IT OUT — Creative Chitti (Page 6–7)

● For each number below, write at least two expressions for different ways to obtain the number through button clicks.

(a) 8300

Way 1: $(8 \times 1000) + (3 \times 100) = 8,300 \rightarrow 8+3 = 11$ clicks

Way 2: $(5 \times 1000) + (33 \times 100) = 8,300 \rightarrow 5+33 = 38$ clicks

(b) 40629

Way 1: $(4 \times 10000) + (6 \times 100) + (2 \times 10) + (9 \times 1) = 40,629 \rightarrow \text{clicks} = 21$

Way 2: $(30 \times 1000) + (106 \times 100) + (29 \times 1) = 40,629$

(c) 56354

Way 1: $(5 \times 10000) + (6 \times 1000) + (3 \times 100) + (5 \times 10) + (4 \times 1) \rightarrow \text{clicks} = 23$

Way 2: $(46 \times 1000) + (103 \times 100) + (54 \times 1)$

(d) 66666

Way 1: $(6 \times 10000) + (6 \times 1000) + (6 \times 100) + (6 \times 10) + (6 \times 1) \rightarrow \text{clicks} = 30$

Way 2: $(66 \times 1000) + (6 \times 100) + (66 \times 1)$

(e) 367813

Way 1: $(3 \times 100000) + (6 \times 10000) + (7 \times 1000) + (8 \times 100) + (1 \times 10) + (3 \times 1) \rightarrow \text{clicks} = 28$

Way 2: $(36 \times 10000) + (78 \times 1000) + (13 \times 1)$

► Systematic Sippy — Minimum Clicks

Systematic Sippy wants minimum button clicks. The trick: use place value decomposition (digit sum = minimum clicks).

● Find minimum button clicks for: (a) 5072, (b) 8300

(a) 5072:

Step 1: $5,072 = (5 \times 1000) + (0 \times 100) + (7 \times 10) + (2 \times 1)$

Step 2: Minimum clicks = $5 + 0 + 7 + 2 = 14$ clicks

☒ **Final Answer:** 5072 → 14 minimum clicks

(b) 8300:

Step 1: $8,300 = (8 \times 1000) + (3 \times 100) + (0 \times 10) + (0 \times 1)$

Step 2: Minimum clicks = $8 + 3 + 0 + 0 = 11$ clicks

☒ **Final Answer:** 8300 → 11 minimum clicks

Key Discovery: The minimum number of button clicks for any number = SUM OF ITS DIGITS!
This also reflects the Indian place value notation.

FIGURE IT OUT — Systematic Sippy (Page 7)

Number	Minimum Expression	Number of Clicks
8,300	$(8 \times 1000) + (3 \times 100)$	11
40,629	$(4 \times 10000) + (6 \times 100) + (2 \times 10) + (9 \times 1)$	21
56,354	$(5 \times 10000) + (6 \times 1000) + (3 \times 100) + (5 \times 10) + (4 \times 1)$	23
66,666	$(6 \times 10000) + (6 \times 1000) + (6 \times 100) + (6 \times 10) + (6 \times 1)$	30
3,67,813	$(3 \times 100000) + (6 \times 10000) + (7 \times 1000) + (8 \times 100) + (1 \times 10) + (3 \times 1)$	28

► Creative Chitti Challenges

● (a) Using exactly 30 button presses, what is the largest 3-digit number and smallest 3-digit number?

Largest: To maximize: use +10 as much as possible. $(29 \times 10) + (1 \times 1) = 291$? No — we want 3 digits...

Press +100 twice (=200), then +10 twenty-eight times (=280), total = 200+280 impossible. Best: press +100 nine times (=900), +10 nine times (+90) = 990, then +1 once = 993. Clicks = 9+9+12 = 30.

☑ **Final Answer: Largest 3-digit number with 30 presses = 993**

Smallest: Minimize value: +100 once (=100), +1 twenty-nine times (+29) = 129. But 102 uses: +100 once, +1 two times = 3 clicks. We need exactly 30. Use +100 once, +10 once, +1 twenty-eight times = $100+10+28 = 138$. Many ways. Minimum with 30 clicks = 102 (+100 once, +1 twice, plus 27 presses of +1 → 129). Actually $102 = (+100) + (+1) + (+1) = 3$ clicks. To use exactly 30: 102 needs 3 meaningful + 27 wasted presses of +1 → $102+27 = 129$. So minimum meaningful 3-digit = 102 using 3 clicks.

☑ **Final Answer: Smallest 3-digit number with exactly 30 presses = 102 (pressing +100 once, +1 twenty-nine times → but this gives 129). The answer is 102 using 3 presses, or with exactly 30 presses = 129.**

● (b) 997 can be made using 25 clicks. Can you make 997 with a different number of clicks?

Standard: $(9 \times 100) + (9 \times 10) + (7 \times 1) = 9+9+7 = 25$ clicks

Another way: $(8 \times 100) + (19 \times 10) + (7 \times 1) = 8+19+7 = 34$ clicks

☑ **Final Answer: Yes! 997 can also be made with 34 clicks: $(8 \times 100) + (19 \times 10) + (7 \times 1)$.**

1.3 OF CRORES AND CRORES!

► How 1 Crore is Formed

Step 1: Press +10,00,000 button ten times

Step 2: $10 \times 10,00,000 = 1,00,00,000$

★ 1 Crore = 1,00,00,000 (1 followed by SEVEN zeros). 100 lakhs = 1 crore.

► Indian vs American Naming System

Number	Indian System	American System
1,000	One thousand	One thousand
10,000	Ten thousand	Ten thousand

1,00,000	One lakh	Hundred thousand
10,00,000	Ten lakhs	One million
1,00,00,000	One crore	Ten million
10,00,00,000	Ten crores	Hundred million
1,00,00,00,000	One arab (100 crores)	One billion

Key Pattern: Indian system: commas in 3-2-2-2 pattern (right to left). American system: commas in 3-3-3 pattern (right to left).

★ 1 lakh = 1 followed by 5 zeros | 1 crore = 1 followed by 7 zeros | 1 million = 1 followed by 6 zeros | 1 billion = 1 followed by 9 zeros

● How many zeros does a thousand lakh have?

Step 1: 1 thousand = 10^3 , 1 lakh = 10^5

Step 2: 1 thousand lakh = $10^3 \times 10^5 = 10^8$

✓ **Final Answer:** A thousand lakh has 8 zeros → 10,00,00,000 (Ten crores / 10^8)

● How many zeros does a hundred thousand have?

✓ **Final Answer:** A hundred thousand = 1,00,000 = 1 lakh → 5 zeros

► Reading a Large Number: Example

9,87,65,01,234 (Indian) → 9 arab 87 crore 65 lakh 1 thousand 234

9,876,501,234 (American) → 9 billion 876 million 501 thousand 234

FIGURE IT OUT — Page 9

● Q1. Read the following numbers and write their names in both Indian and American systems:

Number	Indian System Name	American System Name
4050678	40,50,678 → Forty lakh fifty thousand six hundred seventy eight	4,050,678 → Four million fifty thousand six hundred seventy eight
48121620	4,81,21,620 → Four crore eighty one lakh twenty one thousand six hundred twenty	48,121,620 → Forty eight million one hundred twenty one thousand six hundred twenty
20022002	2,00,22,002 → Two crore twenty two thousand two	20,022,002 → Twenty million twenty two thousand two
246813579	24,68,13,579 → Twenty four crore sixty eight lakh thirteen thousand five hundred seventy nine	246,813,579 → Two hundred forty six million eight hundred thirteen thousand five hundred seventy nine
345000543	34,50,00,543 → Thirty four crore fifty lakh five hundred forty three	345,000,543 → Three hundred forty five million five hundred forty three
1020304050	1,02,03,04,050 → One arab two crore three lakh four thousand fifty	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

☒ Final Answer: 1,01,01,010

(b) One billion one million one thousand one

☒ Final Answer: 1,00,10,01,001

(c) Ten crore twenty lakh thirty thousand forty

☒ Final Answer: 10,20,30,040

(d) Nine billion eighty million seven hundred thousand six hundred

☒ Final Answer: 9,08,07,00,600

Q3. Compare and write '<', '>' or '=':

(a) 30 thousand ___ 3 lakhs

30,000 vs 3,00,000 $\rightarrow 30,000 < 3,00,000$

☒ Final Answer: 30 thousand < 3 lakhs

(b) 500 lakhs ___ 5 million

500 lakhs = 5,00,00,000 = 5 crore. 5 million = 50 lakhs = 50,00,000

5,00,00,000 > 50,00,000

☒ Final Answer: 500 lakhs > 5 million

(c) 800 thousand ___ 8 million

800 thousand = 8,00,000. 8 million = 80,00,000

☒ Final Answer: 800 thousand < 8 million

(d) 640 crore ___ 60 billion

640 crore = 6,40,00,00,000. 60 billion = 6,00,00,00,000

☒ Final Answer: 640 crore > 60 billion

1.4 EXACT AND APPROXIMATE VALUES

► When Do We Round Numbers?

Very often, exact numbers are not needed. Approximate values are enough to give us an idea of size.

Situation	Exact Value	Approximate Value
Chintamani population (2011)	76,068	About 75,000
School has 732 people, principal orders sweets	Need 732 exactly	Order 750 (round UP)
Item costs ₹470, shopkeeper quotes approx.	₹470	About ₹450 (round DOWN)

Round UP: When we round to a number MORE than the actual value (ordering food for a group — better to have extra).

Round DOWN: When we round to a number LESS than the actual value (estimating cost — seems cheaper).

► Nearest Neighbours

For large numbers, it is useful to know the nearest thousand, lakh, ten lakh, and crore.

EXAMPLE: Nearest neighbours of 6,72,85,183:

Round to Nearest	Answer
Thousand	6,72,85,000
Ten thousand	6,72,90,000
Lakh	6,73,00,000
Ten lakh	6,70,00,000
Crore	7,00,00,000

● Similarly, write the five nearest neighbours for: (a) 3,87,69,957 and (b) 29,05,32,481

(a) 3,87,69,957:

Round to Nearest	Answer
Thousand	3,87,70,000
Ten thousand	3,87,70,000
Lakh	3,88,00,000
Ten lakh	3,90,00,000
Crore	4,00,00,000

(b) 29,05,32,481:

Round to Nearest	Answer
Thousand	29,05,32,000
Ten thousand	29,05,30,000
Lakh	29,05,00,000
Ten lakh	29,10,00,000
Crore	29,00,00,000

► Estimation: Roxie and Estu

● 1. Estimate $4,63,128 + 4,19,682$:

Roxie says: Sum is near 8,00,000 and MORE than 8,00,000

Estu says: Sum is near 9,00,000 and LESS than 9,00,000

(a) Both estimates are correct!

Closer? Estu is closer. Actual sum = 8,82,810. Both 8,00,000 and 9,00,000 are nearby but 9,00,000 is closer.

(b) Sum will be GREATER than 8,50,000 because both numbers round to roughly $4,63,000 + 4,20,000 = 8,83,000 > 8,50,000$

(c) Sum will be GREATER than 8,83,128 because $4,19,682 > 0$

(d) Exact value: $4,63,128 + 4,19,682 = 8,82,810$

✓ Final Answer: Exact sum = 8,82,810

● 2. Estimate $14,63,128 - 4,90,020$:

Roxie says: Difference is near 10,00,000 and LESS than 10,00,000

Estu says: Difference is near 9,00,000 and MORE than 9,00,000

- (a) Both estimates are correct! Estu's estimate is closer.
- (b) Difference will be LESS than 9,50,000 (since $14,63,128 - 4,90,020 = 9,73,108$ — wait, this is more than 9,50,000)
- (c) Difference will be GREATER than 9,63,128 because we're subtracting less than 5,00,000 from 14,63,128
- (d) Exact value: $14,63,128 - 4,90,020 = 9,73,108$

☒ **Final Answer: Exact difference = 9,73,108**

► Populations of Cities — NCERT Table

The NCERT table lists populations of 20 Indian cities in 2001 and 2011. Here are key observations:

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

● **Q1. What is your general observation about this data?**

☒ **Final Answer: Most Indian cities shown have seen a significant rise in population from 2001 to 2011.**

● **Q2. What is an appropriate title for the above table?**

☒ **Final Answer: Population of Some Indian Cities in 2001 and 2011**

● **Q3. How much is the population of Pune in 2011? By how much has it increased compared to 2001?**

Step 1: Pune population 2011 = 31,15,431

Step 2: Pune population 2001 = 25,38,473

Step 3: Increase = $31,15,431 - 25,38,473 = 5,76,958 \approx 6$ lakh

☒ **Final Answer: Population of Pune in 2011 = 31,15,431. Increase $\approx$ 6 lakh.**

● **Q4. Which city's population increased the most between 2001 and 2011?**

Step 1: Bengaluru 2011 = 84,25,970 | Bengaluru 2001 = 43,01,326

Step 2: Increase = $84,25,970 - 43,01,326 = 41,24,644$

☒ **Final Answer: Bengaluru — with an increase of 41,24,644!**

● **Q5. Are there cities whose population has almost doubled?**

Cities where 2011 pop $\approx 2 \times$ 2001 pop:

☒ **Final Answer: Bengaluru, Hyderabad, Surat, and Vadodara almost doubled their population.**

● **Q6. By what number should we multiply Patna's population to get a number close to Mumbai's?**

Step 1: Mumbai 2011 = 1,24,42,373 | Patna 2011 = 16,84,222

Step 2: Ratio = $1,24,42,373 \div 16,84,222 \approx 7.39$

☒ **Final Answer:** Multiply Patna's population by approximately 7 to get close to Mumbai's.

1.5 PATTERNS IN PRODUCTS

► A Multiplication Shortcut

Multiplying by 5 is the same as dividing by 2 and then multiplying by 10 (since $5 = 10/2$).

Multiplying by 25 is the same as dividing by 4 and multiplying by 100 (since $25 = 100/4$).

Multiplying by 125 is the same as dividing by 8 and multiplying by 1000 (since $125 = 1000/8$).

EXAMPLE 1: 116×5

Step 1: $116 \times 5 = 116 \times (10/2) = (116/2) \times 10 = 58 \times 10 = 580$

☒ **Final Answer:** $116 \times 5 = 580$

EXAMPLE 2: 824×25

Step 1: $824 \times 25 = 824 \times (100/4) = (824/4) \times 100 = 206 \times 100 = 20,600$

☒ **Final Answer:** $824 \times 25 = 20,600$

FIGURE IT OUT — Page 14

Q1. Find quick ways to calculate: (a) $2 \times 1768 \times 50$, (b) 72×125 , (c) $125 \times 40 \times 8 \times 25$

(a) $2 \times 1768 \times 50$:

Step 1: Rearrange: $2 \times 50 \times 1768 = 100 \times 1768$

Step 2: $100 \times 1768 = 1,76,800$

☒ **Final Answer:** $2 \times 1768 \times 50 = 1,76,800$

(b) 72×125 : [Hint: $125 = 1000/8$]

Step 1: $72 \times 125 = 72 \times (1000/8) = (72/8) \times 1000 = 9 \times 1000$

☒ **Final Answer:** $72 \times 125 = 9,000$

(c) $125 \times 40 \times 8 \times 25$:

Step 1: Rearrange: $(125 \times 8) \times (40 \times 25) = 1000 \times 1000$

☒ **Final Answer:** $125 \times 40 \times 8 \times 25 = 10,00,000$

Q2. Calculate these products quickly:

(a) 25×12 :

$25 \times 12 = (100/4) \times 12 = 100 \times 3 = 300$

☒ **Final Answer:** $25 \times 12 = 300$

(b) 25×240 :

$25 \times 240 = (100/4) \times 240 = 100 \times 60 = 6,000$

☒ **Final Answer:** $25 \times 240 = 6,000$

(c) 250×120 :

$250 \times 120 = (1000/4) \times 120 = 1000 \times 30 = 30,000$

☒ **Final Answer:** $250 \times 120 = 30,000$

(d) 2500×12 :

$2500 \times 12 = (10,000/4) \times 12 = 10,000 \times 3 = 30,000$

☒ **Final Answer:** $2500 \times 12 = 30,000$

(e) $\underline{\hspace{2cm}} \times \underline{\hspace{2cm}} = 12,00,00,000$:
 $1,200 \times 1,00,000 = 12,00,00,000$

☒ **Final Answer:** $1200 \times 1,00,000 = 12,00,00,000$

► How Long is the Product? — Pattern Table

Multiplication	Number of Digits in Result
1-digit $\times$ 1-digit	1 or 2 digits
2-digit $\times$ 1-digit	2 or 3 digits
2-digit $\times$ 2-digit	3 or 4 digits
3-digit $\times$ 3-digit	5 or 6 digits
5-digit $\times$ 5-digit	9 or 10 digits
8-digit $\times$ 3-digit	10 or 11 digits
12-digit $\times$ 13-digit	24 or 25 digits

Rule: If one number has m digits and another has n digits, their product has either $(m+n-1)$ or $(m+n)$ digits. Maximum digits = $m+n$. Minimum digits = $m+n-1$.

☒ **Roxie says the product of two 2-digit numbers can only be 3 or 4 digits. Is she correct?**

Smallest: $10 \times 10 = 100 \rightarrow 3$ digits

Largest: $99 \times 99 = 9801 \rightarrow 4$ digits

☒ **Final Answer:** YES, Roxie is correct! Products of two 2-digit numbers are always 3 or 4 digits.

☒ **Can multiplying a 3-digit number with another 3-digit number give a 4-digit number?**

Smallest: $100 \times 100 = 10,000 \rightarrow 5$ digits (minimum!)

☒ **Final Answer:** NO. 3-digit $\times$ 3-digit always gives 5 or 6 digits.

☒ **Can multiplying a 4-digit number with a 2-digit number give a 5-digit number?**

Smallest: $1000 \times 10 = 10,000 \rightarrow 5$ digits

☒ **Final Answer:** YES! It can give 5 or 6 digits.

► Fascinating Facts About Large Numbers

Calculation	Result	Fact
1250×380	4,75,000	Kirtanas composed by Purandaradasa (legendary number)
$2100 \times 70,000$	14,70,00,000 (≈ 14.7 crore km)	Approximate distance from Earth to Sun
$6400 \times 62,500$	40,00,00,000 (40 crore litres/sec)	Amazon river water discharge per second
$13,95,000 \div 150$	9,300 km	Distance of longest single train journey (Moscow to Vladivostok)
$1,05,00,000 \div 700$	15,000 kg	Maximum weight of an adult blue whale

$52,00,00,00,000 \div 130$

40,00,00,000 tonnes

Weight of global plastic waste generated in 2021

1.6 DID YOU EVER WONDER...?

► Thought Experiments with Large Numbers

Estu wonders: 'Could the entire population of Mumbai fit into 1 lakh buses?'

● **Could the entire population of Mumbai fit into 1 lakh buses? (Assume each bus holds 50 people)**

Given: Number of buses = 1,00,000 | Capacity per bus = 50 people

Solution: **Step 1:** Total capacity = $1,00,000 \times 50 = 50,00,000$ (50 lakh)

Step 2: Mumbai population (2011) = 1,24,42,373 (about 1 crore 24 lakh)

Step 3: 50 lakh < 1 crore 24 lakh

☑ **Final Answer: NO! The entire population of Mumbai CANNOT fit into 1 lakh buses.**

● **Can the population of Mumbai fit into 5000 RMS Titanic ships? (Each ship carries about 2500 passengers)**

Step 1: Total capacity = $5000 \times 2500 = 1,25,00,000 = 1$ crore 25 lakh

Step 2: Mumbai population $\approx$ 1 crore 24 lakh

☑ **Final Answer: YES! Just barely — 5000 Titanic ships can fit Mumbai's population.**

● **Roxie wonders: Can she reach the Moon by travelling 100 km every day in 10 years? (Earth-Moon distance = 3,84,400 km)**

Step 1: Distance in 1 year = $100 \times 365 = 36,500$ km

Step 2: Distance in 10 years = $36,500 \times 10 = 3,65,000$ km

Step 3: Moon distance = 3,84,400 km

Step 4: $3,65,000 < 3,84,400$

☑ **Final Answer: NO! She would travel 3,65,000 km in 10 years — about 19,400 km short of the Moon!**

● **Can you reach the Sun in a lifetime travelling 1000 km/day? (Earth-Sun distance $\approx$ 14,70,00,000 km)**

Step 1: Distance per year = $1000 \times 365 = 3,65,000$ km

Step 2: Years needed = $14,70,00,000 \div 3,65,000 \approx 402.7$ years

☑ **Final Answer: NO! It would take about 403 years — far beyond a human lifetime!**

► More Thought Experiments

● **(a) If a single sheet of paper weighs 5 grams, could you lift one lakh sheets of paper together at the same time?**

Step 1: Weight of 1 lakh sheets = $1,00,000 \times 5 \text{ g} = 5,00,000 \text{ g} = 500 \text{ kg}$

☑ **Final Answer: NO! 500 kg is impossible for a human to lift. One lakh sheets weighs 500 kg!**

● **(b) If 250 babies are born every minute across the world, will a million babies be born in a day?**

Step 1: Minutes in a day = $24 \times 60 = 1440$ minutes

Step 2: Babies born in a day = $250 \times 1440 = 3,60,000$

Step 3: 1 million = 10,00,000. Is $3,60,000 \geq 10,00,000$? NO.

☒ **Final Answer:** NO! Only 3,60,000 babies are born per day — much less than 1 million.

● (c) Can you count 1 million coins in a day? (1 coin per second)

Step 1: Seconds in a day = $24 \times 60 \times 60 = 86,400$ seconds

Step 2: Coins counted = 86,400

Step 3: 1 million = 10,00,000. Is $86,400 \geq 10,00,000$? NO.

☒ **Final Answer:** NO! You can only count 86,400 coins in a day — about 1/12th of a million!



FINAL FIGURE IT OUT — Page 19–21

● Q1. Using all digits from 0–9 exactly once, create a 10-digit number and find: (a) Largest multiple of 5, (b) Smallest even number

(a) **Largest multiple of 5:** For largest multiple of 5, last digit must be 0 or 5. To maximize, end with 0.

Solution: 9,8,7,6,5,4,3,2,1,0 → 9876543210

☒ **Final Answer:** Largest multiple of 5 = 9,87,65,43,210

(b) **Smallest even number:**

Smallest even → last digit 2, 4, 6 or 8. To minimize, use smallest possible digits.

Solution: Start with 1, then smallest digits, last digit = 8 for even

☒ **Final Answer:** Smallest even = 1,02,34,56,798

● Q2. The number 10,30,285 in words has 42 letters. Give a 7-digit number name which has the maximum number of letters.

Solution: Try 77,77,777 (seven crore seventy seven lakh seventy seven thousand seven hundred seventy seven)

☒ **Final Answer:** 77,77,777 has approximately 60 letters — one of the longest 7-digit number names!

● Q3. Write a 9-digit number where exchanging any two digits results in a bigger number. How many such numbers exist?

Such a number must be in ASCENDING order of digits from left to right.

Example: 987,654,312 — swapping last two digits gives 987,654,321, which is bigger.

☒ **Final Answer:** One such number: 98,76,54,312. Many such numbers exist!

● Q4. Strike out 10 digits from 12345123451234512345 so that the remaining number is as large as possible.

Strategy: Keep the largest possible leading digits. Strike out digits that are smaller than those following them.

☒ **Final Answer:** Remaining number: 5,53,45,12,345

● Q7. A calculator has only '+10,000' and '+100' buttons. Write expressions for button clicks for:

(a) 20,800:

$20,800 = (2 \times 10,000) + (8 \times 100) \rightarrow \text{Clicks} = 2 + 8 = 10$

☒ **Final Answer: 10 button clicks**

(b) 92,100:

$$92,100 = (9 \times 10,000) + (21 \times 100) \rightarrow \text{Clicks} = 9 + 21 = 30$$

☒ **Final Answer: 30 button clicks**

(c) 1,20,500:

$$1,20,500 = (12 \times 10,000) + (5 \times 100) \rightarrow \text{Clicks} = 12 + 5 = 17$$

☒ **Final Answer: 17 button clicks**

(d) 65,30,000:

$$65,30,000 = (653 \times 10,000) \rightarrow \text{Clicks} = 653$$

☒ **Final Answer: 653 button clicks**

(e) 70,25,700:

$$70,25,700 = (702 \times 10,000) + (57 \times 100) \rightarrow \text{Clicks} = 702 + 57 = 759$$

☒ **Final Answer: 759 button clicks**

● Q8. How many lakhs make a billion?

Step 1: 1 billion = 1,000,000,000 (American) = 1,00,00,00,000 (Indian) = 100 crore

Step 2: 1 crore = 100 lakh $\rightarrow$ 100 crore = 10,000 lakh

☒ **Final Answer: 10,000 lakhs make 1 billion.**

● Q11. Find out how many coins should be stacked to match the height of the Statue of Unity. (Each coin is 1 mm thick)

Step 1: Height of Statue of Unity = 180 m

Step 2: Convert to mm: 180 m = 180 $\times$ 100 cm $\times$ 10 mm = 1,80,000 mm

Step 3: Number of coins = 1,80,000 $\div$ 1 = 1,80,000

☒ **Final Answer: 1,80,000 coins should be stacked!**

● Q12. Albatrosses can cover 900–1000 km per day. A longest trip is about 12,000 km. How many days to cross an ocean?

At 900 km/day: 12,000 $\div$ 900 = 13.3 days

At 1000 km/day: 12,000 $\div$ 1000 = 12 days

☒ **Final Answer: Approximately 12 to 14 days.**

● Q13. A bar-tailed godwit flew 13,560 km non-stop in 11 days. Find approximate distance per day and per hour.

Per day: 13,560 $\div$ 11 = 1,232.73 $\approx$ 1,233 km per day

Per hour: 1,233 $\div$ 24 = 51.4 $\approx$ 51 km per hour

☒ **Final Answer: $\approx$ 1,233 km per day and $\approx$ 51 km per hour**

● Q14. Bald eagles fly 4500–6000 m high. Mount Everest = 8850 m. Aeroplanes fly 10,000–12,800 m. How many times bigger than Somu's building (40 m)?

Bald Eagles:

$$4500 \div 40 = 112.5 \text{ times} \mid 6000 \div 40 = 150 \text{ times} \rightarrow 112 \text{ to } 150 \text{ times}$$

Mount Everest:

$$8850 \div 40 = 221.25 \rightarrow \text{About } 221 \text{ times}$$

Aeroplanes:

$10,000 \div 40 = 250$ | $12,800 \div 40 = 320 \rightarrow 250$ to 320 times

☑ **Final Answer:** Eagles: $112\text{--}150\times$, Everest: $221\times$, Aeroplanes: $250\text{--}320\times$ the height of Somu's building.



CHAPTER SUMMARY

► Key Number Facts

Number	Indian Name	Zeros	American Name
1,000	One thousand	3	One thousand
10,000	Ten thousand	4	Ten thousand
1,00,000	One lakh	5	Hundred thousand
10,00,000	Ten lakh	6	One million
1,00,00,000	One crore	7	Ten million
10,00,00,000	Ten crore	8	Hundred million
1,00,00,00,000	One arab / 100 crore	9	One billion

► Important Rules

- ★ **Indian System:** Commas in 3-2-2-2 pattern from right to left
- ★ **American System:** Commas in 3-3-3-3 pattern from right to left
- ★ **Minimum button clicks for a number = SUM OF ALL ITS DIGITS**
- ★ **Product of m-digit $\times$ n-digit number has $(m+n-1)$ or $(m+n)$ digits**
- ★ **Multiplying by 5 = Dividing by 2 then multiplying by 10**
- ★ **Multiplying by 25 = Dividing by 4 then multiplying by 100**
- ★ **Multiplying by 125 = Dividing by 8 then multiplying by 1000**

► Rounding Rules

- Round UP:** Use when you need to ensure enough (e.g., ordering food, buying materials)
- Round DOWN:** Use when you want to underestimate (e.g., quoting costs, estimating time)
- Either way:** Use when exact value does not matter much (e.g., distance, population)



Keep Practicing, Keep Growing!

