



Triangle

**Enter any three of them and
find remaining**

**a,b,c , alpha, beta, gamma
and also print labeled triangle
using graphics**

By DJVprogrammers

A triangle has six important elements, three angles and three sides. in triangle ABC, the measures of the three angles are usually denoted by α , β and γ (alpha, beta and gamma, in my program i am using variable Al for α , Be for β and Ga for γ) and measures of three sides opposite to them are denoted by a,b and c respectively

We can solve a triangle if we know

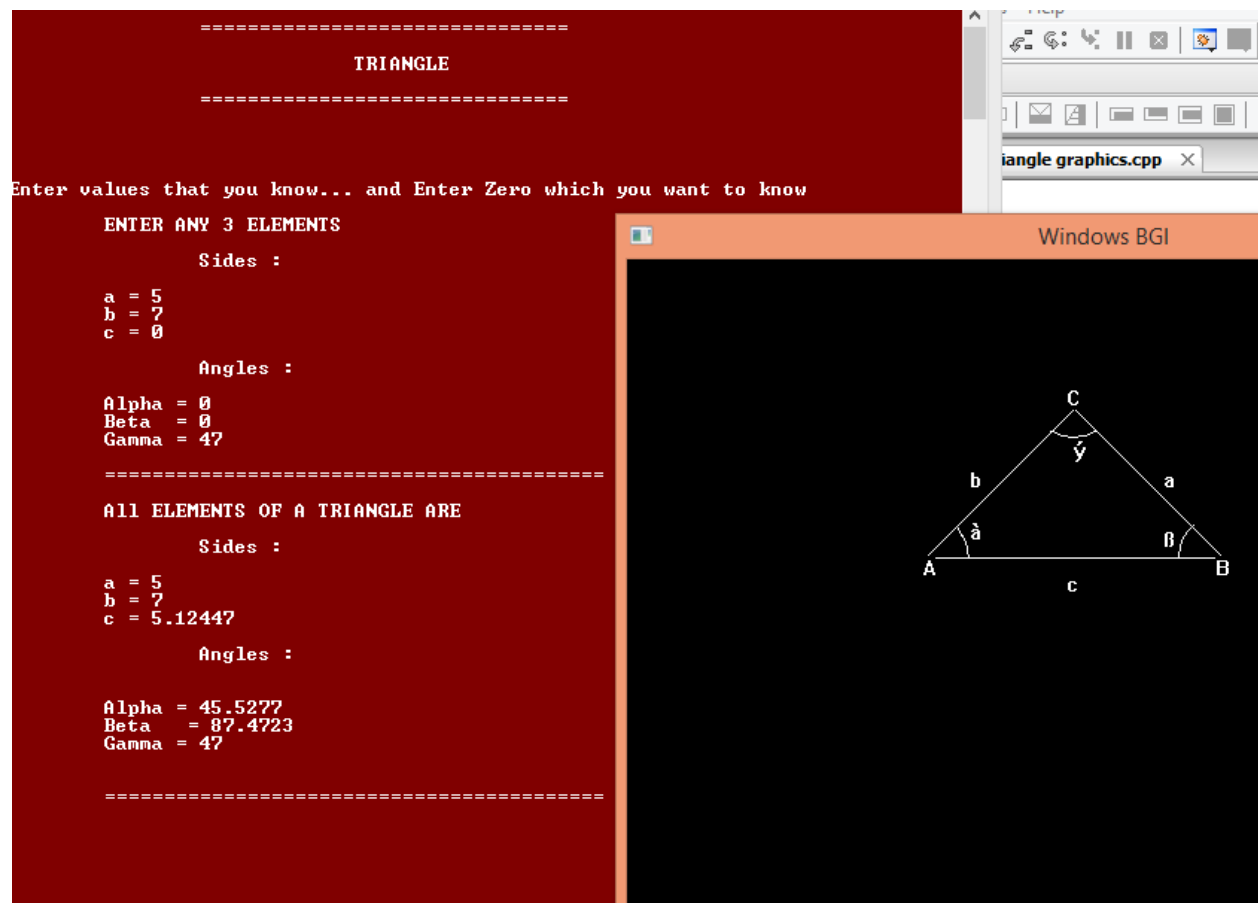
- 1- one side and two angles
- 2- two sides and their included angle
- 3- three sides

So this code gives us remaining elements of a triangle that are unknown...

enter zero for those whose values you want to calculate..

It also shows labeled triangle using graphics

Output should be like this



The screenshot shows a C++ program running in a terminal window. The program is titled "TRIANGLE" and prompts the user to enter values for three elements (sides or angles). The user has entered: a = 5, b = 7, c = 0. The program then calculates the remaining elements: Alpha = 45.5277, Beta = 87.4723, Gamma = 47. To the right of the terminal window, there is a "Windows BGI" graphics window displaying a triangle with vertices A, B, and C. The sides are labeled a, b, and c, and the angles are labeled α , β , and γ .

```
=====
                        TRIANGLE
=====

Enter values that you know... and Enter Zero which you want to know

ENTER ANY 3 ELEMENTS

      Sides :

a = 5
b = 7
c = 0

      Angles :

Alpha = 0
Beta  = 0
Gamma = 47

=====

All ELEMENTS OF A TRIANGLE ARE

      Sides :

a = 5
b = 7
c = 5.12447

      Angles :

Alpha = 45.5277
Beta  = 87.4723
Gamma = 47

=====
```

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```
cout<<"\tAlpha = ";cin>>al;

        cout<<"\tBeta  = ";cin>>be;

        cout<<"\tGamma  = ";cin>>ga;

        alpha=al*3.1416/180.0;

        beta=be*3.1416/180.0;

        gamma=ga*3.1416/180.0;

        if(a==0 && b==0 && c==0)

            goto again;

        if(a!=0 && b!= 0 && gamma !=0 )

        {

            c=sqrt(a*a+b*b-2*a*b*cos(gamma));

            al=asin(a*sin(gamma)/c)*180.0/3.1416;

            be=180-al-ga;

        }

        else if(a!=0 && c!=0 && beta!=0)

        {

            b=sqrt(a*a+c*c-2*a*c*cos(beta));

            ga=asin((c*sin(beta))/b)*180.0/3.1416;

            al=180-be-ga;

        }

        else if(b!=0 && c!=0 && alpha!=0)

        {

            a=sqrt(b*b+c*c-2*c*b*cos(alpha));

            ga=asin(c*sin(alpha)/a)*180.0/3.1416;
```

```
        be=180-al-ga;
    }
    else if(a!=0 && b!=0 && c!=0)
    {
        al= acos (((b*b+c*c-a*a)/(2*b*c))) * 180.0 /3.1416;
        be=acos((a*a+c*c-b*b)/(2*a*c))*180.0 /3.1416;
        ga=180-al-be;
    }
    else if(alpha!=0 && beta!=0 &&( a!=0 || b!=0 || c!=0 ))
    {
        ga= 180-al-be;
        gamma=ga*3.1416/180.0;

    if(a!=0)
    {
        b= a*sin(beta)/sin(alpha);
        c= b*sin(gamma)/sin(beta);
    }
    if(b!=0)
    {
        a= b*(sin(alpha))/(sin(beta));
        c= b* (sin(gamma))/(sin(beta));
    }
    if(c!=0)
```

```
{  
    a= c*(sin(alpha))/(sin(gamma));  
    b= a*(sin(beta))/(sin(alpha));  
}  
  
}  
else if(gamma!=0 && beta!=0 &&( a!=0 || b!=0 || c!=0 ))  
{  
  
    al= 180-ga-be;  
    alpha=al*3.1416/180.0;  
    if(a!=0)  
    {  
        b= a*sin(beta)/sin(alpha);  
        c= b* (sin(gamma))/(sin(beta));  
    }  
    if(b!=0)  
    {  
        a= b*(sin(alpha))/(sin(beta));  
        c= b* (sin(gamma))/(sin(beta));  
    }  
    if(c!=0)  
    {
```

```
a= c*(sin(alpha))/(sin(gamma));  
b= a*(sin(beta))/(sin(alpha));  
}  
}  
else if(gamma!=0 && alpha!=0 &&( a!=0 || b!=0 || c!=0 ))  
{  
  
be= 180-ga-al;  
beta=be*3.1416/180.0;  
if(a!=0)  
{  
b= a*(sin(beta))/(sin(alpha));  
c= b* (sin(gamma))/(sin(beta));  
  
}  
if(b!=0)  
{  
a= b*(sin(alpha))/(sin(beta));  
c= b* (sin(gamma))/(sin(beta));  
}  
if(c!=0)  
{  
a= c*(sin(alpha))/(sin(gamma));  
b= a*(sin(beta))/(sin(alpha));  
}
```

```
}

cout<<"\n\t===== \n\n";

cout<<"\tAll ELEMENTS OF A TRIANGLE ARE\n\n";

    cout<<"\t\tSides : \n\n";

    cout<<"\ta = "<<a;

    cout<<"\n\tb = "<<b;

    cout<<"\n\tc = "<<c;

    cout<<"\n\n\t\tAngles : \n\n";

cout<<"\n\tAlpha = "<<al;

    cout<<"\n\tBeta  = "<<be;

    cout<<"\n\tGamma = "<<ga<<endl<<endl;

cout<<"\n\t===== \n\n";

//graphics

//This portion for graphics

int gdriver = DETECT, gmode;

initgraph(&gdriver, &gmode, "C:\\tc\\bgi");

line(300, 100, 200, 200);

line(300, 100, 400, 200);

line(200, 200, 400, 200);

outtextxy(199,199,"A");

outtextxy(295,85,"C");

outtextxy(395,199,"B");

outtextxy(360,140,"a");
```



```
outtextxy(230,140,"b");  
outtextxy(295,210,"c");  
arc(200, 200, 0, 40, 30);  
outtextxy(230,175,"à");  
arc(300, 90, 240, 300, 30);  
outtextxy(300,120,"ý");  
arc(400, 200, 130, 180, 30);  
outtextxy(360,180,"ß");  
getch();  
closegraph();  
return 0;
```

```
}
```

Output:

```
=====
                        TRIANGLE
=====

Enter values that you know... and Enter Zero which you want to know

ENTER ANY 3 ELEMENTS

      Sides :

a = 0
b = 0
c = 7.2

      Angles :

Alpha = 60
Beta  = 50
Gamma = 0

=====

ALL ELEMENTS OF A TRIANGLE ARE

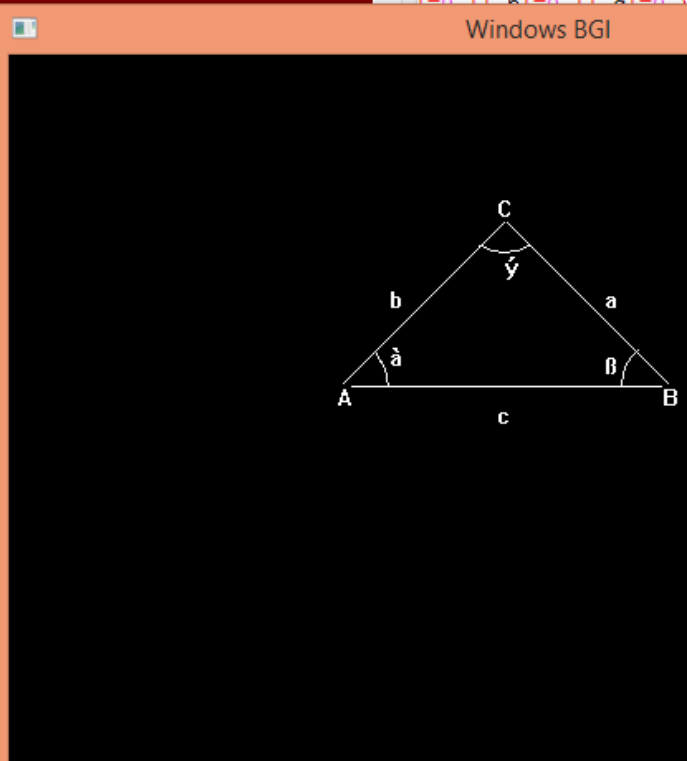
      Sides :

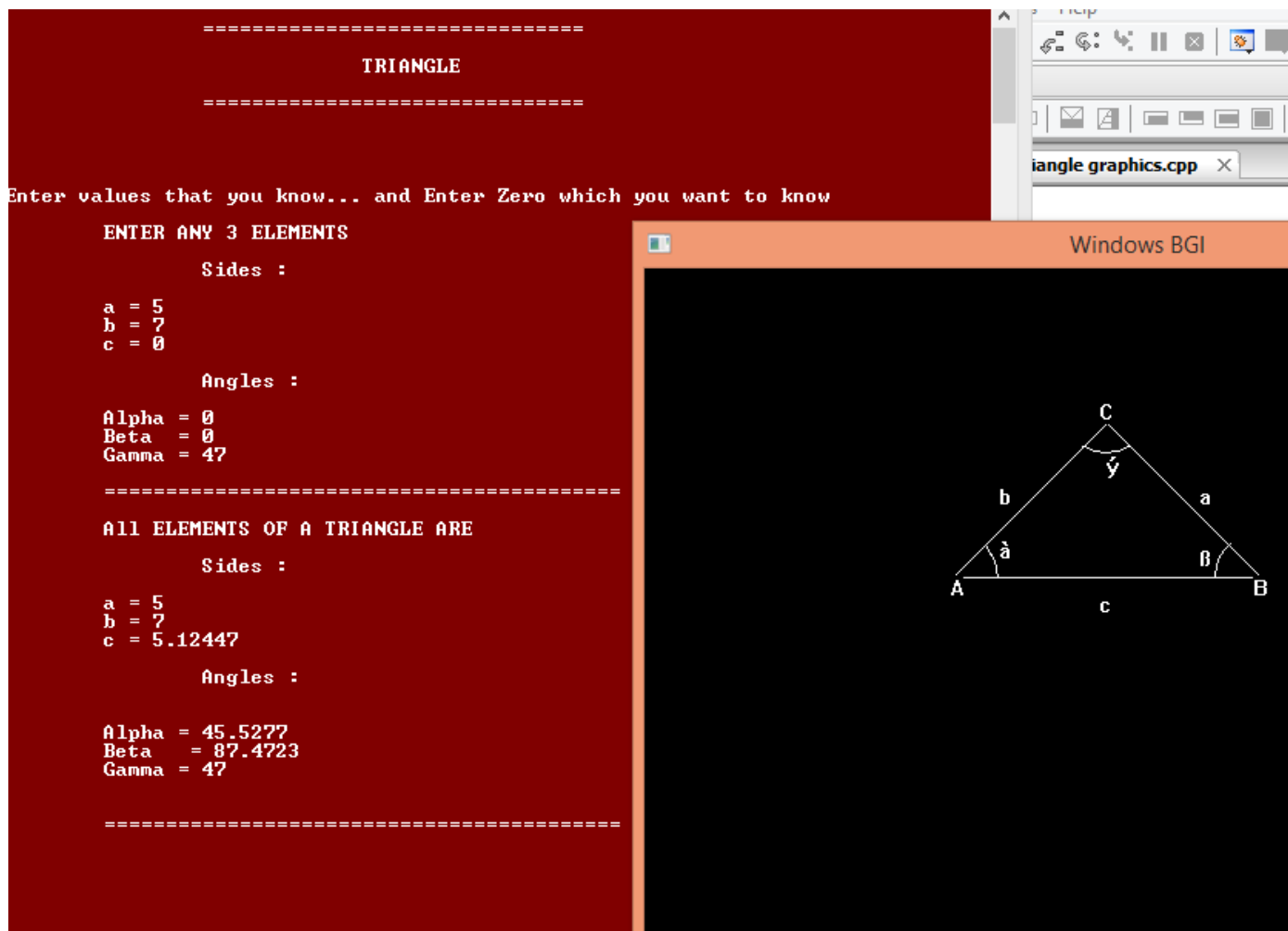
a = 6.63556
b = 5.8695
c = 7.2

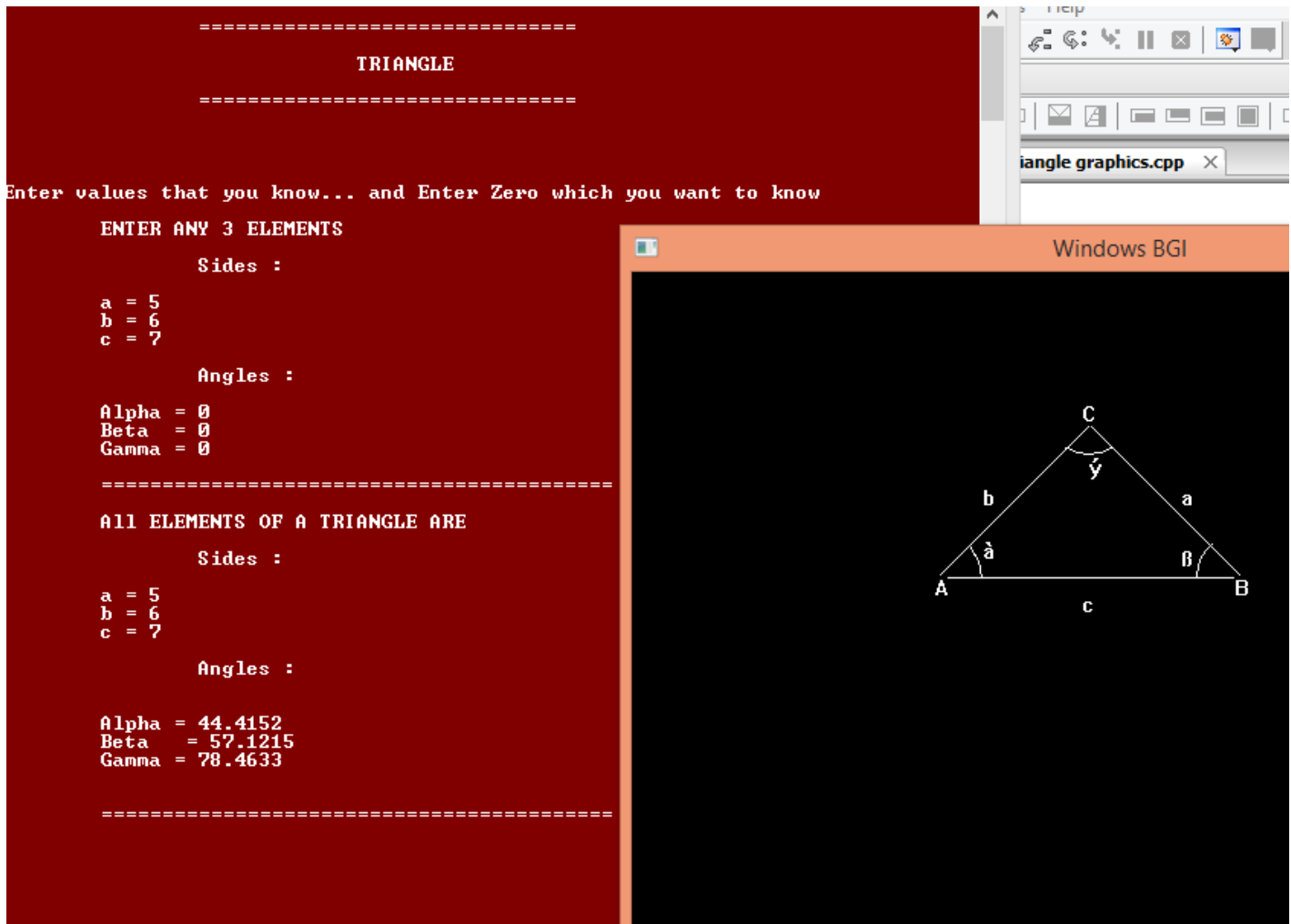
      Angles :

Alpha = 60
Beta  = 50
Gamma = 70

=====
```







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