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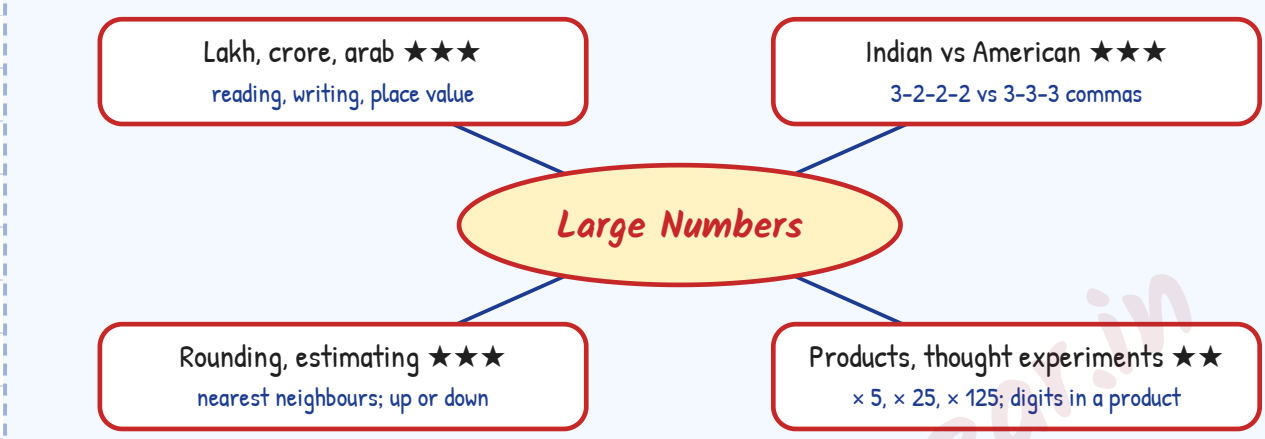
Class 7 · Mathematics (Ganita Prakash) · Number sense

Chapter 1
Large Numbers Around Us

1,00,00,000
= 1 crore
= 10 million

New NCERT Ganita Prakash, Grade 7 Part 1 · 2026-27

Chapter map (★ = important for tests)



What is inside

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★ *Exam tip:* **Score here**: 1 lakh = 1 followed by **5** zeros; 1 crore = **7** zeros; 1 arab = **9** zeros. **10 lakh = 1 million**, **1 crore = 10 million**, **100 crore = 1 billion**. Commas: Indian **3-2-2-2…**, American **3-3-3…** (from the right). Fewest button clicks = **sum of the digits**. Digits in a product = sum of the digits of the factors, or **one less**.

Must-know shortcuts: × 5 = ÷ 2 then × 10; × 25 = ÷ 4 then × 100; × 125 = ÷ 8 then × 1000. Seconds in a day = 60 × 60 × 24 = **86,400**; days in a year = 365.

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Based on NCERT "Ganita Prakash" Grade 7 Part 1 (2026-27), Chapter 1. Figures redrawn and solutions written by us. New book: questions are Exam-style.

1.1 A lakh varieties! ★★

Eshwarappa, a farmer in Chintamani (Karnataka), hears that India once had **about a lakh varieties of rice**; a nearby seed bank has collected about a hundred indigenous varieties. His son Estu wonders: tasting one new variety a day, could we taste them all in a 100-year lifetime?

Days in 100 years (ignoring leap years) = 365 × 100 = **36,500**.

Varieties a day	In 100 years	Reach 1 lakh?
1	36,500	No, far short
2	73,000	No
3	1,09,500	**Yes** (in about 91 years)

Ans. **Fill in the boxes**: largest 3-digit 999 → +1 → smallest 4-digit **1,000**; largest 4-digit **9,999** → +1 → smallest 5-digit **10,000**; largest 5-digit **99,999** → +1 → smallest 6-digit **1,00,000** ("one lakh").
Number line: 99,995, 99,996, **99,997**, 99,998, **99,999**, **1,00,000**.

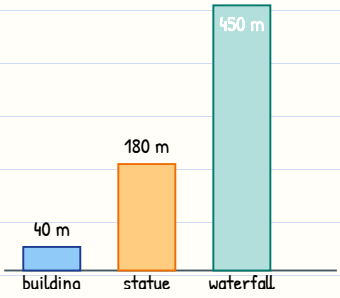
Ans. **Choose y**: days in y years = 365 × y. y = 100: 36,500 (63,500 short); y = 250: 91,250 (8,750 short); y = **274**: 1,00,010, just 10 more than a lakh. So **one lakh days ≈ 274 years**.

Figure it Out (page 3)

Ans. **1.** 1,00,000 − 75,000 = **25,000** less than one lakh.
2. 1,06,000 − 1,00,000 = **6,000** more than one lakh.
3. 1,06,000 − 75,000 = **31,000** increase (2011 to 2024).

Getting a feel of large numbers ★★

Ans. **Somu's building**: Somu is 1 m tall; each floor ≈ 4 × 1 = 4 m; 10 floors ≈ **40 m**.
Statue of Unity (Sardar Vallabhbhai Patel, Gujarat; about 180 m) is taller by 180 − 40 = **140 m**, close to 4 times the building.
Kunchikal waterfall (about 450 m): 450 − 40 = **410 m** taller; floors needed 450 ÷ 4 = 112.5, about **113 floors**.



heights to scale

★ *Exam tip:* **Is a lakh big or small?** It depends on **what we count and what we compare with**. Big: 1 lakh days ≈ 274 years; 1 lakh people shoulder to shoulder ≈ 38 km. Small: the Ahmedabad cricket stadium seats more than 1 lakh; a head has 80,000–1,20,000 hairs; some fish lay about a lakh eggs at once.

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Reading and writing numbers ★★★

Definition ✎ In the **Indian place value system** commas separate groups from the right: first after the **hundreds** (3 digits), then every **2 digits** (thousands, lakhs, crores, arabs). The comma between the "ten thousands" and the "lakhs" place gives 1,00,000.

Arabs		Crores		Lakhs		Thousands		Ones		
Ten arab	Arab	Ten crore	Crore	Ten lakh	Lakh	Ten thousand	Thousand	Hundred	Ten	One
				1	2	৭	8	8	3	0
	৯	8	৭	6	5	0	1	2	3	৪

Row 1: **12,78,830** = twelve lakh seventy-eight thousand eight hundred thirty. Row 2: **৯,৪৭,65,01,234** = ৯ arab ৪৭ crore 65 lakh 1 thousand 234 (or ৯৪৭ crore 65 lakh 1 thousand 234).

Write in words: (a) 3,00,600 (b) 5,04,085 (c) 27,30,000 (d) ৭0,53,138

Ans. (a) Three lakh six hundred
(b) Five lakh four thousand eighty-five
(c) Twenty-seven lakh thirty thousand
(d) Seventy lakh fifty-three thousand one hundred thirty-eight

Write in the Indian system: (a) One lakh twenty three thousand four hundred and fifty six (b) Four lakh seven thousand seven hundred and four (c) Fifty lakhs five thousand and fifty (d) Ten lakhs two hundred and thirty five

Ans. (a) **1,23,456** (b) **4,07,704** (c) **50,05,050** (d) **10,00,235**

✗ **Don't do this: Common mistakes**: (1) forgetting **zeros for empty places**: "fifty lakh five thousand fifty" is 50,05,050, not 50,5,050 or 5,05,050; (2) writing American commas (1,000,000) in an "Indian system" answer; (3) "lakh" in the number name with a plural "lakhs" is fine, but never "lakhs thousands": say "five lakh four thousand". (4) A comma never sits right before the last two digits: 4,07,704 not 40,77,04.

★ **Exam tip: Method for number names**: (1) place commas from the right (3, then 2, 2, 2); (2) read each group with its name (arab, crore, lakh, thousand), then the last 3 digits; (3) skip groups that are 00.

Teacher's challenge: can the whole population of Chintamani (about ৭6,000) fit in a 1-lakh stadium? **Yes**, with about 24,000 seats to spare.

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1.2 Land of Tens ★★★

Special calculators have special buttons. Number of presses = number ÷ button value.

Thoughtful Thousands (+1000)		Tedious Tens (+10)		Handy Hundreds (+100)	
(a) three thousand	3	(a) five hundred	50	(a) four hundred	4
(b) 10,000	10	(b) 780	78	(b) 3,700	37
(c) fifty three thousand	53	(c) 1000	100	(c) 10,000	100
(d) 90,000	90	(d) 3700	370	(d) fifty three thousand	530
(e) one lakh	100	(e) 10,000	1,000	(e) 90,000	900
(f) 1,53,000	153	(f) one lakh	10,000	(f) 97,600	976
(g) thousands in a lakh	100	(g) 4,350	435	(g) 1,00,000	1,000
				(h) 58,200	582
				(i) hundreds in ten thousand	100
				(j) hundreds in one lakh	1,000

Ans. (k) "There are numbers Tedious Tens and Thoughtful Thousands can't show but I can." Not true. Handy Hundreds shows only multiples of 100. Some (3,700, 97,600) cannot be shown by Thoughtful Thousands, but every multiple of 100 is a multiple of 10, so Tedious Tens can show all of them (3,700 = 370 tens). No number escapes both.

Creative Chitti: many ways ★★★

Ans. Buttons +1, +10, +100, +1000, +10000, +100000, +1000000.

321: 32 × 10 + 1 × 1 = 320 + 1 = 321 ✓ (also 2 × 100 + 12 × 10 + 1).

A different way to get 5072: (4 × 1000) + (10 × 100) + (7 × 10) + (2 × 1) = 4000 + 1000 + 70 + 2 = 5072; or (5 × 1000) + (6 × 10) + (12 × 1).

Button	Way (a)	Way (b)	Way (c)
+1000	-	3	4
+100	50	20	10
+10	7	-	7
+1	2	72	2
clicks	59	95	23

★ Exam tip: Idea: one press of a bigger button = ten presses of the next smaller button (+1000 = ten +100s). Trading changes the number of clicks but not the number.

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Figure it Out (page 6): two ways for each number

Number	Way 1	Way 2
(a) 8300	(8 × 1000) + (3 × 100)	(83 × 100); or (7 × 1000) + (13 × 100)
(b) 40629	(4 × 10000) + (6 × 100) + (2 × 10) + (9 × 1)	(40 × 1000) + (62 × 10) + (9 × 1)
(c) 56354	(5 × 10000) + (6 × 1000) + (3 × 100) + (5 × 10) + (4 × 1)	(56 × 1000) + (35 × 10) + (4 × 1)
(d) 66666	(6 × 10000) + (6 × 1000) + (6 × 100) + (6 × 10) + (6 × 1)	(66 × 1000) + (666 × 1)
(e) 367813	(3 × 100000) + (6 × 10000) + (7 × 1000) + (8 × 100) + (1 × 10) + (3 × 1)	(36 × 10000) + (78 × 100) + (13 × 1)

Chitti's questions ★★★

Definition ✎ **Useful fact**: every button adds a number that is **1 more than a multiple of 9** (1, 10 = 9 + 1, 100 = 99 + 1, …). So the number shown always leaves the **same remainder on division by 9** as the number of clicks.

Ans. (a) Exactly 30 presses: 30 leaves remainder 3 on division by 9, so the number must too.
Largest 3-digit: **993** = (9 × 100) + (8 × 10) + (13 × 1): 9 + 8 + 13 = 30 clicks.
Smallest 3-digit: **102** = (8 × 10) + (22 × 1): 8 + 22 = 30 clicks.

Ans. (b) 997 in 25 clicks (9 + 9 + 7). Other counts: break one +100 into ten +10s (adds 9 clicks): (8 × 100) + (19 × 10) + (7 × 1) = **34 clicks**. Possible counts: 25, 34, 43, 52, … (each 9 more), up to 997 clicks of +1.

Systematic Sippy: as few clicks as possible ★★★

Ans. (a) 5072 = (5 × 1000) + (7 × 10) + (2 × 1): **14 clicks** (fewer than the 23 in the book's table). (b) 8300 = (8 × 1000) + (3 × 100): **11 clicks**.

Figure it Out (page 7) 1. Fewest clicks for each number. 2. Connection? 3. Why do least-click expressions give the place value notation?

Number	Fewest clicks
8300	8 + 3 = 11
40629	4 + 0 + 6 + 2 + 9 = 21
56354	5 + 6 + 3 + 5 + 4 = 23
66666	6 × 5 = 30
367813	3 + 6 + 7 + 8 + 1 + 3 = 28

Ans. 2. Fewest clicks = **sum of the digits**.
3. Pressing a button 10 or more times is wasteful: 10 presses can be replaced by **1 press** of the next bigger button (saving 9). So each button is pressed 0 to 9 times, and these counts are exactly the **digits** in each place: the place value expansion.

Ans. +10,00,000 pressed ten times: 10 × 10,00,000 = **1,00,00,000** = 100 lakh = **one crore**, with **7 zeros**.

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1.3 Of crores and crores! ★★★

Indian system		American (International)	
1,000	one thousand	1,000	one thousand
10,000	ten thousand	10,000	ten thousand
1,00,000	one lakh	100,000	hundred thousand
10,00,000	ten lakh	1,000,000	one million
1,00,00,000	one crore	10,000,000	ten million
10,00,00,000	ten crore	100,000,000	hundred million
1,00,00,00,000	one arab (100 crore)	1,000,000,000	one billion

Definition ✎ **Commas**: Indian 3-2-2-2… from the right (thousands, lakhs, crores, arabs); American 3-3-3… (thousands, millions, billions).

Ans. A lakh = 100 × a thousand; a crore = 100 × a lakh; an arab = 100 × a crore. Lakh and crore come from the Sanskrit **lakṣha** and **koṭi**. The Indian system is also used in Bhutan, Nepal, Sri Lanka, Pakistan, Bangladesh, Maldives, Afghanistan and Myanmar.

Ans. **Zeros**: a **thousand lakh** = 1000 × 1,00,000 = 10,00,00,000 (ten crore): **8 zeros**. A **hundred thousand** = 1,00,000 (one lakh): **5 zeros**. **9876501234**: Indian 9,87,65,01,234 (9 arab 87 crore 65 lakh 1 thousand 234); American 9,876,501,234 (9 billion 876 million 501 thousand 234).

Figure it Out (page 9) Q1: number names in both systems

	Indian system	American system
(a)	**40,50,678**: forty lakh fifty thousand six hundred seventy-eight	**4,050,678**: four million fifty thousand six hundred seventy-eight
(b)	**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
(c)	**2,00,22,002**: two crore twenty-two thousand two	**20,022,002**: twenty million twenty-two thousand two
(d)	**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
(e)	**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
(f)	**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

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2. Write in Indian place value notation: (a) One crore one lakh one thousand ten (b) One billion one million one thousand one (c) Ten crore twenty lakh thirty thousand forty (d) Nine billion eighty million seven hundred thousand six hundred

Ans. (a) 1,01,01,010
(b) 1 billion = 100 crore, 1 million = 10 lakh: 1,00,10,01,001
(c) 10,20,30,040
(d) 9 billion = 900 crore, 80 million = 8 crore, 700 thousand = 7 lakh: 9,08,07,00,600

3. Compare with <, > or =: (a) 30 thousand __ 3 lakhs (b) 500 lakhs __ 5 million (c) 800 thousand __ 8 million (d) 640 crore __ 60 billion

Ans. (a) 30,000 < 3,00,000
(b) 500 lakh = 5 crore = 50 million, so >
(c) 8 lakh < 80 lakh
(d) 640 crore = 6.4 billion, so <

Conversions: 1 million = **10 lakh** · 10 million = **1 crore** · 100 million = 10 crore · 1 billion = **100 crore** = 1 arab · 1 crore = 100 lakh = 10,000 thousand · 1 billion = **10,000 lakh**

1.4 Exact and approximate values ★★★

Ans. "1 lakh people visited the book fair." "If I had not gone they would have written 99,999!" The joke: "1 lakh" is a **rounded** figure, not an exact count (perhaps 98,640 or 1,02,315). One person more or less does not change it. Newspapers use such figures ("nearly 2 lakh devotees").

Ans. Chintamani 2011: exact 76,068; "about 75,000" is enough to give an idea of size. Bappi's joke: a phone number must be **exact**; "rounding off" a phone number makes no sense!

Definition ✎ **Rounding up**: the approximation is **more** than the actual (732 people → order **750** sweets). **Rounding down**: the approximation is **less** (an item costing ₹470 → "around ₹450").

Situation type	Examples (Think and share answered)
(a) **round up** (must not fall short)	food or sweets for a function, tiles or paint, chairs or buses for a trip, money for a journey
(b) **round down** (must not exceed)	money we can surely spend, full boxes we can pack, a lift's weight limit, time left before the school bus
(c) **either**	population of a city, distance between towns, crowd at a fair, height of a mountain
(d) **exact**	phone and bank account numbers, money in a bank, medicine doses, exam marks, train times

★ **Exam tip:** **Exam tip**: when asked "round up or down?", always give the **reason** (risk of shortage → up; risk of exceeding a limit → down).

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Nearest neighbours ★★★

Definition ✎ **Rule**: to round to the nearest thousand (lakh, crore …), look at the part after that place. If it is **at least half** (500 for a thousand, 50,000 for a lakh, 50,00,000 for a crore), round **up**; otherwise round **down**.

Nearest	6,72,85,183 (book)	(a) 3,87,69,957	(b) 29,05,32,481
thousand	6,72,85,000	3,87,70,000	29,05,32,000
ten thousand	6,72,90,000	3,87,70,000	29,05,30,000
lakh	6,73,00,000	3,88,00,000	29,05,00,000
ten lakh	6,70,00,000	3,90,00,000	29,10,00,000
crore	7,00,00,000	4,00,00,000	29,00,00,000

Ans. **Math Talk: all five nearest neighbours are 5,00,00,000.** If the nearest **thousand** is 5 crore, so are the others. The number must be within 500 of 5,00,00,000: from **4,99,99,500 to 5,00,00,499** (500 rounds up), e.g. 5,00,00,321. There are **1,000** such numbers.

Estimating sums and differences ★★★

Ans. **1. 4,63,128 + 4,19,682.** (a) Both estimates are **correct**: each number is over 4 lakh (sum > 8 lakh) and under 4.5 lakh (sum < 9 lakh). The sum is 17,190 from 9 lakh but 82,810 from 8 lakh, so **Estu** is closer. (b) **Greater** than 8,50,000: 4,63,128 > 4,50,000 and 4,19,682 > 4,00,000. (c) **Less** than 8,83,128 (= 4,63,128 + 4,20,000; 4,19,682 < 4,20,000). (d) **8,82,810**.

Ans. **2. 14,63,128 − 4,90,020.** (a) Both **correct**: taking a little less than 5 lakh from about 14.6 lakh leaves between 9 and 10 lakh. 26,892 from 10 lakh vs 73,108 from 9 lakh: **Roxie** is closer. (b) **Greater** than 9,50,000: 14,63,128 − 5,00,000 = 9,63,128 already exceeds it. (c) **Greater** than 9,63,128: we subtract less than 5 lakh. (d) **9,73,108**.

★ ***Exam tip:*** **Teacher's question**: what could the numbers be if the sum had to be less than 8,50,000? E.g. 4,20,000 + 4,25,000 = 8,45,000 (both under 4.25 lakh always works).

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Populations of cities ★★

Rank	City	2011	2001	Increase (approx.)
1	Mumbai	1,24,42,373	1,19,78,450	4.6 lakh
2	New Delhi	1,10,07,835	98,79,172	11 lakh
3	Bengaluru	84,25,970	43,01,326	**41 lakh** (almost double)
4	Hyderabad	68,09,970	36,37,483	32 lakh (almost double)
5	Ahmedabad	55,70,585	35,20,085	20 lakh
6	Chennai	46,81,087	43,43,645	3.4 lakh
7	Kolkata	44,86,679	45,72,876	**fell** by 86,000
8	Surat	44,67,797	24,33,835	20 lakh (almost double)
9	Vadodara	35,52,371	16,90,000	19 lakh (more than double)
10	Pune	31,15,431	25,38,473	6 lakh
11–15	Jaipur, Lucknow, Kanpur, Nagpur, Indore	30.5, 28.2, 27.7, 24.1, 19.6 lakh	23.2, 21.9, 25.5, 20.5, 14.7 lakh	7, 6, 2, 3.5, 5 lakh
16–20	Thane, Bhopal, Visakhapatnam, Pimpri-Chinchwad, Patna	18.2, 18.0, 17.3, 17.3, 16.8 lakh	12.6, 14.4, 13.5, 10.1, 13.7 lakh	5.6, 3.6, 3.8, 7.2, 3.2 lakh

Ans. 1. Observations: almost every city grew; only **Kolkata fell** slightly; only Mumbai and Delhi are above **1 crore**; Bengaluru, Hyderabad, Surat and Vadodara grew very fast; Chennai and Kanpur slowly. Ranked by 2011 population.

2. Title: "The 20 most populous cities of India: population in 2001 and 2011".

Ans. 3. Pune 2011: **31,15,431**; increase about 31 − 25 = **6 lakh** (exactly 5,76,958).

4. Bengaluru: 84,25,970 − 43,01,326 = 41,24,644 (about 41 lakh).

5. Bengaluru, Hyderabad, Surat, Vadodara.

6. Patna ≈ 17 lakh, Mumbai ≈ 124 lakh: 124 ÷ 17 ≈ **7** (17 × 7 = 119 lakh; more exactly about 7.4).

★ ***Exam tip:*** **Doubling check**: a number has "almost doubled" if the new value is close to 2 × the old: Surat 2 × 24.3 = 48.7 lakh vs 44.7 lakh (close); Chennai 2 × 43.4 = 86.9 lakh vs 46.8 lakh (far).

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1.5 Patterns in products ★★★

Ans. Roxie: 116 × 5 = 116 × 10/2 = 58 × 10 = 580. Estu: 824 × 25 = 824 × 100/4 = 206 × 100 = 20,600.
Math Talk: 5 = 10 ÷ 2, so 5 groups of a number = half of 10 groups: n × 5 = (n ÷ 2) × 10.

× 5 = ÷ 2, × 10
× 25 = ÷ 4, × 100
× 50 = ÷ 2, × 100
× 125 = ÷ 8, × 1000
× 250 = ÷ 4, × 1000

Ans. Figure it Out (page 14) 1.
(a) 2 × 1768 × 50 = (2 × 50) × 1768 = 100 × 1768 = 1,76,800
(b) 72 × 125 = 72 × 1000/8 = 9 × 1000 = 9,000
(c) 125 × 40 × 8 × 25 = (125 × 8) × (40 × 25) = 1000 × 1000 = 10,00,000

Ans. 2. (a) 25 × 12 = 100 × 3 = 300 (b) 25 × 240 = 100 × 60 = 6,000 (c) 250 × 120 = 1000 × 30 = 30,000 (d) 2500 × 12 = 10000 × 3 = 30,000 (e) 12,00,00,000 = e.g. 12,000 × 10,000, or 1200 × 1,00,000, or 2500 × 48,000.

How long is the product? ★★★

Pattern 1	Pattern 2	Pattern 3	Pattern 4
11 × 11 = 121	66 × 61 = 4026	3 × 5 = 15	101 × 101 = 10201
111 × 111 = 12321	666 × 661 = 440226	33 × 35 = 1155	102 × 102 = 10404
1111 × 1111 = 1234321	6666 × 6661 = 44402226	333 × 335 = 111555	103 × 103 = 10609
11111 × 11111 = 123454321	66666 × 66661 = 4444022226	3333 × 3335 = 11115555	104 × 104 = 10816

Definition ✎ Digits in a product: if the factors have m and n digits, the product has m + n or m + n − 1 digits.
Roxie's reasoning (2-digit × 2-digit = 3 or 4 digits): the smallest product is 10 × 10 = 100 (3 digits) and every product is less than 100 × 100 = 10,000 (so at most 4 digits). Check only the smallest and largest cases: no need to try all.

Ans. 3-digit × 3-digit = 4-digit? No: the least is 100 × 100 = 10,000 (5 digits).
4-digit × 2-digit = 5-digit? Yes: 1000 × 10 = 10,000; 1200 × 20 = 24,000.

Factors	Product
1-digit × 1-digit	1 or 2 digits
3-digit × 3-digit	5 or 6
5-digit × 5-digit	9 or 10
8-digit × 3-digit	10 or 11
12-digit × 13-digit	24 or 25

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Fascinating facts about large numbers ★★

Calculation	Result (Indian)	American	Fact
1250 × 380	4,75,000	475 thousand	kīrtanas of Purandaradāsa (15th c., Carnatic music), by legend
2100 × 70,000	14,70,00,000	147 million	km, Earth to Sun (farthest about 152 million km)
6400 × 62,500	40,00,00,000	400 million	litres per second, Amazon into the Atlantic
13,95,000 ÷ 150	9,300	9,300	km, Moscow–Vladivostok train (about 7 days); India's longest: Dibrugarh–Kanyakumari 4,219 km in about 76 hours
10,50,00,000 ÷ 700	1,50,000	150 thousand	kg, adult blue whale (newborn ≈ 2,700 kg; heart ≈ 700 kg)
52,00,00,00,000 ÷ 130	40,00,00,000	400 million	tonnes of plastic waste, 2021

Ans. Purandaradāsa's songs per year: he lived about 80 years (c. 1484–1564). Composing for about 50 years: 4,75,000 ÷ 50 = 9,500 songs a year, about 26 a day! (A healthy gram of soil holds 100 million to 1 billion bacteria.)

1.6 Did you ever wonder...? ★★★

Ans. Mumbai in 1 lakh buses? 1 lakh × 50 = 50 lakh < 1 crore 24 lakh: No.
5000 Titanic ships (2500 each): 5000 × 2500 = 1,25,00,000, a little more than 1,24,42,373: yes, just (about 57,600 spare).

Ans. 100 km a day to the Moon (3,84,400 km): a year = 36,500 km; 10 years = 3,65,000 km: 19,400 km short (needs about 10½ years). 1000 km a day to the Sun: 14,70,00,000 ÷ 1000 = 1,47,000 days ≈ 403 years: not in a lifetime.

Question	Working	Answer
(a) Lift 1 lakh sheets of 5 g each?	1,00,000 × 5 g = 5,00,000 g = 500 kg	No
(b) 250 babies a minute: a million a day?	250 × 60 × 24 = 3,60,000 < 10,00,000	No
(c) Count 1 million coins in a day at 1 per second?	60 × 60 × 24 = 86,400 a day; 10,00,000 ÷ 86,400 ≈ 11.6 days	No

★ *Exam tip:* Do big calculations in stages (per day → per year → per 10 years) and state your assumptions (50 per bus, 365 days a year, no sleep).

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Figure it Out (page 19)

1. Using all digits 0–9 once (first digit not 0), write the (a) largest multiple of 5 (b) smallest even number.

> **Ans.** (a) Ends in 0 or 5; digits in decreasing order with 0 last: **9876543210**. (b) 1023456789 is odd; keep the smallest start and put the largest even digit last: **1023456798**.

2. 10,30,285 in words has 42 letters. Give a 7-digit number name with the maximum number of letters.

> **Ans.** Use the longest words: "seventy" (7 letters) for the tens and a 5-letter ones word (three, seven, eight), and a 5-letter word before "hundred". **77,77,777**: "seventy seven lakhs seventy seven thousand seven hundred seventy seven": **61 letters** (60 with "lakh"). 73,73,373 and 78,78,878 tie.

3. Write a 9-digit number where exchanging any two digits gives a bigger number. How many exist?

> **Ans.** Every digit must be **smaller than every digit after it** (else swapping a bigger earlier digit with a smaller later one makes it smaller; equal digits give the same number). Digits strictly increasing, no leading 0: only **123456789**. Exactly **one** such number.

4. Strike out 10 digits from 12345123451234512345 so the remaining number is as large as possible.

> **Ans.** Keep 10 digits, the largest possible at each place: 1st from the first 11 digits: the first **5**; 2nd: the second **5**; 3rd: from "1 2 3" the **3**; then the last 7 digits must all stay: 4 5 1 2 3 4 5. Answer: **5534512345**.

5. 'zero' and 'one' share e, o; 'one' and 'two' share o; 'two' and 'three' share t. How far must you count to find two consecutive numbers with no common letter?

> **Ans.** **Never**: every two consecutive numbers share a letter. Up to twenty: three–four (r), four–five (f), five–six (i), six–seven (s), seven–eight (e), eight–nine (e, i, n), nine–ten (e, n), ten–eleven (e, n), eleven–twelve (e, l, v), the "-teen"s share t, e, n; nineteen–twenty (t, e, n). After twenty, neighbours share the tens word (twenty one, twenty two…) except at "…nine" → next tens: twenty nine–thirty (t, y), thirty nine–forty (t, r, y), forty nine–fifty (f, t, y), fifty nine–sixty (i, t, y), sixty nine–seventy (s, e, n, t, y), seventy nine–eighty (e, i, t, y), eighty nine–ninety (n, i, e, t, y), ninety nine–one hundred (n, e). Larger numbers keep the same leading words, which again share letters.

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6. Writing 1, 2, 3, …, the 10th digit is '1' and the 11th is '0' (in 10). (a) What is the 1000th digit, and in which number? (b) Which number contains the millionth digit? (c) When is '5' written for the 5000th time?

Ans. (a) 1–9: 9 digits; 10–99: 90 × 2 = 180; total 189. Left: 1000 − 189 = 811 = 270 × 3 + 1. The 270 numbers 100 to 369 use 810 digits (up to the 999th). The 1000th is the first digit of **370**: **3**.

Numbers	Digits	Running total
1–9	9	9
10–99	180	189
100–999	2,700	2,889
1,000–9,999	36,000	38,889
10,000–99,999	4,50,000	4,88,889

Ans. (b) Left: 10,00,000 − 4,88,889 = 5,11,111 = 85,185 × 6 + 1. The 85,185 six-digit numbers 1,00,000 to 1,85,184 end at the 9,99,999th digit, so the millionth digit is the first digit ('1') of **1,85,185**.

(c) From 1 to 9,999 each of the 4 places shows 5 in one-tenth of the numbers: 4 × 1000 = 4,000 fives. Each thousand-block 10,000–10,999, 11,000–11,999, 12,000–12,999 has 300 fives: 4,900 by 12,999. From 13,000 to 13,499: 50 fives in the tens place and 50 in the ones place = 100 more. The last of these is in **13,495**, where the 5000th '5' is written.

7. A calculator has only '+10,000' and '+100'. Write expressions for (a) 20,800 (b) 92,100 (c) 1,20,500 (d) 65,30,000 (e) 70,25,700.

Ans. (a) (2 × 10,000) + (8 × 100): 10 clicks (b) (9 × 10,000) + (21 × 100): 30 clicks (c) (12 × 10,000) + (5 × 100): 17 clicks (d) (653 × 10,000): 653 clicks (e) (702 × 10,000) + (57 × 100): 759 clicks

8. How many lakhs make a billion?

Ans. 1 billion = 100 crore = 100 × 100 lakh = **10,000 lakh**.

9. Two sets of cards 1–9: fill a 7-digit number and a 5-digit number (right-aligned) to get (a) the largest sum (b) the smallest difference.

Ans. (a) The two highest places (only in the 7-digit number) get 9 and 9; each of the other five places holds one card from each number, so give the biggest pairs to the highest places: 8 and 8, 7 and 7, 6 and 6, 5 and 5, 4 and 4.

99,87,654 + 87,654 = **1,00,75,308**.

Ans. (b) Make the 7-digit number as small and the 5-digit number as large as possible: 11,22,334 − 99,887 = **10,22,447**.

(The answer key's 1,00,54,320 for (a) is smaller than ours, so ours is the true largest.)

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10. Cards 4000, 13000, 300, 70000, 150000, 20, 5; any operations, each card once. Get close to (a) 1,10,000 (b) 2,00,000 (c) 5,80,000 (d) 12,45,000 (e) 20,90,800.

Target	Expression	Value
(a) 1,10,000	(13000 × 20) − 150000	1,10,000 exact (better than the book's 1,13,000)
(b) 2,00,000	(70000 × 5) − 150000	2,00,000 exact
(c) 5,80,000	(70000 × 5) + 150000 + (4000 × 20)	5,80,000 exact
(d) 12,45,000	(70000 + 13000) ÷ 20 × 300	12,45,000 exact
(e) 20,90,800	(300 − 5) × (150000 − 13000) ÷ 20 + 70000	20,90,750 (only 50 away)

11. How many 1 mm coins stack to the height of the Statue of Unity?

> **Ans.** 180 m = 180 × 1000 mm = 1,80,000 mm: **1,80,000 coins**.

12. Albatrosses cover 900–1000 km a day. How many days for a 12,000 km trip?

> **Ans.** 12,000 ÷ 1000 = 12 days; 12,000 ÷ 900 ≈ 13.3 days: **about 12 to 13 days**.

13. A bar-tailed godwit flew 13,560 km non-stop (Alaska to Australia, from 13 October 2022) in about 11 days. Distance per day and per hour?

> **Ans.** Per day: 13,560 ÷ 11 ≈ **1,233 km**. Per hour: 1,233 ÷ 24 ≈ **51 km**.

14. Bald eagles 4500–6000 m; Everest about 8850 m; aeroplanes 10,000–12,800 m. How many times Somu's building (40 m)?

Height	÷ 40	Times the building
Bald eagle 4500–6000 m	112.5 to 150	about **112 to 150**
Everest 8850 m	≈ 221	about **221**
Aeroplanes 10,000–12,800 m	250 to 320	about **250 to 320**

★ ***Exam tip:*** **Exam tip**: for "how many times bigger", **divide** the big quantity by the familiar one, and give a range when the data is a range.

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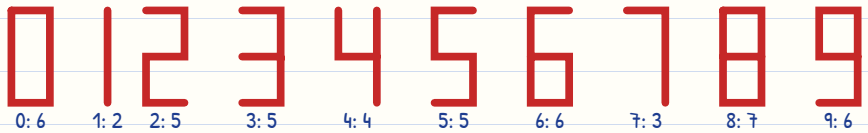
Toothpick digits ★★



digits made of sticks, with the number of sticks each needs

Ans. **5108**: 5 + 2 + 6 + 7 = **20 sticks**.

42,019 uses 4 + 5 + 6 + 2 + 6 = 23 sticks ✓.

Add two sticks to 42,019 for a bigger number (one stick: 0 → 8, 1 → 7, 9 → 8; two sticks: 1 → 4, 2 → 8, 4 → 9): **92,019** (4 → 9), **48,019** (2 → 8), **42,879** (0 → 8, 1 → 7), **42,818** (0 → 8, 9 → 8), **42,049** (1 → 4), and the given 42,078. Biggest: 92,019.

Ans. **Insert a '1' among 4, 2, 0, 1, 9**: 1,42,019; 4,12,019; **4,21,019**; 4,20,119; 4,20,191. Biggest: **4,21,019** (1 between 2 and 0).

63,890 (30 sticks): moving exactly 4 sticks keeps 30 sticks. Bigger numbers: **99,985** (largest), 99,982, 99,906, 99,805, 88,078, 66,208, 66,066.

Ans. **Exactly 24 sticks**: example 51,084 (5 + 2 + 6 + 7 + 4 = 24). **Biggest**: more digits make a bigger number and '1' uses the fewest sticks (2): twelve 1s, **1,11,11,11,11,111**. **Smallest**: fewest digits; 3 digits use at most 3 × 7 = 21 sticks, so 4 digits; the first digit cannot be 1 (then 22 sticks for 3 digits, over 21), so it is 2 (5 sticks), then 0 (6), 0 (6) and 8 (7): 5 + 6 + 6 + 7 = 24: **2,008**.

Key facts box ★★★

- 1 lakh = 1,00,000 (5 zeros) · 10 lakh = 1 million · 1 crore = 1,00,00,000 (7 zeros) = 10 million · 1 arab = 100 crore = 1 billion (9 zeros).
- 1 crore = 100 lakh = 10,000 thousand; 1 billion = 10,000 lakh = 1,000 million.
- Indian commas 3-2-2-2; American 3-3-3.
- Fewest clicks = digit sum; a number and its click count leave the same remainder on division by 9.
- Rounding: half or more → up. Round up to avoid shortage, down to stay within a limit.
- m-digit × n-digit = (m + n − 1) or (m + n) digits.
- Shortcuts: × 5, × 25, × 125 via ÷ 2, ÷ 4, ÷ 8 and × 10, × 100, × 1000.

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Common mistakes and worked examples ★★★

✗ Don't do this: Mistakes to avoid

(1) **Mixing systems**: 5 million is **50 lakh**, not 5 lakh; 1 billion is **100 crore**, not 1 crore.

(2) **Rounding the wrong part**: to the nearest lakh, look at everything after the lakh digit (3,45,67,890 → the 67,890 decides → 3,46,00,000).

(3) **Rounding twice**: round the original number each time, not the previous rounded answer.

(4) **Losing zeros** in quick products: 250 × 120 = 30,000 (not 3,000); count the zeros you add.

(5) "Is it possible?" questions answered with one example only: show the **smallest and largest** cases (100 × 100) to prove a digit-count claim.

(6) Forgetting **units** in thought experiments (g vs kg, mm vs m).

Worked examples

Ans. Ex. 1 Write ₹0,25,700 in the American system and in words.

₹0,25,700 = ₹7,025,700: **seven million twenty-five thousand seven hundred** (Indian: seventy lakh twenty-five thousand seven hundred).

Ans. Ex. 2 Round 8,49,999 to the nearest lakh and nearest ten thousand.

After the lakh digit: 49,999 < 50,000 → **8,00,000**. After the ten-thousand digit: 9,999 ≥ 5,000 → **8,50,000**.

Ans. Ex. 3 48 × 125 quickly.

48 × 1000 ÷ 8 = 6 × 1000 = **6,000**.

Ans. Ex. 4 How many digits can 2,345 × 678 have? 4 + 3 = 7, so 6 or 7. Exact: 2,345 × 678 = **15,89,910** (7 digits).

Ans. Ex. 5 A heart beats about 72 times a minute. About how many times in a year?

72 × 60 = 4,320 an hour; × 24 = 1,03,680 a day; × 365 = **3,78,43,200**, about **3.8 crore** (38 million) times a year.

Ans. Ex. 6 Which is more: 3 crore seconds or 1 year?

1 year = 365 × 86,400 = 3,15,36,000 seconds ≈ 3.15 crore. So **1 year is more** than 3 crore seconds (by about 15 lakh seconds).

★ Exam tip: Check yourself: read every answer aloud in words. If "fifty lakh five thousand fifty" does not match the figures you wrote, a zero is missing.

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Exam-style questions Exam-style

1. Write 1,00,00,000 in words. [1]

Ans. One crore.

2. How many lakhs make one crore? [1]

Ans. 100

3. Place commas in 48121620 in both systems. [2]

Ans. 4,81,21,620 and 48,121,620

4. Round 29,05,32,481 to the nearest crore and ten lakh. [2]

Ans. 29,00,00,000; 29,10,00,000

5. Find 125 × 40 × 8 × 25 quickly. [2]

Ans. (125 × 8)(40 × 25) = 1000 × 1000 = 10,00,000

6. Is 4,63,128 + 4,19,682 more or less than 8,50,000? Find the exact sum. [3]

Ans. More (4,63,128 > 4,50,000 and 4,19,682 > 4,00,000); 8,82,810

7. Can Mumbai's population (1,24,42,373) fit in 1 lakh buses of 50 seats? [3]

Ans. 1,00,000 × 50 = 50,00,000 < 1,24,42,373: No.

8. Show that the product of two 2-digit numbers has 3 or 4 digits. Then state how many digits a 5-digit × 5-digit product can have. [5]

Ans. Smallest: 10 × 10 = 100 (3 digits). Every 2-digit number is less than 100, so every product is less than 100 × 100 = 10,000, i.e. at most 4 digits. So 3 or 4 digits. In general m-digit × n-digit gives m + n − 1 or m + n digits: 5-digit × 5-digit gives **9 or 10** digits (10,000 × 10,000 = 10 crore has 9 digits; 99,999 × 99,999 = 9,99,98,00,001 has 10).

Case study 1: the cricket stadium Exam-style. Assume a stadium seats 1,32,000 people.

(i) Write 1,32,000 in words. **One lakh thirty-two thousand**. [1]

(ii) How many more than one lakh? **32,000**. [1]

(iii) Tickets cost ₹500 each. Collection for a full stadium? 1,32,000 × 500 = **₹6,60,00,000** (6 crore 60 lakh). [2]

(iv) Round 1,32,000 to the nearest ten thousand. **1,30,000**. [1]

Case study 2: a trip to the Moon Exam-style. The Moon is 3,84,400 km away.

(i) Write 3,84,400 in the American system. **384,400**. [1]

(ii) Round it to the nearest lakh. **4,00,000**. [1]

(iii) At 1,000 km a day, about how many days to reach it? 3,84,400 ÷ 1000 ≈ **385 days**. [2]

(iv) Distance for a return trip? **7,68,800 km**. [1]

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Practice set: test yourself *Exam-style*

Try every question before looking at the answers on page 21. 40 or more out of 48 means you are ready for the test.

A. Fill in the blanks (1 mark each)

1. 1 crore = _____ lakh.
2. 1 million = _____ lakh.
3. 1 billion = _____ crore.
4. The smallest 7-digit number is _____.
5. Indian commas follow the _____ pattern.
6. 3,45,67,890 to the nearest lakh is _____.
7. The fewest clicks to make 4,302 is _____.
8. A 4-digit × 3-digit product has _____ or _____ digits.

B. True or false? (1 mark each)

1. 1 lakh has 5 zeros.
2. 10 million = 1 crore.
3. 1 arab = 1 billion.
4. A 2-digit × 2-digit product can have 5 digits.
5. 500 thousand = 5 lakh.
6. 7,49,999 to the nearest lakh is 8,00,000.
7. × 25 is the same as × 100 then ÷ 4.
8. The fewest clicks for a number equals the number itself.

C. Very short answer (1 mark each)

1. Write 45 lakh in figures.
2. Write 7,05,00,300 in words.
3. Write 6,050,000 in the Indian system.
4. How many thousands make a crore?
5. Round 5,67,489 to the nearest thousand.
6. Find 125 × 64 quickly.
7. Find 4,80,000 ÷ 1,000.
8. Largest 6-digit number from 2, 0, 7, 5, 9, 1 (each once)?
9. Smallest 5-digit number with all digits different?
10. How many digits does 99,999 × 999 have?

D. Short answer I (2 marks each)

1. Write 9,87,65,432 in words in both systems.
2. Find the five nearest neighbours of 4,56,78,912.
3. Compare 75 lakh and 7.5 million.
4. Estimate 6,89,450 + 2,15,300 to the nearest lakh and find the exact sum.
5. Using 25 = 100 ÷ 4, find 25 × 368.
6. How many seconds are in a day? Can you count to 1 lakh in a day at one number per second?
7. Write 6,07,080 with the fewest clicks.
8. How many 2-litre bottles can be filled from 10 lakh litres?

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E. Short answer II (3 marks each)

1. Explain why the fewest button clicks for a number equals the sum of its digits.
2. A school of 1,248 people orders sweets. Should it round up or down? To what? Why?
3. Show that a 3-digit × 3-digit product has 5 or 6 digits.
4. A train covers 1,200 km a day. About how many days to cover 3,84,400 km?
5. Surat had 24,33,835 people in 2001 and 44,67,797 in 2011. Find the increase. Did it almost double?
6. Write 8,30,00,000 in the American system, and convert 2.5 billion into crore.

F. Long answer (5 marks each)

1. Write 3,07,05,00,904 in the American system, and its number name in both systems, with a place value chart.
2. For 5,72,340 + 3,48,915: is the sum more or less than 9,00,000? More or less than 9,20,000? Give reasons, then find it.
3. Can 1 crore people be seated in stadiums of 1 lakh each? How many stadiums? How many days to count to 1 crore at one per second?
4. Writing 1, 2, 3, … in a row, which digit is the 500th, and in which number?

G. Challenge (HOTS) questions

1. Can a number have 5,00,00,000 as its nearest thousand but a different nearest lakh?
2. Why is 37 × 3 = 111 and 37 × 6 = 222? Predict 37 × 27.
3. How many digits must a number have for 3 commas in the Indian system but only 2 in the American?
4. Strike out 4 digits from 9182736 to leave the largest possible number.

Case study 3: the seed bank Exam-style. A seed bank stores 4,75,000 seeds in packets of 250.
(i) Write 4,75,000 in words. [1] (ii) How many packets? [2] (iii) Round 4,75,000 to the nearest lakh. [1] (iv) If the store doubles twice, how many seeds? [1]

My score (fill in after checking the answers)

Section	A /8	B /8	C /10	D /16	E /18	F /20	G (bonus)	Total /80
My marks								

Rough work

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20 MCQs

1. 1 crore =
   (a) 10 lakh (b) 1000 lakh (c) 100 lakh (d) 1 million

2. 10 lakh =
   (a) 1 million (b) 10 million (c) 100 thousand (d) 1 billion

3. 12345678 with Indian commas
   (a) 1,234,5678 (b) 12,345,678 (c) 123,45,678 (d) 1,23,45,678

4. 1 billion =
   (a) 10 crore (b) 100 crore (c) 1 crore (d) 1000 crore

5. Zeros in 1 arab
   (a) 7 (b) 9 (c) 8 (d) 10

6. 6,72,85,183 to the nearest lakh
   (a) 6,72,00,000 (b) 7,00,00,000 (c) 6,70,00,000 (d) 6,73,00,000

7. Fewest clicks for 5072
   (a) 14 (b) 23 (c) 50 (d) 72

8. 72 × 125 =
   (a) 900 (b) 90000 (c) 9000 (d) 7200

9. 25 × 240 =
   (a) 600 (b) 60000 (c) 2400 (d) 6000

10. A 3-digit × 3-digit product cannot have
    (a) 5 digits (b) 4 digits (c) 6 digits (d) 5 or 6 digits

11. 1111 × 1111 =
    (a) 123321 (b) 12344321 (c) 1234321 (d) 1223221

12. 30 thousand __ 3 lakh
    (a) < (b) = (c) > (d) cannot say

13. 500 lakh =
    (a) 5 million (b) 50 million (c) 500 million (d) 5 billion

14. Seconds in a day
    (a) 3,600 (b) 8,640 (c) 86,400 (d) 8,64,000

15. Lakhs in a billion
    (a) 100 (b) 1,000 (c) 1,00,000 (d) 10,000

16. Indian comma grouping
    (a) 3-2-2-2 (b) 3-3-3 (c) 2-2-2 (d) 2-3-3

17. Days in 274 years are close to
    (a) 1 lakh (b) 10 thousand (c) 1 thousand (d) 1 crore

18. 13,95,000 ÷ 150 =
    (a) 930 (b) 93 (c) 93,000 (d) 9,300

19. Largest multiple of 5 using 0–9 once
    (a) 9876543215 (b) 9876543210 (c) 9876543250 (d) 1023456789

20. "Lakh" comes from the Sanskrit
    (a) koṭi (b) arbuda (c) lakṣha (d) sahasra

1 (c) · 2 (a) · 3 (d) · 4 (b) · 5 (b) · 6 (d) · 7 (a) · 8 (c) · 9 (d) · 10 (b) · 11 (c) · 12 (a) · 13 (b) · 14 (c) · 15 (d) · 16 (a) · 17 (a) · 18 (d) · 19 (b) · 20 (c)

Assertion–Reason (6)

(a) Both true, R explains A. (b) Both true, R does not explain A. (c) A true, R false. (d) A false, R true.

1. A: 1 crore has 7 zeros. R: 1 crore = 100 lakh and 1 lakh has 5 zeros.
2. A: 5 million = 50 lakh. R: 1 million = 10 lakh.
3. A: Two 2-digit numbers can give a 5-digit product. R: 99 × 99 = 9801.
4. A: 116 × 5 = 580. R: Multiplying by 5 is dividing by 2 and multiplying by 10.
5. A: Newspapers often print rounded numbers. R: 1 billion = 100 crore.
6. A: The fewest clicks for 66666 is 30. R: Fewest clicks = sum of the digits.

Key: 1 (a) · 2 (a) · 3 (d) · 4 (a) · 5 (b) · 6 (a)

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Answers to the practice set

A. 1. 100 2. 10 3. 100 4. 10,00,000 5. 3-2-2-2 6. 3,46,00,000 7. 9 8. 6 or 7

B. 1. T 2. T 3. T 4. F (at most 4) 5. T 6. F (7,00,000) 7. T 8. F (digit sum)

C. 1. 45,00,000 2. seven crore five lakh three hundred 3. 60,50,000 4. 10,000 5. 5,67,000 6. 8,000 7. 480 8. 9,75,210 9. 10,234 10. 8 (99,899,001)

D. 1. nine crore eighty-seven lakh sixty-five thousand four hundred thirty-two; 98,765,432 = ninety-eight million seven hundred sixty-five thousand four hundred thirty-two
2. 4,56,79,000; 4,56,80,000; 4,57,00,000; 4,60,00,000; 5,00,00,000
3. Equal (7.5 million = 75 lakh)
4. about 7 + 2 = 9 lakh; 9,04,750
5. 368 ÷ 4 × 100 = 9,200
6. 86,400; no
7. (6 × 1,00,000) + (7 × 1000) + (8 × 10): 21 clicks
8. 5,00,000 bottles

E. 1. 10 presses of a button = 1 press of the next; so each is pressed 0–9 times = the digits (p. 5)
2. Round up (so no one is left out), e.g. to 1,250 or 1,300
3. 100 × 100 = 10,000 (5 digits); below 1000 × 1000 = 10,00,000 (≤ 6 digits)
4. 3,84,400 ÷ 1,200 ≈ 320.3: about 321 days
5. 20,33,962; 2 × 24,33,835 = 48,67,670, so it nearly doubled
6. 83,000,000 (83 million); 250 crore

F. 1. 3,070,500,904: three arab seven crore five lakh nine hundred four = three billion seventy million five hundred thousand nine hundred four
2. More than 9 lakh (5.7 + 3.4 > 9 lakh); more than 9,20,000 (5,72,340 + 3,48,000 = 9,20,340 already); 9,21,255
3. 100 stadiums; 1,00,00,000 ÷ 86,400 ≈ 116 days
4. 9 + 180 = 189; 311 = 103 × 3 + 2; 100–202 end at the 498th digit; the 500th is the 0 of 203

G. 1. No: within 500 of 5 crore is also within 50,000 2. 111 = 3 × 37, so 37 × 3k = kkk; 37 × 27 = 999 3. 8 or 9 digits 4. 987

Case study 3. (i) four lakh seventy-five thousand (ii) 1,900 (iii) 5,00,000 (iv) 19,00,000

Last-night summary

- 1 lakh (5 zeros), 1 crore (7), 1 arab (9); 10 lakh = 1 million, 1 crore = 10 million, 100 crore = 1 billion.
- Commas: Indian 3-2-2-2, American 3-3-3; read groups with their names.
- Button calculators: presses = number ÷ button; fewest clicks = digit sum = place value.
- Round up (avoid shortage), down (stay in a limit); nearest neighbours: half or more rounds up; estimate before calculating.
- Products: × 5, × 25, × 125 shortcuts; m-digit × n-digit gives m + n − 1 or m + n digits; thought experiments in stages with stated assumptions.

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