

**CALCULATION OF SOIL DENSITY IN THE EARTH'S CRUST IN S++
PROGRAMMING LANGUAGE**

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Abstract: Calculating soil density in civil engineering in C++ is an object-oriented programming and calculation when the problem has indicators.

Keywords: structure, int, float, double, while, do While in C++ programming language.

Before creating a program for any object, it is necessary to create its algorithm. An algorithm is an ordered sequence of instructions that must be followed to solve a problem. Each algorithm should be divided into clear and complete steps. Algorithm program plan. That is, the implementation of the set task is achieved by performing small elementary tasks in a certain sequence. Depending on it, you can create a program in any programming language. In the C++ programming language, an optional program consists only of its own operators. However, various integrated development environments have been released to facilitate the programmer and speed up his work. The best way to design a program is systematic planning. Planning makes the program more efficient. The program design consists of two general parts - program structure and program description. The structure of the program shows how the problem is solved. The C++ programming language has a very rich library of objects. A standard bonus of C++ is to learn how to use ready-made objects/functions. Among the operators, there are several different loop operators, which are used to solve complex examples.

Do-while is called the conditional operator, because the last value of the variable, that is, the condition, is given after the calculation in the program. In programming, if only one operator is used as the body of the repetition in the do - while and while repetition operators, this operator can be written without { } between the blocks. However, professional programmers recommend to enclose the repetition body in a block { } in any case. This prevents possible logical errors.

The do/while statement is similar to the while operator structure. The only difference is that the while condition is checked at the beginning. And in do/while, the body of the iteration is executed and then the condition is checked.

The general structure (structure) of the operator is as follows:

```
the initial value of the variable  
do  
{  
sequence of instructions, step;  
}  
while (condition, that is, the last value of the variable);
```

```
do
    expression;
while (condition);
```

The loop continues until the condition is false. If the condition is false, it is exited from the do/while statement. { } brackets are unnecessary if the expression to be returned in do/while is single. It will be as follows:

we recommend that you always put braces on.

$$P_o = P / (1 + W) = P_s / (1 + e)$$

Problem: Based on the values of soil porosity coefficient, sandy soils can be divided into dense, moderately dense and porous soils. The bulk density of soil particles P_o represents the net mass of the soil relative to its intact volume:

Grunt zaralarning hajmiy zichligi 13-18 kN/m³ oralig`ida o`zgaradi.

$$P = (1 + W / 100)$$

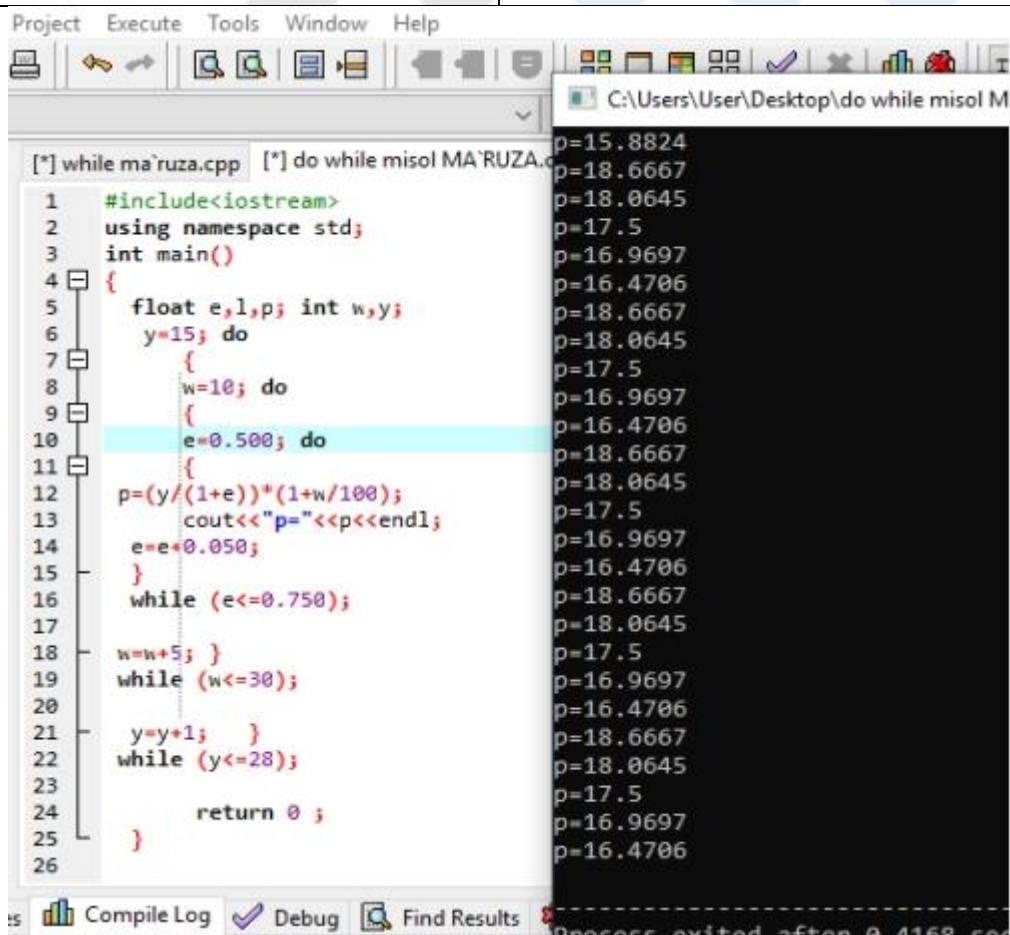
P_o is the volume density of soil particles calculated for different soils will have different values.

$\gamma_s = \rho_s = P_s$ the values of these quantities are the same, only the designation is different. P_s is the density of 1 soil particle located in the soil mass. Using the density of one soil particle, the density of the entire soil mass can be calculated .

To give an example:	Program:
<p>Finding the density of soil in the earth's crust:</p> $\rho = \frac{\rho_s}{1 + e_{oi}} (1 + W / 100)$ <p>γ_s - soil particle density, kN/m³ 15 $\leq \gamma_s \leq 28$ kN/m³</p> <p>e_{oi} - calculation coefficient of porosity at this specified point of the soil $0,500 \leq e_{oi} \leq 0,750$</p> <p>W - soil moisture, (%) $10 \leq e_{oi} \leq 30$</p> <p>In this example γ_s- y marked as; e_{oi}-e was marked as comment: $\gamma_s = y$, $e_{oi} = e$ designation entered</p>	<pre>#include<iostream> using namespace std; int main() { float e,l,p; int w,y; y=15; do { w=10; do { e=0.500; } } do { p=(y/(1+e))*(1+w/100); cout<<"p="<<p<<endl; e=e+0.050;</pre>

```

}
while (e<=0.750);
w=w+5;
}
while (w<=30);
y=y+1;
}
while (y<=28);
return 0 ;
}
    
```



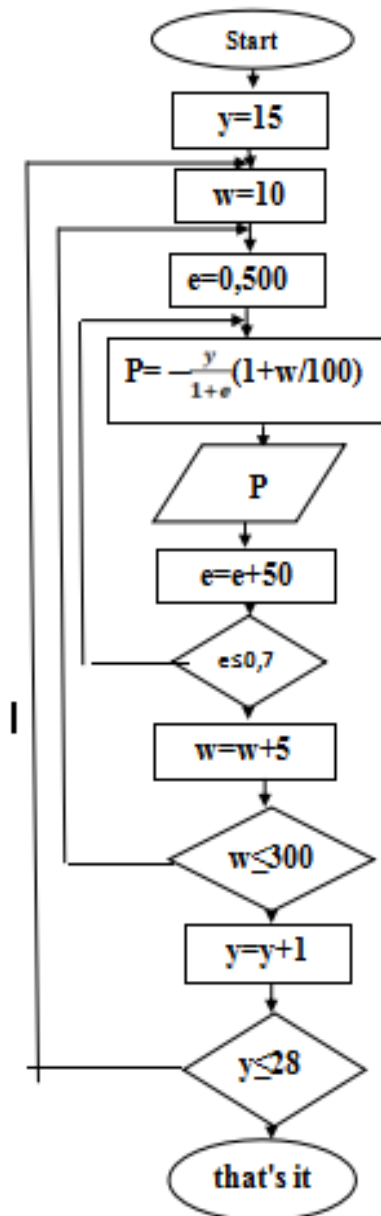
C++ program has three operators that provide a set of instructions to be executed repeatedly until a certain condition is reached. This condition can be predefined (as in the for loop) or open-ended (as in the while and do-while loops). There are three types of loops in C++: while, do-while, and for operators

The while condition is called the pre-given operator, because the last value of the variable, that is, the condition, is given before the calculation in the program. The while loop operator, whose condition is checked before the condition, works only based on the given condition. The general appearance (structure) of this operator is written as follows:

*the initial value of the variable
while (condition, that is, the last value of the
variable)*

*{
Cycle body
step is increased; }*

Algorithm and programming in C++



```

#include<iostream>
using namespace std;
int main()
{ float e,l,p; int w,y;

y=15;
while (y<=28)
{
w=10;
while (w<=30)
{
e=0.500;
while (e<=0.750)
{
p=(y/(1+e))*(1+w/100);
cout<<" p="<<p<<endl;

e=e+0.050;
}
w=w+5;
}
y=y+1;
}
return 0;
}
  
```



```

Project  Execute  Tools  Window  Help
C:\Users\User\Desktop\while ma`ruza.e

[*] while ma`ruza.cpp
1  #include<iostream>
2  using namespace std;
3  int main()
4  {
5      float e,l,p; int w,y;
6      y=15;
7      while (y<=28)
8      {
9          w=10;
10         while (w<=30)
11         {
12             e=0.500;
13             while (e<=0.750)
14             {
15                 p=(y/(1+e))*(1+w/100);
16                 cout<<" p="<<p<<endl;
17                 e=e+0.050;
18             }
19             w=w+5;
20         }
21         y=y+1;
22     }
23     return 0;
24 }
    
```

```

p=15.8824
p=18.6667
p=18.0645
p=17.5
p=16.9697
p=16.4706
p=18.6667
p=18.0645
p=17.5
p=16.9697
p=16.4706
p=18.6667
p=18.0645
p=17.5
p=16.9697
p=16.4706
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p=18.0645
p=17.5
p=16.9697
p=16.4706
p=18.6667
p=18.0645
p=17.5
p=16.9697
p=16.4706
    
```

The purpose of this is to teach construction engineering students to create a program for their specialty.

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