ENHANCING ARITHMETIC OPERATIONS IN C++ THROUGH VEDIC MATHEMATICS PRINCIPLES

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ABTRACT

Vedic mathematics is a relatively recent subject of study that requires integration with other areas of study. It is a collection of formulas taken from ancient Vedic scriptures. Here, we have combined Vedic mathematics with computer science. Specifically, we have created C++ programmes utilising two Vedic mathematics sutras:

I.   URDHVA TIRYAGBHYAM (Sutra-3)
II.   SQUARE BY DUPLEX (4-DIGITS).

These two techniques speed up computations compared to more conventional techniques. We can discover the product and square of huge numbers with ease and with fewer errors when we use these two sutras.

Introduction:

Vedic Mathematics, a mathematical theory rediscovered between 1911 and 1918 by Indian mathematician Jagadguru Shri Bharathi Krishna Tirtha Ji, is documented in his work "Vedic Mathematics." Within the mathematical community, Vedic Mathematics is also referred to as mental mathematics due to its focus on rapid and efficient numerical problem-solving techniques. The system is comprised of sixteen primary sutras (formulae) and thirteen sub-sutras (sub-formulae), which collectively facilitate the swift and accurate execution of various mathematical operations. These sutras can be applied to a broad spectrum of mathematical fields, including calculus, geometry, algebra, arithmetic, and conics. The methodologies encapsulated in Vedic Mathematics are renowned for their ability to streamline complex computations, enhancing both speed and precision in mathematical problem-solving.

Vedic Maths Benefits:

There are several ways to explain the significance of Vedic mathematics. Vedic mathematics can simplify numerical problems far more quickly than contemporary computational techniques. This method of streamlining numerical calculations occasionally eliminates the need for paper and pens as well. Thus, mastering Vedic maths reduces learning time and increases motivation to study other mathematical applications. The following is a list of some advantages of Vedic mathematics sutras:

• Calculations get simple and quick.

• Simplifying things takes less time to complete.

• There is less mental strain on students.

• Using standard techniques, results from sutra-based methodologies can be readily confirmed.

• There is very little chance that pupils applying these sutras will make mistakes.

• Students' understanding and enthusiasm in mathematics are enhanced when sutras are used.

• Vedic maths facilitates the use of mental computations to tackle challenging problems.

C++ PROGRAMS FOR VEDIC MATHEMATICS SUTRAS
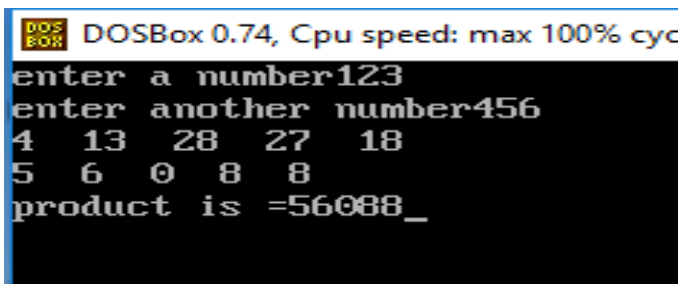
1. URDHVA TIRYAGBHYAM(Sutra-3)

Its general meaning is vertically and crosswise. It is used for multiplying in Vedic mathematics.

Program for multiplication of 3 digits number using Urdhva Tiryagbhyam:

```
#include<iostream.h>
#include<conio.h>
void main()
{ clrscr();
int a,b;
long c,d,e,i,j[3],r[3],m,n,o,p,q,x,pr;
cout<<"enter a number";
cin>>a;
cout<<"enter another number";
cin>>b;
for(i=0;i<3;i++)
{
r[i]=a%10;
a=a/10;
j[i]=b%10;
b=b/10;}
m=r[0]*j[0];
n=r[1]*j[0]+r[0]*j[1];
o=r[2]*j[0]+r[0]*j[2]+r[1]*j[1];
p=r[2]*j[1]+r[1]*j[2];
q=r[2]*j[2];
if(m<10)
{x=m;
m=0;}
else{
x=m%10;
m=m/10;  }
n=n+m;
if(n<10)
{
c=n;
n=0;}
else
{c=n%10;
n=n/10;}
o=o+n;
if(o<10)
{ d=o;
o=0; }
else
{
d=o%10;
o=o/10; }
p=p+o;
if(p<10)
{ e=p;
p=0;  }
else
{e=p%10;
p=p/10;  }
q=q+p;
pr=q*10000+e*1000+d*100+c*10+x;
cout<<"product is ="<<pr;
getch();}
```
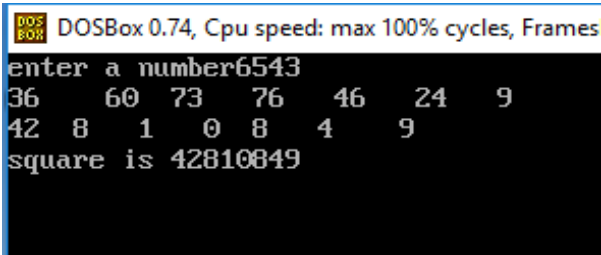
Output with an example:


```
DOSBox 0.74, Cpu speed: max 100% cyc
enter a number123
enter another number456
4   13   28   27   18
5   6   0   8   8
product is =56088_
```

SQUARE BY DUPLEX(4-DIGITS):

```
#include<iostream.h>
#include<conio.h>
void main()
{
clrscr();
int a,i, b[4],m,n,o,p,q,r;
long x,c,d,e,f,g,h;
long long sq;
cout<<"enter a number";
cin>>a;
for(i=0;i<4;i++)
{
b[i]=a%10;
a=a/10;}
x=b[0]*b[0];
c=2*b[0]*b[1];
d=2*b[0]*b[2]+b[1]*b[1];
e=2*b[0]*b[3]+2*b[1]*b[2];
f=2*b[3]*b[1]+b[2]*b[2];
g=2*b[3]*b[2];
h=b[3]*b[3];
cout<<h<<"   "<<g<<" "<<f<<"
"<<e<<"   "<<d<<"   "<<c<<"
"<<x<<endl;
if(x>=10)
{
m=x%10;
x=x/10;
}
else{m=x;
x=0;
}
c=c+x;
if(c>=10)
{
n=c%10;
c=c/10;
}
else
{
n=c;
c=0;
}
d=d+c:
```

```
if(d>=10)
{o=d%10;
d=d/10;}
else
{o=d;
d=0;}
e=e+d;
if(e>=10)
{p=e%10;
e=e/10;}
else
{p=e;
e=0;}
f=f+e;
if(f>=10)
{q=f%10;
f=f/10;}
else
{
q=f;
f=0;
}
g=g+f;
if(g>=10)
{
r=g%10;
g=g/10;
}
else
{
r=g;
g=0;
}
h=h+g;
cout<<h<<" " <<r<<"   "<<q<<"
"<<p<<" "<<o<<"   "<<n<<"
"<<m<<endl;
sq=1000000*h+100000*r+10000*q+1000
*p+100*o+10*n+m;
cout<<"square is "<<sq;
getch();
```

Output with an example:

Conclusion: Integrating Vedic Mathematics into C++ enhances arithmetic operations by simplifying the logic and reducing computational steps. These ancient techniques, when adapted to modern programming, can provide significant improvements in performance and efficiency, making them valuable tools for developers.The study of Vedic Mathematics is an extensive field with numerous untapped possibilities. Although we currently recognize 16 primary sutras and 13 sub-sutras, our Vedic texts contain a wealth of knowledge yet to be uncovered that could significantly advance this domain. Vedic Mathematics can be effectively integrated with various modern disciplines, enhancing its utility and relevance. To further the development of Vedic Mathematics, it is essential to incorporate it across multiple subjects. Integrating Vedic Mathematics with technology offers the best approach to give it contemporary appeal and increase its popularity among the current generation.

References:

1. Jagadguru Swami Shree Bharati Krishna Tirtha Ji Maharaj (1965), VedicMathematics. MotilalBanarasi Dass Publisher.
2. Sumita Arora, Computer Science With C++, Dhanpat Rai & Co.(P) Ltd.