eLitmus Previous Papers
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Quantitative Aptitude - and Problem Solving

eLitmus Previous Year Papers and study materials

Important Note - eLitmus will change the Question Bank on 31st Mar 2018. Thus, no questions will be repeated from this PDF post 31st Mar 2018 and this PDF will be of very limited use(or No USE) as no questions will be repeated. Thus will suggest buying new one if you're using this post 31st Mar 2018.

Also, don't share this PDF with anyone as if they will score good marks too your percentile will get decreased.

Topics	Subtopics	
Aptitude Module (45 min)	• Number Systems (4 Ques) • Probability (2 Ques) • Permutation Combination (2 Ques) • Geometry (3 Questions) • Equations and Inequalities (1-2 Ques) • AP ,GP, HP : (1-2 Ques) • Logarithms (1 Ques) • Speed, Time and Distance (1-3 Ques) • Time and Work (1-2 Ques) • Mixture and alligation (1 Ques), • Percentage (1 Ques)	• 30 m ~ 70 percentile • 40 m ~ 80 percentile • 50 m ~ 90 percentile • 60 m ~ 95 percentile • And if you score more than 60 marks, You will get good percentile 95-100 Percentile.
	• Analytical Reasoning	
	• Numerical Reasoning	

Computer Fundamentals (15 min)

Topics	Subtopics	
Problem Solving Section	• Data Tabulation based Questions • Crypt arithmetic Problem • Arrangement Based Problems • Bar Graphs/Pie Charts • Few Miscellaneous Questions	• 30 marks ~ 70 percentile • 40 marks ~ 80 percentile • 50 marks ~ 90 percentile • 60 marks ~ 95+ percentile • And if you score more than 60 marks, You will get more percentile 95-100 Percentile.

English

Topics	Type Questions	
English	1. Questions Related To Grammatical Concepts 2. Paragraph Based Questions 3. Fill In The Blanks 4. Reading Comprehension 5. Questions Related To Grammatical Concepts 6. Paragraph Based Questions 7. Fill In The Blanks 8. Reading Comprehension	• 60 marks ~ 60 percentile • 70 marks ~ 70 percentile • 80 marks ~ 80 percentile • 90 marks ~ 85 percentile • 100 marks ~ 90 percentile • If you score more than 100, be sure to get above 90 percentile.

Elitmus Syllabus 2017:

Elitmus Syllabus : Negative Marking Scheme

Elitmus test contains 60 questions and those 60 questions to be solved in 120 minutes (2 Hours), Each question carries 10 marks in all the sections. Every section will have 20 questions and it carries 200 marks in all sections. Negative marking will be calculated through the student wrong attempts. For example, If you did more than 25% Wrongly attempted questions then you will get negative marking for questions wrongly done. You will lose 5 marks out of 10 marks for question which you wrongly attempted in the outer part of 25% and questions which are Unattempted doesn't follow any penalty.

Example:

Case 1: Student 'A' attempts 12 questions in a section.

Ouput Result: 9 Right, 3 Wrong, 8 Unattempted.

He did exactly 25% wrong in his total no of attempts. Out of 12 questions 9 questions 75% correct 3 questions 25% wrong. So he doest have any negative marking.

Score: 90 (9 Correct questions , 10 marks gets each questions 9*10=90)

Case 2: Student 'B' attempts 12 questions in a section.

Output Result: 8 Right , 4 Wrong, 8 Unattempted.

He did 33% wrong in his total no of attempts which is more than 25% wrong attempts made. Out 12 questions 8 questions correct 66% 4 questions 33% wrong. So he will have negative marking for only wrong attempts over the 25% i.e., only 1 question will have the penalty of 5 marks in the wrongly attempted questions.

Score: 75 (8 Correct questions, 10 marks for each question 8*10=80, Wrong attempts over 25% 1*5=5 , 80-5=75)

Mode of exam will be Pen/Paper OMR mode. Students should mark their answers in the OMR Sheets. E-litmus test will conduct every week or twice in a month. It will conducted in only big cities.

Rules and Practice Materials

eLitmus Cryptarithmetic Problems with solutions

HOW TO SOLVE CRYPTARITHMETIC PROBLEMS?

eLitmus Cryptarithmetic Questions are very hard and time consuming. If you don't know to solve those while giving exam don't waste your time you will not be able to solve how to solve Cryptarithmetic Multiplication Problems for eLimtus. eLitmus Cryptarithmetic Problems with solutions can be found out here.
What types of Questions are asked-

- eLitmus Cryptarithmetic Multiplication Problems
- eLitmus Cryptarithmetic Addition Problems

You can refer the following for practicing-

- Cryptarithmetic Introduction
- How to Solve Cryptarithmetic Problems

- eLitmus Cryptarithmetic Previous Problems

Cryptarithmetic Problems for eLitmus

- **Total Number of Question** - 1x3(1 Ques divided into 3 sub-ques)
- **Total Time consumed** - 10 Mins
- **Percentile Increase if All Question Correct** - 30-40%
- **Difficulty Level** - High

These are highly important as most students(90%) are not able to answer questions based on Cryptarithmetic.Thus solving 3 questions gives you an edge of at least 30-40+ increase in percentile since in eLitmus 90%+ percentile is achievable by solving only 6-7 questions in Reasoning section.

WHAT ARE THE RULES FOR SOLVING CRYPTARITHMETIC PROBLEMS IN ELITMUS?

If you want to know the rules for eLitmus Cryptarithmetic Questions you must refer these two articles.

- How to Solve Cryptarithmetic Problems
- eLitmus Unit Digit Method for Cryptarithmetic Questions

HOW MANY CRYPTARITHMETIC PROBLEMS IN ELITMUS ARE ASKED?

Generally around 1 question which is subdivided into 3 questions will be asked.

HOW MUCH TIME WILL IT TAKE IF I WANT TO SOLVE ALL THREE QUESTIONS AND I KNOW ALL CRYPTARITHMETIC RULES?

The solution will take about 10-15 minutes depending upon the difficulty of the Cryptarithmetic Addition or Multiplication Problem.

FAQ's

Ques. What is the difficulty level of eLitmus Cryptarithmetic Problems with Solutions?

Ans. These are the most difficult section in eLitmus section and need a lot of practice to solve but surely if you're able to solve these questions correctly they can increase your elitmus percentile by as much as 40%ile in Logical Reasnoning Sections.

Basic Rules

- Alphabets can take up only one distinct value.
- Alphabets can only take up values between 0-9.
- Decoded numbers can't begin with 0, for example, 0813.
- Problems are uni-solutional.
- 19 is the max value with a carryover for two one-digit number in the same column.
- Carry over can only be 1.
- Be patient there is no specific rule, you will only learn how to solve when you see examples.

Practice questions after finishing Rules and Hacks here

Alternate method 2 - Unit Digit(Only Try this once you understand this basic method on this page)

Hacks

Hack 1

- If A + B = A then the possible value of B=0 or 9

```
   5  6
 + 9  7          <- Example for 9
 1 5  3
```

- Numbers can't begin with 0 in the below example G or B ≠0.

```
09841 makes no sense => 9841
```

- All values are unique thus for e.g in below example G=1 thus B, A, S, E, L, M ≠ 1
- Values are distinct thus for e.g. if G=1 then if at a later point in time you get G=2 you're solving wrongly.

Hack 2

- If X * X = _X. **Therefore** - A={1, 5, 6}

```
    Since only,
     1*1 = _1
     5*5 = _5
     6*6 = _6
```

Hack 3

- If P x Q= _ P
    - then possible values of P and Q, then P = 5 and Q = 3, 7, 9.
    - When P = 2, 4, 8 and Q = 6

```
-    P x Q = _P
     5 x 3 = _5 i.e 15
     5 x 7 = _5 i.e 35
     5 x 9 = _5 i.e 45
-    P x Q = _P
     2 x 6 = _ 2 i.e 12
     4 x 6 = _ 4 i.e 24
     8 x 6 = _ 8 i.e 48
```

Example

- Based on Addition
- **Suggestion -** Use Pen and Paper to learn from the example it might take more than 30 mins to understand this but when you get the logic, you'll be able to solve any problem within very less time.

```
 BASE
+BALL
```

```
 ------------
 GAMES
 ------------
```

=> Since, Maximum Carryover = 1

=> G = 1

Now Considering only the unit digits and tens digit

```
 SE
 +LL
 -------
  ES
 -------
```

=> S+L = E - (i) or S+L = 10 + E(Where 1 is carry) - (ii)

=> Similary E + L = S - (iii) or E + L = 10 + S(Where 1 is carry) - (iv)

=> E = S - L or **E = S - L + 10(using this)**

=> Putting value of E in S + L = E => S + L = S - L + 10

=> 2L = 10 => **L = 5**

=> from equation (iii) E + L = S => S - E = L = 5

=> This gives us possible values for (S,E) as (0,5), (1,6), (2,7), (3,8) and (4,9) or (E,S) if we take equation (i)

But out of these (0,5) and (1,6) cannot be accepted as G=1 and L=5.(Alphabets can only have distinct values)

So we are left with the possibilities of (2,7) , (3,8) and (4,9). We can also infer that of S and E , E is the smaller value and S is the larger.because if E were larger, we would have a carry and then S+L=E would not be valid. This means that S+L=E has a carry over of 1.

use the trial and error method substituting values for the letters keeping all the above points in mind.

Let us assume E=2 and S=7 and B=6. So we have,

```
1
  6A72
 +6A55
 -----------
 1AM27
 ------------
```

Now A can be either 2 or 3 depending on whether we have a carry from A+A or not. But since E=2, that means A must be 3 and therefore there is a carry. But replacing the other A's in the equation with 2's gives us two contradictions. Firstly M shall become equal to 7 (S is already equal to 7) and A+A does not produce a carry. Therefore our assumptions were wrong and we will have to try again for different values.

(I shall skip to the combination which yields the solution, but you shall have to try for all possible values in between)

Now let us try for E=3 and S=8 and B=7. We have,

```
1
  7A83
 +7A55
 ----------
 1AM38
 -----------
```

This gives us A=4 or 5 based on whether there is a carry or not, but since already L=5, A must be equal to 4, therefore M=9. We have obtained values for all unknowns without any contradictions and hence this is the solution)

So finally we have

```
1
  7483
 +7455
 ---------
```

```
 14938
 ---------
```

Therefore,

G=1

E=3

A=4

L=5

B=7

S=8

M=9

When to use Unit Digit Method?

- When you don't know how to solve the problem and just can't get started.
- You think the problem is really tough to solve.
- In this case you have to start **hit and trial** with the possible values of unit digit of the multiplication problem.

Time to solve whole problem - 10 mins

Suggestion - You must know how to solve Basic Crypt arithmetic questions firsts

Steps to Solve-

- Break the problem in to subcomponents for eg -If it is a 3 x 3 Cryptarithmetic Problem, then you have to convert it into 3 x 1 problem.
- After dividing the problem in three parts, analyse all the parts very closely and try to collect some clue. Now, you have to choose one among 3 which has maximum number of clues.
- You have to start hit and trial with the possible values of the variable which is present at the unit digit. {0, 1, 2, 3, 4, 5, 6, 7, 8, 9}
    - Possible ways of getting unit digit 0, 1 , 2

- Possible ways of getting unit digit 3, 4, 5
- Possible ways of getting unit digit 6, 7, 8, 9

At each step, you have to check, whether the values satisfies Basic Cryptarithmetic Rule

Example

```
                    W  B  A
                 x  B  P  W
                ----------
                 C  X  R  F
              F  X  A  X
           A  A  C  C
          -----------------
           A  P  C  A  B  F
```

Firstly divide the problem in three parts. As,

```
(1)      W  B  A            (2)      W  B  A        (3)      W  B  A
            x  W                        x  P                    x  B
    -----------                 ---------               ---------
      C  X  R  F                F  X  A  X             A  A  C  C
```

Now, you have to select one from three which has maximum number of clues.i.e. maximum number of variables getting repeated.
In this case take,

```
(3)          W  B  A
               x  B
         ----------
          A  A  C  C
```

Now, you have to start hit and trial with the possible values C i.e.

C={1, 2, 3, 4, 5, 6, 7, 8, 9}

Firstly take C=1 and check further

Possible ways of getting 1 as Unit Digit

```
(3)                                   W  B  A
                                         x  B
                                   ----------
                                    A  A  C  C
```

then

Case 1 C=1 A=1 B=1 Rejected As A = B = C [violates the Basic Cryptarithmetic Rules.]

Case 2 C=1 A=7 B=3 Needs to be checked further

Case 3 C=1 A=3 B=7 Needs to be checked further

Case 4 C=1 A=9 B=9 Rejected As A = B [violates the basic Cryptarithmetic Rules.]

Now check for Case 2 and Case 3 only.

```
(3)     W  B  A
           x B
    ----------
     A  A  C  C
```

```
        W  3  7
           x  3
    ----------
     7  7  1  1
```

Rejected as, even after taking the value of W=9, You will never get 77.

```
        W  3  7
           x  3
    ----------
     7  7  1  1
```

Now, you have to check with case 3

```
C=1, A=3, B=7
       W  B  A
          x  B
   ----------
    A  A  C  C

       W  7  3
          x  7
    ---------
    3  3  1  1
Here you can easily predict the value of W=4
Hence W=4, C=1, A=3, B=7 put these values in main problem
              4  7  3
           x  7  P  4
          ----------
           1  X  R  F
        F  X  3  X
     3  3  1  1
    ----------------
     3  P  1  3  7  F
Now, you can see
              4  7  3
                 x  4
           1  8  9  2 [ 1  X  R  F]
If you compare side by side you will get X=8, R=9 and F=2
Put these values in main problem, and rewrite again
              4  7  3
           x  7  P  4
          ----------
           1  8  9  2
        2  8  3  8
     3  3  1  1
```

```
    ----------------
     3  P  1  3  7  2
```

Now, you can easily predict the value of P=6

Hence,

```
              4  7  3
           x  7  6  4
          ----------
           1  8  9  2
        2  8  3  8
     3  3  1  1
    ----------------
     3  6  1  3  7  2
```

[Relax - it's going to take some time to understand the whole concept. If you are facing any difficulty. Please go through the Cryptarithmetic Tutorial.]

Possible ways of getting 0

Unit Digit= 0 (10, 20, 30, 40)		
Sl No.	Variable (A x B =_ C)	Detailed Explanation
1.	5 x 2=_0 (10)	5 x 2=_0 and 2 x 5=_0 are different cases.
2.	2 x 5=_0 (10)	5 x 2=_0 A x B=_0 A=5, B=2 2 x 5=_0 A x B=_0 A=2 , B=5
3.	4 x 5=_0 (20)	5 x 4=_0 and 4 x 5=_0 are different cases.
4.	5 x 4=_0 (20)	5 x 4=_0 A x B=_0 A=5, B=4 4 x 5=_ 0 A x B=_0 A=4, B=5
5.	5 x 6=_0 (30)	5 x 6=_0 and 6 x 5=_0 are different cases.
6.	6 x 5=_0 (30)	5 x 6=_0 A x B=_0 A=5, B=6 6 x 5=_0 A x B=_0 A=6, B=5
7.	8 x 5=_0 (40)	5 x 8=_0 and 8 x 5 =_0 are different cases.
8.	5 x 8=_0 (40)	5 x 8=_0 A x B=_0 A=5, B=8 8 x 5=_0 A x B=_0 A=8, B=5

Possible ways of getting 1

Unit Digit= 1 (1, 21, 81)		
Sl No.	Variable (A x B =_ C)	Detailed Explanation
1.	1 x 1=_1 (1)	Only possible when A=B=C i.e. A x A =_A
2.	7 x 3=_1 (21)	7 x 3=_1 and 3 x 7=_1 are different cases.
3.	3 x 7=_1 (21)	7 x 3=_1 A x B=_1 A=7, B=3 3 x 7=_1 A x B=_1 A=3, B=7
4.	9 x 9=_1 (81)	Only possible when B=A i.e. A x A =_C (C=1)

Possible ways of getting 2

Unit Digit= 2 (2, 12, 32, 42, 72)		
Sl No.	Variable (A x B =_ C)	Detailed Explanation
1.	1 x 2=_2 (10)	1 x 2=_2 and 2 x 1=_2 are different cases.
		1 x 2=_2 A=1, B=2 (Applicable when B=C i.e. A x C=_C)
2.	2 x 1=_2 (10)	2 x 1=_2 A=2, B=5 (Applicable when A=C i.e. C x B=_C)
3.	6 x 2=_2 (12)	6 x 2=_2 and 2 x 6=_2 are different cases.
		6 x 2=_2 A=6, B=2 (Applicable when B=C i.e. A x C=_C)
4.	2 x 6=_2 (12)	2 x 6=_2 A=2, B=6 (Applicable when A=C i.e. C x B=_C)
5.	3 x 4=_2 (12)	7 x 6=_2 and 6 x 7=_2 are different cases.
		7 x 6=_2 A x B=_2 A=7, B=6
6.	4 x 3=_2 (12)	6 x 7=_2 A x B=_2 A=6, B=7
7.	8 x 4=_2 (32)	8 x 4=_2 and 4 x 8=_2 are different cases.
		8 x 4=_2 A x B=_2 A=8, B=4
8.	4 x 8=_2 (32)	4 x 8=_2 A x B=_2 A= 4, B=8
9.	7 x 6=_2 (42)	7 x 6=_2 and 6 x 7=_2 are different cases.
		7 x 6=_2 A x B=_2 A=7, B=6
10.	6 x 7=_2 (42)	6 x 7=_2 A x B=_2 A=6, B=7
11.	9 x 8=_2 (72)	9 x 8=_2 and 8 x 9=_2 are different cases.
		9 x 8=_2 A x B=_2 A=9, B=8
12.	8 x 9=_2 (72)	8 x 9=_2 A x B=_2 A=8, B=9

Possible ways of getting 3

Unit Digit= 3 (3, 63)		
Sl No.	Variable(A x B=_ C)	Detailed Explanation
1.	1 x 3=_3 (3)	1 x 3=_3 and 3 x 1=_3 are different cases. 1 x 3=_3 A=1, B=3 (Applicable when B=C i.e. A x C=_C)
2.	3 x 1=_3 (3)	3 x 1=_3 A=3, B=1 (Applicable when A=C i.e. C x B=_C)
3.	9 x 7=_3 (63)	9 x 7=_3 and 7 x 9=_3 are different cases. 9 x 7=_3 A x B=_3 A=9, B=7
4.	7 x 9=_3 (63)	7 x 9=_3 A x B=_3 A=7, B=9

Possible ways of getting 4

Unit Digit= 4 (4, 14, 24, 54, 64)		
Sl No.	Variable (A x B =_ C)	Detailed Explanation
1.	1 x 4=_4(4)	1 x 4=_4 and 4 x 1=_4 are different cases. 1 x 4=_4 A=1, B=4 (Applicable when B=C i.e. A x C=_C)
2.	4 x 1=_4(4)	4 x 1=_4 A=4, B=1 (Applicable when A=C i.e. C x B=_C)
3.	2 x 2=_4(4)	A=2, B=2, C=4 (Applicable when A=B i.e. A x A=_C)
4.	7 x 2=_4(14)	7 x 2=_4 and 2 x 7=_4 are different cases. 7 x 2=_4 A x B=_4 A=7, B=2
5.	2 x 7=_4(14)	2 x 7=_4 A x B=_4 A=2, B=7
6.	8 x 3=_4(24)	8 x 3=_4 and 3 x 8=_4 are different cases. 8 x 3=_4 A x B=_4 A=8, B=3
7.	3 x 8=_4(24)	3 x 8=_4 A x B=_4 A=3, B=8
8.	6 x 4=_4(24)	6x 4=_4 and 4 x 6=_4 are different cases. 6 x 4=_4 A=6, B=4 (Applicable when B=C i.e. A x C=_C)
9.	4 x 6=_4(24)	4 x 6=_4 A=4, B=6 (Applicable when A=C i.e. C x B=_C)
10.	9 x 6=_4(54)	9 x 6=_4 and 6 x 9=_4 are different cases. 9 x 6=_4 A x B=_4 A=9, B=6
11.	6 x 9=_4(54)	6 x 9=_4 A x B=_4 A=6, B=9
12.	8 x 8=_4(64)	A=8, B=8, C=4 (Applicable when A=B i.e. A x A=_C)

Possible ways of getting 5

Unit Digit= 5 (5, 15, 25, 35, 45)		
Sl No.	Variable (A x C =_ C)	Detailed Explanation
1.	1 x 5 =_5 (5)	1 x 5=_5 A=1, C=5
2.	3 x 5 =_5 (15)	3 x 5=_5 A=3, C=5
3.	5 x 5 =_5 (25)	5 x 5=_5 A=5, C=5 (Applicable when A x A =_A)
4.	7 x 5 =_5 (35)	7 x 5=_5 A=7, C=5
5.	9 x 5 =_5 (45)	9 x 5=_5 A=9, C=5

Possible ways of getting 6

Unit Digit =6 (6, 16, 36, 56)		
Sl No.	Variable (A x B = _C)	Detailed Explanation
1.	1 x 6 = _6 (6)	1 x 6 = _6 and 6 x 1 = _6 are different cases. 1 x 6 = _6 A=1, B=6 (Applicable when B = C i.e. A x C= _C) 1 x 6 = _6 A=1, B=6 (Applicable when B = C i.e. A x C= _C)
2.	6 x 1 = _6 (6)	
3.	2 x 3 = _6 (6)	2 x 3 = _6 and 3 x 2 = _6 are different cases. 2 x 3 = _6 A x B = _6 A = 2, B = 3 3 x 2 = _6 A x B = _6 A = 3, B = 2
4.	3 x 2 = _6 (6)	
5.	4 x 4 = _6 (16)	A=4, B=4 and C=6 (Applicable when A=B i.e. A x A= _C)
6.	6 x 6 = _6 (36)	A=6, B=6 and C=6 (Applicable when A=B=C i.e. A x A= _A)
7.	8 x 2 = _6 (16)	8 x 2 = _6 and 2 x 8 = _6 are different cases. 8 x 2 = _6 A x B = _6 A = 8, B = 2 2 x 8 = _6 A x B = _6 A = 2, B = 8
8.	2 x 8 = _6 (16)	
9.	9 x 4 = _6 (36)	9 x 4 = _6 and 4 x 9 = _6 are different cases. 9 x 4 = _6 A x B = _6 A = 9, B = 4 4 x 9 = _6 A x B = _6 A = 4, B = 9
10.	4 x 9 = _6 (36)	
11.	8 x 7 = _6 (56)	8 x 7 = _6 and 7 x 8 = _6 are different cases. 8 x 7 = _6 A x B = _6 A = 8, B = 7 7 x 8 = _6 A x B = _6 A = 7, B = 8
12.	7 x 8 = _6 (56)	

Possible ways of getting 7

Unit Digit=7 (7, 27)		
Sl No.	Variable(A x B=_C)	Detailed Explanation
1.	1 x 7=_7 (7)	1 x 7=_7 and 7 x 1=_7 are different cases. 1 x 7=_7 A=1, B=7 (Applicable when B=C i.e. A x C=_C) 7 x 1=_7 A=7, B=1 (Applicable when A=C i.e. C x B=_C)
2.	7 x 1=_7 (7)	
3.	9 x 3=_7 (27)	9 x 3=_7 and 3 x 9=_7 are different cases. 9 x 3=_7 A x B=_7 A=9, B=3 3 x 9=_7 A x B=_7 A=3, B=9
4.	3 x 9=_7 (27)	

Possible ways of getting 8

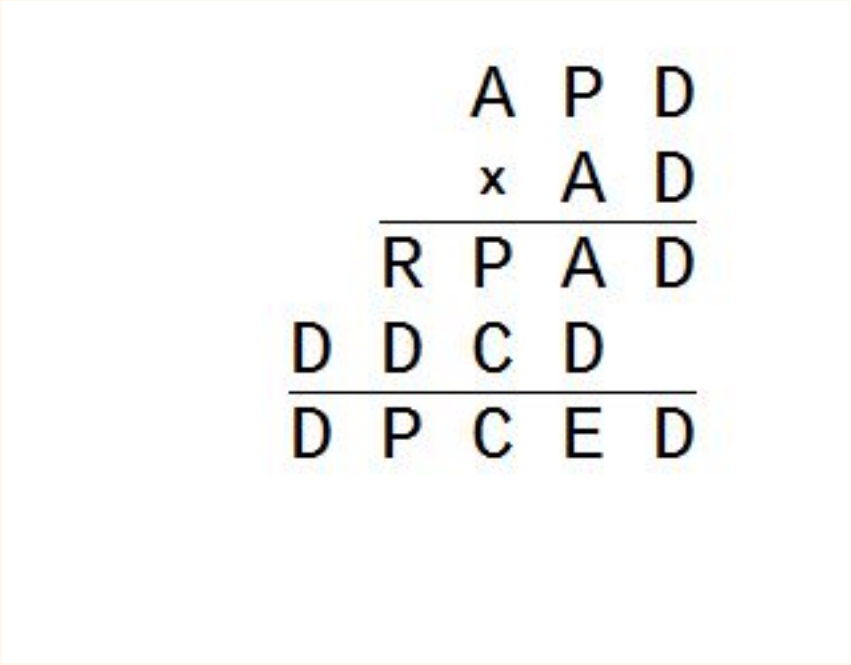
Unit Digit= 8 (8, 18, 28, 48)		
Sl No.	Variable (A x B =_ C)	Detailed Explanation
1.	1 x 8 =_8(8)	1 x 8=_8 and 8 x 1=_8 are different cases. 1 x 8=_8 A=1, B=8 (Applicable when B=C i.e. A x C=_C)
2.	8 x 1 =_8(8)	8 x 1=_8 A=8, B=1 (Applicable when A=C i.e. C x B=_C)
3.	4 x 2 =_8(8)	4 x 2=_8 and 2 x 4=_8 are different cases. 4 x 2=_8 A x B=_8 A=4, B=2
4.	2 x 4 =_8(8)	2 x 4=_8 A x B=_8 A=2, B=4
5.	9 x 2 =_8(18)	9 x 2=_8 and 2 x 9=_8 are different cases. 9 x 2=_8 A x B=_8 A=9, B=2
6.	2 x 9 =_8(18)	2 x 9=_8 A x B=_8 A=2, B=9
7.	6 x 3 =_8(18)	6 x 3=_8 and 3 x 6=_8 are different cases. 6 x 3=_8 A x B=_8 A=6, B=3
8.	3 x 6 =_8(18)	3 x 6=_8 A x B=_8 A=3, B=6
9.	7 x 4 =_8(28)	7 x 4=_8 and 4 x 7=_8 are different cases. 7 x 4=_8 A x B=_8 A=7, B=4
10.	4 x 7 =_8(28)	4 x 7=_8 A x B=_8 A=4, B=7
11.	6 x 8 =_8(48)	6 x 8=_8 and 8 x 6=_8 are different cases. 6 x 8=_8 A=6, B=8 (Applicable when B=C i.e. A x C=_C)
12.	8 x 6 =_8(48)	8 x 6=_8 A=8, B=6 (Applicable when A=C i.e. C x B=_C)

Possible ways of getting 9

Unit Digit=9(9, 49)		
Sl No.	Variable(A x B=_C)	Detailed Explanation
1.	1 x 9=_9 (9)	1 x 9=_9 and 9 x 1=_9 are different cases. 1 x 9=_9 A=1, B=9 (Applicable when B=C i.e. A x C=_C)
2.	9 x 1=_9 (9)	9 x 1=_9 A=9, B=1 (Applicable when A=C i.e. C x B=_C)
3.	3 x 3=_9 (9)	A=3, B=3, C=9 (Applicable when A=B i.e. A x A=_C)
4.	7 x 7=_9 (49)	A=4, B=7, C=9 (Applicable when A=B i.e. A x A=_C)

QUESTIONS

Cryptarithmetic Problem 1



1. Value of A ?

(a) 5 (b) 6 (c) 7 (d) 9

2. Value of R + P + A + D ?

(a) 20 (b) 21 (c) 23 (d) 24

Value of P ?

3.

(a) 6 (b) 7 (c) 8 (d) 9

```
    A  P  D
    x  A  D
  R  P  A  D
D  D  C  D
D  P  C  E  D
```

As, P + C= _C
Hence value of P=9 Rule 1 - Case-II
Put P=9 and rewrite the problem,

```
    A  9  D
    x  A  D
  R  9  A  D
D  D  C  D
D  9  C  E  D
```

further, you can see

```
    A  9  D
    x  A  D
  R  9  A  D
D  D  C  D
D  9  C  E  D
```

Here D x D = _ D [R 9 A D]
Hence possible values of D={5, 6} Detailed Explanation- Rule 2

Firstly take D=5 and rewrite the problem

```
    A  9  5
    x  A  5
  R  9  A  5
5  5  C  5
5  9  C  E  5
```

```
        A  9  5
        x  A  5
      R  9  A  5
   5  5  C  5
   5  9  C  E  5
```

Here, you can easily predict the value of R=3
So, the problem reduces to

```
        A  9  5
        x  A  5
     3  9  A  5
   5  5  C  5
   5  9  C  E  5
```

As, A x 5 = _5 [5 5 C 5]
Hence possible values of A={3, 7, 9} Detailed Explanation
and as you have already taken R=3, Hence A cannot be equal to 3.

[In Cryptarithmetic, each variable should have unique and distinct value]

Hence possible value of A={7, 9}
Now, start hit and trial with the possible values of A
Firstly take A=7
Put A=7, and rewrite the problem again

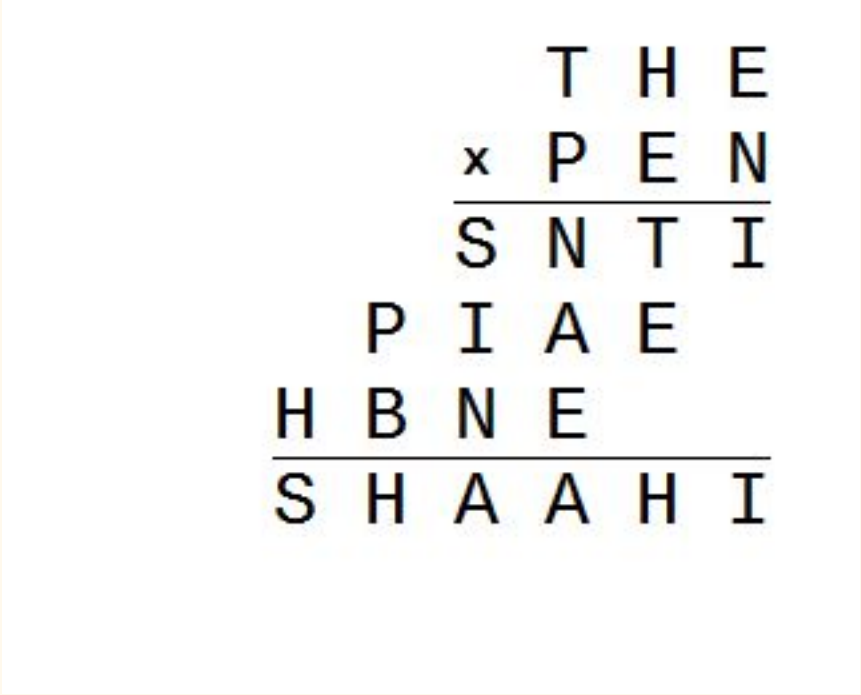
```
      7  9  5
      x  7  5
   3  9 7  5
5  5  C  5
5  9  C  E  5
```

Now you can easily predict the value of C and E.

```
      7  9  5
      x  7  5
   3  9  7  5
5  5  6  5
5  9  6  2  5
```

[Relax - it's going to take some time to understand the whole concept. If you are facing any difficulty. Please go through the Cryptarithmetic Tutorial.]

Cryptarithmetic Problem 2



1. Value of N ?

(a) 2 (b) 4 (c) 3 (d) 8

2. Value of T + 2E ?

(a) 15 (b) 17 (c) 16 (d) 11

Which of the following forms Right Angled Triangle ?

3.

(a) N, P, E (b) T, P, E (c) T, H, A (d) B, N, S

(The solution has been given considering you as a beginner in Cryptarithmetic)

Firstly, you have to divide the problem in three parts, so that it will help you in collecting more clues.

(1)
```
    T H E
  x   N
S N T I
```

(2)
```
    T H E
  x   E
P I A E
```

(3)
```
    T H E
  x   P
H B N E
```

(Choose one among the three which has maximum number of clues.)

In this case, you can take case(2)

Here, E x E = _E

Therefore, possible values of E = {5, 6} Rule 2

As,

5 x 5 = _5 [25] (last digit)

6 x 6 = _6 [36] (last digit)

```
      T H E
    x P E N
    S N T I
  P I A E
H B N E
S H A A H I
```

Further, we have one more clue E x P = _E

Hence, possible values of E and P are as follows.

Case I - When E=5 and P={3, 7, 9}

Case II - When P=6 and E={2, 4, 8} Rule 3

Now, you have to start hit and trial with both the possible cases.

Firstly, take E=5 and P = {3, 7, 9}

Put E=5 and rewrite the problem again.

```
        T  H  5
      x P  5  N
      S  N  T  I
    P  I  A  5
  H  B  N  5
  S  H  A  A  H  I
```

Further, 5 x N = _I [S N T I]

[If you multiply 5 to any number, you will only get [0, 5] as their last digit.](5 x even =_0 and 5 x odd=_5)

Therefore, value of I = 0

Hence, possible value of N = {2, 4 ,6 ,8}

Now, E=5 and I=0 and write the problem again.

```
        T  H 5
      x P  5  N
      S  N  T 0
    P  0  A  5
  H  B  N  5
  S  H  A  A  H  0
```

Now, again divide the problem in three parts

```
(1)       T  H  5
            x N
      S  N  T O
(2)       T  H  5
            x 5
      P  0 A  5
(3)       T  H 5
            x P
      H  B  N  5
```

Take Case (2) as it has less number of variable in comparison to case (1) and Case(2)

```
(2)     T  H  5
          x 5
    P  0 A  5
```

Earlier, you have only three possible values of P= {3, 7, 9}

you have to start hit and trial with the values of P

Firstly, take P=3

```
(2)     T  H  5
```

```
        x 5
    3 0 A 5
```

Then T=6 [6 x 5 = 30]

```
      T H 5
     x P 5 N
     S N T 0
   P 0 A 5
 H B N 5
 S H A A H 0
```

as T + 5 = H i.e. 6 + 5 =_1 [last digit] Hence H=1,

```
 (2)    6 1 5
        x 5
    3 0 A 5 [ 3 0 7 5]
```

If you compare side by side then you will get A=7
Put these values in the main problem,
T=6, H=1, E=5, P=3, I=0, A=7
Hence,

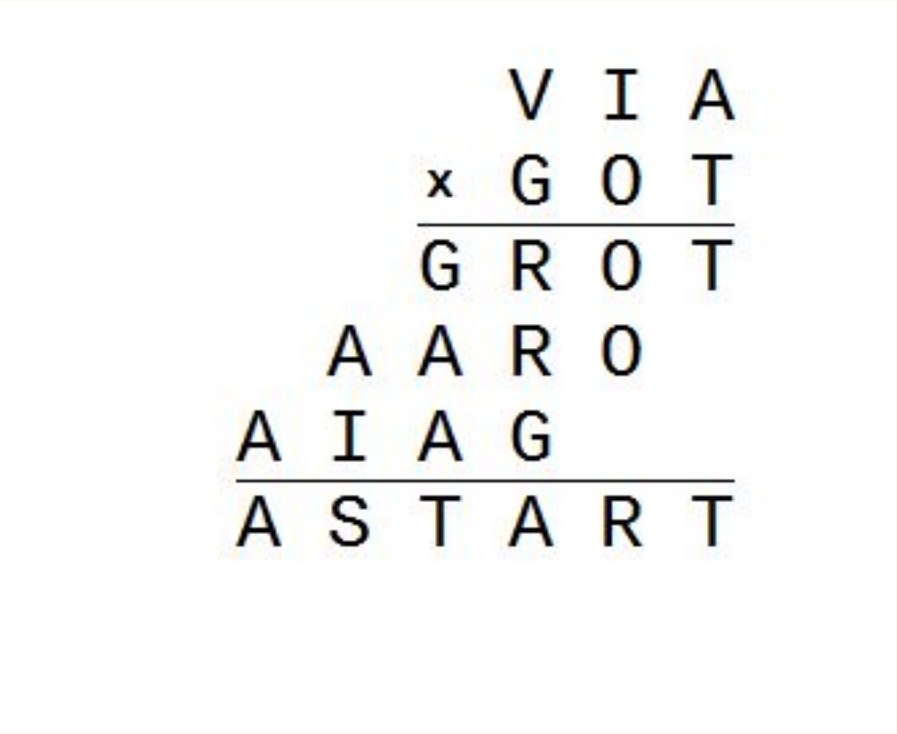
```
      6 1 5
    x 3 5 N
    S N 6 0
  3 0 7 5
 1 B N 5
 S 1 7 7 1 0
```

Now you can easily solve the problem.

```
      6 1 5
    x 3 5 4
    2 4 6 0
  3 0 7 5
 1 8 4 5
 2 1 7 7 1 0
```

[Relax - it's going to take some time to understand the whole concept. If you are facing any difficulty. Please go through the Cryptarithmetic Tutorial.]

Cryptarithmetic Problem 3



1. Value of A + S + T + A + R + T ?

(a) 21 (b) 26 (c) 24 (d) 25

2. Find the value of 4R + T ?

(a) 19 (b) 20 (c) 21 (d) 22

Find the value of 2A + R ?

3.

(a) 5 (b) 6 (c) 7 (d) 8

```
    V I A
  x G O T
  G R O T
A A R O
A I A G
A S T A R T
```

Here,
A x T = _T [G R O T]
A x O = _0 [A A R O]
A x G = _G [A I A G]
This is only possible when A=1
Hence, Put A=1 and rewrite the problem again.

```
    V I 1
  x G O T
  G R O T
1 1 R O
1 I 1 G
1 S T 1 R T
```

At this stage, divide the problem in 3 parts for collecting more clues..

```
(1)   V I 1
        x T
      G R O T
(2)   V I 1
        x O
      1 1 R O
(3)   V I 1
        x G
      1 I 1 G
```

Now you have to choose one among three based on number of clues.
In this problem, you can take case (3).
(You can also take case (1) and Case (2))

(3) V I 1
x G
1 I 1 G
At this stage you have to start hit and trial with the possible values of G
G = {2, 3, 4, 5, 6, 7, 8, 9}
*G ≠ {1}
(As you have already taken A=1)
[In Cryptarithmetic, each variable should have and unique and distinct value.]
*G ≠ {0}
(As you are multiplying some number by G in (3). If we take G=0)
then V I 1
x G
0 0 0 0 [1 I 1 G]
Now,take G=2
(3) V I 1
x 2
1 I 1 2
*Rejected (you can see 2 x I =_1)

(You will never get unit digit at 1 after multiplying any number by 2.)
If we multiply any digit by 2 we cannot get last digit as 1.
i.e. 2x1=2, 2x3=6, 2x4=8 2x5=_0, 2x6=_2, 2x8=_6[16] and 2x9=_8[18])

[Relax it's going to take some time to understand the concept. Please read...again!]

Now,take G=3
put G=3 in case(3)
(3) V I 1
x 3
1 I 1 3
Now we can see I x 3 = _1 [1 I 1 3]
(last digit is 1 which is only possible when I=7 (7 x 3 = 21)
Put I=7 in (3)
(3) V 7 1
x 3
1 7 1 3
Now, you can easily predict the value of V=5 (3 x 5 = 15 + 2(carry)=17)

(3) 5 7 1
x 3
1 7 1 3

Therefore,
V=5, I=7, A=1, G=3, Put these value in main problem and solve further.

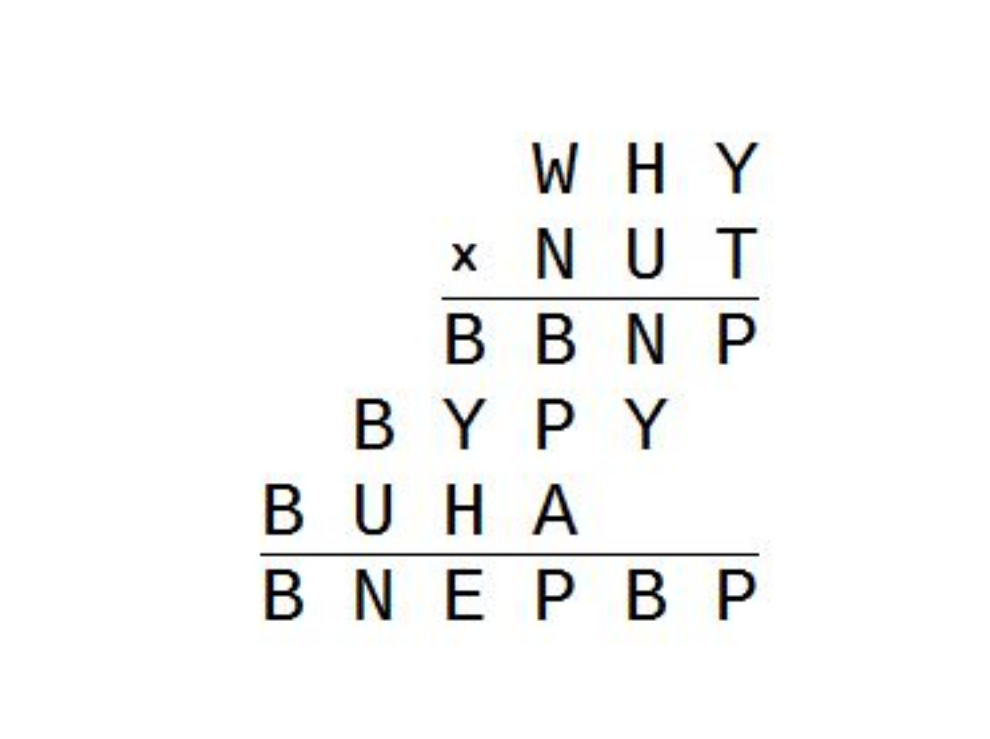
5 7 1
x 3 O T
3 R O T
1 1 R O
1 7 1 3
1 S T 1 R T

Now you can easily predict the other values.
S=8, T=6, R=4, O=2
These values also satisfies the Basic Cryptarithmetic Rules

5 7 1
x 3 2 6
3 4 2 6
1 1 4 2
1 7 1 3
1 8 6 1 4 6

[Relax - It is going to take some time to understand the whole concept. If you are facing any difficulty. Please go through the Cryptarithmetic Tutorial]

Cryptarithmetic Problem 4



1. Value of W + H + Y ?

(a) 7 (b) 8 (c) 9 (d) 10

2. Value of B ?

(a) 1 (b) 2 (c) 3 (d) 4

3. Value of N + U + T ?

(a) 17 (b) 18 (c) 19 (d) 20

W H Y
x N U T
B B N P
B Y P Y
B U H A
B N E P B P

As, Y x U= _ Y [B Y P Y]
Hence, possible values of Y and U are
Case-1 When Y={2, 4, 8} and U={6}
Case-2 When Y={5} and U={3, 7, 9} Detailed Explanation- Rule 3
Firstly, take case-1
Take U=6 and rewrite the problem,

W H Y
x N 6 T
B B N P
B Y P Y
B 6 H A
B N E P B P

At this stage, collect some more clues,

W H Y
x N 6 T
B B N P
B Y P Y
B 6 H A
B N E P B P

B + 6 + (carry) = N [Carry may be either 0, 1 or 2]
Hence, Possible value of N= {7, 8, 9}
You have to start hit and trial with possible values of N={7, 8, 9} and Y={2, 4 ,8}
Firstly taking N=7 and Y=2. and check further,
when N=7 and Y=2 then B=9 [As, N + Y = B] If we take take B=9 then,

W H Y
x N 6 T
B B N P
9 Y P Y

9 6 H A
0 N E P B P
Value of B=0 and B=9 will come in the same problem. i.e. you are getting the two values of B.Rejected.

Now, Check the with other possible values of Y and N
Let's take N=7 and Y=4
then B=1 as N + Y = B [last digit]
Taking B=1, N=7 and Y=4 rewrite the problem again,

```
      W  H  4
    x 7  6  T
      1  1  7  P
   1  4  P  4
1  6  H  A
1  7  E  P  1  P
```

Now, you can easily predict the value of A=8 As, 7 x 4= _ A [last digit]

```
      W  H  4
    x 7  6  T
      1  1  7  P
   1  4  P  4
1  6  H  8
1  7  E  P  1  P
```

Now,

```
      W  H  4
         x  7
    1  6  H  8
```

You can easily predict the value of W=2

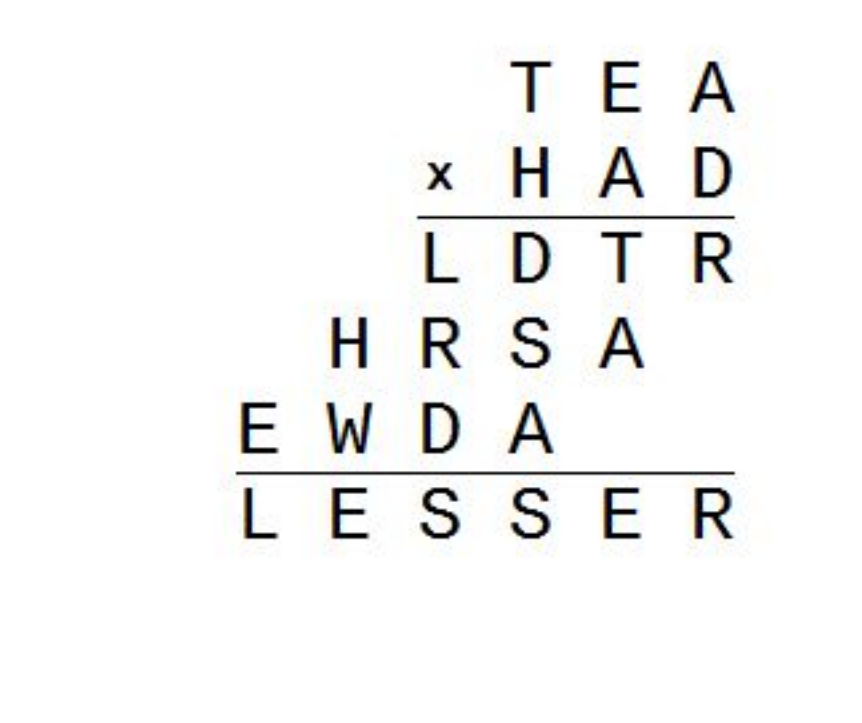
```
      2  H  4
    x 7  6  T
      1  1  7  P
   1  4  P  4
1  6  H  8
1  7  E  P  1  P
```

Now you can easily predict other values.
Value of T=5 and P=0

```
      2 3 4
    x 7 6 5
    1 1 7 0
  1 4 0 4
1 6 3 8
1 7 9 0 1 0
```

[Relax - it's going to take some time to understand the whole concept. If you are facing any difficulty. Please go through the Cryptarithmetic Tutorial.]

Cryptarithmetic Problem 5



1. Value of S ?

(a) 6 (b) 7 (c) 8 (d) 9

Which of the following follows the Pythagoras theorem ?

2.

(a) H, A, D (b) H, A, B (c) T, E, A (d) T, E, D

Value of H + R + S + A ?

3.

(a) 14 (b) 15 (c) 16 (d) 17

T E A
x H A D
L D T R
H R S A
E W D A
L E S S E R

Here, A x A = _ A [H R S A]

Therefore, Possible values of A= {5, 6} Detailed Explanation- Rule 2

Further,

T E A
x H A D
L D T R
H R S A
E W D A
L E S S E R

Here, H x A= _A [E W D A]

Therefore, two possible cases for the values of H and A

Case I - when A={5} then H={3, 7, 9}

Case II - when A={2, 4, 8} then H={6} Detailed Explanation-Rule 3

Firstly taking case - I

Taking A=5 rewrite the problem again,

T E 5
x H 5 D

```
      L  D  T  R
    H  R  S  5
  E  W  D  5
  L  E  S  S  E  R
```

Further,

```
        T  E 5
      x  H  5  D
      L  D  T  R
    H  R  S  5
  E  W  D  5
  L  E  S  S  E  R
```

Here, 5 x D = _ R [L D T R]

Now, you can easily predict the value of R = 0 and possible values of D= {2, 4, 6, 8}

[If you multiply 5 to a number, you will only get[0,5] as their unit digit.]

5 x Even =_0 [2, 4, 6, 8]

5 x Odd =_5 [3, 5, 7, 9]

[Relax it's going to take some to understand the concept. Please read... again!]

Put R=0 and write the problem again,

```
        T  E  5
      x  H  5  D
      L  D  T  0
    H  0  S  5
  E  W  D  5
  L  E  S  S  E  0
```

At this stage, divide the problem into 3 parts,

```
(1)       T  E  5
            x  D
      L  D  T  0
(2)       T  E  5
            x  5
      H  0  S  5
(3)       T  E  5
            x  H
      E  W  D  5
```

Now, take (2) [As it has less number of variables. 5 is repeated three times.]

```
(2)       T  E  5
```

```
          x  5
      H  0  S  5
```

Now you have to start hit and trial with the possible values of E
Firstly take E=1
Put E=1 in (2)

```
(2)       T  1  5
          x  5
      H  0  S  5 [ H  0  7  5]
```

If you compare side by side, then you will get S=7
Put S=7 and E=1 in the main problem.
[It needs to be checked further whether these values satisfies the Basic Cryptarithmetic Rules]

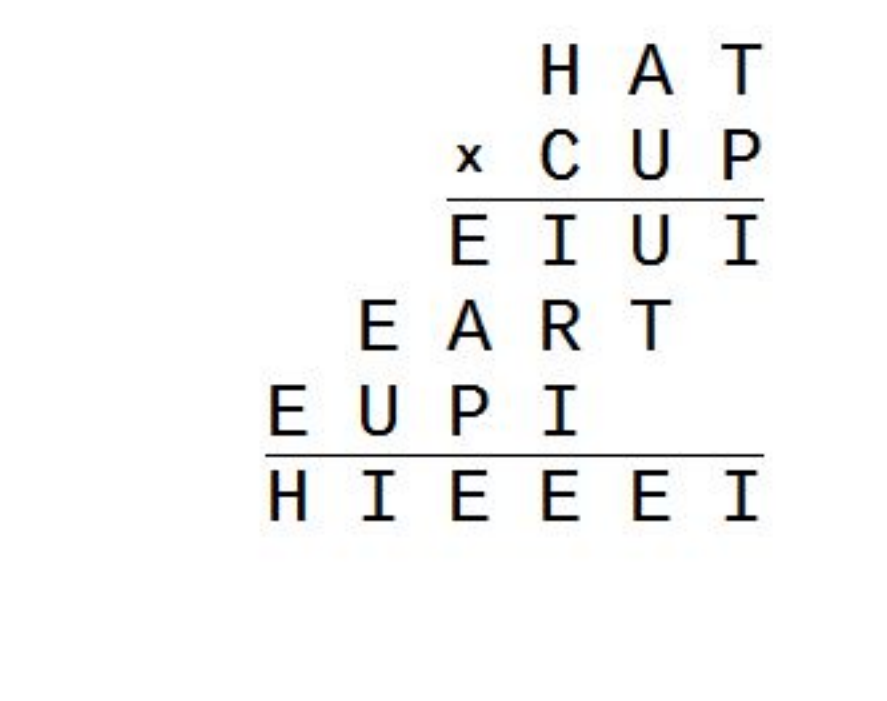
```
          T  1  5
       x  H  5  D
       L  D  T  0
     H  0  7 5
  1  W  D  5
  L  1  7  7  1  0
```

At this stage you can easily predict all the values as
You can see T + 5 =_1 (which is only possible when the value of the T=6)
L=2 (As, 1 + 1(carry) = L)
Hence T=6, L=2.
Now you can easily solve the problem.

```
       6  1  5
    x  3  5  4
    2  4  6  0
  3  0  7  5
1  8  4  5
2  1  7  7  1  0
```

[Relax - it's going to take some time to understand the whole concept. If you are facing any difficulty. Please go through the Cryptarithmetic Tutorial.]

Cryptarithmetic Problem 6



1. Value of C ?

(a) 2 (b) 4 (c) 6 (d) 8

2. Value of E + A + R + T ?

(a) 10 (b) 11 (c) 12 (d) 13

3. Value of 2E + H ?

(a) 7 (b) 5 (c) 6 (d) 2

(The solution has been given considering you as beginner in Cryptarithmetic.)

```
      H  A  T
    x C  U  P
    E  I  U  I
  E  A  R  T
E  U  P  I
H  I  E  E  E  I
```

Here, T x U=_T [E A R T]
Therefore, Possible value of T and U are,
Case I - When T=[5] AND U=[3, 7, 9] or
Case II - When U=[6] AND T=[2, 4, 8] Detailed Explanation- Rule 3
Let's take T=5

```
      H  A  T
    x C  U  P
    E  I  U  I
  E  A  R  T
E  U  P  I
H  I  E  E  E  I
```

Further as,
T x P=_I [E I U I] and T x C=_I [E U P I]
i.e.
5 x P=_I [E I U I] and 5 x C=_I [E U P I]
Therefore, I=0 and P and C are even numbers.
[If you multiply 5 to any number, you will only get [0,5] as their last digit)
[(5*even=_0 and 5*odd=_5)]

Put I=0 and T=5 and rewrite the problem,

```
      H  A  5
    x C  U  P
    E  0  U  0
  E  A  R  5
E  U  P  0
H  0  E  E  E  0
```

At this stage,
Possible values of variable U, P and C

U= {3, 7, 9}
P= {2, 4, 6, 8}
C= {2, 4, 6, 8}

At this stage, you have one more clue,

```
      H  A  5
    x C  U  P
    E  0  U  0
  E  A  R  5
E  U  P  0
H  0  E  E  E  0
```

U + 5 = E
Now, start hit and trial with the possible values of U={3, 7, 9}
Firstly take U=3
You have U + 5 = E therefore E=8 Now, put E=8 and check further whether it satisfies the Basic Cryptarithmetic Rules.

```
      H  A  5
    x C  U  P
    8  0  3  0
  8  A  R  5
8  U  P  0
H  0  8  8  8  0
```

i.e. 0 + R + 0 = E
Therefore R=8
Rejected as E=8 and R=8
[In Cryptarithmetic each variable should have **unique** and **distinct** values]
Now, check with U=7
You have U + 5 = E [7 + 5 =_2(last digit)] therefore E=2
and as, 0 + R + 0 = 2, Therefore, value of R = 1 [R + 1(carry)=2]
Put R=1, E=2 and rewrite the problem,

```
      H  A  5
    x C  7  P
    2  0  7  0
  2  A  1  5
2  7  P  0
```

```
      H  0  2  2  2  0
```

[2+1(carry)=3(H)-- As value of E=2]
therefore H=3

put E=2 H=3 T=5, R=1 in main problem

```
          3  A  5
        x  C  7  P
        2  0  7  0
     2  A  1  5
  2  7  P  0
  3  0  2  2  2  0
```

2.

```
          3  A  5
           x  7
        2  A  1  5
```

Now You can easily predict the value of A=4
[(28+3*(carry)*=_1(last digit)]
[(28*(7*4(A))*+3*(carry 7*5=35)*=_1[31](last digit)]

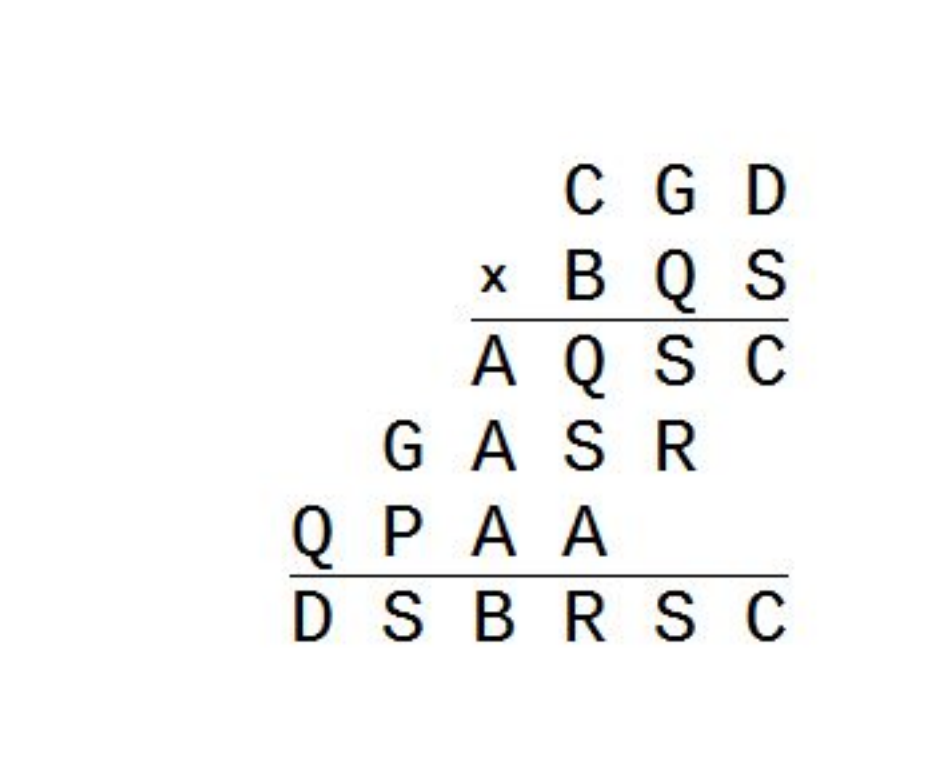
```
          3  4  5
           x  7
        2  4  1  5
```

Hence,

```
          3  4  5
        x  8  7  6
        2  0  7  0
     2  4  1  5
  2  7  6  0
  3  0  2  2  2  0
```

[Relax - it's going to take some time to understand the whole concept. If you are facing any difficulty. Please go through the Cryptarithmetic Tutorial.]

Cryptarithmetic Problem 7



			C	G	D
		x	B	Q	S
		A	Q	S	C
	G	A	S	R	
Q	P	A	A		
D	S	B	R	S	C

1. Which of the following forms the right angled triangle ?

(a) S, G, Q (b) S, G, P (c) Q, P, A (d) R, S, C

2. Value of C ?

(a) 5 (b) 6 (c) 7 (d) 8

Value of 2Q + D ?

3.

(a) 15 (b) 16 (c) 17 (d) 18

(The solution has been given considering you as a beginner in Cryptarithmetic)

```
      C  G  D
    x B  Q  S
    A  Q  S  C
  G  A  S  R
Q  P  A  A
D  S  B  R  S  C
```

As, S + R = S

Therefore, R=0 Detailed Explanation- Rule 1

Put R=0 and write the problem again,

```
      C  G  D
    x B  Q  S
    A  Q  S  C
  G  A  S  0
Q  P  A  A
D  S  B  0  S  C
```

Here we have one more clue,

```
      C  G  D
        x  Q
    G  A  S  0
```

D x Q = _0

i.e. value of Q=5 and D={2, 4, 6, 8}

Possible ways of getting 0 at Unit Digit

Put Q=5

```
      C  G  D
    x B  5  S
    A  5  S  C
  G  A  S  0
5  P  A  A
D  S  B  0  S  C
```

[To get unit digit as 0 you have to multiply 5 with any even number]

[If you multiply 5 to any number, you will only get [0,5] as their last digit.(5*even=_0 and 5*odd=_5)]

Further,

```
      C  G  D
    x B  5  S
    A  5  S  C
  G  A  S  0
5  P  A  A
D  S  B  0  S  C
```

5 + 1 (carry) = D

Therefore, value of D=6, now rewrite the problem after replacing the value of D=6

```
      C  G  6
    x B  5  S
    A  5  S  C
  G  A  S  0
5  P  A  A
6  S  B  0  S  C
```

At this stage, split the problem in 3 parts for collecting the more clues...

1.
```
      C  G  6
        x  S
    A  5  S  C
```

2.
```
      C  G  6
        x  5
    G  A  S  0
```

3.
```
      C  G  6
        x  B
    5  P  A  A
```

Taking (2) [you can see three variables have been replaced by digits. i.e. you have less number of variable in Case (2)]

(2)
```
      C  G  6
        x  5
    G  A  S  0
```

You have to start hit and trial with the possible values of G

Here you can see the possible values of S={3, 8}

Explanation : If you multiply any number by 5 then you will only get 0 and 5 at last digit.

0 + 3 (carry) =_3
5 + 3 (carry) =_8
[It will take some time to understand the concept. Please read..... again!]

You have start hit and trial with both the possible values of S={3, 8}
Firstly take S=3 put in the main problem and rewrite it.
i.e. Q=5, S=3, R=0, D=6

```
      C  G  6
    x B  5  3
    A  5  3  C
  G  A  3  0
5  P  A  A
6  3  B  0  3  C
```

Here you can see value of C=8
put C=8 and rewrite the problem

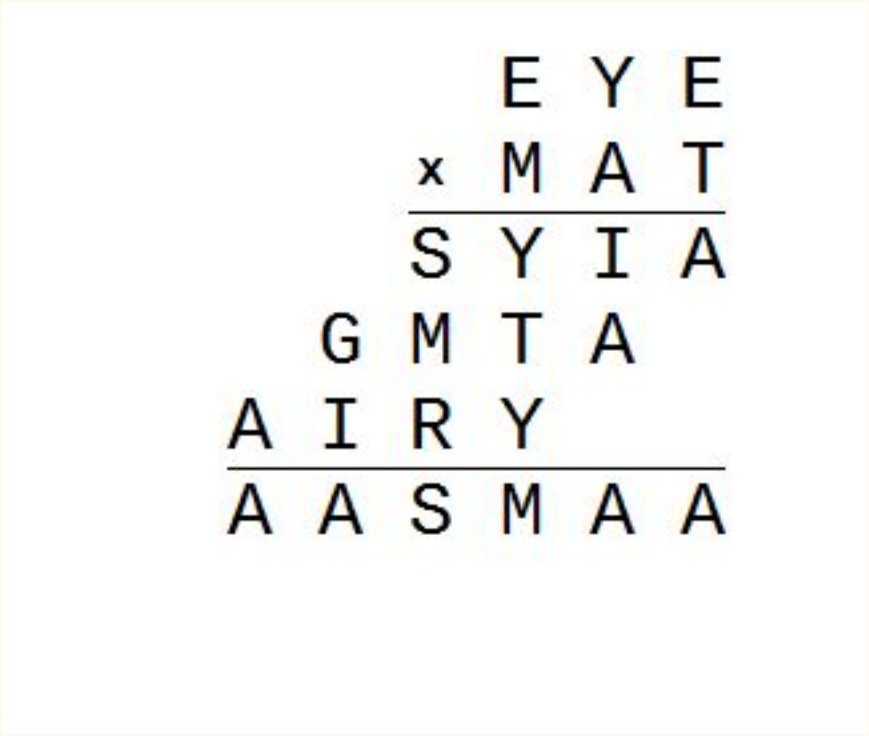
```
      8  G  6
    x B  5  3
    A  5  3  8
  G  A  3  0
5  P  A  A
6  3  B  0  3  8
```

Now you can easily solve the problem further
G=4, A=2, P=9

```
      8  4  6
    x 7  5  3
    2  5  3  8
  4  2  3  0
5  9  2  2
6  3  7  0  3  8
```

[Relax - it's going to take some time to understand the whole concept. If you are facing any difficulty. Please go through the Cryptarithmetic Tutorial.]

Cryptarithmetic Problem 8



1. Value of M ?

(a) 5 (b) 6 (c) 7 (d) 3

2. Value of M + A + T ?

(a) 10 (b) 11 (c) 12 (d) 13

Which of the following is the set of even number ?

3.

(a) {Y, A, S} (b) {Y, T, S} (c) {Y, R, S} (d) {Y, E, M}

(The solution has been given considering you as a beginner in Cryptarithmetic)

```
      E  Y  E
    x  M  A  T
    S  Y  I  A
  G  M  T  A
A  I  R  Y
A  A  S  M  A  A
```

As, I + A = A
Therefore, I = 0
Put I=0 and Rewrite the Problem again,

```
      E  Y  E
    x  M  A  T
    S  Y  0  A
  G  M  T  A
A  0  R  Y
A  A  S  M  A  A
```

and E x A =_A [G M T A]. Two possible cases
Case 1. E=6 and A={2, 4, 8} or Detailed Explanation- Rule 3
Case 2. A=5 and E={3, 7, 9}
Firstly take Case (1)
E=6, and A={2, 4, 8}
E=6 and I=0 put in the main problem and proceed further,

```
      6  Y  6
    x  M  A  T
    S  Y  0  A
  G  M  T  A
A  0  R  Y
A  A  S  M  A  A
```

Possible value of A={2, 4, 8}

as 6 * A = _A [G M T A]
6 x 2 =_2[12] [considering last digit only]
6 x 4 =_4[24] [considering last digit only]
6 x 8 =_8[48] [considering last digit only]

Now, you have to start hit and trail with the values of A={2, 4, 8}

```
      6  Y  6
    x  M  A  T
    S  Y  0  A
 G  M  T  A
A  O  R  Y
A  A  S  M  A  A
```

Case-I
When you will take A=2 then T=7
as 6 x T=_2[42]

Case-II
When you will take A=4 then T=9
As 6 x T=_4[54]

Case-III
When you will take A=8 then T=3
As 6 x T=_8[18]

[Relax- It is going to take some time to understand the concept. Please read...again !]
You have to check for each case separately.
Firstly, take Case(I) and proceed further
A=2, T=7

```
    6  Y  6
      x  2
  G  M  7  2 [1 M 7 2]
```

If you compare side by side, then you will get G=1
you can easily predict the value of Y=8
Now put Y=8

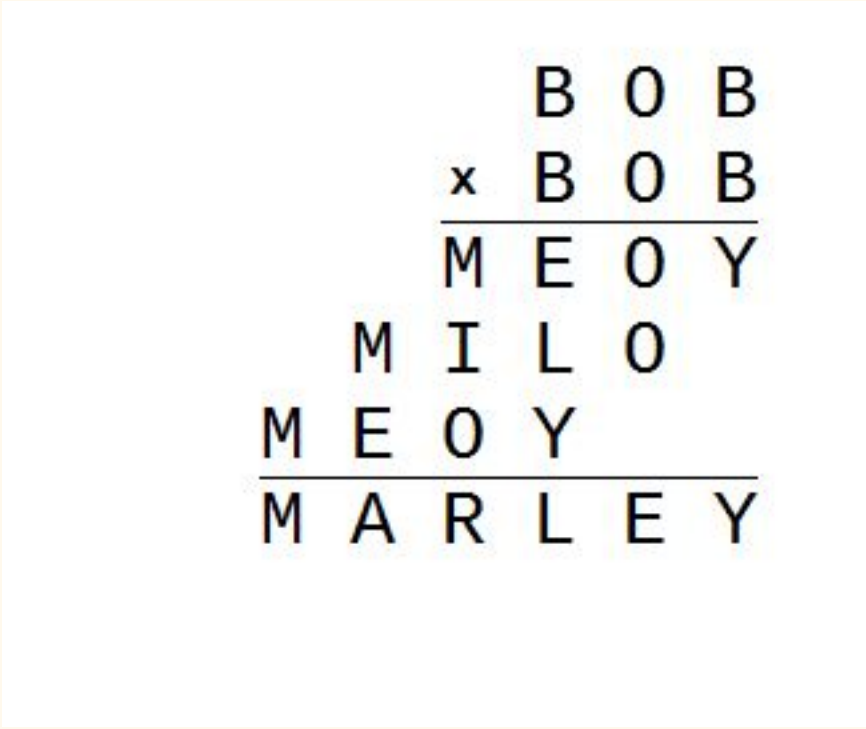
```
    6  8  6
      x  2
  1  3  7  2 [G M T A]
```

Therefore M=3, T=7, A=2, G=1

Hence,

```
      6 8 6
    x 3 2 7
    4 8 0 2
  1 3 7 2
2 0 5 8
2 2 4 3 2 2
```

Cryptarithmetic Problem 9



1. Value of 2B + M ?

(a) 5 (b) 6 (c) 7 (d) 8

Value of M + A + R + L + E + Y ?

2.

(a) 19 (b) 20 (c) 21 (d) 22

Value of Y ?

3.

(a) 6 (b) 7 (c) 8 (d) 9

```
      B O B
    x B O B
    M E O Y
  M I L O
M E O Y
M A R L E Y
```

O + O = E i.e. 2O=E

and

```
      B O B
    x B O B
    M E O Y
  M I L O
M E O Y
M A R L E Y
```

Here, B x O=_O [M I L O]

Hence Possible Values of B and O are

Case-I- When O={5} and B={3, 7, 9} Rule 3

Case-II When B={6} and O={2, 4, 8}

Now, you have to start hit and trail with both the above cases.

Firstly, take O=5

When you will take O=5 then E=0 as [O + O = _E(last digit)]

Put E=0 and O=5 and rewrite the problem

```
    B 5 B
```

```
        x  B  5  B
        M  0  5  Y
     M  I  L  5
  M  O  5  Y
  M  A  R  L  0  Y
```

Now, divide the problem in three parts

```
(1)     B  5  B
        x  B
     M  0  5  Y
(2)     B  5  B
        x  5
     M  I  L  5
(3)     B  5  B
        x  B
     M  O  5  Y
```

Here, you can take Case (2).[In (2) you have maximum number of clues. You can select anyone based on your convenience.]
Now, you have to start hit and trial with the possible values i.e. B=={3, 7, 9}

Firstly take B=3
Now Put B=3 in (2)
i.e.

```
   B  5  B
      x  5
   M  I  L  5
```

now it leads to

```
    3  5  3
       x  5
   1  7  6  5
```

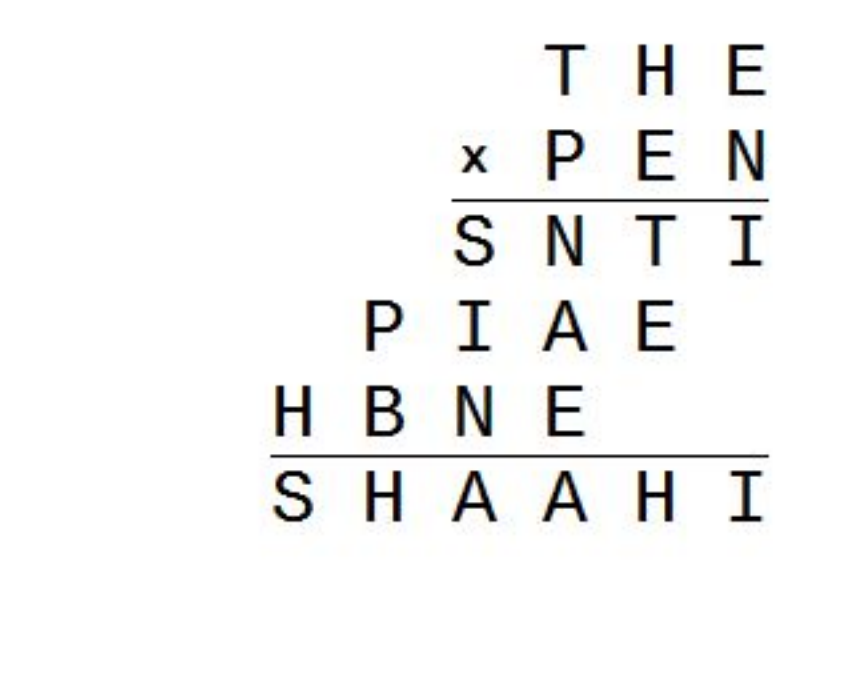
If you compare [M I L 5] and [1 7 6 5]
M=1, I=7, L=6
At this stage, you have to check further whether these values violates any Basic Cryptaritmetic Rules
For checking this
put these values in

```
    B  O  B
       x  B
  M  E  O  Y
```

i.e. 3 5 3
x 3
1 0 5 9 [M 0 5 Y]
From here you are also getting M=1, E=0, O=5 and Y=9.
Hence, It satisfies the Basic Cryptarithmetic Rules.

3 5 3
x 3 5 3
1 0 5 9
1 7 6 5
1 0 5 9
1 2 4 6 0 9

Cryptarithmetic Problem 10



1. Value of N ?

(a) 2 (b) 4 (c) 3 (d) 8

Value of T + 2E ?

2.

(a) 15 (b) 17 (c) 16 (d) 11

Which of the following forms Right Angled Triangle ?

3.

(a) N, P, E (b) T, P, E (c) T, H, A (d) B, N, S

(The solution has been given considering you as a beginner in Cryptarithmetic)

Firstly, you have to divide the problem in three parts, so that it will help you in collecting more clues.

(1)
```
  T H E
  x N
S N T I
```
(2)
```
  T H E
  x E
P I A E
```
(3)
```
  T H E
  x P
H B N E
```
(Choose one among the three which has maximum number of clues.)

In this case, you can take Case(2)

Here, E x E = _E

Therefore, possible values of E = {5, 6} Rule 2

As,

5 x 5 = _5 [25] (last digit)

6 x 6 = _6 [36] (last digit)

```
  T H E
```

```
        x P E N
        S N T I
      P I A E
    H B N E
    S H A A H I
```

Further, you have one more clue E x P = _E

Hence, possible values of E and P are as follows.

Case I - When E={5} and P={3, 7, 9}

Case II - When P={6} and E={2, 4, 8} Rule 3

Now, you have to start hit and trial with both the cases.

Firstly, take E=5 and P = {3, 7, 9}

```
        T H 5
      x P 5 N
      S N T I
    P I A 5
  H B N 5
  S H A A H I
```

Further, 5 x N = _I [S N T I]

[If you multiply 5 to any number, you will only get [0, 5] as their last digit.]

(5 x Even=_0 and 5 x Odd=_5)

Therefore, value of I=0

Hence, possible value of N = {2, 4, 6, 8}

Now, put E=5 and I=0 and write the problem again.

```
        T H 5
      x P 5 N
      S N T 0
    P 0 A 5
  H B N 5
  S H A A H 0
```

Now, again divide the problem in three parts

```
(1)       T H 5
            x N
      S N T O
(2)       T H 5
            x 5
      P 0 A 5
(3)       T H 5
            x P
```

H B N 5

Take Case (2) as it has less number of variable.

(2) T H 5
x 5
P 0 A 5

Earlier, you have only three possible values of P={3, 7, 9}
you have to start hit and trial with the values of P
Firstly, take P=3

(2) T H 5
x 5
3 0 A 5

Then T=6 [6 x 5 = 30]

T H 5
x P 5 N
S N T 0
P 0 A 5
H B N 5
S H A A H 0

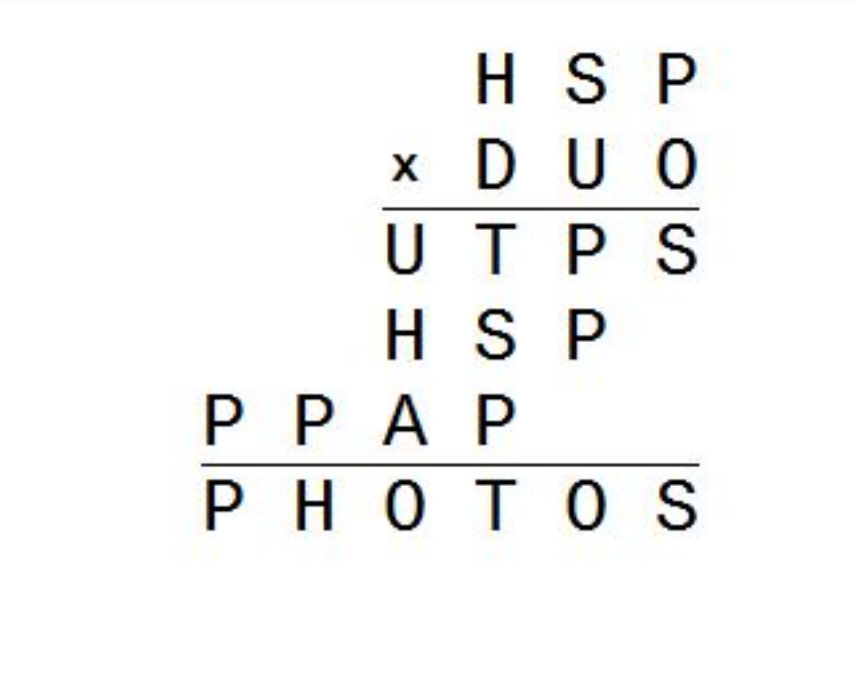
as T + 5 = H i.e. 6 + 5=_1 [last digit] Hence H=1, A=7

(2) 6 1 5
x 5
3 0 7 5

Put these values in the main problem,
T=6, H=1, E=5, P=3, I=0, A=7

6 1 5
x 3 5 4
2 4 6 0
3 0 7 5
1 8 4 5
2 1 7 7 1 0

Cryptarithmetic Multiplication 11



1. Value of H + S + P ?

(a) 10 (b) 11 (c) 12 (d) 13

2. Which of the following forms a triangle ?

(a) H, S, P (b) H, T, O (c) D, U, O (d) U, T, P

3. Value of 2D + P ?

(a) 14 (b) 15 (c) 16 (d) 17

H S P
x D U O
U T P S
H S P
P P A P
P H O T O S

You can easily predict the value of U=1 as,

H S P
x U
H S P

i.e. after multiplication you are getting the same results which is only possible when U=1

For example.

A B C 3 4 5
x 1 x 1
A B C 3 4 5

Further, You have one more clue

H S P
x D U O
U T P S
H S P
P P A P
P H O T O S

D x P= _P [P P A P]

Hence, Possible values of D and P are

Case I : When D= {6} and P={2, 4, 8} Rule 3

Case I : When P= {5} and D={3, 7, 9}

Now, You have to collect some more clues for solving the problem,

Such as

H S P
x D U O
U T P S
H S P
P P A P

P H O T O S

P + P = O and P x O =_S
Now, take case I to solve the problem
Case I - When D={6} and P={2, 4, 8}
Now, you have to start hit and trial with the value of P={2, 4, 8}
Let's take P=2
then O=4 [P + P = O] and as P x O=_S Hence S=8
i.e. U=1, O=4, S=8, P=2 and D=6
Put these values in the main problem and rewrite the problem.

```
      H 8 2
    x 6 1 4
    1 T 2 8
    H 8 2
 2 2 A 2
 2 H 4 T 4 S
```

As,

```
      H 8 2
        x 6
    2 2 A 2
```

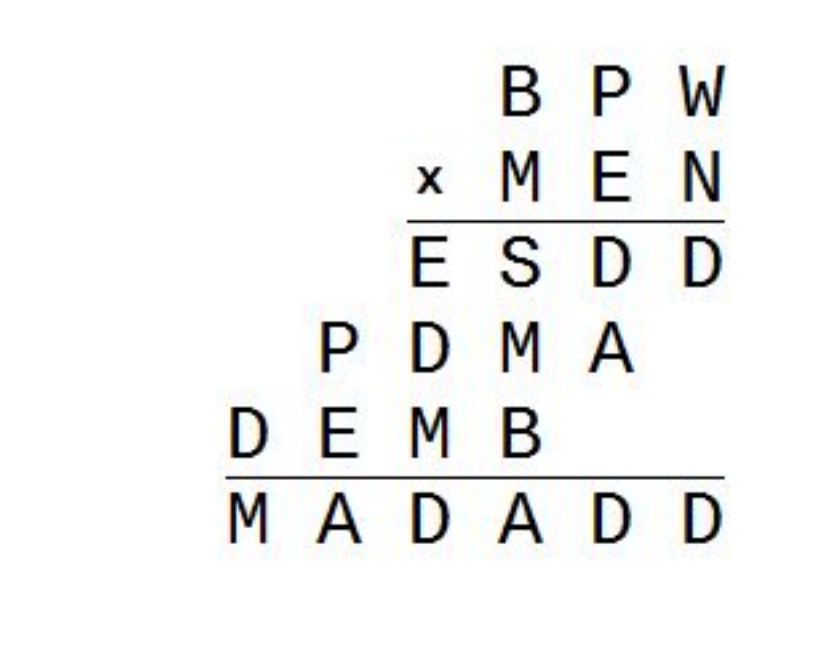
Now you can easily predict the value of H=3 and it also satisfies Basic Cryptarithmetic Rules.
18 + 4(carry)= 33[6 x 3 =18]
Now,

```
      3 8 2
        x 6
   2 2 9 2 [ 2 2 A 2]
```

Hence, A=9

```
      3 8 2
    x 6 1 4
    1 5 2 8
    3 8 2
2 2 9 2
2 3 4 5 4 8
```

Cryptarithmetic Multiplication 12



```
      B P W
    x M E N
    -------
    E S D D
  P D M A
D E M B
-------
M A D A D D
```

1. Value of B ?

(a) 2 (b) 4 (c) 6 (d) 8

2. Value of W/2 ?

(a) 1 (b) 2 (c) 3 (d) 4

3. Sum of E + S + D + D ?

(a) 16 (b) 17 (c) 18 (d) 19

```
      B  P  W
    x  M  E  N
    E  S  D  D
  P  D  M  A
 D  E  M  B
 M  A  D  A  D  D
```

As, D + A = D

Hence A=0 Detailed Explanation

Put A=0 and rewrite the problem.

```
      B  P  W
    x  M  E  N
    E  S  D  D
  P  D  M  0
 D  E  M  B
 M  0  D  0  D  D
```

Now,

```
      B  P  W
     x M E  N
    E  S  D  D
  P  D  M  0
 D  E  M  B
 M  0  D  0  D  D
```

Here, You can see, E x W = _0 [P D M 0]

which is only possible when E=5 and W={2, 4, 6, 8}

[To get O at unit digit you must have to multiply 5 with an even number {2, 4, 6, 8}]

[5 x even =_0 and 5 x odd=_5] Possible ways of getting 0 at Unit Digit

Put E=5 and rewrite the problem,

```
      B  P  W
    x  M  5  N
    5  S  D  D
  P  D  M  0
 D  5  M  B
 M  0  D  0  D  D
```

Further,

```
      B  P  W
    x  M  5  N
    5  S  D  D
  P  D  M  0
```

D 5 M B
M 0 D 0 D D

At this stage, You have two clues,

1. D + 1 (carry) = M
2. P + 5 = _0 [P + 5 + 1 (carry) = 10]

Hence, Possible value of P=4

[Relax it's going to take some time to understand the concept.Please read... again!]

Let's take P=4 and rewrite the problem again,

B 4 W
x M 5 N
5 S D D
4 D M 0
D 5 M B
M 0 D 0 D D

At this stage, Divide the problem in three parts

(1) B 4 W
x N
5 S D D

(2) B 4 W
x 5
4 D M 0

(3) B 4 W
x M
D 5 M B

If you further analyse, (2)

(2) B 4 W
x 5
4 D M O

Here, You can see 4 is at thousand place.

which will be only possible when B={8, 9}

[5 x 8 = 40 , 5 x 9 = 45]

We have to check further with each possible values of B.

Let's take B=8,

(2) 8 4 W
x 5
4 2 M 0 [4 D M 0]

If you compare side by side,you have D=2

Hence M=3 [As, D + 1(carry) = M]

Now it reduces to,

```
    8  4  W
       x  5
  4  2  3  0
```

You can easily predict the value of W=6.

```
    8  4  6
       x  5
  4  2  3  0
```

Put these values in the main problem

B=8, P=4, W=6, M=3, E=5, A=0

```
    8  4  6
  x  3  5  7
  5  9  2  2
4  2  3  0
2  5  3  8
3  0  2  0  2  2
```

```
    B  P  W
  x  M  E  N
  E  S  D  D
P  D  M  A
D  E  M  B
M  A  D  A  D  D
```

As, D + A = D

Hence A=0 Detailed Explanation

Put A=0 and rewrite the problem.

```
    B  P  W
  x  M  E  N
  E  S  D  D
P  D  M  0
D  E  M  B
M  0  D  0  D  D
```

Now,

```
    B  P  W
  x M E  N
  E  S  D  D
P  D  M  0
D  E  M  B
```

M 0 D 0 D D

Here, You can see, E x W = _0 [P D M 0]

which is only possible when E=5 and W={2, 4, 6, 8}

[To get O at unit digit you must have to multiply 5 with an even number {2, 4, 6, 8}]

[5 x even =_0 and 5 x odd=_5] Possible ways of getting 0 at Unit Digit

Put E=5 and rewrite the problem,

```
    B P W
  x M 5 N
  5 S D D
P D M 0
D 5 M B
M 0 D 0 D D
```

Further,

```
    B P W
  x M 5 N
  5 S D D
P D M 0
D 5 M B
M 0 D 0 D D
```

At this stage, You have two clues,

1. D + 1 (carry) = M
2. P + 5 = _0 [P + 5 + 1 (carry) = 10]

Hence, Possible value of P=4

[Relax it's going to take some time to understand the concept.Please read... again!]

Let's take P=4 and rewrite the problem again,

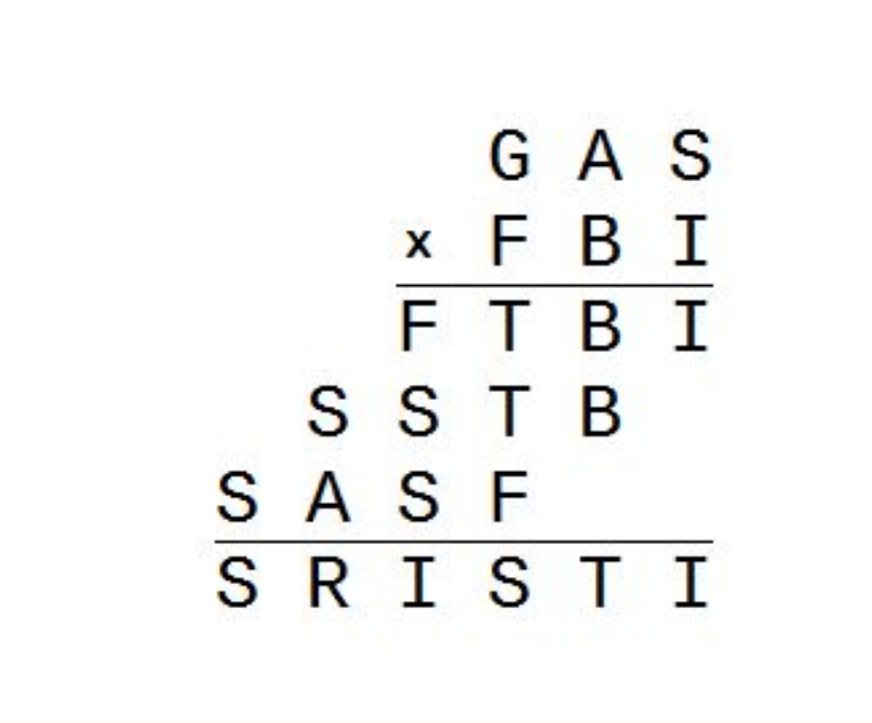
```
    B 4 W
  x M 5 N
  5 S D D
4 D M 0
D 5 M B
M 0 D 0 D D
```

At this stage, Divide the problem in three parts

```
(1)     B 4 W
          x N
      5 S D D
(2)     B 4 W
          x 5
      4 D M 0
```

(3) B 4 W
x M
D 5 M B
If you further analyse, (2)
(2) B 4 W
x 5
4 D M O
Here, You can see 4 is at thousand place.
which will be only possible when B={8, 9}
[5 x 8 = 40 , 5 x 9 = 45]
We have to check further with each possible values of B.
Let's take B=8,
(2) 8 4 W
x 5
4 2 M 0 [4 D M 0]
If you compare side by side,you have D=2
Hence M=3 [As, D + 1(carry) = M]
Now it reduces to,
8 4 W
x 5
4 2 3 0
You can easily predict the value of W=6.
8 4 6
x 5
4 2 3 0
Put these values in the main problem
B=8, P=4, W=6, M=3, E=5, A=0
8 4 6
x 3 5 7
5 9 2 2
4 2 3 0
2 5 3 8
3 0 2 0 2 2

Cryptarithmetic Multiplication 13



1. Find the value of G + A + S ?

(a) 12 (b) 13 (c) 14 (d) 15

2. Find the value of 2S + R?

(a) 9 (b) 5 (c) 10 (d) 12

3. Value of F ?

(a) 1 (b) 2 (c) 3 (d) 4

```
      G  A  S
    x F  B  I
    F  T  B  I
  S  S  T  B
S  A  S  F
S  R  I  S  T  I
```

As,
S x I= _I [F T B I]
S x B= _B [S S T B]
S x F= _F [S A S F]
As you are getting the same digit after multiplying with S (last digit). This condition is only satisfied when value of S=1.
Hence, S=1

Put S=1 and rewrite the problem,

```
      G  A  1
    x F  B  I
    F  T  B  I
  1  1  T  B
1 A  1  F
1  R  I  1  T  I
```

Now,

```
      G  A  1
    x F  B  I
    F  T B  I
  1  1  T  B
1  A  1  F
1  R  I  1 T  I
```

Here, You can collect one more clue i.e. B + B = T

Now, At this stage, divide the problem in 3 parts i.e.

```
(1)      G  A  1
           x  I
    F  T  B  I
```

```
(2)        G  A  1
             x  B
         1  1  T  B
```

```
(3)        G  A  1
             X  F
         1  A  1  F
```

Now can take (2) (As it has maximum number of clues i.e. you can see 1 is getting repeated thrice)
You can also take (3) and solve the further.
In this case taking (2)

```
(2)        G  A  1
             x  B
         1  1  T  B
```

Now, you have to start hit and trial with the possible value of B={2, 3, 4, 5, 6, 7, 8, 9}

Let's take B=2
then T=4 as B+B=T
Put B=2 and T=4 in (2)

```
(2)        G  A  1
             x  2
         1  1  4  2
```

Here, you can easily predict the value of A=7, and G=5
[Value of A cannot be 2, as it violates the Basic Cryptarithmetic Rules.You have already taken B=2]
Now, put A=7, T=4 and G=5 in main problem,

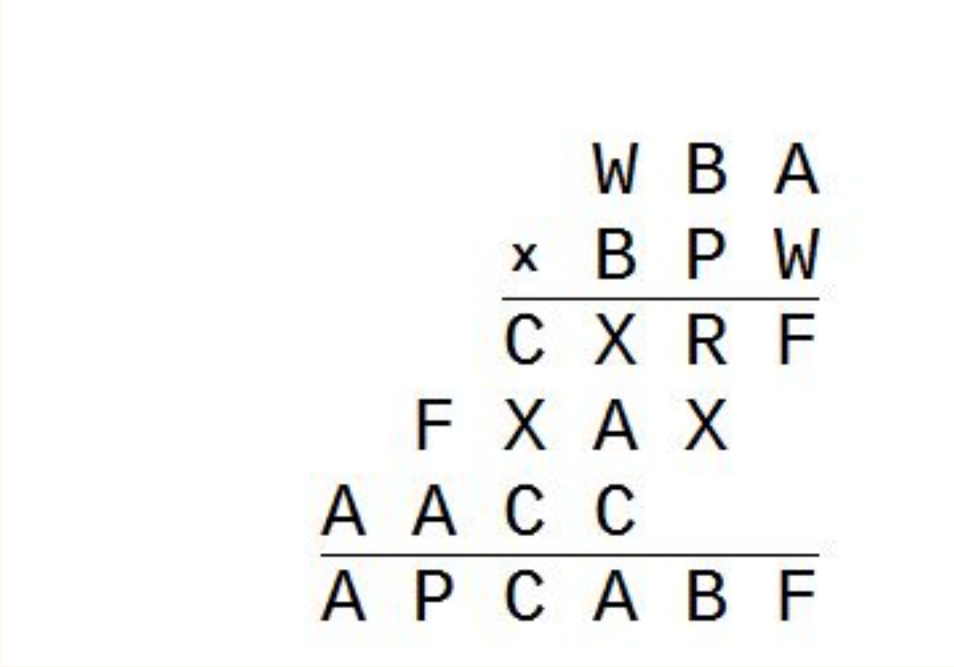
```
          5  7  1
        x  F  2  I
        F  4  2  I
     1  1  4  2
  1  7  1  F
  1  R  I  1  4  I
```

Now, you can easily predict the R=9, F=3

```
          5  7  1
        x  3  2  6
```

```
    3 4 2 6
  1 1 4 2
1 7 1 3
1 8 6 1 4 6
```

Cryptarithmetic Multiplication 14



1. Value of A ?

(a) 3 (b) 4 (c) 5 (d) 6

2. Find the value of W + P + R ?

(a) 16 (b) 17 (c) 18 (d) 19

Value of R ?

3.

(a) 6 (b) 7 (c) 8 (d) 9

```
    W B A
  x B P W
  C X R F
F X A X
A A C C
A P C A B F
```

Firstly divide the problem in three parts. As,

```
(1)   W B A     (2)   W B A     (3)   W B A
      x W             x P             x B
  C X R F         F X A X         A A C C
```

Now you have to select one from three which has maximum number of clues.i.e. maximum number of variables getting repeated.
In this case take,

```
(3)   W B A
      x B
  A A C C
```

Now you have to start hit and trial with the possible values C i.e.

C={1, 2, 3, 4, 5, 6, 7, 8, 9}
Value of C cannot be equal to zero)

```
(1)   W B A
      x W
  0 X R F
```

Cryptarithmetic Tutorial Fundamental Rules Point 03
Firstly take C=1 and check further

Possible ways of getting 1 as Unit Digit

```
(3)        W  B  A
              x  B
           A  A  C  C
```

Case 1 C=1 A=1 B=1 Rejected As A=B=C
Case 2 C=1 A=7 B=3 Needs to be checked further
Case 3 C=1 A=3 B=7 Needs to be checked further
Case 4 C=1 A=9 B=9 Rejected As A=B
[In Cryptarithmetic, each variable should have unique and distinct values.]
Now check for Case 2 and Case 3 only.
Case 2 C=1, A=7, B=3

```
(3)    W  B  A
          x B
    A  A  C  C
```

```
       W  3  7
          x  3
    7  7  1  1
```

Rejected As even after taking the value of W=9, You will never get 77.

```
       W  3  7
          x  3
    7  7  1  1
```

Now, you have to check with Case 3
Case 3 C=1, A=3, B=7

```
       W  B  A
          x  B
    A  A  C  C
```

```
       W  7  3
          x  7
    3  3  1  1
```

Here you can easily predict the value of W=4
Hence W=4, C=1, A=3, B=7 put these values in main problem

```
          4  7  3
       x  7  P  4
```

```
      1  X  R  F
    F  X  3  X
  3  3  1  1
  3  P  1  3  7  F
```

Now, you can see

```
        4  7  3
          x  4
      1  8  9  2 [ 1  X  R  F]
```

If you compare side by side you will get X=8, R=9 and F=2

Put these values in main problem, and rewrite again

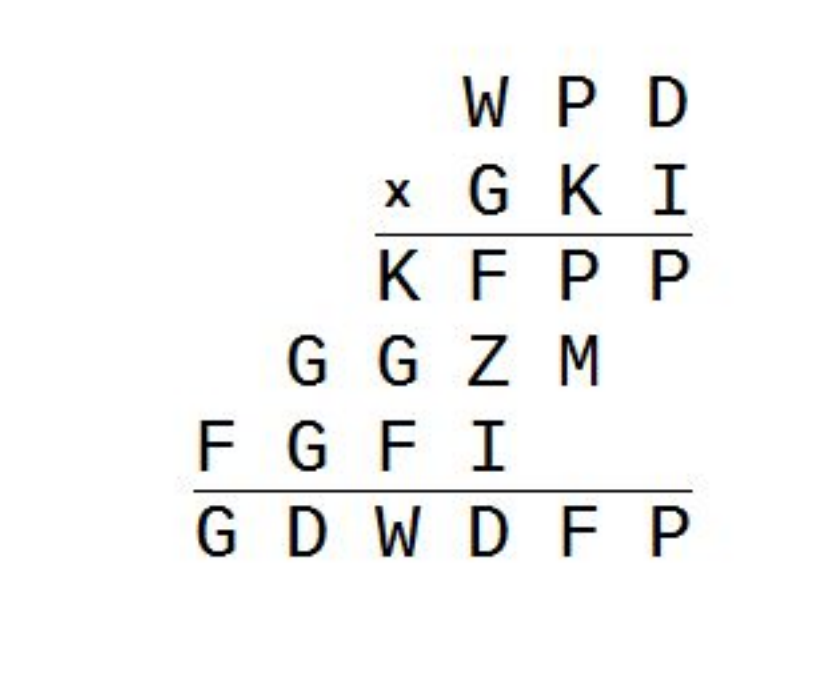
```
        4  7  3
      x  7  P  4
      1  8  9  2
    2  8  3  8
  3  3  1  1
  3  P  1  3  7  2
```

Now you can easily predict the value of P=6

Hence,

```
        4  7  3
      x  7  6  4
      1  8  9  2
    2  8  3  8
  3  3  1  1
  3  6  1  3  7  2
```

Cryptarithmetic Multiplication 15



1. Value of W ?

(a) 6 (b) 7 (c) 8 (d) 9

2. Value of 2F + P ?

(a) 12 (b) 13 (c) 14 (d) 15

3. Value of 3G + F ?

(a) 20 (b) 21 (c) 22 (d) 23

(Solution have been given considering you as beginner in Cryptarithmetic)

```
      W P D
    x G K I
    K F P P
  G G Z M
F G F I
G D W D F P
```

Now you have to divide the problem into three parts. As,

```
(1)     W P D
          x I
        K F P P
```

```
(2)     W P D
          x K
        G G Z M
```

```
(3)     W P D
          x G
        F G F I
```

At this stage, you have to analyse all three parts and find which has maximum number of clues.(i.e. maximum number of variables in the repetition)

In this problem you can choose (1). You can see P is repeated three times.

Hence, take (1)

```
(1)     W P D
          x I
        K F P P
```

Now you have to start hit and trial with the possible value of P={1, 2, 3, 4, 5, 6, 7, 8, 9}

Firstly take P=1

Possible ways of getting 1 at Unit Digit

Case 1 - D=1, I=1, P=1 Rejected (D = I = P)

Case 2 - D=7, I=3, P=1 Needs to be checked further

Case 3- D=3, I=7, P=1 Needs to be checked further

Case 4- D=9, I=9, P=1 Rejected (D = I)
[In Cryptarithmetic, each variable should have unique and distinct values.]
Now check for Case 2 and Case 3
Put P=1
(1) W 1 D
x I
K F 1 1
Case 2 D=7, I=3, P=1
(1) W 1 7
x 3
K F 1 1 [K F 5 1] Rejected
Case 3 D=3, I=7, P=1
(1) W 1 3
x 7
K F 1 1[K F 9 1] Rejected
[Relax it's going to take some time to understand the whole concept. Please read.. again!]
Now take P=2
Possible ways of getting 2 at Unit Digit

Case 1 D=1, I=2, P=2 Rejected (P = I)
Case 2 D=2, I=1, P=2 Rejected (D = P)
Case 3 D=6, I=2, P=2 Rejected (I = P)
Case 4 D=2, I=6, P=2 Rejected (D = P)
Case 5 D=3, I=4, P=2 Needs to be checked
Case 6 D=4, I=3, P=2 Needs to be checked
Case 7 D=4, I=8, P=2 Needs to be checked
Case 8 D=8, I=4, P=2 Needs to be checked
Case 9 D=7, I=6, P=2 Needs to be checked
Case 10 D=6, I=7, P=2 Needs to be checked
Case 11 D=8, I=9, P=2 Needs to be checked
Case 12 D=9, I=8, P=2 Needs to be checked
Put P=2
(1) W 2 D
x I
K F 2 2

Case 5 D=3, I=4, P=2
(1) W 2 3

x 4
K F 2 2 [K F 9 2] Rejected
Case 6 D=4, I=3, P=2
(1) W 2 4
x 3
K F 2 2 [K F 7 2] Rejected
Case 7 D=4, I=8, P=2
(1) W 2 4
x 8
K F 2 2 [K F 7 2] Rejected

Case 8 D=8, I=4, P=2
(1) W 2 8
x 4
K F 2 2 [K F 9 2] Rejected
Case 9 D=7, I=6, P=2
(1) W 2 7
x 6
K F 2 2 [K F 6 2] Rejected
Case 10 D=6, I=7, P=2
(1) W 2 6
x 7
K F 2 2 [K F 8 2] Rejected

Case 11 D=8, P=9, P=2
(1) W 2 8
x 9
K F 2 2 [K F 5 2] Rejected
Case 12 D=9, P=8, P=2
(1) W 2 9
x 8
K F 2 2 [K F 3 2] Rejected

Possible ways of getting 3 at Unit Digit

Case 1 D=3, I=1, P=3 Rejected (D = P)
Case 2 D=1, I=3, P=3 Rejected (I = P)
Case 3 D=7, I=9, P=3 Needs to be checked further

Case 4 D=9, I=7, P=3 Needs to be checked further
Now check for Case 3 and Case 4
Put P=3
(1) W 3 D
x I
K F 3 3
Case 3 D=7 I=9, P=3
(1) W 3 7
x 9
K F 3 3 [K F 3 3]
for this case you have to check more.
As you have taken I=9, P=3 and D=7
Put these values in main problem and write again.
W 3 7
x G K 9
K F 3 3
G G Z M
F G F 9
G 7 W 7 F 3
As, W 3 7
x G
F G F 9
For getting 9 at unit digit, G should be equal to 7. As you have already taken D=7 so G cannot be equal to 7. Rejected

[Relax it's going to take some time to understand the concept. Please read..... again !]
Case 4 D=9, I=7, P=3
(1) W 3 9
x 7
K F 3 3 [K F 4 3] Rejected
Now take P=4
Possible ways of getting 4 at unit digit

Case 1 D=1, I=4, P=4 Rejected (I = P)
Case 2 D=4, I=1, P=4 Rejected (D = P)
Case 3 D=2, I=2, P=4 Rejected (D = I)
Case 4 D=7, I=2, P=4 Needs to be checked
Case 5 D=2, I=7, P=4 Needs to be checked

Case 6 D=3, I=8, P=4 Needs to be checked
Case 7 D=8, I=3, P=4 Needs to be checked
Case 8 D=4, I=6, P=4 Rejected (D = P)
Case 9 D=6, I=4, P=4 Rejected (I = P)
Case 10 D=9, I=6, P=4 Needs to be checked
Case 11 D=6, I=9, P=4 Needs to be checked
Case 12 D=8, I=8, P=4 Rejected (D = I)

```
(1)        W  P  D
             x  I
           K  F  P  P
```

Case 4 D=7, I=2, P=4

```
(1)        W  4  7
             x  2
           K  F  4  4 [ K F 9 4] Rejected
```

Case 5 D=2, I=7, P=4

```
(1)        W  4  2
             x  7
           K  F  4  4 [ K F 9 4] Rejected
```

Case 6 D=3, I=8, P=4

```
(1)        W  4  3
             x  8
           K  F  4  4
```

For this case you have to check more.
Put D=3, I=8, and P=4 and rewrite the problem

```
             W  4  3
           x  G  K  8
           K  F  4  4
        G  G  Z  M
     F  G  F  8
     G  3  W  3  F  4
```

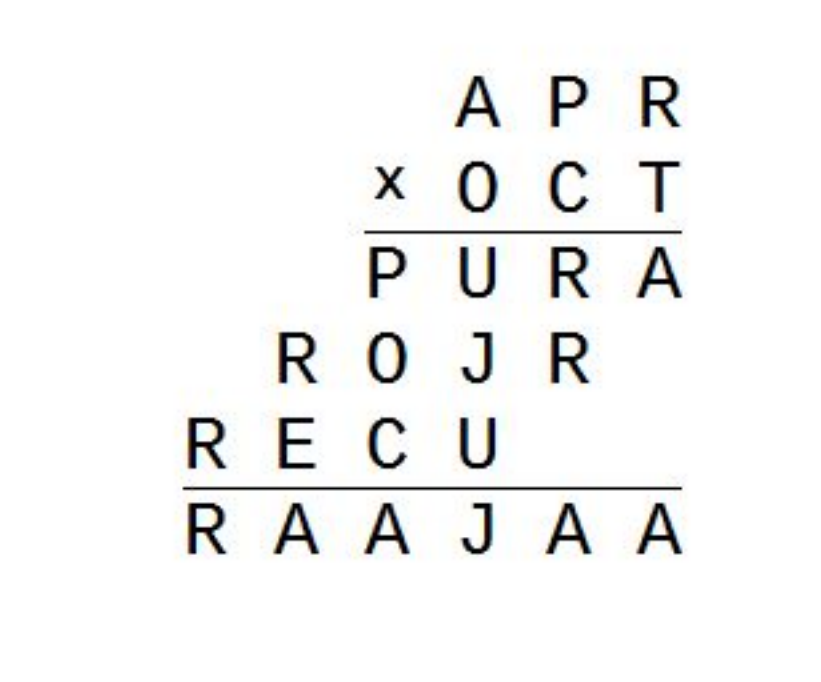
At this stage you can easily predict the value of G=6
put G=6 in the main problem

```
             W  4  3
           x  6  K  8
           K  F  4  4
        6  6  Z  M
```

F 6 6 8
6 3 W 3 F 4
Here you can see value of F=5 put F=5
W 4 3
x 6 K 8
K 5 4 4
6 6 Z M
5 6 6 8
6 3 W 3 5 4
now you can easily solve the problem.
W=9, M=1, K=6

9 4 3
x 6 7 8
7 5 4 4
6 6 0 1
5 6 5 8
6 3 9 3 5 4

Cryptarithmetic Multiplication 16



1. Which of the following set contains only even numbers ?

(a) A, R, C (b) A, P, R (c) P, R, O (d) O, C, T

2. Which of the following set contains odd numbers ?

(a) A, P, R (b) T, O, P (c) J, T, C (d) R, O, C

3. Value of A ?

(a) 1 (b) 2 (c) 3 (d) 4

```
      A  P  R
    x  O  C  T
    P  U  R  A
  R  O  J  R
R  E  C  U
R  A  A  J  A  A
```

As, R x C= _C [R O J R]
Hence Possible values of R and C are
Case 1 When C={6} then R={2, 4, 8}
Case 2 When R={5} then C={3, 7, 9} Detailed Explanation -Rule 3
At this stage you can also collect one more clue

```
      A  P  R
    x  O  C  T
    P  U  R  A
  R  O  J  R
R  E  C  U
R  A  A  J  A  A
```

i.e. R + R = A
Now firstly take Case-1
Case 1- C={6} then R={2, 4, 8}
take C=6 and R=2
Put C=6 and R=2 and rewrite the problem again.

```
      A  P  2
    x  O  6  T
    P  U  2  A
  2  O  J  2
2  E  6  U
2  A  A  J  A  A
```

```
      A  P  R
    x  O  C  T
    P  U  R  A
```

```
      R  O  J  R
   R  E  C  U
   R  A  A  J  A  A
```

At this stage you can easily predict the value of A=4
Put A=4 and rewrite the problem again

```
         4  P  2
      x  O  6  T
      P  U  2  4
   2  O  J  2
2  E  6  U
2  4  4  J  4  4
```

At this you can easily predict the value of T=7
(As, 2 x T= _ 4) (T cannot be equal to 2 as you have already taken R=2)
Put T=7 and rewrite the problem.

```
         4  P  2
      x  O  6  7
      P  U  2  4
   2  O  J  2
2  E  6  U
2  4  4  J  4  4
```

At this stage, you can see 2 + E + 1(carry) = 4
Hence E=1

Now,

```
         4  P  2
            x  O
      2  E  6  U
```

you can see, 2 is present at thousand place, which is only possible when value of O=5
(Value of O cannot be equal to 6,7 as you have already taken these values)
Hence put O=5 and E=1 and rewrite the problem.

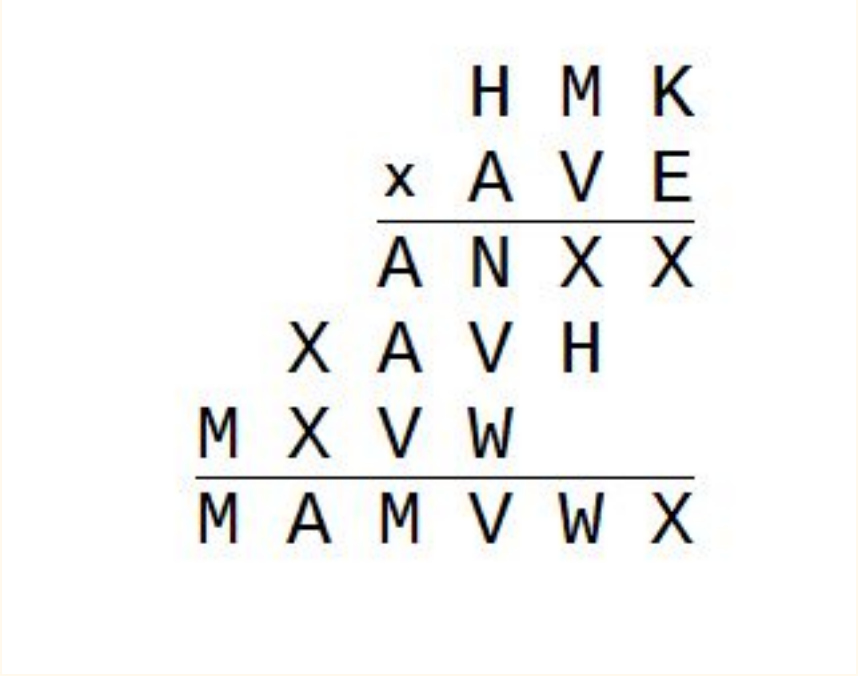
```
         4  P  2
      x  5  6  7
      P  U  2  4
   2  5  J  2
2  1  6  U
```

```
    2 4 4 J 4 4
```

Now you can easily solve the problem.

```
      4 3 2
    x 5 6 7
    3 0 2 4
  2 5 9 2
2 1 6 0
2 4 4 9 4 4
```

Cryptarithmetic Multiplication 18



1. Value of K ?

(a) 4 (b) 5 (c) 6 (d) 7

Value of M + X + V + M ?

2.

(a) 9 (b) 10 (c) 11 (d) 13

Value of W ?

3.

(a) 0 (b) 1 (c) 2 (d) 3

```
    H M K
  x A V E
  A N X X
X A V H
M X V W
M A M V W X
```

(You have to use Unit Digit Method for solving this Cryptarithmetic Problem.)
Firstly divide the problem in three parts.

```
(1)     H M K
          x E
    A N X X
(2)     H M K
          x V
  X A V H
(3)     H M K
          x A
  M X V W
```

At this stage, you have to analyse all the three parts and find which has maximum number of clues.
In this problem you can choose (1)(X is getting repeated at unit and tens place.)
Take case (1)

```
(1)     H M K
          x E
```

A N X X

Now you have to start hit and trial with the possible values of X = {1, 2, 3, 4, 5, 6, 7, 8, 9}

Firstly take X=1

Possible ways of getting 1 at Unit Digit

Case 1 K=1, E=1, X=1 Rejected (E = K = X)
Case 2 K=7, E=3, X=1 Needs to be checked
Case 3 K=3, E=7, X=1 Needs to be checked
Case 4 K=9, E=9, X=1 Rejected (K = E)

[In Cryptarithmetic, each variable should have unique and distinct values.]

Now check for Case 2 and Case 3

Case 2 K=7, E=3, X=1

Put these values in (1)

(1) H M 7
x 3
A N 1 1

For getting 1 at tens place value of M should be 3. But you have already taken E=3.Hence value of M cannot be equal to 3. Rejected

Case 3 K=3, E=7, X=1

Put these values in (1)

(1) H M 3
x 7
A N 1 1

For getting 1 at tens place value of M should be 7. But you have already taken E=7. Hence value of M cannot be equal to 7. Rejected

[Relax it's going to take some time to understand the concept. Please read... again!]

Possible ways of getting 2 at Unit Digit

Case 1 K=1, E=2, X=2 Rejected (E = X)
Case 2 K=2, E=1, X=2 Rejected (K = X)
Case 3 K=6, E=2, X=2 Rejected (E = X)
Case 4 K=2, E=6, X=2 Rejected (K = X)
Case 5 K=3, E=4, X=2 Needs to be checked
Case 6 K=4, E=3, X=2 Needs to be checked
Case 7 K=6, E=7, X=2 Needs to be checked

Case 8 K=7, E=6, X=2 Needs to be checked
Case 9 K=8, E=4, X=2 Needs to be checked
Case 10 K=4, E=8, X=2 Needs to be checked
Case 11 K=9, E=8, X=2 Needs to be checked
Case 12 K=8, E=9, X=2 Needs to be checked
Now you have to check for Case 5 to Case 12

Case 5 K=3, E=4, X=2
Put these values in (1)
(1) H M 3
x 4
A N 2 2
Any value of M cannot give 2 at tens place.
[If you multiply any number by 4 you will always get a even number.]
[even(4 x any number) + 1(carry)= odd]
Rejected
Case 6 K=4, E=3, X=2
Put these values in (1)
(1) H M 4
x 3
A N 2 2
At this stage possible value of M=7
put M=7, K=4, E=3, X=2 in the main problem
H 7 4
x A V 3
A N 2 2
2 A V H
7 2 V W
7 A 7 V W 2
Here you can easily predict the value of A=5
H M 4
x 5 V 3
5 N 2 2
2 5 V H
7 2 V W
7 5 7 V W 2
In (1) you can see
H M 4

x 3

5 N 2 2

You will never get 5 at thousand place for any value of H.You are multiplying a three digit number by 3]

Rejected

[Relax it is going to take some to understand the concept. Please read... again!]

Case 7 K=6, E=7, X=2

Put these values in (1)

(1) H M 6

x 7

A N 2 2

At this stage you can easily predict the value of M=4

[7 x 4 + 4(carry) =_2]

Hence put M=4, K=6, E=7 and X=2 in main problem

H 4 6

x A V 7

A N 2 2

2 A V H

4 2 V W

4 A 4 V W 2

At this stage you can easily predict the value of A=5

(As you have already taken K=6 and M=4. So, value of A cannot be equal to 4, 6)

put A=5 and rewrite the problem again.

H 4 6

x 5 V 7

5 N 2 2

2 5 V H

4 2 V W

4 5 4 V W 2

Now you can see W=0 H=8 (2 + H = W)

8 4 6

x 5 V 7

5 N 2 2

2 5 V 8

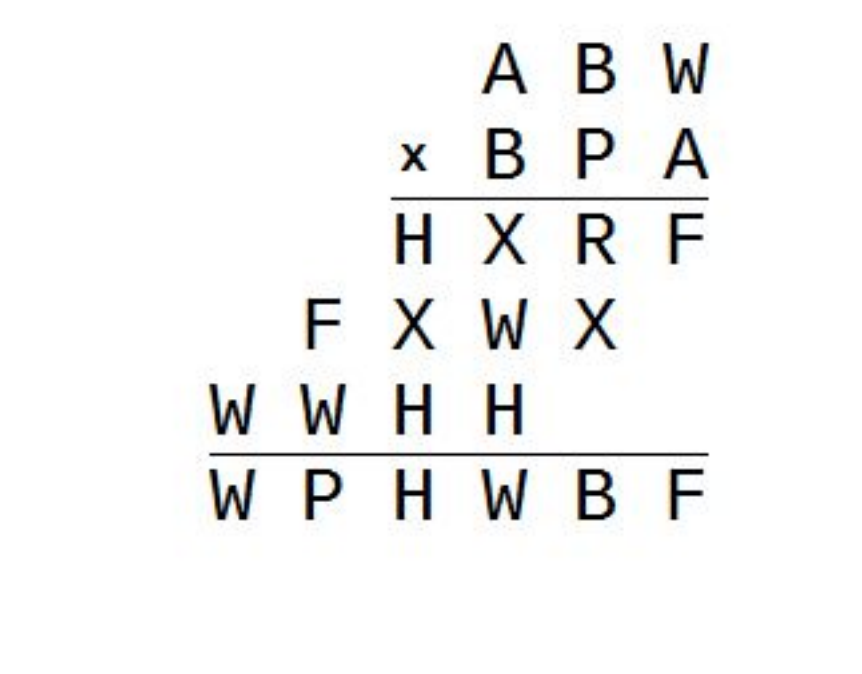
4 2 V 0

4 5 4 V 0 2

Now you can easily predict other values.

```
      8 4 6
    x 5 3 7
    5 9 2 2
  2 5 3 8
4 2 3 0
4 5 4 3 0 2
```

Cryptarithmetic Multiplication 19



1. Which of the following set forms a triangle ?

(a) H, X, F (b) A, P, R (c) B, H, F (d) H, W, X

Value of P ?

2.

(a) 4 (b) 5 (c) 6 (d) 7

Which of the following set contains only even numbers ?

3.

(a) A, B, W (b) A, P, X (c) A, P, R (d) B, H, F

(Solution has been given considering you as a beginner in Cryptarithmetic.)

```
    A  B  W
  x B  P  A
  H  X  R  F
F  X  W  X
W  W  H  H
W  P  H  W  B  F
```

(You have to use Unit Digit Method for solving this Cryptarithmetic problem)
Firstly divide the problem in three parts for collecting the clues.

(1)
```
    A  B  W
  x A
H  X  R  F
```

(2)
```
    A  B  W
  x P
F  X  W  X
```

(3)
```
    A  B  W
  x B
W  W  H  H
```

Now analyse all the three parts separately,
In Case (3) you can see B, H, W are repeated twice.
Hence take Case (3)

(3) A B W
x B
W W H H

Now you have to start hit and trial with the possible values of H={1, 2, 3, 4, 5, 6, 7, 8, 9,0}

Firstly take H=1
Possible ways of getting 1 at Unit Digit

Case 1 W=1, B=1, H=1 Rejected (W = B = H)
Case 2 W=3, B=7, H=1 Needs to be checked
Case 3 W=7, B=3, H=1 Needs to be checked
Case 4 W=9, B=9, H=1 Rejected (W = B)
[In Cryptarithmetic, each variable should have unique and distinct values.]
You have to only check for Case 2 and Case 3
Case 2 W=3, B=7, H=1
put these values in (3) i.e.
(3) A 7 3
x 7
3 3 1 1
At this stage you can easily predict the value of A=4
Now you have to put these values in main problem and check whether it satisfies the Basic Cryptarithmetic Rules.
put W=3, H=1, A=4, and B=7
4 7 3
x 7 P 4
1 X R F
F X 3 X
3 3 1 1
3 P 1 3 7 F
Now, easily find the values of other variables.
(1) 4 7 3
x 4
1 X R F [1 8 9 2]
If you compare side by side then you will get
X=8, R=9 and F=2
Now put these values

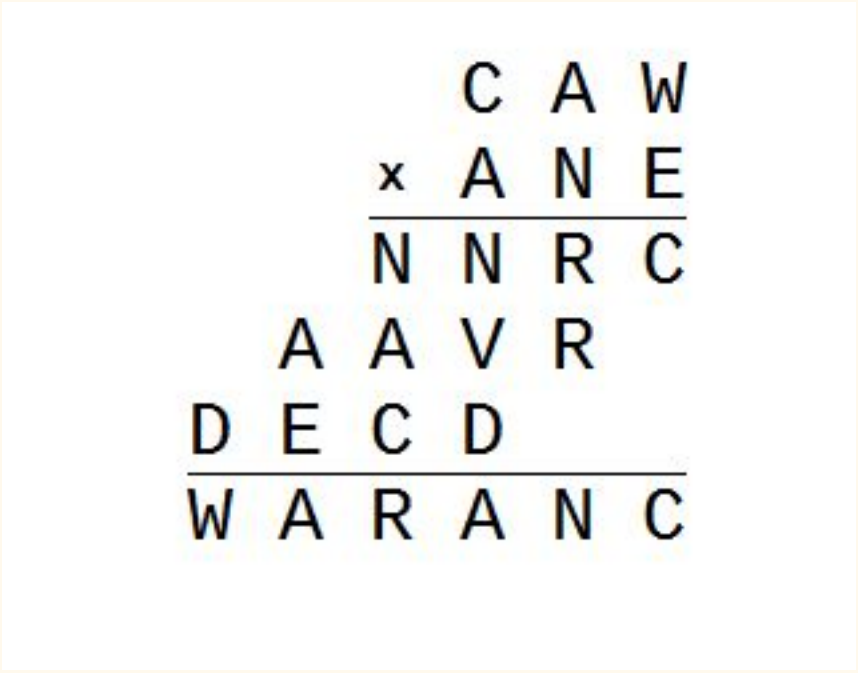
```
        4 7 3
      x 7 P 4
      1 8 9 2
    2 8 3 8
  3 3 1 1
  3 P 1 3 7 2
```

Here you can easily predict the value of P=6

Hence,

```
        4 7 3
      x 7 6 4
      1 8 9 2
    2 8 3 8
  3 3 1 1
  3 6 1 3 7 2
```

Cryptarithmetic Multiplication 20



1. Value of C ?

(a) 5 (b) 6 (c) 7 (d) 8

Value of W + A + R + A + N + C ?

2.

(a) 30 (b) 31 (c) 32 (d) 33

Value of D ?

3.

(a) 1 (b) 2 (c) 3 (d) 4

```
      C A W
    x A N E
    N N R C
  A A V R
D E C D
W A R A N C
```

Here you can see A + E = A
Therefore E=9 Detailed Explanation Rule-1
Put E=9 rewrite the problem

```
      C A W
    x A N 9
    N N R C
  A A V R
D 9 C D
W A R A N C
```

At this stage divide the problem into three parts
(1)

```
    C A W
  x 9
  N N R C
```

(2) C A W
x N
A A V R

(3) C A W
x A
D 9 C D

Now you have to analyse all three parts separately and choose which is having maximum number of clues.

In this case, you can take Case (3). [D, A and C are repeated twice.]

(3) C A W
x A
D 9 C D

Now you have to start hit and trial with the possible of D={1, 2, 3, 4, 5, 6, 7, 8}

Firstly take D=1

Possible ways of getting 1 at Unit Digit

Case 1 W=1, A=1, D=1 Rejected (W = A = D)

Case 2 W=3, A=7, D=1 Needs to be checked

Case 3 W=7, A=3, D=1 Needs to be checked

case 4 W=9, A=9, D=1 Rejected (W = A)

[In Cryptarithmetic, each variable should have unique and distinct values.]

You have to check for Case 2 and Case 3

Case 2 W=3, A=7, D=1

put these values in (3)

(3) C 7 3
x 7
1 9 C 1 [1 9 1 1]

If you compare side by side then you will get C=1

As you have already taken D=1. Hence you cannot take C=1. It will violate the Basic Cryptarithmetic Rules

Rejected

Case 3 W=7, A=3, D=1

put these values in (3)

(3) C 3 7
x 3
1 9 C 1 [1 9 0 1]
If you compare side by side then you will get C=0.
Value of C cannot be equal to zero.
(3) 0 A W
x A
D 9 0 D
Rejected
Now you have start hit and trial with value of D=2

Possible ways of getting 2 at Unit Digit

Case 1 W=1, A=2, D=2 Rejected (A = D)
Case 2 W=2, A=1, D=2 Rejected (W = D)
Case 3 W=6, A=2, D=2 Rejected (A = D)
Case 4 W=2, A=6, D=2 Rejected (W = D)
Case 5 W=3, A=4, D=2 Needs to be checked
Case 6 W=4, A=3, D=2 Needs to be checked
Case 7 W=4, A=8, D=2 Needs to be checked
Case 8 W=8, A=8, D=2 Needs to be checked
Case 9 W=7, A=6, D=2 Needs to be checked
Case 10 W=6, A=7, D=2 Needs to be checked
Case 11 W=9, A=8, D=2 Needs to be checked
Case 12 W=8, A=9, D=2 Needs to be checked

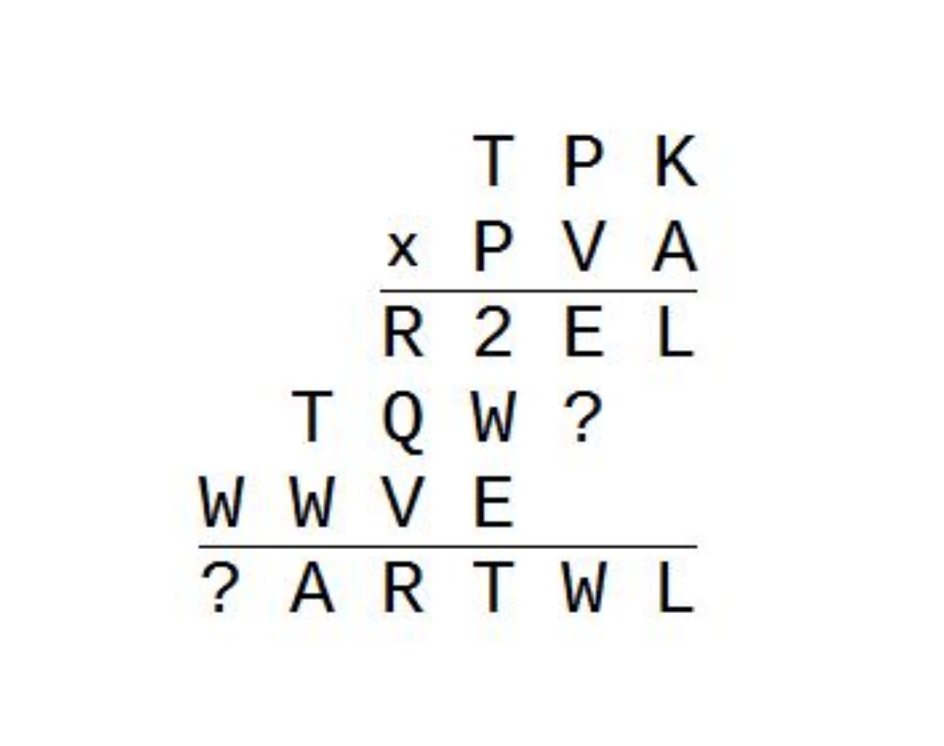
Now you have to check for Case 5 to Case 12.

Case 5 W= 3, A=4, D=2
Put these values in (3)
(3) C 4 3
x 4
2 9 C 2 [2 9 7 2]
If you compare side by side you will get C=7
Now put W=3, A=4, D=2, C=7 and E=9 in the main problem and check whether it satisfies the Cryptarithmetic Rules.
7 4 3
x 4 N 9

N N R 7 *[6 6 8 7]*
4 4 V R
2 9 7 2
3 4 R 4 N 7
From here you will get N=6 and R=8

Hence,
7 4 3
x 4 6 9
6 6 8 7
4 4 5 8
2 9 7 2
3 4 8 4 6 7

Cryptarithmetic Multiplication 31



Value of T ?

1.

(a) 3 (b) 4 (c) 5 (d) 6

Value of P?

2.

(a) 5 (b) 1 (c) 3 (d) 4

Value of K ?

3.

(a) 2 (b) 8 (c) 0 (d) 1

(Solution have been given considering you as beginner in Cryptarithmetic)

```
      T P K
    x P V A
    R 2 E L
  T Q W ?
W W V E
? A R T W L
```

Now you have to divide the problem into three parts. As,

(1)
```
      T P K
    x A
    R 2 E L
```

(2)
```
      T P K
    x V
  T Q W ?
```

(3)
```
      T P K
```

x P
W W V E

At this stage, you have to analyse all three parts and find which has maximum number of clues.(i.e. maximum number of variables in the repetition)
In this problem you can choose (3 OR 1).

In this case you can take (3),
(1) T P K
x P
W W V E
Now you have to start hit and trial with the possible value of E={0, 1, 2, 3, 4, 5, 6, 7, 8, 9}

Firstly take E=0
Possible ways of getting 0 at Unit Digit

Case 1 - K=5, P=2, E=0 Needs to be checked further
Case 2 - K=2, P=5, E=0 Needs to be checked further
Case 3- K=4, P=5, E=0 Needs to be checked further
Case 4- K=5, P=4, E=0 Needs to be checked further
Case 5- K=6, P=5, E=0 Needs to be checked further
Case 6- K=5, P=6, E=0 Needs to be checked further
Case 7- K=8, P=5, E=0 Needs to be checked further
Case 8- K=5, P=8, E=0 Needs to be checked further

Firstly take Case 1
Case 1 - K=5, P=2, E=0

Put these values in (3)

(3) T P K
x P
W W V E
i.e. T 2 5
x 2
W W V 0
From here you will get value of V=5. (Rejected, as you have already taken K=5).
[In Cryptarithmetic, each variable should have and unique and distinct value.]

Cryptarithmetic Tutorial

Case 2 - K=2, P=5, E=0

Put these values in (3)

```
(3)      T  P  K
         x  P
      W  W  V  E
i.e.     T  5  2
         x  5
      W  W  V  0
```

From here you will get value of V=6.
Now problem reduces to below

```
         T  5  2
         x  5
      W  W  6  0
```

From, here you can assume the possible W =(1, 3, 4)
(You cannot assume the values of W as 0, 2, 5, 6 as you have already taken.)
Further you cannot assume the value of W as 7, 8, 9)
(Please recollect the table of 5. You will never get 6, 7, 8, 9 as last digit whenever you will multiply any number with 5.
)
Just take each possible values of W={1, 3, 4} and check with the combination of T.
[Relax it's going to take some time to understand the concept. Please read.... again !]

Case 3 K=4, P=5, E=0

Now put these values in (3) and check further..

```
(3)     T  P  K
        x  P
     W  W  V  E
        T  5  4
        x  5
     W  W  V  0
```

For here you will get the value of V=7.
Now you have to search for the possible values of W= {1, 2 , 3}

You have to make hit and trial with the possible values of W.
Firstly take W=1.
now the problem will reduce to

```
(3)    T  5  4
         x  5
      1 1 7 0
```

[Rejected: For any value of T.. you will never get 11 at last.]

Now try with W=2

```
(3)    T  5  4
         x  4
     2  2  7  0
```

[Rejected : For any value of T.. you will never get 22 at last..]
[Don't think of taking value of T=4. As you have already , E=0 taken K=4]
Case 4 K=5, P=4, E=0

```
(3)    T  P  K
         x  P
     W  W  V  E
```

i.e.

```
       T  4  5
         x  4
     W  W  V  0
```

From here you will get value of V=8.
Now you have to search for the possible values of W = {1, 2, 3}
All the cases will get rejected. Please try yourself for each possible values of W.
Case 5 K=6, P=5, E=0

```
(3)    T  P  K
         x  P
     W  W  V  E
       T  5  6
         x  5
     W  W  V  0
```

From here you will get value of V=8.

```
       T  5  6
         x  5
     W  W  8  0
```

Now you have to search for the possible values of W= {1, 2, 3, 4}
All the cases will get rejected. Please try yourself for each possible values of W.

Case 6 K=5, P=6, E=0

(3) T P K
x P
W W V E
Put these values in the (3)
T 6 5
x 6
W W V 0
From here you will get value of V=9
Now the problem reduces to
T 6 5
x 6
W W 9 0
Now just think for all the possible values of W={1, 2, 3, 4}
Firstly take W=1 and think of possible values of T.
All the cases will get rejected.[Just try with all combinations]

Case 7 K=8, P=5, E=0

(3) T P K
x P
W W V E

T 5 8
x 5
W W V 0
From here you will get V=9
Now you have to start hit and trial with the possible values of W={1, 2, 4}
Firstly take W=1.
For any value of T x 5 + 2 { you will never get equal values W W i.e. 1 1 }
[Relax it's going to take sometime to understand the concept. Please read .... again !]
now take W=2.
For T=4 it will results into

```
      4  5  8
         x  5
   2  2  9  0
```

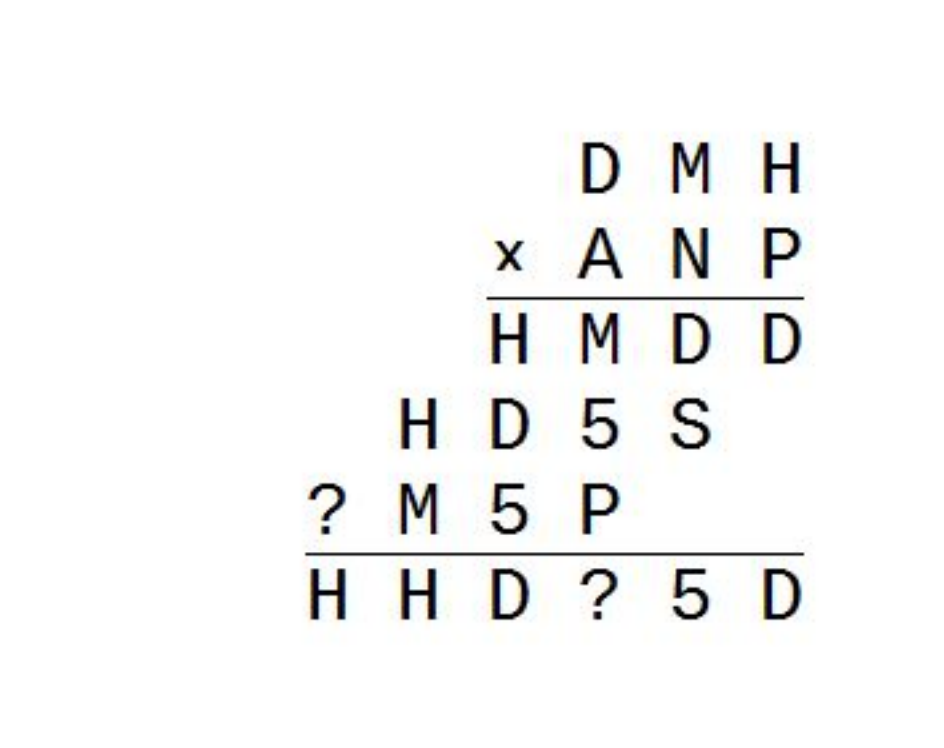
From here you will get T=4, P=5, K=8, V=9, W=2 and E=0.
Put these values in the main problem.

```
      4  5  8
   x  5  9  A
   R  2  0  L
4  Q  2  ?
2  2  9  0
?  A  R  4  2  L
```

Now you can easily solve the problem further.

```
      4  5  8
   x  5  9  7
   3  2  0  6
4  1  2  2
2  2  9  0
2  7  3  4  2  6
```

Cryptarithmetic Multiplication 32



```
      D M H
    x A N P
    -------
      H M D D
    H D 5 S
  ? M 5 P
  -----------
  H H D ? 5 D
```

1. Value of M ?

(a) 6 (b) 7 (c) 8 (d) 9

2. Value of D ?

(a) 4 (b) 5 (c) 6 (d) 7

3. Value of H ?

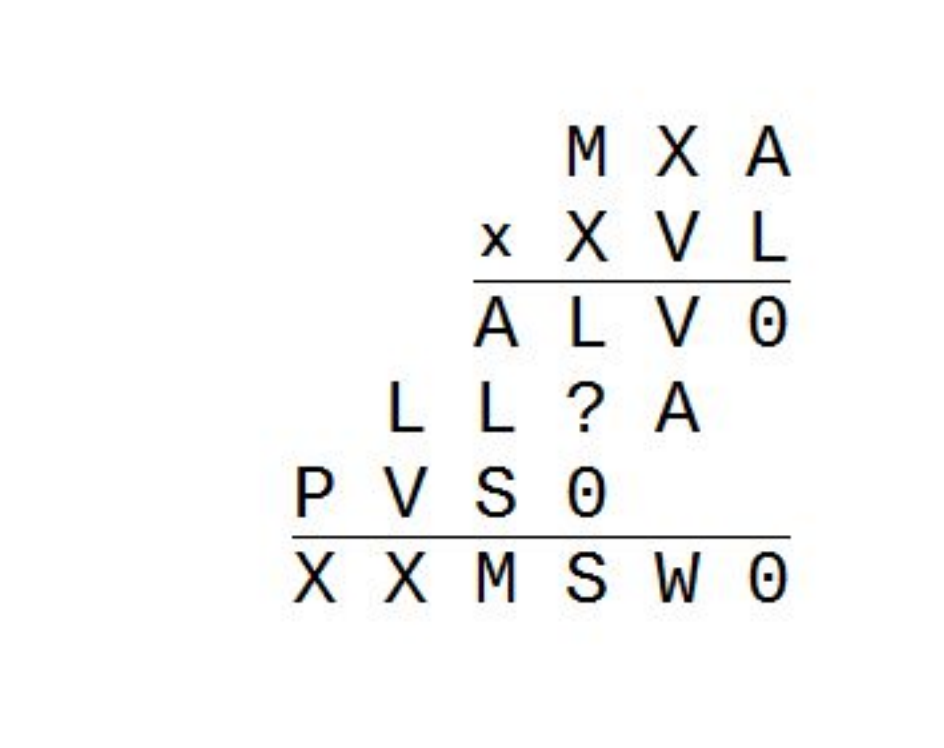
(a) 1 (b) 2 (c) 3 (d) 4

1. D
2. A
3. C

D=4, M=9, H=3, A=6, N=7, P=8, S=1,

```
      4 9 3
    x 6 7 8
    3 9 4 4
  3 4 5 1
2 9 5 8
3 3 4 2 5 4
```

Cryptarithmetic Multiplication 33



1. Which of the following set contains only even numbers ?

(a) M, X, A (b) A, V, L (c) X, L, W (d) P, W, S

2. Value of M ?

(a) 9 (b) 8 (c) 2 (d) 3

3. Which of the following set contains prime numbers only ?

(a) A, V, P (b) M, X, A (c) A, V, L (d) S, P, W

1. C
2. A
3. A

M=9, X=4, A=5, V=7, L=6, G=1, P=3, K=0, W=2, S=8

```
      9 4 5
    x 4 7 6
    5 6 7 0
  6 6 1 5
3 7 8 0
4 4 9 8 2 0
```