

eLitmus Previous Papers

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**All Cryptarithmic Questions asked Yet in
eLitmus**

**eLitmus Previous Year
Papers and study materials**



eLitmus Syllabus

Quants

Topics	Subtopics	
Aptitude Module (45 min)	<ul style="list-style-type: none"> • 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) 	<ul style="list-style-type: none"> • 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.

BUY QUANTS PAPER HERE -

<https://www.instamojo.com/PrepInstaTech/elitmus-previous-year-papers-with-solution-2/>

Logical Reasoning

- Logical Reasoning
- Cryptarithmic
- Data Interpretation (Pie/Bar charts)
- Data Sufficiency

1. **Max Score** – 100 Marks
2. **Number of Questions** – 20 Questions
3. **Time for Sections** – 25 mins

(Solve 5-7 questions for good percentile)

BUY LOGICAL REASONING PAPER HERE -

<https://www.instamojo.com/PrepInstaTech/elitmus-logical-reasoning-previous-year-pape/>

Computer Fundamentals (15 min)

Topics	Subtopics	
Problem Solving Section	<ul style="list-style-type: none"> • Data Tabulation based Questions • Crypt arithmetic Problem • Arrangement Based Problems • Bar Graphs/Pie Charts • Few Miscellaneous Questions 	<ul style="list-style-type: none"> • 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.

BUY CSE PAPER HERE -

<https://www.instamojo.com/PrepInstaTech/elitmus-computer-programming-previous-year-p/>

English

Topics	Type Questions	
English	<ol style="list-style-type: none"> 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 	<ul style="list-style-type: none"> • 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.

	7. Fill In The Blanks 8. Reading Comprehension	
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BUY ENGLISH PAPER HERE -

<https://www.instamojo.com/PrepInstaTech/elitmus-verbal-english-previous-year-papers-/>

Elitmus Syllabus 2017:

eLitmus Negative Marking Rule

- No negative marking if the total number of incorrect questions is less than or equal to 25% of the total number of questions.
- 5 marks will be deducted out of 10 marks for every wrong answer after 25% window.
- No negative marks for unattempted questions.

ELITMUS SCORE CALCULATOR

The hardest section in eLitmus is Problem Solving followed by Quants and English Verbal which is the easiest and thus 99 percentile is only when you score more than 99.

Percentile	<20	40	50	60	70	80	90	>99
Verbal English	30	38	45	51	58	85	94.50	99
Quantitative Aptitude	-10	15	22	29	37	42	60	90
Problem Solving	-18	0	10	18	22	35	53	70

eLitmus allows it's recruiter to have control over the examination:

- Test will be Auto Protected (Audio and Video will be recorded)
- Web Proctor Feature (Blocking navigation away from test)
- In the case of mischievous activities, the test can be terminated.

QUESTIONS

Cryptarithmic Problem 1

$$\begin{array}{r}
 \begin{array}{r}
 \text{A P D} \\
 \times \text{A D} \\
 \hline
 \text{R P A D}
 \end{array} \\
 \text{D D C D} \\
 \hline
 \text{D P C E D}
 \end{array}$$

Value of A ?

1.

(a) 5

(b) 6

(c) 7

(d) 9

Value of R + P + A + D ?

2.

(a) 20

(b) 21

(c) 23

(d) 24

Value of P ?

3.

(a) 6

(b) 7

(c) 8

(d) 9

$$\begin{array}{r}
 A \ P \ D \\
 \times A \ D \\
 \hline
 R \ P \ A \ D \\
 D \ D \ C \ D \\
 D \ P \ C \ E \ D
 \end{array}$$

As, $P + C = _C$ Hence value of $P=9$ [Rule 1 - Case-II](#)Put $P=9$ and rewrite the problem,

$$\begin{array}{r}
 A \ 9 \ D \\
 \times A \ D \\
 \hline
 R \ 9 \ A \ D \\
 D \ D \ C \ D \\
 D \ 9 \ C \ E \ D
 \end{array}$$

further, you can see

$$\begin{array}{r}
 A \ 9 \ D \\
 \times A \ D \\
 \hline
 R \ 9 \ A \ D \\
 D \ D \ C \ D \\
 D \ 9 \ C \ E \ D
 \end{array}$$

Here $D \times D = _D [R \ 9 \ A \ D]$ Hence possible values of $D=\{5, 6\}$ [Detailed Explanation- Rule 2](#)Firstly take $D=5$ and rewrite the problem

$$\begin{array}{r}
 A \ 9 \ 5 \\
 \times A \ 5 \\
 \hline
 R \ 9 \ A \ 5 \\
 5 \ 5 \ C \ 5
 \end{array}$$

$$\begin{array}{r} 5\ 9\ C\ E\ 5 \\ \times\ A\ 5 \\ \hline 5\ 5\ C\ 5 \\ 5\ 9\ C\ E\ 5 \end{array}$$

$$\begin{array}{r} A\ 9\ 5 \\ \times\ A\ 5 \\ \hline R\ 9\ A\ 5 \\ 5\ 5\ C\ 5 \\ 5\ 9\ C\ E\ 5 \end{array}$$

Here, you can easily predict the value of $R=3$

So, the problem reduces to

$$\begin{array}{r} A\ 9\ 5 \\ \times\ A\ 5 \\ \hline 3\ 9\ A\ 5 \\ 5\ 5\ C\ 5 \\ 5\ 9\ C\ E\ 5 \end{array}$$

As, $A \times 5 = _5 [5\ 5\ C\ 5]$

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 Cryptarithmic, 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

$$\begin{array}{r} 7\ 9\ 5 \\ \times\ 7\ 5 \\ \hline 3\ 9\ 7\ 5 \\ 5\ 5\ C\ 5 \\ 5\ 9\ C\ E\ 5 \end{array}$$

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

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

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

Cryptarithmic Problem 2

$$\begin{array}{r}
 T H E \\
 \times P E N \\
 \hline
 S N T I \\
 P I A E \\
 H B N E \\
 \hline
 S H A A H I
 \end{array}$$

Value of N ?

1.

(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 Cryptarithmic)

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, $E \times E = _E$

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

As,

$5 \times 5 = _5$ [25] (last digit)

$6 \times 6 = _6$ [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 $E \times P = _E$

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.

$$\begin{array}{r} \text{T H } 5 \\ \times \text{ P } 5 \text{ N} \\ \hline \text{S N T I} \\ \text{P I A } 5 \\ \text{H B N } 5 \\ \hline \text{S H A A H I} \end{array}$$

Further, $5 \times N = _I \text{ [S N T I]}$

[If you multiply 5 to any number, you will only get [0, 5] as their last digit.]($5 \times \text{even} = _0$ and $5 \times \text{odd} = _5$)

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.

$$\begin{array}{r} \text{T H } 5 \\ \times \text{ P } 5 \text{ N} \\ \hline \text{S N T } 0 \\ \text{P } 0 \text{ A } 5 \\ \text{H B N } 5 \\ \hline \text{S H A A H } 0 \end{array}$$

Now, again divide the problem in three parts

$$\begin{array}{l} (1) \quad \begin{array}{r} \text{T H } 5 \\ \times \text{ N} \\ \hline \text{S N T } 0 \end{array} \\ (2) \quad \begin{array}{r} \text{T H } 5 \\ \times 5 \\ \hline \text{P } 0 \text{ A } 5 \end{array} \\ (3) \quad \begin{array}{r} \text{T H } 5 \\ \times \text{ P} \\ \hline \text{H B N } 5 \end{array} \end{array}$$

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

$$\begin{array}{r} (2) \quad \text{T H } 5 \\ \times 5 \\ \hline \text{P } 0 \text{ A } 5 \end{array}$$

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 $P=3$

$$(2) \quad \begin{array}{r} T \ H \ 5 \\ \times 5 \\ \hline 3 \ 0 \ A \ 5 \end{array}$$

Then $T=6$ [$6 \times 5 = 30$]

$$\begin{array}{r} T \ H \ 5 \\ \times P \ 5 \ N \\ \hline S \ N \ T \ 0 \end{array}$$

$$\begin{array}{r} P \ 0 \ A \ 5 \\ \hline H \ B \ N \ 5 \end{array}$$

$$\begin{array}{r} S \ H \ A \ A \ H \ 0 \end{array}$$

$$\begin{array}{r} P \ 0 \ A \ 5 \\ \hline H \ B \ N \ 5 \end{array}$$

$$\begin{array}{r} S \ H \ A \ A \ H \ 0 \end{array}$$

$$\begin{array}{r} S \ H \ A \ A \ H \ 0 \end{array}$$

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

$$(2) \quad \begin{array}{r} 6 \ 1 \ 5 \\ \times 5 \\ \hline 3 \ 0 \ A \ 5 \end{array}$$

$$\times 5$$

$$3 \ 0 \ A \ 5 \ [\ 3 \ 0 \ 7 \ 5]$$

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,

$$\begin{array}{r} 6 \ 1 \ 5 \\ \times 3 \ 5 \ N \\ \hline S \ N \ 6 \ 0 \end{array}$$

$$\begin{array}{r} S \ N \ 6 \ 0 \\ \hline 3 \ 0 \ 7 \ 5 \end{array}$$

$$\begin{array}{r} 3 \ 0 \ 7 \ 5 \\ \hline 1 \ B \ N \ 5 \end{array}$$

$$\begin{array}{r} 1 \ B \ N \ 5 \\ \hline S \ 1 \ 7 \ 7 \ 1 \ 0 \end{array}$$

$$\begin{array}{r} S \ 1 \ 7 \ 7 \ 1 \ 0 \end{array}$$

$$\begin{array}{r} S \ 1 \ 7 \ 7 \ 1 \ 0 \end{array}$$

Now you can easily solve the problem.

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

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

$$\begin{array}{r} 3 \ 0 \ 7 \ 5 \\ \hline 1 \ 8 \ 4 \ 5 \end{array}$$

$$\begin{array}{r} 1 \ 8 \ 4 \ 5 \\ \hline 2 \ 1 \ 7 \ 7 \ 1 \ 0 \end{array}$$

$$\begin{array}{r} 2 \ 1 \ 7 \ 7 \ 1 \ 0 \end{array}$$

$$\begin{array}{r} 2 \ 1 \ 7 \ 7 \ 1 \ 0 \end{array}$$

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

Cryptarithmic Problem 3

$$\begin{array}{r}
 V I A \\
 x G O T \\
 \hline
 G R O T \\
 A A R O \\
 A I A G \\
 \hline
 A S T A R T
 \end{array}$$

Value of $A + S + T + A + R + T$?

1.

(a) 21

(b) 26

(c) 24

(d) 25

Find the value of $4R + T$?

2.

(a) 19

(b) 20

(c) 21

(d) 22

Find the value of $2A + R$?

3.

(a) 5

(b) 6

(c) 7

(d) 8

$$\begin{array}{r}
 \text{V I A} \\
 \times \text{G O T} \\
 \hline
 \text{G R O T} \\
 \text{A A R O} \\
 \text{A I A G} \\
 \hline
 \text{A S T A R T}
 \end{array}$$

Here,

$$A \times T = _T [G R O T]$$

$$A \times O = _O [A A R O]$$

$$A \times G = _G [A I A G]$$

This is only possible when $A=1$

Hence, Put $A=1$ and rewrite the problem again.

$$\begin{array}{r}
 \text{V I 1} \\
 \times \text{G O T} \\
 \hline
 \text{G R O T} \\
 \text{1 1 R O} \\
 \text{1 I 1 G} \\
 \hline
 \text{1 S T 1 R T}
 \end{array}$$

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

$$\begin{array}{r}
 (1) \quad \text{V I 1} \\
 \times \text{T} \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 \text{G R O T} \\
 (2) \quad \text{V I 1} \\
 \times \text{O} \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 \text{1 1 R O} \\
 (3) \quad \text{V I 1} \\
 \times \text{G} \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 \text{1 I 1 G}
 \end{array}$$

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))

$$\begin{array}{r} (3) \quad \quad V \ I \ 1 \\ \quad \quad x \ G \\ \hline \quad \quad 1 \ I \ 1 \ G \end{array}$$

At this stage you have to start hit and trial with the possible values of G

$$G = \{2, 3, 4, 5, 6, 7, 8, 9\}$$

$$*G \neq \{1\}$$

(As you have already taken A=1)

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

$$*G \neq \{0\}$$

(As you are multiplying some number by G in (3). If we take G=0)

$$\begin{array}{r} \text{then} \quad \quad V \ I \ 1 \\ \quad \quad x \ G \\ \hline \quad \quad 0 \ 0 \ 0 \ 0 \ [1 \ I \ 1 \ G] \end{array}$$

Now, take G=2

$$\begin{array}{r} (3) \quad \quad V \ I \ 1 \\ \quad \quad x \ 2 \\ \hline \quad \quad 1 \ I \ 1 \ 2 \end{array}$$

***Rejected** (you can see $2 \times I = _1$)

(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. $2 \times 1 = 2$, $2 \times 3 = 6$, $2 \times 4 = 8$, $2 \times 5 = _0$, $2 \times 6 = _2$, $2 \times 8 = _6$ [16] and $2 \times 9 = _8$ [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)

$$\begin{array}{r} (3) \quad \quad V \ I \ 1 \\ \quad \quad x \ 3 \\ \hline \quad \quad 1 \ I \ 1 \ 3 \end{array}$$

Now we can see $I \times 3 = _1$ [1 I 1 3]

(last digit is 1 which is only possible when I=7 ($7 \times 3 = 21$))

Put I=7 in (3)

$$\begin{array}{r} (3) \quad \quad V \ 7 \ 1 \\ \quad \quad x \ 3 \end{array}$$

$$\begin{array}{r} 1713 \\ \times 3 \\ \hline 1713 \end{array}$$

Now, you can easily predict the value of $V=5$ ($3 \times 5 = 15 + 2(\text{carry})=17$)

(3)
$$\begin{array}{r} 571 \\ \times 3 \\ \hline 1713 \end{array}$$

Therefore,

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

$$\begin{array}{r} 571 \\ \times 3 \text{ O T} \\ \hline 3 \text{ R O T} \\ 11 \text{ R O} \\ 1713 \\ 1 \text{ S T } 1 \text{ R T} \end{array}$$

Now you can easily predict the other values.

$S=8, T=6, R=4, O=2$

These values also satisfies the Basic Cryptarithmic Rules

$$\begin{array}{r} 571 \\ \times 326 \\ \hline 3426 \\ 1142 \\ 1713 \\ 186146 \end{array}$$

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

Cryptarithmic Problem 4

$$\begin{array}{r}
 W H Y \\
 x N U T \\
 \hline
 B B N P \\
 B Y P Y \\
 B U H A \\
 \hline
 B N E P B P
 \end{array}$$

Value of $W + H + Y$?

1.

(a) 7

(b) 8

(c) 9

(d) 10

Value of B ?

2.

(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, $Y + U = _ Y [B Y P Y]$

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

$B + 6 + (\text{carry}) = N$ [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 $B = 9$ 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, $7 \times 4 = _ A$ [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

$$\begin{array}{r}
 234 \\
 \times 765 \\
 \hline
 1170 \\
 1404 \\
 1638 \\
 \hline
 179010
 \end{array}$$

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

Cryptarithmic Problem 5

$$\begin{array}{r}
 \\
 \\
 \hline
 \\
 \\
 \\
 \hline

 \end{array}$$

Value of S ?

1.

- (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, $A \times A = _ A [H R S A]$

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, $H \times A = _ A [E W D A]$

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,

$$\begin{array}{r} \text{T E } 5 \\ \times \text{H } 5 \text{ D} \\ \text{L D T R} \\ \text{H R S } 5 \\ \text{E W D } 5 \\ \text{L E S S E R} \end{array}$$

Further,

$$\begin{array}{r} \text{T E } 5 \\ \times \text{H } 5 \text{ D} \\ \text{L D T R} \\ \text{H R S } 5 \\ \text{E W D } 5 \\ \text{L E S S E R} \end{array}$$

Here, $5 \times D = _ R [\text{L D T R}]$

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.]

$5 \times \text{Even} = _0 [2, 4, 6, 8]$

$5 \times \text{Odd} = _5 [3, 5, 7, 9]$

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

Put $R=0$ and write the problem again,

$$\begin{array}{r} \text{T E } 5 \\ \times \text{H } 5 \text{ D} \\ \text{L D T } 0 \\ \text{H } 0 \text{ S } 5 \\ \text{E W D } 5 \\ \text{L E S S E } 0 \end{array}$$

At this stage, divide the problem into 3 parts,

$$\begin{array}{l} (1) \quad \begin{array}{r} \text{T E } 5 \\ \times \text{D} \\ \text{L D T } 0 \end{array} \\ (2) \quad \begin{array}{r} \text{T E } 5 \\ \times 5 \\ \text{H } 0 \text{ S } 5 \end{array} \\ (3) \quad \begin{array}{r} \text{T E } 5 \\ \times \text{H} \end{array} \end{array}$$

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 O 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 O S 5 [H O 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 Cryptarithmic Rules]

T 1 5

x H 5 D

L D T 0

H O 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, $1 + 1(\text{carry}) = L$)

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 Cryptarithmic Tutorial.]

Cryptarithmic Problem 6

$$\begin{array}{r}
 \text{H A T} \\
 \times \text{C U P} \\
 \hline
 \text{E I U I} \\
 \text{E A R T} \\
 \text{E U P I} \\
 \hline
 \text{H I E E E I}
 \end{array}$$

Value of C ?

1.

(a) 2

(b) 4

(c) 6

(d) 8

Value of E + A + R + T ?

2.

(a) 10

(b) 11

(c) 12

(d) 13

Value of $2E + H$?

3.

(a) 7

(b) 5

(c) 6

(d) 2

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

```

      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, $T \times U = _T [E A R T]$

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,

$T \times P = _I [E I U I]$ and $T \times C = _I [E U P I]$

i.e.

$5 \times P = _I [E I U I]$ and $5 \times C = _I [E U P I]$

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 Cryptarithmic 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 Cryptarithmic 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

```

$$\begin{array}{r}
 x C 7 P \\
 2 0 7 0 \\
 2 A 1 5 \\
 2 7 P 0 \\
 H 0 2 2 2 0
 \end{array}$$

[$2+1(\text{carry})=3(H)$ -- As value of $E=2$]
therefore $H=3$

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

$$\begin{array}{r}
 3 A 5 \\
 x C 7 P \\
 2 0 7 0 \\
 2 A 1 5 \\
 2 7 P 0 \\
 3 0 2 2 2 0
 \end{array}$$

$$\begin{array}{r}
 2. \quad 3 A 5 \\
 x 7 \\
 2 A 1 5
 \end{array}$$

Now You can easily predict the value of $A=4$

[$(28+3(\text{carry}))=_1(\text{last digit})$]

[$(28(7*4(A))+3(\text{carry } 7*5=35))=_1[31](\text{last digit})$]

$$\begin{array}{r}
 3 4 5 \\
 x 7 \\
 2 4 1 5
 \end{array}$$

Hence,

$$\begin{array}{r}
 3 4 5 \\
 x 8 7 6 \\
 2 0 7 0 \\
 2 4 1 5 \\
 2 7 6 0 \\
 3 0 2 2 2 0
 \end{array}$$

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

Cryptarithmic Problem 7

$$\begin{array}{r}
 C G D \\
 x B Q S \\
 \hline
 A Q S C \\
 G A S R \\
 Q P A A \\
 \hline
 D S B R S C
 \end{array}$$

Which of the following forms the right angled triangle ?

1.

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

Value of C ?

2.

- (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 Cryptarithmic)

```

      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
  
```

$D \times Q = _0$

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

```

$5 + 1 \text{ (carry)} = D$

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.

$$0 + 3 \text{ (carry)} = _3$$

$$5 + 3 \text{ (carry)} = _8$$

[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. $Q=5, S=3, R=0, D=6$

$$\begin{array}{r} C G 6 \\ \times B 5 3 \\ \hline A 5 3 C \\ G A 3 0 \\ 5 P A A \\ 6 3 B 0 3 C \end{array}$$

Here you can see value of $C=8$

put $C=8$ and rewrite the problem

$$\begin{array}{r} 8 G 6 \\ \times B 5 3 \\ \hline A 5 3 8 \\ G A 3 0 \\ 5 P A A \\ 6 3 B 0 3 8 \end{array}$$

Now you can easily solve the problem further

$G=4, A=2, P=9$

$$\begin{array}{r} 8 4 6 \\ \times 7 5 3 \\ \hline 2 5 3 8 \\ 4 2 3 0 \\ 5 9 2 2 \\ 6 3 7 0 3 8 \end{array}$$

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

Cryptarithmic Problem 8

$$\begin{array}{r}
 E\ Y\ E \\
 x\ M\ A\ T \\
 \hline
 S\ Y\ I\ A \\
 G\ M\ T\ A \\
 A\ I\ R\ Y \\
 \hline
 A\ A\ S\ M\ A\ A
 \end{array}$$

Value of M ?

1.

(a) 5

(b) 6

(c) 7

(d) 3

Value of M + A + T ?

2.

(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 Cryptarithmic)

```

      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 $E \times A = _A \text{ [G M T A]}$. 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 $6 * A = _A [G M T A]$

$6 \times 2 = _2[12]$ [considering last digit only]

$6 \times 4 = _4[24]$ [considering last digit only]

$6 \times 8 = _8[48]$ [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 $6 \times T = _2[42]$

Case-II

When you will take $A=4$ then $T=9$

As $6 \times T = _4[54]$

Case-III

When you will take $A=8$ then $T=3$

As $6 \times T = _8[18]$

[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 $G=1$

Now put $Y=8$

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

$$\begin{array}{r} 686 \\ \times 327 \\ \hline 4802 \\ 1372 \\ 2058 \\ \hline 224322 \end{array}$$

Cryptarithmic Problem 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

```

Value of $2B + M$?

1.

(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, $B \times O = _O [M I L O]$

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 $[O + O = _E(\text{last digit})]$

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 0 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 0 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 Cryptarithmic Rules

For checking this
put these values in

$$\begin{array}{r} B O B \\ \times B \\ \hline M E O Y \end{array}$$

i.e. 3 5 3

$$\begin{array}{r} 0 5 3 \\ \times 3 \\ \hline 1 0 5 9 \end{array} \quad [M \ 0 \ 5 \ Y]$$

From here you are also getting $M=1$, $E=0$, $O=5$ and $Y=9$.

Hence, It satisfies the Basic Cryptarithmic Rules.

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

Cryptarithmic Problem 10

$$\begin{array}{r}
 T H E \\
 x P E N \\
 \hline
 S N T I \\
 P I A E \\
 H B N E \\
 \hline
 S H A A H I
 \end{array}$$

Value of N ?

1.

(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 Cryptarithmic)

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, $E \times E = _E$

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

As,

$5 \times 5 = _5$ [25] (last digit)

$6 \times 6 = _6$ [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 $E \times P = _E$

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, $5 \times N = _I [S \ N \ T \ I]$

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

($5 \times \text{Even} = _0$ and $5 \times \text{Odd} = _5$)

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 0

(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 $T=6$ [$6 \times 5 = 30$]

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

Cryptarithmic Multiplication 11

$$\begin{array}{r}
 H S P \\
 x D U O \\
 \hline
 U T P S \\
 H S P \\
 P P A P \\
 \hline
 P H O T O S
 \end{array}$$

Value of $H + S + P$?

1.

(a) 10

(b) 11

(c) 12

(d) 13

Which of the following forms a triangle ?

2.

(a) H, S, P

(b) H, T, O

(c) D, U, O

(d) U, T, P

Value of $2D + P$?

3.

(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

```

$D \times P = _P [P P A P]$

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 $P \times O = _S$

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 $P \times O = _S$ 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 Cryptarithmic Rules.

$18 + 4(\text{carry}) = 33$ [$6 \times 3 = 18$]

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

```

Cryptarithmic Multiplication 12

$$\begin{array}{r}
 B P W \\
 \times M E N \\
 \hline
 E S D D \\
 P D M A \\
 D E M B \\
 \hline
 M A D A D D
 \end{array}$$

Value of B ?

1.

(a) 2

(b) 4

(c) 6

(d) 8

Value of W/2 ?

2.

(a) 1

(b) 2

(c) 3

(d) 4

Sum of E + S + D + D ?

3.

(a) 16

(b) 17

(c) 18

(d) 19

$$\begin{array}{r}
 B P W \\
 x M E N \\
 E S D D \\
 P D M A \\
 D E M B \\
 M A D A D D
 \end{array}$$

As, $D + A = D$

Hence $A=0$ Detailed Explanation

Put $A=0$ and rewrite the problem.

$$\begin{array}{r}
 B P W \\
 x M E N \\
 E S D D \\
 P D M 0 \\
 D E M B \\
 M 0 D 0 D D
 \end{array}$$

Now,

$$\begin{array}{r}
 B P W \\
 x M E N \\
 E S D D \\
 P D M 0 \\
 D E M B \\
 M 0 D 0 D D
 \end{array}$$

Here, You can see, $E \times W = _0$ [P D M 0]

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

[To get 0 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,

$$\begin{array}{r}
 B P W \\
 x M 5 N \\
 5 S D D \\
 P D M 0 \\
 D 5 M B \\
 M 0 D 0 D D
 \end{array}$$

Further,

$$\begin{array}{r}
 B P W \\
 x M 5 N \\
 5 S D D \\
 P D M 0
 \end{array}$$

D 5 M B

M 0 D 0 D D

At this stage, You have two clues,

$$1. D + 1 (\text{carry}) = M$$

$$2. P + 5 = _0 [P + 5 + 1 (\text{carry}) = 10]$$

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

$$(1) \quad B \ 4 \ W$$

x N

5 S D D

$$(2) \quad B \ 4 \ W$$

x 5

4 D M 0

$$(3) \quad B \ 4 \ W$$

x M

D 5 M B

If you further analyse, (2)

$$(2) \quad B \ 4 \ W$$

x 5

4 D M 0

Here, You can see 4 is at thousand place.

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

$$[5 \times 8 = 40, 5 \times 9 = 45]$$

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

Let's take B=8,

$$(2) \quad 8 \ 4 \ W$$

x 5

4 2 M 0 [4 D M 0]

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

Hence M=3 [As, $D + 1 (\text{carry}) = M$]

Now it reduces to,

$$\begin{array}{r} 8 \ 4 \ W \\ \times 5 \\ \hline 4 \ 2 \ 3 \ 0 \end{array}$$

You can easily predict the value of $W=6$.

$$\begin{array}{r} 8 \ 4 \ 6 \\ \times 5 \\ \hline 4 \ 2 \ 3 \ 0 \end{array}$$

Put these values in the main problem

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

$$\begin{array}{r} 8 \ 4 \ 6 \\ \times 3 \ 5 \ 7 \\ \hline 5 \ 9 \ 2 \ 2 \\ 4 \ 2 \ 3 \ 0 \\ 2 \ 5 \ 3 \ 8 \\ 3 \ 0 \ 2 \ 0 \ 2 \ 2 \end{array}$$

$$\begin{array}{r} B \ P \ W \\ \times M \ E \ N \\ \hline E \ S \ D \ D \\ P \ D \ M \ A \\ D \ E \ M \ B \\ M \ A \ D \ A \ D \ D \end{array}$$

As, $D + A = D$

Hence $A=0$ Detailed Explanation

Put $A=0$ and rewrite the problem.

$$\begin{array}{r} B \ P \ W \\ \times M \ E \ N \\ \hline E \ S \ D \ D \\ P \ D \ M \ 0 \\ D \ E \ M \ B \\ M \ 0 \ D \ 0 \ D \ D \end{array}$$

Now,

$$\begin{array}{r} B \ P \ W \\ \times M \ E \ N \\ \hline E \ S \ D \ D \\ P \ D \ M \ 0 \\ D \ E \ M \ B \end{array}$$

M 0 D 0 D D

Here, You can see, $E \times W = _0$ [P D M 0]

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

[To get 0 at unit digit you must have to multiply 5 with an even number $\{2, 4, 6, 8\}$]

[$5 \times \text{even} = _0$ and $5 \times \text{odd} = _5$] 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. $D + 1 \text{ (carry)} = M$
2. $P + 5 = _0$ [$P + 5 + 1 \text{ (carry)} = 10$]

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
  
```

$$\begin{array}{r}
 (3) \quad B \ 4 \ W \\
 \times M \\
 \hline
 D \ 5 \ M \ B
 \end{array}$$

If you further analyse, (2)

$$\begin{array}{r}
 (2) \quad B \ 4 \ W \\
 \times 5 \\
 \hline
 4 \ D \ M \ O
 \end{array}$$

Here, You can see 4 is at thousand place.

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

$$[5 \times 8 = 40, 5 \times 9 = 45]$$

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

Let's take $B=8$,

$$\begin{array}{r}
 (2) \quad 8 \ 4 \ W \\
 \times 5 \\
 \hline
 4 \ 2 \ M \ O \ [4 \ D \ M \ O]
 \end{array}$$

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

Hence $M=3$ [As, $D + 1(\text{carry}) = M$]

Now it reduces to,

$$\begin{array}{r}
 8 \ 4 \ W \\
 \times 5 \\
 \hline
 4 \ 2 \ 3 \ 0
 \end{array}$$

You can easily predict the value of $W=6$.

$$\begin{array}{r}
 8 \ 4 \ 6 \\
 \times 5 \\
 \hline
 4 \ 2 \ 3 \ 0
 \end{array}$$

Put these values in the main problem

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

$$\begin{array}{r}
 8 \ 4 \ 6 \\
 \times 3 \ 5 \ 7 \\
 \hline
 5 \ 9 \ 2 \ 2 \\
 4 \ 2 \ 3 \ 0 \\
 2 \ 5 \ 3 \ 8 \\
 3 \ 0 \ 2 \ 0 \ 2 \ 2
 \end{array}$$

Cryptarithmic Multiplication 13

$$\begin{array}{r}
 G A S \\
 \times F B I \\
 \hline
 F T B I \\
 S S T B \\
 S A S F \\
 \hline
 S R I S T I
 \end{array}$$

Find the value of $G + A + S$?

1.

(a) 12

(b) 13

(c) 14

(d) 15

Find the value of $2S + R$?

2.

(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,

$S \times I = _I [F T B I]$

$S \times B = _B [S S T B]$

$S \times F = _F [S A S F]$

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
  
```

$$\begin{array}{r}
 (2) \quad \quad G \ A \ 1 \\
 \quad \quad \times \ B \\
 \hline
 1 \ 1 \ T \ B
 \end{array}$$

$$\begin{array}{r}
 (3) \quad \quad G \ A \ 1 \\
 \quad \quad \times \ F \\
 \hline
 1 \ A \ 1 \ F
 \end{array}$$

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)

$$\begin{array}{r}
 (2) \quad \quad G \ A \ 1 \\
 \quad \quad \times \ B \\
 \hline
 1 \ 1 \ T \ B
 \end{array}$$

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)

$$\begin{array}{r}
 (2) \quad \quad G \ A \ 1 \\
 \quad \quad \times \ 2 \\
 \hline
 1 \ 1 \ 4 \ 2
 \end{array}$$

Here, you can easily predict the value of $A=7$, and $G=5$

[Value of A cannot be 2, as it violates the Basic Cryptarithmic Rules. You have already taken $B=2$]

Now, put $A=7$, $T=4$ and $G=5$ in main problem,

$$\begin{array}{r}
 \quad \quad 5 \ 7 \ 1 \\
 \quad \quad \times \ F \ 2 \ I \\
 \hline
 \quad \quad F \ 4 \ 2 \ I \\
 1 \ 1 \ 4 \ 2 \\
 1 \ 7 \ 1 \ F \\
 1 \ R \ I \ 1 \ 4 \ I
 \end{array}$$

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

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

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

Cryptarithmic Multiplication 14

$$\begin{array}{r}
 WBA \\
 \times BPW \\
 \hline
 CXR \\
 F XAX \\
 A AC \\
 \hline
 AP CABF
 \end{array}$$

Value of A ?

1.

(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	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	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	

Cryptarithmic Tutorial Fundamental Rules Point 03

Firstly take $C=1$ and check further

Possible ways of getting 1 as Unit Digit

$$\begin{array}{r} (3) \quad \quad W \ B \ A \\ \quad \quad \times \ B \\ \hline \quad \quad A \ A \ C \ C \end{array}$$

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 Cryptarithmic, each variable should have unique and distinct values.]

Now check for Case 2 and Case 3 only.

Case 2 $C=1$, $A=7$, $B=3$

$$\begin{array}{r} (3) \quad \quad W \ B \ A \\ \quad \quad \times \ B \\ \hline \quad \quad A \ A \ C \ C \end{array}$$

$$\begin{array}{r} \quad \quad W \ 3 \ 7 \\ \quad \quad \times \ 3 \\ \hline \quad \quad 7 \ 7 \ 1 \ 1 \end{array}$$

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

$$\begin{array}{r} \quad \quad W \ 3 \ 7 \\ \quad \quad \times \ 3 \\ \hline \quad \quad 7 \ 7 \ 1 \ 1 \end{array}$$

Now, you have to check with Case 3

Case 3 $C=1$, $A=3$, $B=7$

$$\begin{array}{r} \quad \quad W \ B \ A \\ \quad \quad \times \ B \\ \hline \quad \quad A \ A \ C \ C \end{array}$$

$$\begin{array}{r} \quad \quad W \ 7 \ 3 \\ \quad \quad \times \ 7 \\ \hline \quad \quad 3 \ 3 \ 1 \ 1 \end{array}$$

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

$$\begin{array}{r} \quad \quad 4 \ 7 \ 3 \end{array}$$

$$\begin{array}{r}
 x 7 P 4 \\
 1 X R F \\
 F X 3 X \\
 3 3 1 1 \\
 3 P 1 3 7 F
 \end{array}$$

Now, you can see

$$\begin{array}{r}
 4 7 3 \\
 x 4 \\
 1 8 9 2 [1 X R F]
 \end{array}$$

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

$$\begin{array}{r}
 4 7 3 \\
 x 7 P 4 \\
 1 8 9 2 \\
 2 8 3 8 \\
 3 3 1 1 \\
 3 P 1 3 7 2
 \end{array}$$

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

Hence,

$$\begin{array}{r}
 4 7 3 \\
 x 7 6 4 \\
 1 8 9 2 \\
 2 8 3 8 \\
 3 3 1 1 \\
 3 6 1 3 7 2
 \end{array}$$

Cryptarithmic Multiplication 15

$$\begin{array}{r}
 W P D \\
 x G K I \\
 \hline
 K F P P \\
 G G Z M \\
 F G F I \\
 \hline
 G D W D F P
 \end{array}$$

Value of W ?

1.

(a) 6

(b) 7

(c) 8

(d) 9

Value of $2F + P$?

2.

(a) 12

(b) 13

(c) 14

(d) 15

Value of $3G + F$?

3.

(a) 20

(b) 21

(c) 22

(d) 23

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

$$\begin{array}{r}
 \text{W P D} \\
 \times \text{G K I} \\
 \hline
 \text{K F P P} \\
 \text{G G Z M} \\
 \text{F G F I} \\
 \hline
 \text{G D W D F P}
 \end{array}$$

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

$$\begin{array}{r}
 (1) \quad \text{W P D} \\
 \times \text{I} \\
 \hline
 \text{K F P P}
 \end{array}$$

$$\begin{array}{r}
 (2) \quad \text{W P D} \\
 \times \text{K} \\
 \hline
 \text{G G Z M}
 \end{array}$$

$$\begin{array}{r}
 (3) \quad \text{W P D} \\
 \times \text{G} \\
 \hline
 \text{F G F I}
 \end{array}$$

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)

$$\begin{array}{r}
 (1) \quad \text{W P D} \\
 \times \text{I} \\
 \hline
 \text{K F P P}
 \end{array}$$

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 Cryptarithmic, 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) $W \ 3 \ D$

$\times I$

$K \ F \ 3 \ 3$

Case 3 $D=7, I=9, P=3$

(1) $W \ 3 \ 7$

$\times 9$

$K \ F \ 3 \ 3 \ [\ K \ F \ 3 \ 3]$

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.

$W \ 3 \ 7$

$\times G \ K \ 9$

$K \ F \ 3 \ 3$

$G \ G \ Z \ M$

$F \ G \ F \ 9$

$G \ 7 \ W \ 7 \ F \ 3$

As, $W \ 3 \ 7$

$\times G$

$F \ G \ F \ 9$

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) $W \ 3 \ 9$

$\times 7$

$K \ F \ 3 \ 3 \ [\ K \ F \ 4 \ 3] \ \text{Rejected}$

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

Cryptarithmic Multiplication 16

$$\begin{array}{r}
 A P R \\
 x O C T \\
 \hline
 P U R A \\
 R O J R \\
 R E C U \\
 \hline
 R A A J A A
 \end{array}$$

Which of the following set contains only even numbers ?

1.

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

Which of the following set contains odd numbers ?

2.

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

Value of A ?

3.

(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, $R \times C = _C [R O J R]$

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, $2 \times T = _ 4$) (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 $2 + E + 1(\text{carry}) = 4$
 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.

$$\begin{array}{r}
 432 \\
 \times 567 \\
 \hline
 3024 \\
 2592 \\
 2160 \\
 \hline
 244944
 \end{array}$$

Cryptarithmic Multiplication 18

$$\begin{array}{r}
 \\
 \times \\
 \hline
 A N X X \\
 X A V H \\
 M X V W \\
 \hline
 M A M V W X
 \end{array}$$

Value of K ?

1.

(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

$$\begin{array}{r}
 \text{H M K} \\
 \times \text{A V E} \\
 \hline
 \text{A N X X} \\
 \text{X A V H} \\
 \text{M X V W} \\
 \hline
 \text{M A M V W X}
 \end{array}$$

(You have to use Unit Digit Method for solving this Cryptarithmic Problem.)

Firstly divide the problem in three parts.

$$\begin{array}{r}
 (1) \quad \text{H M K} \\
 \times \text{E} \\
 \hline
 \text{A N X X}
 \end{array}$$

$$\begin{array}{r}
 (2) \quad \text{H M K} \\
 \times \text{V} \\
 \hline
 \text{X A V H}
 \end{array}$$

$$\begin{array}{r}
 (3) \quad \text{H M K} \\
 \times \text{A} \\
 \hline
 \text{M X V W}
 \end{array}$$

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)

$$\begin{array}{r}
 (1) \quad \text{H M K} \\
 \times \text{E} \\
 \hline
 \end{array}$$

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 Cryptarithmic, 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

$$\begin{array}{r} \times 3 \\ 5 \text{ N } 2 \text{ 2} \end{array}$$

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)

$$\begin{array}{r} (1) \quad \quad \text{H M } 6 \\ \quad \quad \times 7 \\ \quad \text{A N } 2 \text{ 2} \end{array}$$

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

$$\begin{array}{r} \text{H } 4 \text{ 6} \\ \times \text{A V } 7 \\ \text{A N } 2 \text{ 2} \\ 2 \text{ A V H} \\ 4 \text{ 2 V W} \\ 4 \text{ A 4 V W } 2 \end{array}$$

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.

$$\begin{array}{r} \text{H } 4 \text{ 6} \\ \times 5 \text{ V } 7 \\ 5 \text{ N } 2 \text{ 2} \\ 2 \text{ 5 V H} \\ 4 \text{ 2 V W} \\ 4 \text{ 5 4 V W } 2 \end{array}$$

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

$$\begin{array}{r} 8 \text{ 4 } 6 \\ \times 5 \text{ V } 7 \\ 5 \text{ N } 2 \text{ 2} \\ 2 \text{ 5 V } 8 \\ 4 \text{ 2 V } 0 \\ 4 \text{ 5 4 V } 0 \text{ 2} \end{array}$$

Now you can easily predict other values.

$$\begin{array}{r}
 846 \\
 \times 537 \\
 \hline
 5922 \\
 2538 \\
 4230 \\
 \hline
 454302
 \end{array}$$

Cryptarithmic Multiplication 19

$$\begin{array}{r}
 A B W \\
 \times B P A \\
 \hline
 H X R F \\
 F X W X \\
 W W H H \\
 \hline
 W P H W B F
 \end{array}$$

Which of the following set forms a triangle ?

1.

(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 Cryptarithmic.)

$$\begin{array}{r}
 A \ B \ W \\
 \times B \ P \ A \\
 \hline
 H \ X \ R \ F \\
 F \ X \ W \ X \\
 W \ W \ H \ H \\
 W \ P \ H \ W \ B \ F
 \end{array}$$

(You have to use Unit Digit Method for solving this Cryptarithmic problem)

Firstly divide the problem in three parts for collecting the clues.

$$\begin{array}{r}
 (1) \quad A \ B \ W \\
 \times A \\
 \hline
 H \ X \ R \ F
 \end{array}$$

$$\begin{array}{r}
 (2) \quad A \ B \ W \\
 \times P \\
 \hline
 F \ X \ W \ X
 \end{array}$$

$$\begin{array}{r}
 (3) \quad A \ B \ W \\
 \times B \\
 \hline
 W \ W \ H \ H
 \end{array}$$

Now analyse all the three parts separately,

In Case (3) you can see B, H, W are repeated twice.

Hence take Case (3)

$$\begin{array}{r}
 (3) \quad \begin{array}{r} A \ B \ W \\ \times \ B \\ \hline W \ W \ H \ H \end{array}
 \end{array}$$

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 Cryptarithmic, 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.

$$\begin{array}{r}
 (3) \quad \begin{array}{r} A \ 7 \ 3 \\ \times \ 7 \\ \hline 3 \ 3 \ 1 \ 1 \end{array}
 \end{array}$$

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 Cryptarithmic Rules.

put $W=3, H=1, A=4$, and $B=7$

$$\begin{array}{r}
 \begin{array}{r} 4 \ 7 \ 3 \\ \times \ 7 \ P \ 4 \\ \hline 1 \ X \ R \ F \\ F \ X \ 3 \ X \\ 3 \ 3 \ 1 \ 1 \\ 3 \ P \ 1 \ 3 \ 7 \ F \end{array}
 \end{array}$$

Now, easily find the values of other variables.

$$\begin{array}{r}
 (1) \quad \begin{array}{r} 4 \ 7 \ 3 \\ \times \ 4 \\ \hline 1 \ X \ R \ F \ [\ 1 \ 8 \ 9 \ 2 \] \end{array}
 \end{array}$$

If you compare side by side then you will get

$X=8, R=9$ and $F=2$

Now put these values

$$\begin{array}{r}
 473 \\
 \times 7P4 \\
 \hline
 1892 \\
 2838 \\
 3311 \\
 3P1372
 \end{array}$$

Here you can easily predict the value of $P=6$

Hence,

$$\begin{array}{r}
 473 \\
 \times 764 \\
 \hline
 1892 \\
 2838 \\
 3311 \\
 361372
 \end{array}$$

Cryptarithmic Multiplication 20

$$\begin{array}{r}
 C A W \\
 \times A N E \\
 \hline
 N N R C \\
 A A V R \\
 D E C D \\
 \hline
 W A R A N C
 \end{array}$$

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

$$\begin{array}{r}
 C \ A \ W \\
 \times \ A \ N \ E \\
 \hline
 N \ N \ R \ C \\
 A \ A \ V \ R \\
 D \ E \ C \ D \\
 W \ A \ R \ A \ N \ C
 \end{array}$$

Here you can see $A + E = A$

Therefore $E=9$ [Detailed Explanation Rule-1](#)

Put $E=9$ rewrite the problem

$$\begin{array}{r}
 C \ A \ W \\
 \times \ A \ N \ 9 \\
 \hline
 N \ N \ R \ C \\
 A \ A \ V \ R \\
 D \ 9 \ C \ D \\
 W \ A \ R \ A \ N \ C
 \end{array}$$

At this stage divide the problem into three parts

$$\begin{array}{r}
 (1) \quad C \ A \ W \\
 \times \ 9 \\
 \hline
 N \ N \ R \ C
 \end{array}$$

$$\begin{array}{r}
 (2) \quad \quad C \ A \ W \\
 \quad \quad x \ N \\
 \hline
 \quad \quad A \ A \ V \ R
 \end{array}$$

$$\begin{array}{r}
 (3) \quad \quad C \ A \ W \\
 \quad \quad x \ A \\
 \hline
 \quad \quad D \ 9 \ C \ D
 \end{array}$$

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.]

$$\begin{array}{r}
 (3) \quad \quad C \ A \ W \\
 \quad \quad x \ A \\
 \hline
 \quad \quad D \ 9 \ C \ D
 \end{array}$$

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 Cryptarithmic, 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)

$$\begin{array}{r}
 (3) \quad \quad C \ 7 \ 3 \\
 \quad \quad x \ 7 \\
 \hline
 \quad \quad 1 \ 9 \ C \ 1 \ [\ 1 \ 9 \ 1 \ 1 \]
 \end{array}$$

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 Cryptarithmic Rules

Rejected

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

put these values in (3)

$$\begin{array}{r}
 (3) \quad \quad C \ 3 \ 7 \\
 \quad \quad \times \ 3 \\
 \hline
 \quad \quad 1 \ 9 \ C \ 1 \ [\ 1 \ 9 \ 0 \ 1]
 \end{array}$$

If you compare side by side then you will get $C=0$.

Value of C cannot be equal to zero.

$$\begin{array}{r}
 (3) \quad \quad 0 \ A \ W \\
 \quad \quad \times \ A \\
 \hline
 \quad \quad D \ 9 \ 0 \ D
 \end{array}$$

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.

$$\text{Case 5} \quad W=3, \ A=4, \ D=2$$

Put these values in (3)

$$\begin{array}{r}
 (3) \quad \quad C \ 4 \ 3 \\
 \quad \quad \times \ 4 \\
 \hline
 \quad \quad 2 \ 9 \ C \ 2 \ [\ 2 \ 9 \ 7 \ 2]
 \end{array}$$

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 Cryptarithmic Rules.

$$\begin{array}{r}
 \quad \quad 7 \ 4 \ 3 \\
 \quad \quad \times \ 4 \ N \ 9
 \end{array}$$

$$\begin{array}{r}
 \text{N N R } 7 \text{ [} 6 \text{ 6 8 7] } \\
 4 \text{ 4 V R} \\
 2 \text{ 9 7 2} \\
 3 \text{ 4 R 4 N 7}
 \end{array}$$

From here you will get $N=6$ and $R=8$

Hence,

$$\begin{array}{r}
 7 \text{ 4 3} \\
 \times 4 \text{ 6 9} \\
 \hline
 6 \text{ 6 8 7} \\
 4 \text{ 4 5 8} \\
 2 \text{ 9 7 2} \\
 3 \text{ 4 8 4 6 7}
 \end{array}$$

Cryptarithmic Multiplication 31

$$\begin{array}{r}
 \text{T P K} \\
 \times \text{P V A} \\
 \hline
 \text{R 2 E L} \\
 \text{T Q W ?} \\
 \text{W W V E} \\
 \hline
 \text{? A R T W L}
 \end{array}$$

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 Cryptarithmic)

```

      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
  
```

$$\begin{array}{r} \times P \\ W \quad W \quad V \quad E \end{array}$$

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),

$$(1) \quad T \quad P \quad K$$

$$\begin{array}{r} \times P \\ W \quad W \quad V \quad E \end{array}$$

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)

$$\begin{array}{r} (3) \quad T \quad P \quad K \\ \times P \\ W \quad W \quad V \quad E \\ \text{i.e.} \quad T \quad 2 \quad 5 \\ \times 2 \\ W \quad W \quad V \quad 0 \end{array}$$

From here you will get value of $V=5$. (**Rejected, as you have already taken $K=5$**).
[In Cryptarithmic, each variable should have and unique and distinct value.]

Cryptarithmic Tutorial

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

Put these values in (3)

$$\begin{array}{r}
 (3) \quad T \ P \ K \\
 \quad \times P \\
 \hline
 W \ W \ V \ E \\
 \text{i.e.} \quad T \ 5 \ 2 \\
 \quad \times 5 \\
 \hline
 W \ W \ V \ 0
 \end{array}$$

From here you will get value of $V=6$.

Now problem reduces to below

$$\begin{array}{r}
 T \ 5 \ 2 \\
 \times 5 \\
 \hline
 W \ W \ 6 \ 0
 \end{array}$$

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..

$$\begin{array}{r}
 (3) \quad T \ P \ K \\
 \quad \times P \\
 \hline
 W \ W \ V \ E \\
 \quad T \ 5 \ 4 \\
 \quad \times 5 \\
 \hline
 W \ W \ V \ 0
 \end{array}$$

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

$$\begin{array}{r} (3) \quad T \ 5 \ 4 \\ \quad \times \ 5 \\ \hline 1 \ 1 \ 7 \ 0 \end{array}$$

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

Now try with $W=2$

$$\begin{array}{r} (3) \quad T \ 5 \ 4 \\ \quad \times \ 4 \\ \hline 2 \ 2 \ 7 \ 0 \end{array}$$

[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 $K=5, P=4, E=0$

$$\begin{array}{r} (3) \quad T \ P \ K \\ \quad \times \ P \\ \hline W \ W \ V \ E \end{array}$$

i.e.

$$\begin{array}{r} T \ 4 \ 5 \\ \quad \times \ 4 \\ \hline W \ W \ V \ 0 \end{array}$$

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

$$\begin{array}{r} (3) \quad T \ P \ K \\ \quad \times \ P \\ \hline W \ W \ V \ E \\ T \ 5 \ 6 \\ \quad \times \ 5 \\ \hline W \ W \ V \ 0 \end{array}$$

From here you will get value of $V=8$.

$$\begin{array}{r} T \ 5 \ 6 \\ \quad \times \ 5 \\ \hline W \ W \ 8 \ 0 \end{array}$$

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 $T \times 5 + 2$ { 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

$$\begin{array}{r}
 4\ 5\ 8 \\
 \times\ 5 \\
 \hline
 2\ 2\ 9\ 0
 \end{array}$$

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.

$$\begin{array}{r}
 4\ 5\ 8 \\
 \times\ 5\ 9\ A \\
 \hline
 R\ 2\ 0\ L \\
 4\ Q\ 2\ ? \\
 2\ 2\ 9\ 0 \\
 ?\ A\ R\ 4\ 2\ L
 \end{array}$$

Now you can easily solve the problem further.

$$\begin{array}{r}
 4\ 5\ 8 \\
 \times\ 5\ 9\ 7 \\
 \hline
 3\ 2\ 0\ 6 \\
 4\ 1\ 2\ 2 \\
 2\ 2\ 9\ 0 \\
 2\ 7\ 3\ 4\ 2\ 6
 \end{array}$$

Cryptarithmic Multiplication 32

$$\begin{array}{r}
 D M H \\
 \times A N P \\
 \hline
 H M D D \\
 H D 5 S \\
 ? M 5 P \\
 \hline
 H H D ? 5 D
 \end{array}$$

Value of M ?

1.

(a) 6

(b) 7

(c) 8

(d) 9

Value of D ?

2.

(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

```

Cryptarithmic Multiplication 33

```

          M X A
        x X V L
        -----
        A L V 0
      L L ? A
    P V S 0
    -----
  X X M S W 0

```


Which of the following set contains only even numbers ?

1.

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

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

Value of M ?

2.

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

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

Which of the following set contains prime numbers only ?

3.

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

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

2. A

3. A

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

$$\begin{array}{r} 945 \\ \times 476 \\ \hline 5670 \\ 6615 \\ 3780 \\ \hline 449820 \end{array}$$

