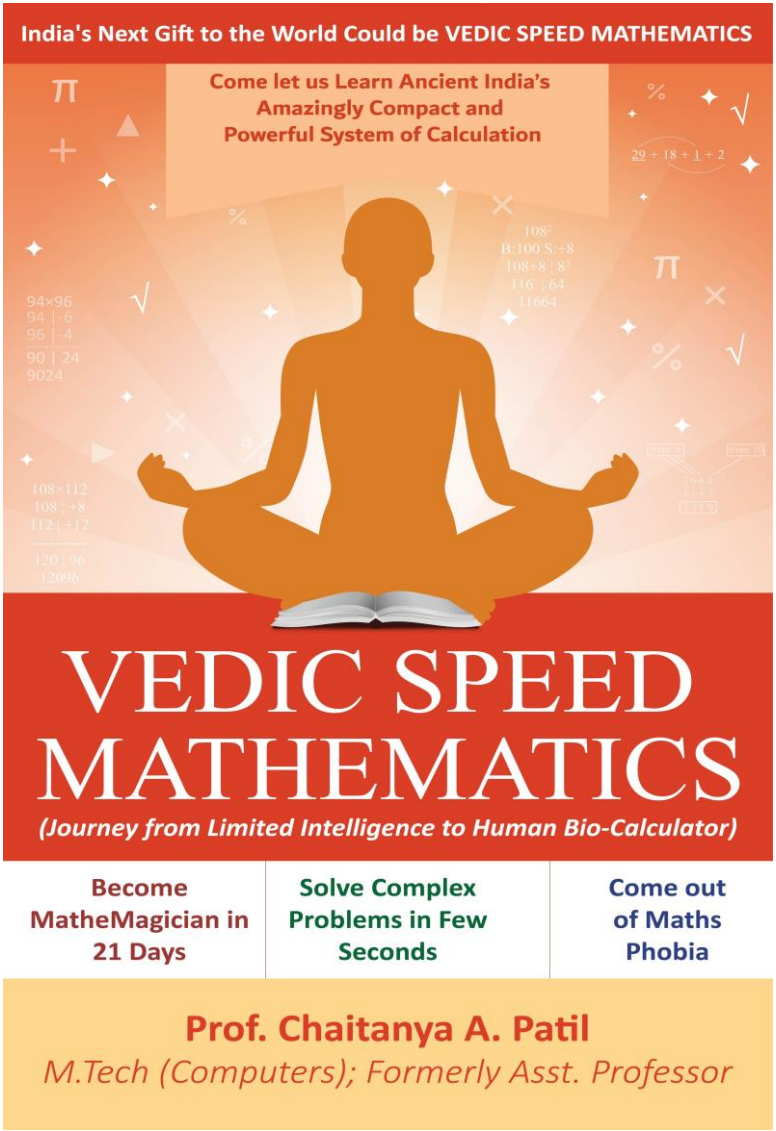

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MULTIPLICATION

Multiplication means times or repeated addition.

Ex.1: 13×3=39 (or 13+13+13=39)

Ex.2: 24×4=96 (or 24+24+24+24=96)

1.1 Multiplication using Base Method

1. **Bases** are any positive numbers ending with 0's (zeroes).
   Ex: 70, 80, 90, 100, 140, 1300, 5600 etc.
2. **Working** (or functional) **Base** is always power of 10.
   Ex: 10 (10^1), 100 (10^2), 1000 (10^3), 10000 (10^4) etc.
3. **Surplus** = Number – Base
4. **Complement** = Number – Base
5. **Note:** In multiplication, Base method is preferred if given numbers are nearer (closer) to Working Bases. Otherwise Criss Cross method is preferred.
6. Formula used: 'Nikhilam Navataścaramam Daśatah' (निखिलं नवतश्चरमं दशतः) **Meaning:** All from 9 and the last from 10.

Number	Base	Surplus
12	10	+2
107	100	+7
1145	1000	+145
12364	10000	+2364
57	50	+7
1846	1800	+46

Number	Base	Complement
8	10	-2
93	100	-7
974	1000	-26
845	1000	-155
57	60	-3
1846	1900	-54

In Vedic Speed Mathematics we get answers quickly if we choose Working Bases. So Prefer Working Bases over Bases. Ex. For 93 Base is both 90 and 100. Choose 100 over 90 because 100 is Working Base.

Abbreviations used	**D:** Digit	**B:** Base	**C:** Complement
	S: Surplus	**BM:** Base Multiple	**BR:** Base Ratio

Case 1: When both numbers (Multiplicand and Multiplier) are Greater than the Working Base:

Working Procedure:

1. Write multiplicand and multiplier one below the other.
2. Write surpluses of multiplicand and multiplier to its right side with signs.
3. Answer consists of two parts. Left Part and Right Part.
4. Left Part: Evaluation of any of the cross values (Addition).
5. Right Part: Product of both the surpluses (right side values).
6. **Caution:** Total number of digits in the Right Part should be same as total number of zeroes in the base. If lesser, add required number of zeroes before the right part. If greater, carry the left most excess digits of Right Part to Left Part.

Ex.1:12×14
Base = 10
12 +2 14 +4 ---------- 16 ¦ 8
168

Ex.1: 12×14; here we need to multiply 12 and 14. Multiplicand (12) and Multiplier ((14) are written one below the other. Surplus of 12 is +2 (12-10) & Surplus of 14 is +4 (14-10). Left Part is 16 (12+4 or 14+2). Right Part is product of both the surpluses i.e. 2×4=8. So final answer is 168.

Ex.2:108×112
Base = 100
108 +8 112 +12 ---------- 120 ¦ 96
12096

Ex.2: 108×112; here we need to multiply 108 and 112. Multiplicand (108) and Multiplier (112) are written one below the other. Surplus of 108 is +8 (108-100) & Surplus of 112 is +12 (112-100). Left Part is 120 (108+12 or 112+8). Right Part is product of both the surpluses i.e. 8×12=96. So final answer is 12096.

Ex.3:117×110
Base = 100
117 +17 110 +10 --- 127¦170 127+1¦70 128 ¦ 70
12870

Ex. 3: 117×110; surpluses are +17 and +10 respectively. Left Part is 127 (117+10 or 110+17). Right Part is 170 (17×10)**. Caution:** Here base is 100 (Two Zeroes). But in the Right Part we are having three digits. Leftmost digit of right part (here it is 1) is transferred to left part. So Left part becomes 128 (127+1) and Right part becomes 70. So final answer is 12870.

Ex. 4: 1020×1033
Base = 1000
1020 +20 1033 +33 ---------- 1053 ¦ 660
1053660

Ex. 4: 1020×1033; surplus: +20 and +33. Left Part is 1053 (1020+33 or 1033+20). Right Part is 660 (20×33). Here base is 1000 (Three Zeroes). Right part is having three digits. So no any further actions are required. The final answer is 1053660.

Ex.5:104×102
Base = 100
104 +4 102 +2 ---------- 106 ¦ 8 106 ¦ 08
10608

Ex. 5: 104×102; surplus: +4 and +2. Left Part is 106 (104+2 or 102+4). Right Part is 8 (4×2). Here base is 100 and there are two zeroes in the base. But in the Right part we are having only one digit. So, we need to add one zero before 8 to make it as two digit number. So our final answer is 10608.

Ex.6: 112×125?	**Ex.7: 126×104?**	**Ex.8: 1048×1040?**
Base = 100	Base = 100	Base = 1000
112 +12 125 +25 ---------- 137 ¦ 300 137+3 ¦ 00 140 ¦ 00	126 +26 104 +4 ---------- 130 ¦ 104 130+1 ¦ 04 131 ¦ 04	1048 +48 1040 +40 ---------- 1088 ¦ 1920 1088+1 ¦ 920 1089 ¦ 920
14000	**13104**	**1089920**

Ex.9: 12745×10200?	**Ex.10: 1024×1006?**	**Ex.11: 113×107**
Base = 10000	Base = 1000	Base = 100
12745 +2745 10200 +200 ---------- 12945 ¦ 549000 12945+54 ¦ 9000 12999 ¦ 9000	1024 +24 1006 +6 ---------- 1030 ¦ 144	113 +13 107 +7 ---------- 120 ¦ 91
129999000	**1030144**	**12091**

Ex.12: 109×121?	**Ex.13: 107×114?**	**Ex.14: 102×103?**
Base =	Base =	Base =

Ex.15: 115×108?	**Ex.16: 129×106?**	**Ex.17: 1016×1008?**
Base =	Base =	Base =

Ex.18:1251×1003?	**Ex.19:1673×1001?**	**Ex.20:1042×1020?**
Base =	Base =	Base =

Ex.21:1037×1039?	**Ex.22: 1461×1002?**	**Ex.23: 1278×1010?**
Base =	Base =	Base =

Ex.24:10450×10020	**Ex.25:12451×10002**	**Ex.26:10600×13211**
Base =	Base =	Base =

Case 2: When both numbers (Multiplicand and Multiplier) are Less than the Working Base:

Working Procedure:

1. Write multiplicand and multiplier one below the other.
2. Write complements of multiplicand and multiplier to its right side with signs.
3. Answer consists of two parts. Left Part and Right Part.
4. Left Part: Evaluation of any of the cross values (Subtraction)
5. Right Part: Product of both complements (right side values).
6. **Caution:** Total number of digits in the Right Part should be same as total number of zeroes in the base. If lesser, add required number of zeroes before the right part. If greater, carry the left most excess digits of Right Part to Left Part.

Ex.1: 94×96	**Ex.1:** Here we need to multiply 94 and 96. Base is 100 as both the given numbers (94 and 96) are closer to 100. Complement of 94 is -6 (94-100) and complement of 96 is -4 (96-100). Left Part is 90 (94-4 or 96-6). Right Part is 24 (-6*-4). So final answer is: 9024.
Base = 100	
94 -6 96 -4 --------- 90 ¦ 24	
9024	

Ex.2: 90×89	**Ex.2:** 90×89; Here complements are -10 and -11. Left Part is 79 (90-11 or 89-10). Right Part is 110 (-10 * -11). In the base there are two zeroes, so right part should be of two digits. But, in the Right Part we are having three digits. So we need to transfer leftmost excess digit of Right Part (1) to Left Part. Left Part becomes 79+1=80 and Right Part becomes 10. Final answer is: 8010**.**
Base = 100	
90 -10 89 -11 ---------- 79 ¦ 110 79+1 ¦ 10 80 ¦ 10	
8010	

Ex.3: 997×993	**Ex.3:** 997×993; Base is 1000. Complements are -3 and -7. Left Part is 990 (997-7 or 993-3). Right Part is **021** (-3*-7). **IMP Note:** -3*-7=21. But we need to add one ZERO before 21 to make it as three digit number. Because base is 1000 & having THREE zeroes. So, in the Right Part we should have three digits.
Base = 1000	
997 -3 993 -7 ---------- 990 ¦ 21 990 ¦ 021	
990021	

Ex.4: 950×930	**Ex.4:** 950×930: complements are -50 and -70. Left Part is 880 (950-70 or 930-50). Right Part is 3500 (-50*-70). Here base is 1000 (Three Zeroes) and Right Part is having four digits. So Left most excess digit of Right Part (3) is passed as carry to Left Part. So Left Part becomes 880+3=883 and Right Part becomes 500. So final answer is: 883500.
B = 1000	
950 -50 930 -70 ---------- 880 ¦ 3500 880+3 ¦ 500 883 ¦ 500	
883500	

Ex.5: 81×92?	**Ex.6: 76×95?**	**Ex.7: 985×960?**
Base = 100	Base = 100	Base = 1000
81 -19 92 -8 ---------- 73 ¦ 152 73+1 ¦ 52 **74 ¦ 52**	76 -24 95 -5 ---------- 71 ¦ 120 71+1 ¦ 20 **72 ¦ 20**	985 -15 960 -40 ---------- **945 ¦ 600**
7452	**7220**	**945600**

"Success is not final; failure is not fatal: It is the courage to continue that counts."

"It is better to fail in originality than to succeed in imitation."

"The road to success and the road to failure are almost exactly the same."

"Success usually comes to those who are too busy to be looking for it."

Ex.8: 9800×9784?	**Ex. 9: 84×94?**	**Ex.10: 996×975?**
Base = 10000	Base = 100	Base = 1000
9800 -200 9784 -216 ---------- 9584 ¦ 43200 9584+4 ¦ 3200 **9588 ¦ 3200**	84 -16 94 -6 ---------- **78 ¦ 96**	996 -4 975 -25 ---------- **971 ¦ 100**
95883200	**7896**	**971100**

Ex.11: 88×91	**Ex.12: 87×96**	**Ex.13: 79×92**
Base =	Base =	Base =

Ex.14: 86×89	**Ex.15: 984×975**	**Ex.16: 875×997**
Base =	Base =	Base =

Ex.17: 780×996	**Ex.18: 979×989**	**Ex.19: 9880×9996**
Base =	Base =	Base =

Ex.20: 875×997	**Ex.21: 749×998**	**Ex.22: 896×927**
Base =	Base =	Base =

Ex.23: 938×899	**Ex.24: 979×984**	**Ex.25: 623×999**
Base =	Base =	Base =

Case 3: When one number is Lesser and other is Greater than the Working Base:

Working Procedure:

1. Write multiplicand and multiplier one below the other.
2. Write complement / surplus of multiplicand and multiplier to its right side with signs.
3. Left Part: Evaluation of any of the cross values as per the sign (addition or subtraction).
4. Right Part: Product of both complement and surplus.
5. **Additional Step:** In this case, in the Right Part we always get negative value. Let 'n' be the total number of zeroes in the base. To get 'n' digit positive number in the Right Part, Add 'x' times of Base to the Right Part and Parallelly Subtract 'x' from Left Part. Read explanation of below examples to get more clarity.

Ex.1: 8×13	**Ex.1:** 8×13; Complement of 8 is -2 and Surplus of 13 is +3. Left Part is 11 (8+3 or 13-2). Right Part is product of complement and surplus. i.e. -2×3=-6. Here base is 10 & there is only one zero in the base. So, in the Right Part we should have one digit positive number but having negative value. To get one digit positive number, we need to add **ONE** time of base to Right Part. Parallelly we need to subtract 1 from Left Part. Right Part is 4 (∵-6+10=4) and Left Part is 10 (∵11-1=10). So final answer is 104.
Base = 10	
08 -2 13 +3 --------- 11 ¦ -6 11-1¦ -6+10 10 ¦ 4	
104	

Ex.2: 106×76	Surplus of 106 is +6 and Complement of 76 is -24. Left Part is 82 (106-26 or 76+6). Right Part is product of surplus and complement. i.e. 6×-24=-144. Here base is 100 & there are two zeroes in the base. So, in the Right Part we should have two digit positive number but having negative value. To get two digit positive number, we need to add **TWO** times of base to Right Part. Parallelly we need to subtract 2 from
Base = 100	
106 +6 76 -24 ---------- 82 ¦ -144 82-2¦-144+200 80 ¦ 56 = **8056**	
Left Part. Right Part is 56 (∵-144+200=56) and Left Part is 80 (∵82-2=80). Final answer is 104. **Note:** If we add one time of base to Right Part; we get -44 (∵-144+100=-44). We don't want negative value in the Right Part. If we add three times of base; we get 156 (∵-144+300=156). We don't want three digit number in the Right Part as our base is 100 and having two zeroes. That's why we choose two times of base. After choosing we get required two digit positive number in the Right Part.	

Ex.3: 109×94	Surplus of 109 is +9 and Complement of 94 is -6. Left Part is 103 (109-6 or 94+9). Right Part is product of surplus and complement. i.e. 9×-6=-54. Here base is 100 & there are two zeroes in the base. So, in the Right Part we should have two digit positive number but having negative value. To get two digit positive number, we need to add **ONE** time of base to Right Part. Parallelly we need to subtract 1 from Left Part. Right Part is 46 (∵-54+100=46) and Left Part is 102 (∵103-1=102). Final answer is 10246.
Base = 100	
109 +9 94 -6 ---------- 103 ¦ -54 103-1¦-54+100 102 ¦ 46 =**10246**	

***I**f opportunity doesn't knock, build a door --Milton Berle*

***T**he way to get started is to quit talking and begin doing --Walt Disney*

Ex.4: 97×124	Complement of 97 is -3 and Surplus of 124 is +24. Left Part is 121 (97+24 or 124-3). Right Part is product of complement and surplus. i.e. -3×24=-72. Here base is 100 & there are two zeroes in the base. So, in the Right Part we should have two digit positive number but having negative value. To get two digit positive number, we need to add **ONE** time of base to
Base = 100	
97 -3 124 +24 121 ¦ -72 121-1 ¦ -72+100 120 ¦ 28 =**12028**	
Right Part. Parallelly we need to subtract 1 from Left Part. Right Part is 28 (∵-72+100=28) and Left Part is 120 (∵121-1=120). Final answer is 12028.	

Note: There is an alternative for additional step. Multiply Left Part with base. Add Right Part to it. We will get answer. For example:

Ex.2: Left Part is 82. Base is 100. Multiply both. Product is 8200. Add Right Part (-144) to it. So final answer is 8200 + (-144) = 8200 – 144 = 8056.

Ex.4: Left Part is 121. Base is 100. Multiply both. Product is 12100. Add Right Part (-72) to it. So final answer is 12100+(-72) = 12100 – 72 = 12028.

Ex.5: 1020×989	Surplus of 1020 is +20 and Complement of 989 is -11. Left Part is 1009 (1020-11 or 989+20). Right Part is product of surplus and complement. i.e. 20×-11=-220. Here base is 1000 & there are three zeroes in the base. So, in the Right Part we should have three digit positive number but having negative value. To get three digit positive number, we need to add **ONE** time of base to Right Part.
B = 1000	
1020 +20 989 -11 ---------- 1009 ¦ -220 1009-1 ¦ -220+1000 1008 ¦ 780 =**1008780**	
Parallelly we need to subtract 1 from Left Part. Right Part is 780 (∵-220+1000=780) and Left Part is 1008 (∵1009-1=1008). Final answer is 1008780.	

Ex.6: 1250×975	Surplus of 1250 is +250 and Complement of 975 is -25. Left Part is 1225 (1250-25 or 975+250). Right Part is product of surplus and complement. i.e. 250×-25=-6250. Here base is 1000 & there are three zeroes in the base. So, in the Right Part we should have three digit positive number but having negative value. To get three digit positive number, we need to add
Base = **1000**	
1250 +250 975 -25 ---------- 1225 ¦ -6250 1225-7 ¦ -6250+7000 1218 ¦ 750 **=1218750**	
SEVEN times of base to Right Part. Parallelly we need to subtract 7 from Left Part. Right Part is 750 (∵-6250+7000=750) and Left Part is 1218 (∵1225-7=1218). Final answer is 1218750	

Ex.7:	**Ex.8:**	**Ex.9:**	**Ex.10:**
89×112?	**92×116?**	**976×1030?**	**870×1026?**
Base = 100	Base = 100	Base = 1000	Base=1000
89 -11 112 +12 ---------- 101 ¦ -132 101-2 ¦ -132+200 99 ¦ 68	92 -8 116 +16 ---------- 108 ¦ -128 108-2 ¦ -128+200 106 ¦ 72	976 -24 1030 +30 ---------- 1006 ¦ -720 1006-1 ¦ -720+1000 1005 ¦ 280	870 -130 1026 +26 ---------- 896 ¦ -3380 896-4 ¦ -3380+4000 892 ¦ 620
9968	**10672**	**1005280**	**892620**

Ex.11: 92×107?	**Ex.12: 99×436?** B:100	**Ex.13: 98×284?**

Ex.14: 103×77?	Ex.15: 106×69?	Ex.16: 121×93?

Ex.17: 1040×996?	Ex.18: 1874×999?	Ex.19: 1232×998?

Ex.20: 10201×9987?	Ex.21: 10040×9860?	Ex.22: 12465×9700?

Case 4: Working with two different Bases:

Working Procedure:

1. Write multiplicand and multiplier one below the other.
2. Total number of digits in multiplicand and multiplier should be same. If not add required number of zeroes (say 'n') to smaller number at the end.
3. Calculate product using any of the applicable cases (1, 2 or 3).
4. Cut all 'n' ending zeroes from intermediate answer to get final answer.

Ex.1: 989×92	**Ex. 1:** 989×92; Here 92 is smaller. Place one zero at the end of 92. It becomes 920. Now calculate product of 989 and 920 using case 2. It gives 909880. We added one zero, so cut one ending zero to get final answer (90988)
989 92 989 -11 92**0** -80 ---------- 909 ¦ 880 9098~~80~~	
=90988	

Ex.2:991×9970	**Ex.3:96×9840**	**Ex.4:56×580**	**Ex.5:11×1040**
991 9970	96 9840	56 580	11 1040
991***0*** -90 9970 -30 ----------	96***00*** -400 9840 -160 ----------	56***0*** -40 580 -20 ----------	11***00*** +100 1040 +40 ----------
9880 ¦ 2700 98802700 9880270~~0~~	9440 ¦ 64000 9440+6 ¦ 4000 9446 ¦ 4000 94464000 9446400~~0~~	540 ¦ 800 540×6¦800 3240 ¦ 800 3240+8¦800-800 3248 ¦ 0~~0~~	1140 ¦ 4000 1140+4 ¦ 000 1144000 114400~~0~~
9880270	**944640**	**32480**	**11440**

Ex.6:	**Ex.7:**	**Ex.8:**	**Ex.9:**
89×974?	**98×1042?**	**94×10124?**	**76×9850?**
89 974 89***0*** -110 974 -26 ---------- 864 ¦ 2860 864+2 ¦ 860 866 ¦ 86~~0~~	98 1042 98***0*** -20 1042 +42 ---------- 1022 ¦ -840 1022-1 ¦ -840+1000 1021 ¦ 16~~0~~	94 10124 94***00*** -600 10124 +124 ---------- 9524 ¦ -74400 9524-8 ¦ -74400+80000 9516 ¦ 56~~00~~	76 9850 76***00*** -2400 9850 -150 ---------- 7450 ¦ 360000 7450+36 ¦ 0000 7486 ¦ 00~~00~~
86686	**102116**	**951656**	**748600**

Ex.10: 94×988	**Ex.11: 89×996**	**Ex.12: 986×9974**

Ex.13: 106×987	**Ex.14: 112×974**	**Ex.15: 1024×96**

Ex.16: 876×91	Ex.17: 103×9874	Ex.18: 109×1231

Ex.19: 107×12234	Ex.20: 88×9760	Ex.21: 92×1016

Ex.22: 1016×12241	Ex.23: 1212×77	Ex.24: 984×9976

Case 5: When both numbers are not nearer to Working Bases:

Some Examples:
Ex.: 592×624?
Ex.: 410×874?
Ex.: 1824×1208?
Ex.: 65475×3456?

Case 5 is little tricky as compared to other cases (1 to 4). There is an alternative for Case 5 (as well as to all other Cases). Alternative method is **Criss Cross Method** (We are learning this in the next Section). So avoid Case 5. Prefer Criss Cross method over Case 5 of Base Method. Download Appendix if you want more information (Working Procedure and Solved Examples of case 5) by following below link.
Link: www.Speed16.com/books/vm

1.2 Multiplication using Criss Cross Method

Formula Used: 3. Ūrdhva – tiryagbhyām (ऊर्ध्वतिर्यग्भ्याम्)

Meaning: Vertically & Crosswise

How to Remember? Here you no need to remember any formulas, just you need to understand pattern. Go through graphical representation of various cases and understand pattern.

Case 1: Two Digit Numbers (2D×2D and 2D×1D) {D: Digit}
Answer consists of three parts.

First Part:	Second Part:	Third Part:
		
(a×c)	**(a×d) + (b×c)**	**(b×d)**

- First Part is product of respective first digits of both multiplier and multiplicand.
- Second Part is applying criss cross on all digits of both multiplier and multiplicand.
- Last Part is product of respective last digits of both multiplier and multiplicand.

Ex. 1: 42 × 57	**Ex. 2: 84 × 36**
4 2 × 5 7 --- (4×5) ¦ (4×7 + 2×5) ¦ (2×7) 20 ¦ 28+10 ¦ 14 20 ¦ 38 ¦ 14 20 ¦ 38+1 ¦ 4 20 ¦ 39 ¦ 4 20+3 ¦ 9 ¦ 4 23 ¦ 9 ¦ 4	8 4 × 3 6 --- (8×3) ¦ (8×6 + 4×3) ¦ (4×6) 24 ¦ 48+12 ¦ 24 24 ¦ 60 ¦ 24 24 ¦ 60+2 ¦ 4 24 ¦ 62 ¦ 4 24+6 ¦ 2 ¦ 4 30 ¦ 2 ¦ 4
2394	**3024**

Ex.1: Calculate & Place Values as per Pattern. Evaluate all parts. All Parts except first should contain only one digit. Start observation from Right and go towards Left. If you find more than one digit in any of the parts, then pass leftmost excess digits to its immediate left part.

Ex. 3: 67 × 89	**Ex. 4: 76 × 59**
6 7 × 8 9 --- (6×8) ¦ (6×9 + 7×8) ¦ (7×9) 48 ¦ 54+56 ¦ 63 48 ¦ 110 ¦ 63 48 ¦ 110+6 ¦ 3 48 ¦ 116 ¦ 3 48+11 ¦ 6 ¦ 3 59 ¦ 6 ¦ 3	7 6 × 5 9 --- (7×5) ¦ (7×9 + 6×5) ¦ (6×9) 35 ¦ 63+30 ¦ 54 35 ¦ 93 ¦ 54 35 ¦ 93+5 ¦ 4 35 ¦ 98 ¦ 4 35+9 ¦ 8 ¦ 4 44 ¦ 8 ¦ 4
5963	**4484**

Ex. 5: 78 × 8	**Ex. 6: 83 × 7**
7 8 × 0 8 --- (7×0) ¦ (7×8 + 8×0) ¦ (8×8) 0 ¦ 56+0 ¦ 64 0 ¦ 56 ¦ 64 0 ¦ 56+6 ¦ 4 0 ¦ 62 ¦ 4 0+6 ¦ 2 ¦ 4 6 ¦ 2 ¦ 4	8 3 × 0 7 --- (8×0) ¦ (8×7 + 2×0) ¦ (3×7) 0 ¦ 56+0 ¦ 21 0 ¦ 56 ¦ 21 0 ¦ 56+2 ¦ 1 0 ¦ 58 ¦ 1 0+5 ¦ 8 ¦ 1 5 ¦ 8 ¦ 1
624	**581**

Ex.7: 59×62	**Ex.8: 41×96**	**Ex.9: 87×58**
5 9 × 6 2 --- = 30¦10+54¦18 = 30¦64¦18 = 30¦64+1¦8 = 30¦65¦8 = 30+6¦5¦8	4 1 × 9 6 --- = 36¦24+9¦6 = 36¦33¦6 = 36+3¦3¦6 = 39¦3¦6	8 7 × 5 8 --- =40¦64+35¦56 = 40¦99¦56 = 40¦99+5¦6 = 40¦104¦6 = 40+10¦4¦6
= **3658**	= **3936**	= **5046**

Ex.10: 71×39	**Ex.11: 24×87**	**Ex.12: 37×68**
7 1 × 3 9 --- = 21¦63+3¦9 = 21¦66¦9 = 21+6¦6¦9 = 27¦6¦9	2 4 × 8 7 --- = 16¦14+32¦28 = 16¦46¦28 = 16¦46+2¦8 = 16¦48¦8 = 16+4¦8¦8 = 20¦8¦8	3 7 × 6 8 --- = 18¦24+42¦56 = 18¦66¦56 = 18¦66+5¦6 = 18¦71¦6 = 18+7¦1¦6 = 25¦1¦6
= **2769**	= **2088**	= **2516**

Ex.13: 44×69	Ex.14: 68×9	Ex.15: 49×54

Ex.16: 99×24	Ex.17: 87×29	Ex.18: 63×26

Ex.19: 41×62	Ex.20: 69×8	Ex.21: 89×23

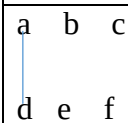
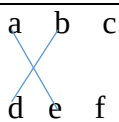
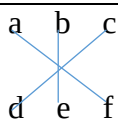
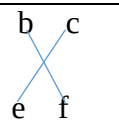
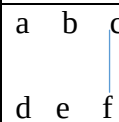
Ex.22: 28×93	Ex.23: 36×67	Ex.24: 58×77

Ex.25: 13×62	Ex.26: 29×87	Ex.27: 44×68

Ex.28: 54×67	Ex.29: 63×27	Ex.30: 82×91

Case 2: Three Digit Numbers (3D×3D; 3D×2D and 3D×1D)

Answer consists of Five Parts.

First Part:	Second Part:	Third Part:	Fourth Part:	Fifth Part:
				
(a×d)	**(a×e)+(b×d)**	**(a×f)+(b×e)+(c×d)**	**(b×f)+(c×e)**	**(c×f)**

- First Part is product of respective first digits of both multiplier and multiplicand.
- Second Part is applying Criss Cross on first two digits of both multiplier and multiplicand.
- Third Part is applying Criss Cross on first three (all) digits of both multiplier and multiplicand.
- Fourth Part is applying Criss Cross on last two digits of both multiplier and multiplicand.
- Fifth (Last) Part is product of respective last digits of both multiplier and multiplicand.

Ex. 1: 417 × 765	Ex. 2: 644 × 589
4 1 7 × 7 6 5 --- (4×7) ¦ (4×6) + (1×7) ¦ (4×5 + 1×6 + 7×7) ¦ (1×5 + 7×6) ¦ (7×5)	6 4 4 × 5 8 9 --- (6×5) ¦ (6×8) + (4×5) ¦ (6×9 + 4×8 + 4×5) ¦ (4×9 + 4×8) ¦ (4×9)
28 ¦ 24+7 ¦ 20+6+49 ¦ 5+42 ¦ 35 28 ¦ 31 ¦ 75 ¦ 47 ¦ 35 28 ¦ 31 ¦ 75 ¦ 47+3 ¦ 5 28 ¦ 31 ¦ 75 ¦ 50 ¦ 5 28 ¦ 31 ¦ 75+5 ¦ 0 ¦ 5 28 ¦ 31 ¦ 80 ¦ 0 ¦ 5 28 ¦ 31+8 ¦ 0 ¦ 0 ¦ 5 28 ¦ 39 ¦ 0 ¦ 0 ¦ 5	30 ¦ 48+20 ¦ 54+32+20 ¦ 36+32 ¦ 36 30 ¦ 68 ¦ 106 ¦ 68 ¦ 36 30 ¦ 68 ¦ 106 ¦ 68+3 ¦ 6 30 ¦ 68 ¦ 106 ¦ 71 ¦ 6 30 ¦ 68 ¦ 106+7 ¦ 1 ¦ 6 30 ¦ 68 ¦ 113 ¦ 1 ¦ 6 30 ¦ 68+11 ¦ 3 ¦ 1 ¦ 6 30 ¦ 79 ¦ 3 ¦ 1 ¦ 6

28+3 ¦ 9 ¦ 0 ¦ 0 ¦ 5 31 ¦ 9 ¦ 0 ¦ 0 ¦ 5	30+7 ¦ 9 ¦ 3 ¦ 1 ¦ 6 37 ¦ 9 ¦ 3 ¦ 1 ¦ 6
319005	**379316**

Ex. 3: 844 × 67	**Ex. 4: 749 × 9**
8 4 4 × 0 6 7 --- (8×0) ¦ (8×6) + (4×0) ¦ (8×7 + 4×6 + 4×0) ¦ (4×7 + 4×6) ¦ (4×7) 0 ¦ 48+0 ¦ 56+24+0 ¦ 28+24 ¦ 28 0 ¦ 48 ¦ 80 ¦ 52 ¦ 28 0 ¦ 48 ¦ 80 ¦ 52+2 ¦ 8 0 ¦ 48 ¦ 80 ¦ 54 ¦ 8 0 ¦ 48 ¦ 80+5 ¦ 4 ¦ 8 0 ¦ 48 ¦ 85 ¦ 4 ¦ 8 0 ¦ 48+8 ¦ 5 ¦ 4 ¦ 8 0 ¦ 56 ¦ 5 ¦ 4 ¦ 8 0+5 ¦ 6 ¦ 5 ¦ 4 ¦ 8 5 ¦ 6 ¦ 5 ¦ 4 ¦ 8	7 4 9 × 0 0 9 --- (7×0) ¦ (7×0) + (4×0) ¦ (7×9 + 4×0 + 9×0) ¦ (4×9 + 9×0) ¦ (9×9) 0 ¦ 0+0 ¦ 63+0+0 ¦ 36+0 ¦ 81 0 ¦ 0 ¦ 63 ¦ 36 ¦ 81 0 ¦ 0 ¦ 63 ¦ 36+8 ¦ 1 0 ¦ 0 ¦ 63 ¦ 44 ¦ 1 0 ¦ 0 ¦ 63+4 ¦ 4 ¦ 1 0 ¦ 0 ¦ 67 ¦ 4 ¦ 1 0 ¦ 0+6 ¦ 7 ¦ 4 ¦ 1 0 ¦ 6 ¦ 7 ¦ 4 ¦ 1
56548	**6741**

Ex.5: 478 × 743	**Ex.6: 649×928**
4 7 8 × 7 4 3 --- = 28¦16+49¦12+28+56¦21+32¦24 = 28 ¦ 65 ¦ 96 ¦ 53 ¦ 24 = 28 ¦ 65 ¦ 96 ¦ 53+2 ¦ 4 = 28 ¦ 65 ¦ 96 ¦ 55 ¦ 4 = 28 ¦ 65 ¦ 96+5 ¦ 5 ¦ 4 = 28 ¦ 65 ¦ 101 ¦ 5 ¦ 4 = 28 ¦ 65+10 ¦ 1 ¦ 5 ¦4 = 28 ¦ 75 ¦ 1 ¦ 5 ¦4 = 28+7 ¦ 5 ¦ 1 ¦ 5 ¦4 = 35 ¦ 5 ¦ 1 ¦ 5 ¦4	6 4 9 × 9 2 8 --- = 54¦12+36¦48+8+81¦32+18¦72 = 54 ¦ 48 ¦ 137 ¦ 50 ¦ 72 = 54 ¦ 48 ¦ 137 ¦ 50+7 ¦ 2 = 54 ¦ 48 ¦ 137 ¦ 57 ¦ 2 = 54 ¦ 48 ¦ 137+5 ¦ 7 ¦ 2 = 54 ¦ 48 ¦ 142 ¦ 7 ¦ 2 = 54 ¦ 48+14 ¦ 2 ¦ 7 ¦ 2 = 54 ¦ 62 ¦ 2 ¦ 7 ¦ 2 = 54+6 ¦ 2 ¦ 2 ¦ 7 ¦ 2 = 60 ¦ 2 ¦ 2 ¦ 7 ¦ 2
= 355154	**= 602272**

Exercise: Solve using appropriate methods.

1. 14×17	**2.** 19×16		**29.** 477×510	**30.** 369×764
3. 121×119	**4.** 116×109		**31.** 415×698	**32.** 286×478
5. 1024×1005	**6.** 1039×1010		**33.** 389×855	**34.** 475×996
7. 88×91	**8.** 96×89		**35.** 785×774	**36.** 475×875
9. 99×97	**10.** 980×978		**37.** 9987×9900	**38.** 9985×10200
11. 976×988	**12.** 955×990		**39.** 7007×7050	**40.** 9875×9980
13. 971×980	**14.** 1024×1010		**41.** 78×99	**42.** 7×99
15. 1100×1046	**16.** 1020×1005		**43.** 874×99	**44.** 649×999
17. 89×121	**18.** 91×115		**45.** 87×999	**46.** 7436×999
19. 94×117	**20.** 97×109		**47.** 96354×999	**48.** 7465×9999
21. 990×1050	**22.** 977×1020		**49.** 316×9999	**50.** 547×9999
23. 455×485	**24.** 475×485		**51.** 54×56	**52.** 77×73
25. 585×620	**26.** 690×725		**53.** 736×764	**54.** 349×351
27. 78×86	**28.** 475×520		**55.** 369×179	**56.** 411×296

Answers:

1. 238	**2.** 304		**29.** 243270	**30.** 281916
3. 14399	**4.** 12644		**31.** 289670	**32.** 136708
5. 1029120	**6.** 1049390		**33.** 332595	**34.** 473100
7. 8008	**8.** 8544		**35.** 607590	**36.** 415625
9. 9603	**10.** 958440		**37.** 98871300	**38.** 101847000
11. 964288	**12.** 945450		**39.** 49399350	**40.** 98552500
13. 951580	**14.** 1034240		**41.** 7722	**42.** 693
15. 1150600	**16.** 1025100		**43.** 86526	**44.** 648351
17. 10769	**18.** 10465		**45.** 86913	**46.** 7428564
19. 10998	**20.** 10573		**47.** 96257646	**48.** 74642535
21. 1039500	**22.** 996540		**49.** 3159684	**50.** 5469453
23. 220675	**24.** 230375		**51.** 3024	**52.** 5621
25. 362700	**26.** 500250		**53.** 562304	**54.** 122499
27. 6708	**28.** 247000		**55.** 66051	**56.** 121656

6. SQUARES

What is Square: Square is the result of multiplying a number by itself.

For ex. Square of 3 is 9 (3×3); Square of -45 is 2025 (-45×-45)

Square of 12 is 144 (12×12); Square of -12 is 144 (-12×-12)

6.1 Squares of numbers ending with Digit 5

Formula used is: 1. Ekādhikena Pūrvena (एकाधिकेन पूर्वेण)

Meaning: One More than the Previous One

Note: This formula is used to obtain square of numbers ending with digit 5 (Ex. 15, 125, 345, 4585, 6485, 9745 etc.).

Working Procedure:

1. Split the given number into two parts (left and right) using vertical line (¦). Right part is last digit (i.e 5) and Left part is remaining digits.
2. Multiply left part with its next number in the number line. Right part is 25 (Square of 5).
3. Remove vertical line, the obtained number is required square of given number.

Ex.1:15^2	**Ex.2:25^2**	**Ex.3:75^2**	**Ex.4:95^2**	**Ex.5:115^2**
1 ¦ 5	2 ¦ 5	7 ¦ 5	9 ¦ 5	11 ¦ 5
1×2 ¦ 25	2×3 ¦ 25	7×8 ¦ 25	9×10 ¦ 25	11×12 ¦ 25
2 ¦ 25	6 ¦ 25	56 ¦ 25	90 ¦ 25	132 ¦ 25
225	**625**	**5625**	**9025**	**13225**

Ex.6:145^2	**Ex.7:205^2**	**Ex.8:795^2**	**Ex.9: 1015^2**	**10:7995^2**
14 ¦ 5	20 ¦ 5	79 ¦ 5	101 ¦ 5	799 ¦ 5
14×15 ¦ 25	20×21 ¦ 25	79×80 ¦ 25	101×102 ¦25	799×800¦25
210 ¦ 25	420 ¦ 25	6320 ¦ 25	10302 ¦ 25	39200¦25
21025	**42025**	**632025**	**1030225**	**3920025**

Ex.3: Left part is 7 and right part is 5. Multiply 7 with its next number in the number line (8). It gives 56. Right part is 25 (5^2). After removing vertical line we get 5625, which is the square of 75

Ex.8: Left part is 79 and right part is 5. Multiply 79 with its next number in the number line (80). It gives 6320. Right part is 25 (square of 5). After removing vertical line we get 632025, which is the square of 795.

Ex.1: 35^2	**Ex.2: 195^2**	**Ex.3: 105^2**

Ex.4: 205^2	**Ex.5: 45^2**	**Ex.6: 65^2**

Ex.7: 55^2	**Ex.8: 115^2**	**Ex.9: 85^2**

6.2 Squares Using Surpluses and Complements

Corollary used is: 7 Yāvadūnam Tāvadūnīkrtya Vargaňca Yojayet (यावदूनं तावदूनीकृत्य वर्गं च योजयेत्) **Meaning:** Lessen by the Deficiency and set up the square of that deficiency.

Note: This formula is used to obtain square of numbers which are closer to bases (10, 100, 1000 etc.).

Case 1: When Number is above the Working Base.

Working Procedure:

1. Note given number, its Base (B) and Surplus (S).
2. Answer consists of Two Parts (Left Part and Right Part).
3. Right Part is Square of Surplus.
4. Left Part = (Given Number + Surplus).
5. **Note:** Total number of digits in the Right Part should be same as total number of zeroes in the base. If lesser add required number of zeroes, if greater pass the carry (leftmost excess digits) to left part.

Ex.1: 108^2	**Ex.2: 103^2**	**Ex.3: 1104^2**	**Ex.4: 1250^2**
B:100;S:+08	B:100;S:+3	B:1000;S:+104	B:1000;S:+250
108+8 ¦ 8^2	103+3 ¦ 3^2	1104+104 ¦ 104^2	1250+250¦250^2
116 ¦ 64	106 ¦ 9	1208 ¦ 10816	1500 ¦ 62500
	106 ¦ 09	1208+10 ¦ 816	1500+62 ¦ 500
		1218 ¦ 816	1562 ¦ 500
11664	**10609**	**1218816**	**1562500**

Ex.5: 1205^2	**Ex.6: 1301^2**	**Ex.7: 11320^2**
B:1000; S:+205	B:1000; S:+301	B:10000; S:+1320
1205+205 ¦ 205^2	1301+301 ¦ 301^2	11320+1320¦1320^2
1410¦42025	1602 ¦ 90601	12640¦1742400
1410+42 ¦ 025	1602+90 ¦ 601	12640+174 ¦ 2400
1452 ¦ 025	1692 ¦ 601	12814 ¦ 2400
1452025	**1692601**	**128142400**

Case 2: When Number is below the Working Base.

Working Procedure:

1. Note given number, its Base and Complement.
2. Answer consists of Two Parts (Left Part and Right Part).
3. Right Part is square of Complement.
4. Left Part = (Given Number + Complement).
5. **Note:** Total number of digits in the Right Part should be same as total number of zeroes in the base. If lesser add required number of zeroes, if greater pass the carry (leftmost excess digits) to left part.

Ex.1: 94^2	**Ex.2: 97^2**	**Ex.3: 87^2**
B:100; C: -6	B:100; C: -3	B:100; C: -13
94-6 ¦ -6^2 88 ¦ 36	97-3 ¦ -3^2 94 ¦ 09	87-13 ¦ -13^2 74 ¦ 169 74+1 ¦ 69
8836	**9409**	**7569**

Ex.4: 79^2	**Ex.5: 84^2**	**Ex.6: 976^2**
B:100; C: -21	B:100; C: -16	B:1000; C: -24
79-21 ¦ -21^2 58 ¦ 441 58+4 ¦ 41 62 ¦ 41	84-16 ¦ -16^2 68 ¦ 256 68+2 ¦ 56 70 ¦ 56	976-24 ¦ -24^2 952 ¦ 576
6241	**7056**	**952576**

Ex.7: 893^2	**Ex.8: 9790^2**	**Ex.9: 98930^2**
B:1000; C:-107	B:10000; C:-210	B:100000; C: -1070
893-107 ¦ -107^2 786 ¦ 11449 786+11 ¦ 449 797 ¦ 449	9790-210 ¦ -210^2 9580 ¦ 44100 9580+4 ¦ 4100 9584 ¦ 4100	98930-1070 ¦-1070^2 97860 ¦1144900 97860+11 ¦ 44900 97871 ¦ 44900
797449	**95844100**	**9787144900**

Ex.1: 88^2	**Ex.2: 875^2**	**Ex.3: 117^2**
B: C:	B: C:	B: C:

Ex.4: 91^2	**Ex.5: 9890^2**	**Ex.6: 124^2**
B: C:	B: C:	B: C:

Ex.7: 76^2	**Ex.8: 9989^2**	**Ex.9: 1102^2**
B: C:	B: C:	B: C:

Ex.10: 85^2	**Ex.11: 9650^2**	**Ex.12: 1220^2**
B: C:	B: C:	B: C:

Ex.13: 93^2	**Ex.14: 102^2**	**Ex.15: 1045^2**
B: C:	B: C:	B: C:

Ex.16: 98^2	**Ex.17: 109^2**	**Ex.18: 116^2**
B: C:	B: C:	B: C:

Ex.19: 989^2	**Ex.20: 113^2**	**Ex.21: 190^2**
B: C:	B: C:	B: C:

Ex.22: 979^2	**Ex.23: 126^2**	**Ex.24: 10205^2**
B: C:	B: C:	B: C:

6.3 Squares using Criss Cross Method

- Square is the result of multiplying a number by itself.
- Square of A is (A × A); Square of 98456 is (98456 × 98456); Square of 64578965 is (64578965 × 64578965)
- For finding Squares of any complex (bigger) numbers, apply Criss Cross Method. We already Studied Multiplication using Criss Cross Method and refer the same for finding squares of any number.

Ex.1: 83^2	**Ex.2: 678^2**	**Ex.3: -59^2**
8 3 8 3 --- 64 24+24 9 64 48 9 64+4 8 9 68 8 9	6 7 8 6 7 8 --- 36; 42+42; 48+49+48; 56+56; 64 36 84 145 112 64 45 ~~99~~ ~~156~~ ~~118~~ ~~64~~ 459684	5 9 5 9 --- 25 45+45 81 25 90 81 34 ~~98~~ ~~81~~ 3481
6889	**459684**	**3481**

Ex.4: 74^2	**Ex.5: -396^2**	**Ex.6: 578^2**
7 4 7 4 --- 49 28+28 16 49 56 16 54 ~~57~~ ~~16~~	3 9 6 3 9 6 --- 9; 27+27; 18+81+18; 54+54; 36 9 54 117 108 36 15 ~~66~~ ~~128~~ ~~111~~ ~~36~~	5 7 8 5 7 8 --- 25 70 129 112 64 33 ~~84~~ ~~140~~ ~~118~~ ~~64~~
5476	**156816**	**334084**

Ex.1: 349^2	Ex.2: 426^2	Ex.3: 512^2

Ex.4: 568^2	Ex.5: 789^2	Ex.6: 880^2

Ex.7: 29^2	Ex.8: 43^2	Ex.9: 3456^2

Ex.10: 67^2	**Ex.11: 78^2**	**Ex.12: 7321^2**

Ex.13: 81^2	**Ex.14: 109^2**	**Ex.15: 8426^2**

Ex.16: 146^2	**Ex.17: 235^2**	**Ex.18: 9271^2**

Exercise: Find squares of following numbers.

1. 25	**2.** 35	**3.** 45	**4.** 55	**5.** 65	**6.** 135
7. 185	**8.** 195	**9.** 355	**10.** 495	**11.** 49	**12.** 94
13. 104	**14.** 112	**15.** 109	**16.** 113	**17.** 97	**18.** 93
19. 473	**20.** 239	**21.** 477	**22.** 369	**23.** 89	**24.** 74
25. 76	**26.** 98	**27.** 73	**28.** 36	**29.** 984	**30.** 746
31. 638	**32.** 697	**33.** 1005	**34.** 977	**35.** 983	**36.** 1036
37. 1058	**38.** 666	**39.** 305	**40.** 989		

Answers:

1. 625	**2.** 1255		**21.** 227529	**22.** 136161
3. 2025	**4.** 3025		**23.** 7921	**24.** 5476
5. 4225	**6.** 18225		**25.** 5776	**26.** 9604
7. 34225	**8.** 38025		**27.** 5329	**28.** 1296
9. 126025	**10.** 245025		**29.** 968256	**30.** 556516
11. 2401	**12.** 8836		**31.** 407044	**32.** 485809
13. 10816	**14.** 12544		**33.** 1010025	**34.** 954529
15. 11881	**16.** 12769		**35.** 966289	**36.** 1073296
17. 9409	**18.** 8649		**37.** 1119364	**38.** 443556
19. 223729	**20.** 57121		**39.** 93025	**40.** 978121

P*lastics give a helpful hand, but they are polluting our land!*

C*hoose to be a scholastic; refuse plastic.*

D*on't laminate the earth!*

M*any innocent animals eat plastic and die due to which our earth cry.*

I*f you are kind so show your kindness towards reducing plastic.*

S*ave our best friend earth from the plastic.*

G*o Green ,no plastic ,everything is Fantastic.*

12. POLYNOMIALS

Polynomials: Polynomial is addition /subtraction /multiplication /division of constants, variables and exponents, but

1. Division by variable is not allowed (but division by constant is allowed).
2. Variable's exponents can only be whole numbers (0,1,2,3,..).
3. Number of terms should be finite.

- Constants: 14, 36, -74, -963 etc.
- Variables: x, y, z, a, b, c, p, q, r, s etc.
- Exponents: x^2, x^3 etc.
- If p(x) is a polynomial in x, the highest power of x is called degree of polynomial.
- Polynomials with one term is called monomial, with two terms is called binomial; with three terms is called Trinomials.

Ex.1: $x^2+7x+12$ (Degree: **2**)
Ex.2: $x^3-13x^2+2x-87$ (Degree: **3**);
Ex.3: x^4-8x^2+12x (Degree:**4**); etc.

Types of Polynomials:

- A polynomial of degree 1 is called linear polynomial.
- A polynomial of degree 2 is called quadratic polynomial.
- A polynomial of degree 3 is called cubic polynomial.
- A polynomial of degree 4 is called biquadratic (or quartic) polynomial.

NOTE: Download below supplement for Graphical Representation of various methods and other materials.
Link: www.chaitanyapatil.in/books/vms1.pdf

12.1 Multiplication using Criss Cross Method

Sutra 3: Ūrdhva – tiryagbhyām; (ऊर्ध्वतिर्यग्भ्याम्)

Meaning: Vertically & Crosswise

Note: Read Multiplication using Criss Cross Method from Multiplication Unit.

Working Procedure:

1. Write coefficients of both polynomials one below the other separated by spaces. Write coefficient as zero if any term is absent.
2. Apply Criss Cross method on coefficients.
3. No need to alter any parts (it means **don't** transfer leftmost excess digits to its immediate left part).
4. Last part is constant. Go on incrementing powers of variable by 1 from right side. Second last is x, then x^2, x^3, x^4, x^5 and so on.

CASE 1: (2×2; 2×1)

First Part:	Second Part:	Third Part:
a b c d	a b c d	a b c d
(a×c)	**(a×d + b×c)**	**(b×d)**

Ex.1: (x+3) (x+5)	Ex.2: (x+3) (x-5)	Ex.3: (x-3) (x-5)
1 3 1 5 ---------- (1×1)|(1×5+1×3)|(3×5) 1 | 8 | 15 $x^2+8x+15$	1 3 1 -5 ---------- (1×1)|(1×-5+1×3)|(3×-5) 1 | -2 | -15 $x^2-2x-15$	1 -3 1 -5 ---------- (1×1) | (1×-5+1×-3) | (-3×-5) 1 | -8 | 15 $x^2-8x+15$
$x^2+8x+15$	**$x^2-2x-15$**	**$x^2-8x+15$**

Ex.4: (x+3) (x)	**Ex.5: (-x+3) (-x+5)**	**Ex.6: (-x-3) (-x-5)**
1 3 1 0 (1×1) | (1×0+1×3) | (3×0) 1 | 3 | 0 x^2+3x+0	-1 3 -1 5 (-1×-1) | (-1×5+-1×3) | (3×5) 1 | -8 | 15 $x^2-8x+15$	-1 -3 -1 -5 (-1×-1) | (-1×-5+-1×-3) | (-3×-5) 1 | 8 | 15 $x^2+8x+15$
x^2+3x	**$x^2-8x+15$**	**$x^2+8x+15$**

CASE 2: (3×3; 3×2; 3×1)

First Part:	**Second Part:**	**Third Part:**	**Fourth Part:**	**Fifth Part:**
a b c d e f	a b c d e f	a b c d e f	a b c d e f	a b c d e f
(a×d)	**(a×e + b×d)**	**(a×f + b×e + c×d)**	**(b×f + c×e)**	**(c×f)**

Ex.1: $(x^2+5x+1)(3x^2-10x+15)$	**Ex.2: $(2x^2-4x-7)(4x^2+20x-12)$**
1 5 1 3 -10 15 (1×3) | (1×-10+3×5) | (1×15+5×-10+1×3) | (5×15+-10×1) | (1×15) 3 | 5 | -32| 65| 15 $3x^4+5x^3-32x^2+65x+15$	2 -4 -7 4 20 -12 (2×4) | (2×20+4×-4) | (2×-12+-4×20+4×-7) | (-4×-12+20×-7) | (-7×-12) 8 | 24 | -132| -92| 84 $8x^4+24x^3-132x^2-92x+84$
$3x^4+5x^3-32x^2+65x+15$	**$8x^4+24x^3-132x^2-92x+84$**

The greatest sin is to think that you are weak.--Swami Vivekananda

Reach Us:

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- Email: info@speed16.com
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