

About the Author



DP SINGH

Btech-NIT
12+ Years teaching experience
For govt. exam like SSC /RAILWAY/ BANK

Download App- Maths by DP Sir Official

Why is "Competitive Maths - Shortcuts Secrets" the Right Path for You?

- Student Problem #1** (Difficult Questions) I get stuck on difficult questions. How do I even start solving them?
Our Solution We have mapped every possible question type for every chapter. Once you finish this book, you won't find a single question in the exam that you haven't seen and solved before.
- Student Problem #2** (Time management and accuracy) I know the method, but it takes too much time! How can I get the right answer faster?
Our Solution We provide the best proven tricks for every chapter. These shortcuts are designed to cut your solving time in half while ensuring 100% accuracy.
- Student Problem #3** (Big confusion) I have memorized many tricks, but I always get confused—which trick should I use for this specific question?
Our Solution To end this confusion, every trick comes with a dedicated Solved Example. You will learn exactly which "Secret" unlocks which type of question.
- Student Problem #4** (Eduquity new questions) The exam pattern has changed! Eduquity is now asking different questions than TCS used to. How do I prepare for this new style?
Our Solution Don't worry about the change. We have tracked and included all the new question types asked by Eduquity so far, making you 100% ready for the current pattern.

STUDENTS PERFORMANCE AUDIT (Survey of 30,000+ Aspirants)

Key Findings after Studying "Maths Shortcuts Secrets book":

- 50% Speed Increase:** Average solving time per question dropped from 90 seconds to 45 seconds.
 - 94% Accuracy:** Trick + Example" logic reduced calculation and formula errors by 26%.
 - 100% Pattern Mastery:** 9 out of 10 students successfully solved the latest Eduquity (SSC) question types.
 - 65% Higher Scores:** Students recorded a massive jump in Mock Test marks, making exams cut-offs easy to clear.
- "The Verdict: Data proves that students using this book are 2x faster than the competition".

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(Complete Information about Competitive Exam and Company Helpline No. given for any problem Related to Book and exam)

Maths (Shortcuts Secrets)

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	2.	Square-Square Root & Cube- Cube Root <ul style="list-style-type: none"> • Concepts, Short Tricks & Solved Examples • Questions (Based on Many Patterns) 	1. Questions Based on Square and Square Root	12	68	9-14
			2. Questions Based on Cube and Cube Root	7		
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Questions types marked as 'NEW' are collected from the latest Eduquity (SSC) papers. Focus on these to stay ahead of the changing exam pattern.

Unit	Chapter No.	Chapter Name	Name of Type	No. of Ques.	Total Questions	Page No.
II Arithmetic	5.	Simplification & Approximation ● Concepts, Short Tricks & Solved Examples ● Questions (Based on Many Patterns)	1. Questions Based on BODMAS	20	75	30-34
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			3. If X is m % Less/More than Y then Y Exceed/Less than X	5		
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3. Sum and Difference of Two Numbers is given			5			
4. Questions Based on Shares of Amount			4			
5. Questions Based on Number of Coins and Notes			5			
6. Questions Based on Mean, Third and Fourth Proportion			5			
7. Questions Based on Income			5			



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Unit	Chapter No.	Chapter Name	Name of Type	No. of Ques.	Total Questions	Page No.
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			5. If A Sells an Article to B, B Sells it to C, then	5		
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Unit	Chapter No.	Chapter Name	Name of Type	No. of Ques.	Total Questions	Page No.
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			4. If Rates are Different for First, Second and Third Year, then CI	5		
			5. To Find Rate ($R\%$), if a Sum P Becomes A in T Years on Compound Interest	7		
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Unit	Chapter No.	Chapter Name	Name of Type	No. of Ques.	Total Questions	Page No.
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			4. Questions Based on Alligation of Profit/Loss	6		
			5. Miscellaneous	27		
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6. Questions Based on Stoppage			3			
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8. Questions Based on Relative Speed			7			
9. Questions Based on $\frac{S_1}{S_2} = \sqrt{\frac{T_2}{T_1}}$			5			
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11. Questions Based on Races			8			
12. Questions Based on Circular Track			6			
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14. Time taken by a Train to Cross a Bridge at a Certain Speed			3			



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Unit	Chapter No.	Chapter Name	Name of Type	No. of Ques.	Total Questions	Page No.
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			23. Miscellaneous	28		
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			2. Questions Based on H.C.F.	5		
			3. L.C.M. and H.C.F. of Fractions	5		
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			5. Questions Based on Ratio of Numbers	6		
			6. Questions Based on Common Pair	4		
			7. Questions Based on Remainder on H.C.F.	6		
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			10. Questions Based on Ring or Traffic Light	4		
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			12. Questions Based on Completely Divisible Numbers	5		
			13. Miscellaneous	28		
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			4. When a Person Leaves Work After a Few Days	4		
			5. When a Person Left the Work Before Some Days	5		
			6. First, X Person Does the Work and Rest is Done by Y Person	6		



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Unit	Chapter No.	Chapter Name	Name of Type	No. of Ques.	Total Questions	Page No.
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			15. Partwise Filling Tank by Taps	5		
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			17. Questions Based on Capacity of Tank	5		
			18. Opening the Taps According to the Time	5		
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			4. When X Numbers are Added/Subtracted/Multiplied/Divided then its Average	7		
			5. Questions Based on Misread Numbers	5		
			6. When a Person Joins a Group	5		
			7. When one Person Takes the Place of Another	5		
			8. When a Person Enters or Leaves a Group	4		



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Unit	Chapter No.	Chapter Name	Name of Type	No. of Ques.	Total Questions	Page No.
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			14. Questions Based on Mixture	5		
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			2. Place Value & Face Value	7		
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			6. Subtracting/Adding a Number from given Number so that the given Number is Divisible by Another Number	3		
			7. Questions Based on Unit Digits	6		
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			12. Questions Based on Factorization	3		
			13. Counting Digits	5		
			14. Binary and Decimal Number 	10		
			15. Modulo Arithmetic 	12		
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Unit	Chapter No.	Chapter Name	Name of Type	No. of Ques.	Total Questions	Page No.
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	21.	Height and Distance ● Concepts, Short Tricks & Solved Examples ● Questions (Based on Many Patterns)	1. Questions Based on Angle of Elevation & Angle of Depression	15	73	198-206
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			3. Two Elevation Angles from Two Points to Top of an Object & Distance Between Two Points is given	7		
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Unit	Chapter No.	Chapter Name	Name of Type	No. of Ques.	Total Questions	Page No.
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			4. Pythagoras Theorem	8		
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			13. Internal & External Angle Bisector Theorem of Triangle	5		
			14. Angle Subtended by the Bisectors of Exterior Angles Extending Two Sides of Triangle	2		
			15. An Altitude and an Angle Bisector are Drawn from a Vertex of Triangle	5		
			16. Questions Based on Angle Sum Property of Quadrilaterals	4		
			17. Questions Based on Properties of Quadrilaterals	5		
			18. Questions Based on Perpendicular Distance From Centre of Circle Bisects its Chord	5		



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Unit	Chapter No.	Chapter Name	Name of Type	No. of Ques.	Total Questions	Page No.
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			25. A Tangent and a Secant are Drawn to Circle from an External Point	4		
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			27. Cyclic Quadrilateral	6		
			28. Incircle of a Quadrilateral	7		
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Unit	Chapter No.	Chapter Name	Name of Type	No. of Ques.	Total Questions	Page No.
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			15. Questions Based on Right Circular Cone	7		
			16. Questions Based on Frustum	4		
			17. Questions Based on Sphere & Hemisphere	5		
			18. Questions Based on Prism 	6		
			19. Questions Based on Pyramid 	8		
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			2. Questions Based on Area of Triangle	12		
			3. Questions Based on Centroid of Triangle	10		
			4. Questions Based on Mid Point of Two Points	14		
			5. Questions Based on Slope	17		
			6. Questions Based on Internal Division of Line Segment	5		
			7. Questions Based on Equation of Straight Line	5		
			8. Questions Based on the Area of a Quadrilateral	10		
			9. Miscellaneous	26		



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Unit	Chapter No.	Chapter Name	Name of Type	No. of Ques.	Total Questions	Page No.
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			2. Questions Based on GP	21		
			3. Questions Based on HP	10		
			4. Questions Based on Special Progressions	17		
			5. Miscellaneous	20		
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	27.	Permutation and Combination ● Concepts, Short Tricks & Solved Examples ● Questions (Based on Many Patterns)	1. Questions Based on Formula of Permutation 	13	47	285-289
			2. Permutation of N Object When Repetition is Not Allowed 	11		
			3. Permutation of N Object When Repetition is Allowed 	7		
			4. Permutation of Multi Sets 	3		
			5. Circular Permutation 	3		
			6. Questions Based on Combination Formula 	4		
			7. Questions Based on Selections (Combination) 	5		
			8. Combination Arrangement Series 	1		
	28.	Probability ● Concepts, Short Tricks & Solved Examples ● Questions (Based on Many Patterns)	1. Basic Concept of Probability	8	79	290-300
			2. Questions Based on Additional Theorem on Probability	8		
			3. Questions Based on Multiplication Theorem on Probability	7		
			4. Questions Based on Division Theorem on Probability	5		
			5. Question Based on At least One Possibility	1		
			6. Questions Based on Selection (Combination)	8		
			7. Based on Balls/Marbles	3		



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Unit	Chapter No.	Chapter Name	Name of Type	No. of Ques.	Total Questions	Page No.
			8. Bayes' Theorem 	12		
			9. Miscellaneous	27		
	29.	Statistics <ul style="list-style-type: none"> • Concepts, Short Tricks & Solved Examples • Questions (Based on Many Patterns) 	1. Questions Based on Range	4	83	301-313
			2. Mean of Ungrouped & Grouped Data by Direct Method	10		
			3. Median of Ungrouped and Grouped Data	12		
			4. Mode of Ungrouped and Grouped Data	11		
			5. Relation Between Mean, Median and Mode	8		
			6. Questions Based on Mean Deviation	5		
			7. Questions Based on Variance 	6		
			8. Karl Pearson Coefficient of Skewness 	3		
			9. Quartile Deviation 	2		
			10. Questions Based on Standard Deviation	3		
			11. Miscellaneous	19		
	30.	Data Interpretation <ul style="list-style-type: none"> • Concepts, Short Tricks & Solved Examples • Questions (Based on Many Patterns) 	1. Questions Based on Tabulation 	39	147	314-331
			2. Questions Based on Line Graph 	20		
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			4. Questions Based on Bar Graph 	23		
			5. Questions Based on Pie Chart 	28		
			6. Miscellaneous	23		
				Total Questions : 2885		



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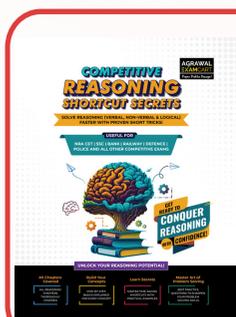
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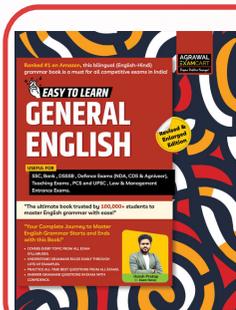
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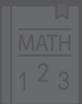


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Unit-I Calculation

CHAPTER 1

Speed Up Your Calculations

1. Addition

In this chapter, we will learn how to make addition even easier. How would we add 63 and 9?

The easy way would be to add 10 and then subtract 1.

So, adding 10 to 63 we get 73 and then subtracting 1 from 73 we get 72. Hence, required answer is 72.

It is easy to add 10 to any number; for example adding 10 to 46 gives 56; adding 10 to 73 gives 83. If 10 is added to any number, then tens digit of the number is increased by 1.

Some basic Rules for addition are given below :

- To add 9, add 10 and then subtract 1;
- To add 8, add 10 and then subtract 2;
- To add 7, add 10 and then subtract 3; etc.

I. Addition of two digit numbers

In the addition of two-digit numbers, if the unit digit is high, round off to the next ten and then subtract the difference. If the unit digit is low, add the tens digit and then add the unit digit.

Ex. : To add 47, add 50 and then subtract 3; to add 96, add 100 and then subtract 4; to add 82, add 80 and then add 2 more etc.

To add 35, 67 and 42 together, we would begin with 35.

$$\begin{aligned} \text{Now, } 35 + 67 &= (35 + 70) - 3 \\ &= 105 - 3 = 102 \end{aligned}$$

$$\begin{aligned} \text{Now, } 102 + 42 &= (102 + 40) + 2 \\ &= 142 + 2 = 144 \end{aligned}$$

Hence, the addition of 35, 67 and 42 is 144.

II. Addition of three digit numbers :

We use the same method for adding three-digit numbers.

To add 355, 752 and 694 together, add the hundreds digit of each number, *i.e.*, $3 + 7 + 6 = 1600$

$$\begin{aligned} \text{Now, remaining parts of the numbers,} \\ 55 + 52 &= (55 + 50) + 2 \\ &= 105 + 2 \\ &= 107 \end{aligned}$$

$$\begin{aligned} \text{and, } 107 + 94 &= (107 + 100) - 6 \\ &= 207 - 6 = 201 \end{aligned}$$

$$\begin{aligned} \text{Now, } 355 + 752 + 694 &= 1600 + 201 \\ &= 1801 \end{aligned}$$

We can also solve the addition of larger numbers by the same method.

$$\text{Ex. : } 89978 + 12345 + 36218 = ?$$

$$\text{Sol. : } 89978 + 12345 + 36218$$

$$\begin{array}{r} \text{Step 1 : } \boxed{8}9978 + \boxed{1}2345 + \boxed{3}6218 \\ \downarrow \quad \quad \quad \downarrow \quad \quad \quad \downarrow \\ 8 \quad + \quad 1 \quad + \quad 3 = 120000 \end{array}$$

$$\begin{array}{r} \text{Step 2 : } 8\boxed{9}978 + 1\boxed{2}345 + 3\boxed{6}218 \\ \downarrow \quad \quad \quad \downarrow \quad \quad \quad \downarrow \\ 9 \quad + \quad 2 \quad + \quad 6 = 17000 \end{array}$$

$$\begin{array}{r} \text{Now,} \\ 120000 \\ + 17000 \\ \hline 137000 \end{array}$$

$$\begin{array}{r} \text{Step 3 : } 89\boxed{9}78 + 12\boxed{3}45 + 36\boxed{2}18 \\ \downarrow \quad \quad \quad \downarrow \quad \quad \quad \downarrow \\ 9 \quad + \quad 3 \quad + \quad 2 = 1400 \end{array}$$

$$\begin{array}{r} \text{Now,} \\ 137000 \\ + 1400 \\ \hline 138400 \end{array}$$

$$\text{Step 4 : } 78 + 45 + 18$$

$$78 + 45 = (78 + 50) - 5 = 128 - 5 = 123$$

$$\begin{aligned} \text{and, } 123 + 18 &= (123 + 20) - 2 = 143 - 2 \\ &= 141 \end{aligned}$$

$$\begin{aligned} \text{Hence, } 89978 + 12345 + 36218 &= 138400 + 141 \\ &= 138541 \end{aligned}$$

2. Subtraction

To subtract, round off the number we are subtracting and then correct the answer.

How would we subtract 9 from 63?

To subtract 9, subtract 10 and then add 1. So, subtracting 10 from 63, we get 53 and then adding 1. We get 54. The required answer will be 54.

Some basic rules for subtraction are given below :

- To subtract 9, subtract 10 and then add 1;
- To subtract 8, subtract 10 and then add 2;
- To subtract 7, subtract 10 and then add 3; etc.

To subtract a number near 100, take 100 and add the remainder. For example : $436 - 97 = ?$

We subtract 100 from 436 and then add 3.

$$\text{i.e., } (436 - 100) + 3 = 336 + 3 = 339$$

So, required answer is 339.

- **Subtracting one number below a hundreds value from another which is just above the same hundreds number :**

If the number to be subtracted is less than 100, and the number from which we are subtracting is greater than 100, then the difference, which is less than 100 and the other difference, which is greater than 100, add both the differences.

Ex. 1: $174 - 88 = ?$

Sol : Here, 88, is less than 100 by 12 and 174 is more than 100 by 74.

So required answer = $12 + 74 = 86$

Ex. 2: $7254 - 3897 = ?$

Sol : Here, the number 3897 is to be subtracted, then taking nearest thousand of this number, *i.e.*, 4000. 4000 is more than 3897 by 103 and less than 7254 by 3254.

So, $7254 - 3897 = 103 + 3254 = 3357$

3. Multiplication

I. Multiplication by two-digit numbers :

If two-digit numbers are 23 and 34,

$$\begin{array}{r} 23 \\ \times 34 \\ \hline \end{array}$$

Step 1: Multiply the unit digit of both the numbers each other.

i.e., $3 \times 4 = 12$

Now, write the unit digit 2 of the product 12 and take tens digit 1 as carry.

$$\begin{array}{r} \textcircled{1} \\ 23 \\ \times 34 \\ \hline 2 \end{array}$$

Step 2: Multiply tens digit of the first number and unit digit of the second number; and multiply unit digit of the first number and tens digit of the second number. Now, add both the products and the carry in step 1.

i.e., $(2 \times 4) + (3 \times 3) + 1 = 8 + 9 + 1 = 18$

Now, write the unit digit 8 of the sum 18 and take tens digit 1 as carry.

$$\begin{array}{r} \textcircled{1} \\ 23 \\ \times 34 \\ \hline 82 \end{array}$$

Step 3: Multiply tens digit of both the number each other and add the product and the carry in Step 2.

i.e., $(2 \times 3) + 1 = 6 + 1 = 7$

$$\begin{array}{r} 23 \\ \times 34 \\ \hline 782 \end{array}$$

Hence, $23 \times 34 = 782$

Ex. : $82 \times 91 = ?$

Sol : **Step 1:**

$$\begin{array}{r} 82 \\ \times 91 \\ \hline 2 \end{array}$$

Step 2:

$$\begin{array}{r} 82 \\ \times 91 \\ \hline 62 \end{array}$$

Carry = 2

Step 3:

$$\begin{array}{r} 82 \\ \times 91 \\ \hline 7462 \end{array}$$

Hence, $82 \times 91 = 7462$

II. Multiplication by three-digit numbers :

If three digit numbers are 837 and 456.

$$\begin{array}{r} 837 \\ \times 456 \\ \hline \end{array}$$

Step 1: Multiply the unit digit of both the numbers each other.

i.e., $7 \times 6 = 42$

Now, write unit digit 2 of the product 42 and take tens digit 4 as carry.

$$\begin{array}{r} 837 \\ \times 456 \\ \hline 2 \end{array}$$

Carry = 4

Step 2: Multiply the tens digit of first number and unit digit of second number; and multiply the unit digit of first number and tens digit of second number. Now add both the products and the carry in step 1.

i.e., $(3 \times 6) + (7 \times 5) + 4 = 18 + 35 + 4 = 57$

Now, write the unit digit 7 of the sum 57 and take tens digit 5 as carry.

$$\begin{array}{r} 837 \\ \times 456 \\ \hline 72 \end{array}$$

Carry = 5

Step 3: Multiply the hundreds digit of first number and the unit digit of second number; multiply the unit digit of first number and the hundreds digit of second number; and multiply the tens digit of both the numbers. Now add all the three products and the carry in step 2.

i.e., $(8 \times 6) + (7 \times 4) + (3 \times 5) + 5 = 48 + 28 + 15 + 5 = 96$

Now, write the unit digit 6 of the sum 96 and take tens digit 9 as carry.

$$\begin{array}{r} 837 \\ \times 456 \\ \hline 672 \end{array}$$

Carry = 9

Step 4: Multiply the hundreds digit of first number and the tens digit of second number; and multiply the tens digit of first number and hundreds digit of second number. Now add both the products and the carry in step 3.

i.e., $(8 \times 5) + (3 \times 4) + 9 = 40 + 12 + 9 = 61$

Now, write the unit digit 1 of the sum 61 and take tens digit 6 as carry.

$$\begin{array}{r} 8 \quad 3 \quad 7 \\ \times 4 \quad 5 \quad 6 \\ \hline 1 \quad 6 \quad 7 \quad 2 \end{array} \text{Carry} = 6$$

Step 5: Multiply the hundreds digit of both the numbers each other. Now, add the product and the carry in step 4.

i.e., $(8 \times 4) + 6 = 32 + 6 = 38$

$$\begin{array}{r} 8 \quad 3 \quad 7 \\ \times 4 \quad 5 \quad 6 \\ \hline 38 \quad 1 \quad 6 \quad 7 \quad 2 \end{array}$$

Hence, $837 \times 456 = 381672$

Ex. : $932 \times 243 = ?$

Sol : Step 1:

$$\begin{array}{r} 9 \quad 3 \quad 2 \\ \times 2 \quad 4 \quad 3 \\ \hline 6 \end{array}$$

Step 2:

$$\begin{array}{r} 9 \quad 3 \quad 2 \\ \times 2 \quad 4 \quad 3 \\ \hline 7 \quad 6 \end{array} \text{Carry} = 1$$

Step 3:

$$\begin{array}{r} 9 \quad 3 \quad 2 \\ \times 2 \quad 4 \quad 3 \\ \hline 4 \quad 7 \quad 6 \end{array} \text{Carry} = 4$$

Step 4:

$$\begin{array}{r} 9 \quad 3 \quad 2 \\ \times 2 \quad 4 \quad 3 \\ \hline 6 \quad 4 \quad 7 \quad 6 \end{array} \text{Carry} = 4$$

Step 5:

$$\begin{array}{r} 9 \quad 3 \quad 2 \\ \times 2 \quad 4 \quad 3 \\ \hline 22 \quad 6 \quad 4 \quad 7 \quad 6 \end{array}$$

Hence, $932 \times 243 = 226476$

III. Multiplication by Four digit numbers :

If four-digit numbers are 3367 and 6789, then :

$$\begin{array}{r} 3 \quad 3 \quad 6 \quad 7 \\ \times 6 \quad 7 \quad 8 \quad 9 \\ \hline \end{array}$$

Step 1: Multiply the unit digit of both numbers each other.

i.e., $7 \times 9 = 63$

Write the unit digit 3 of the product 63 and take 6 tens digit 6 as carry :

$$\begin{array}{r} 3 \quad 3 \quad 6 \quad 7 \\ \times 6 \quad 7 \quad 8 \quad 9 \\ \hline 3 \end{array} \text{Carry} = 6$$

Step 2: Multiply the tens digit of first number and the unit digit of second number; and multiply the unit digit of first number and the tens digit of second number. Now add both the products and the carry in step 1.

i.e., $(6 \times 9) + (7 \times 8) + 6 = 54 + 56 + 6 = 116$

Now, write the unit digit 6 of the sum 116 and take the remaining part 11 as carry.

$$\begin{array}{r} 3 \quad 3 \quad 6 \quad 7 \\ \times 6 \quad 7 \quad 8 \quad 9 \\ \hline 6 \quad 3 \end{array} \text{Carry} = 11$$

Step 3: Multiply the hundreds digit of first number and the unit digit of second number; multiply the unit digit of first number and the hundreds digit of second number; and multiply the tens digit of both the numbers. Now add all the three products and the carry in step 2.

i.e., $(3 \times 9) + (7 \times 7) + (6 \times 8) + 11$
 $= 27 + 49 + 48 + 11 = 135$

Now, write the 135 unit digit 5 of the sum and take the remaining part 13 as carry.

$$\begin{array}{r} 3 \quad 3 \quad 6 \quad 7 \\ \times 6 \quad 7 \quad 8 \quad 9 \\ \hline 5 \quad 6 \quad 3 \end{array} \text{Carry} = 13$$

Step 4: Multiply the thousands, digit of first number and the unit digit of second number; multiply the hundreds digit of first number and the tens digit of second number; multiply the tens digit of first number and the hundreds digit of second; and multiply the unit digit of first number and the thousands digit of second number. Now add all the four products and the carry in step 3.

i.e., $(3 \times 9) + (3 \times 8) + (6 \times 7) + (7 \times 6) + 13$
 $= 27 + 24 + 42 + 42 + 13 = 148$

Now, write the unit digit 8 of the sum 148 and take the remaining part 14 as carry.

$$\begin{array}{r} 3 \quad 3 \quad 6 \quad 7 \\ \times 6 \quad 7 \quad 8 \quad 9 \\ \hline 8 \quad 5 \quad 6 \quad 3 \end{array} \text{Carry} = 14$$

Step 5: Multiply the thousands digit of first number and the tens digit of second number; multiply the tens digit of first number and the thousands digit of second number; and multiply the hundreds digit of both the numbers. Now add all the three products and the carry in step 4.

i.e., $(3 \times 8) + (6 \times 6) + (3 \times 7) + 14$
 $= 24 + 36 + 21 + 14 = 95$

Now, write the unit digit 5 of the sum 95 and take the remaining part 9 as carry.

$$\begin{array}{r} 3 \quad 3 \quad 6 \quad 7 \\ \times 6 \quad 7 \quad 8 \quad 9 \\ \hline 5 \quad 8 \quad 5 \quad 6 \quad 3 \end{array} \text{Carry} = 9$$

Step 6: Multiply the thousands digit of first number and the hundreds digit of second number; and multiply the hundreds digit of first number and the thousands digit of second number. Now add both the products and the carry in step 5.

$$\text{i.e., } (3 \times 7) + (3 \times 6) + 9 = 21 + 18 + 9 = 48$$

Now, write the unit digit 8 of the sum 48 and take the remaining part 4 as carry.

$$\begin{array}{r} 3 \ 3 \ 6 \ 7 \\ \times 6 \ 7 \ 8 \ 9 \\ \hline 8 \ 5 \ 8 \ 5 \ 6 \ 3 \end{array} \text{Carry} = 4$$

Step 7: Multiply the thousands digit of both the numbers.

Now add the product and the carry in step 6.

$$\text{i.e., } (3 \times 6) + 4 = 18 + 4 = 22$$

$$\begin{array}{r} 3 \ 3 \ 6 \ 7 \\ \times 6 \ 7 \ 8 \ 9 \\ \hline 22 \ 8 \ 5 \ 6 \ 3 \end{array}$$

Hence, $3367 \times 6789 = 22858563$

Ex. : $5632 \times 1672 = ?$

Sol : Step 1:

$$\begin{array}{r} 5 \ 6 \ 3 \ 2 \\ \times 1 \ 6 \ 7 \ 2 \\ \hline 4 \end{array}$$

Step 2:

$$\begin{array}{r} 5 \ 6 \ 3 \ 2 \\ \times 1 \ 6 \ 7 \ 2 \\ \hline 0 \ 4 \end{array} \text{Carry} = 2$$

Step 3:

$$\begin{array}{r} 5 \ 6 \ 3 \ 2 \\ \times 1 \ 6 \ 7 \ 2 \\ \hline 7 \ 0 \ 4 \end{array} \text{Carry} = 4$$

Step 4:

$$\begin{array}{r} 5 \ 6 \ 3 \ 2 \\ \times 1 \ 6 \ 7 \ 2 \\ \hline 6 \ 7 \ 0 \ 4 \end{array} \text{Carry} = 7$$

Step 5:

$$\begin{array}{r} 5 \ 6 \ 3 \ 2 \\ \times 1 \ 6 \ 7 \ 2 \\ \hline 1 \ 6 \ 7 \ 0 \ 4 \end{array} \text{Carry} = 8$$

Step 6:

$$\begin{array}{r} 5 \ 6 \ 3 \ 2 \\ \times 1 \ 6 \ 7 \ 2 \\ \hline 4 \ 1 \ 6 \ 7 \ 0 \ 4 \end{array} \text{Carry} = 4$$

Step 7:

$$\begin{array}{r} 5 \ 6 \ 3 \ 2 \\ \times 1 \ 6 \ 7 \ 2 \\ \hline 9 \ 4 \ 1 \ 6 \ 7 \ 0 \ 4 \end{array}$$

Hence, $5632 \times 1672 = 9416704$

IV. Multiplication by the numbers nearest to 10, 100, 1000 etc.

If two numbers 46 and 98 are to be multiplied, then the number 98 is nearest to 100 or we can say that 98 is less than 100 by 2, then we can write $98 = 100 - 2$.

Now,

$$\begin{aligned} 46 \times 98 &= 46 \times (100 - 2) \\ &= 46 \times 100 - 46 \times 2 \\ &= 4600 - 92 \\ &= 4508 \end{aligned}$$

Ex. 1: $998 \times 85 = ?$

Sol :

$$\begin{aligned} 998 \times 85 &= (1000 - 2) \times 85 \\ &= 1000 \times 85 - 2 \times 85 \\ &= 85000 - 170 \\ &= 84830 \end{aligned}$$

Ex. 2: $99 \times 79 = ?$

Sol :

$$\begin{aligned} &= (100 - 1) \times 79 \\ &= 79 \times 100 - 79 \\ &= 7900 - 79 = 7821 \end{aligned}$$

V. Multiplication the numbers just below or above 100

If two numbers are 106 and 107, and their product is to be found.

i.e., $106 \times 107 = ?$

Then, $(100 + 6) \times (100 + 7)$

Now, $(100 + 6 + 7)$ or $(100 + 7 + 6) = 113$

A number 106 is more than 100 by 6 and another number 107 is more than 100 by 7, then multiply 6 and 7.

i.e., $6 \times 7 = 42$

Now, the sum 113 and the product 42 are written in the order.

Hence, $106 \times 107 = 11342$

Ex. 1: $92 \times 97 = ?$

Sol : $92 \times 97 = (100 - 8) \times (100 - 3)$

Now, $(100 - 8 - 3)$ or $(100 - 3 - 8) = 89$

A number 92 is less than 100 by 8 and another number 97 is less than 100 by 3, then

$$8 \times 3 = 24$$

Now, the difference 89 and the product 24 are written in the order.

Hence, $92 \times 97 = 8924$

Ex. 2: $108 \times 109 = ?$

Sol : $108 \times 109 = (100 + 8) \times (100 + 9)$

Now, $(100 + 8 + 9)$ or $(100 + 9 + 8) = 117$

A number 108 is more than 100 by 8 and another number 109 is more than 100 by 9, then

$$8 \times 9 = 72$$

Now, the sum 117 and the product 72 are written in the order.

Hence, $108 \times 109 = 11772$

VI. Multiplication by 11

If the number 8345 is to be multiplied by 11, then

Step 1: The unit digit of 8345 is put down.

i.e.,
$$\begin{array}{r} 8345 \times 11 \\ 5 \end{array}$$

Step 2: Each successive digit 8345 is added to its right-hand neighbour.

$$\frac{8345 \times 11}{95} \quad (4 + 5 = 9)$$

$$\frac{8345 \times 11}{795} \quad (3 + 4 = 7)$$

$$\frac{8345 \times 11}{1795} \quad (8 + 3 = 11; \text{ put unit digit 1 and carry over 1})$$

Step 3: Now adding the first digit 8 of 8345 and the carry 1, the sum $8 + 1 = 9$ is written :

$$\text{i.e.,} \quad \frac{8345 \times 11}{91795}$$

Hence, $8345 \times 11 = 91795$

Ex. : $89067 \times 11 = ?$

Sol : The unit digit of 89067 is put down

$$\frac{89067 \times 11}{7}$$

Now, $\frac{89067 \times 11}{37}$ [$6 + 7 = 13$, put down the unit digit 3 and Carry = 1]

$$\frac{89067 \times 11}{737} \quad [0 + 6 + 1 (\text{Carry}) = 7]$$

$$\frac{89067 \times 11}{9737} \quad [9 + 0 = 9]$$

$$\frac{89067 \times 11}{79737} \quad [8 + 9 = 17 \text{ put down the unit digit 7 and Carry} = 1]$$

Now, $\frac{89067 \times 11}{979737}$ [$8 + 1 (\text{Carry}) = 9$]

Hence, $89067 \times 11 = 979737$

VII. Multiplication by 12

If the number 35604 is to be multiplied by 12, then

Step 1: Double the unit digit of the number 35604.

$$\text{i.e.,} \quad \frac{35604 \times 12}{8} \quad [4 \times 2 = 8]$$

Step 2: Double the first digit of two consecutive digits from the right of the number 35604 is added to the second digit.

$$\frac{35604 \times 12}{48} \quad [0 \times 2 + 4 = 4]$$

$$\frac{35604 \times 12}{248} \quad [6 \times 2 + 0 = 12, \text{ put down the unit digit 2 and Carry} = 1]$$

$$\frac{35604 \times 12}{7248} \quad [5 \times 2 + 6 + 1 (\text{Carry}) = 17, \text{ put down the unit digit 7 and Carry} = 1]$$

$$\frac{35604 \times 12}{27248} \quad [3 \times 2 + 5 + 1 (\text{Carry}) = 12, \text{ put down the unit digit 2 and Carry} = 1]$$

Step 3: The first digit of the number 35604. *i.e.*, 3 is added to the previous carry 1. So $3 + 1 = 4$.

Now put down the sum 4.

$$\text{i.e.,} \quad \frac{35604 \times 12}{427248} \quad [3 + 1 (\text{Carry}) = 4]$$

Hence, $35604 \times 12 = 427248$

Ex. : $85762 \times 12 = ?$

Sol : $\frac{85762 \times 12}{4}$ [Double the unit digit $2 = 2 \times 2 = 4$]

$$\frac{85762 \times 12}{44} \quad [6 \times 2 + 2 = 14, \text{ put down the unit digit 4 and Carry} = 1]$$

$$\frac{85762 \times 12}{144} \quad [7 \times 2 + 6 + 1 (\text{Carry}) = 21, \text{ put down the unit digit 1 and Carry} = 2]$$

$$\frac{85762 \times 12}{9144} \quad [5 \times 2 + 7 + 2 (\text{Carry}) = 19, \text{ put down the unit digit 9 and Carry} = 1]$$

$$\frac{85762 \times 12}{29144} \quad [8 \times 2 + 5 + 1 (\text{Carry}) = 22, \text{ put down the unit digit 2 and Carry} = 2]$$

Now, $\frac{85762 \times 12}{1029144}$ [$8 + 2 (\text{Carry}) = 10$]

Hence, $85762 \times 12 = 1029144$

VIII. Multiplication by 13

If the number 56493 is to be multiplied by 13, then

Step 1: Three times the unit digit of the number 56493.

$$\text{i.e.,} \quad \frac{56493 \times 13}{9} \quad [3 \times 3 = 9]$$

Step 2: Three times the first digit of two consecutive digits from the right of the number 56493 is added to the second digit.

$$\frac{56493 \times 13}{9} \quad [9 \times 3 + 3 = 30, \text{ put down the unit digit 0 and Carry} = 3]$$

$$\frac{56493 \times 13}{409} \quad [4 \times 3 + 9 + 3 (\text{Carry}) = 24, \text{ put down the unit digit 4 and Carry} = 2]$$

$$\frac{56493 \times 13}{4409} \quad [6 \times 3 + 4 + 2 (\text{Carry}) = 24, \text{ put down the unit digit 4 and Carry} = 2]$$

$$\frac{56493 \times 13}{34409} \quad [5 \times 3 + 6 + 2 (\text{Carry}) = 23, \text{ put down the unit digit 3 and Carry} = 2]$$

Step 3: The first digit of the number 56493 *i.e.*, 5 is added to the previous carry = 2, So $5 + 2 = 7$.

Now, put down the sum 7.

$$\text{i.e.,} \quad \frac{56493 \times 13}{734409} \quad [5 + 2 (\text{Carry}) = 7]$$

Hence, $56493 \times 13 = 734409$

Ex. : $11952 \times 13 = ?$

Sol : $\frac{11952 \times 13}{6}$ [three times the unit digit $2 = 2 \times 3 = 6$]

$$\frac{11952 \times 13}{76} \quad [5 \times 3 + 2 = 17, \text{ put down the unit digit 7 and Carry} = 1]$$

$$\frac{11952 \times 13}{376} \quad [9 \times 3 + 5 + 1 (\text{Carry}) = 33, \text{ put down the unit digit 3 and Carry} = 3]$$

$$\frac{11952 \times 13}{5376} \quad [1 \times 3 + 9 + 3 (\text{Carry}) = 15, \text{ put down the unit digit 5 and Carry} = 1]$$

Step 5: Now our dividend is 43. Subtract the sum of the cross-multiplication of the pair of the indexed digits in divisor-column (43) and the last two quotient-digits (43) from the new dividend 43.

$$\text{i.e., } 43 - (4 \times 3 + 3 \times 4) = 43 - 24 = 19$$

Now net-dividend is 19 and it is divided by 7. Put down the obtained quotient 2 and remainder 5 their respective places.

$$\begin{array}{r|l} 7^{43} & 10 \quad 3 \quad 4 \quad 4 \quad 3 \quad | \quad 5 \quad 2 \quad 1 \\ & 1 \quad 4 \quad 3 \quad 2 \quad | \end{array}$$

Thus the division process is called, in which required remainder = Number obtained in remainder-column - $10 \times$ (sum of the cross multiplication of the pair of the indexed digits in divisor-column and the last two quotient-digits) - Product of the unit digit of indexed number in divisor-column and the last quotient-digit.

$$\begin{aligned} &= 521 - 10 \times (4 \times 2 + 3 \times 3) - 3 \times 2 \\ &= 521 - 10 \times 17 - 6 \\ &= 345 \end{aligned}$$

Hence, quotient = 1432 ; remainder = 345.

Ex. : Divided the number 4213 by 1234 upto 4 decimal places.

Sol : **Step 1:** $\begin{array}{r|l} 12^{34} & 4 \quad 2 \quad | \quad 1 \quad 3 \quad 0 \quad 0 \quad 0 \\ & \quad \quad | \end{array}$

\therefore 12 is a small number to handle with we can treat 1234 as a three-digit number.

We have to find the quotient in decimal so we can put zeroes in the last in decimal-column or remainder-column.

Step 2: $\begin{array}{r|l} 12^{34} & 4 \quad 2 \quad | \quad 6 \quad 1 \quad 3 \quad 0 \quad 0 \quad 0 \\ & \quad \quad | \quad 3 \quad \quad \end{array}$

Dividing 42 by 12, we get quotient = 3 and remainder = 6

Step 3: $\begin{array}{r|l} 12^{34} & 4 \quad 2 \quad | \quad 6 \quad 1 \quad 3 \quad 0 \quad 0 \quad 0 \\ & \quad \quad | \quad 3 \quad \quad 4 \quad \quad \end{array}$

$$61 - (3 \times 3) = 61 - 9 = 52$$

Dividing 52 by 12, we get quotient = 4 and remainder = 4

Step 4: $\begin{array}{r|l} 12^{34} & 4 \quad 2 \quad | \quad 6 \quad 1 \quad 3 \quad 7 \quad 0 \quad 0 \quad 0 \\ & \quad \quad | \quad 3 \quad \quad 4 \quad 1 \quad \quad \end{array}$

$$43 - (3 \times 4 + 4 \times 3) = 43 - 24 = 19$$

Dividing 19 by 12, we get quotient = 1 and remainder = 7

Step 5: $\begin{array}{r|l} 12^{34} & 4 \quad 2 \quad | \quad 6 \quad 1 \quad 3 \quad 7 \quad 0 \quad 3 \quad 0 \quad 0 \\ & \quad \quad | \quad 3 \quad \quad 4 \quad 1 \quad 4 \quad \quad \end{array}$

$$70 - (3 \times 1 + 4 \times 4) = 70 - 19 = 51$$

Dividing 51 by 12, we get quotient = 4 and remainder = 3

Step 6: $\begin{array}{r|l} 12^{34} & 4 \quad 2 \quad | \quad 6 \quad 1 \quad 3 \quad 7 \quad 0 \quad 3 \quad 0 \quad 2 \quad 0 \\ & \quad \quad | \quad 3 \quad \quad 4 \quad 1 \quad 4 \quad 1 \quad \quad \end{array}$

$$30 - (3 \times 4 + 4 \times 1) = 30 - 16 = 14$$

Dividing 14 by 12, we get quotient = 1 and remainder = 2

Hence, required answer 3.4141.

