Start 2020

How many dominos are there?

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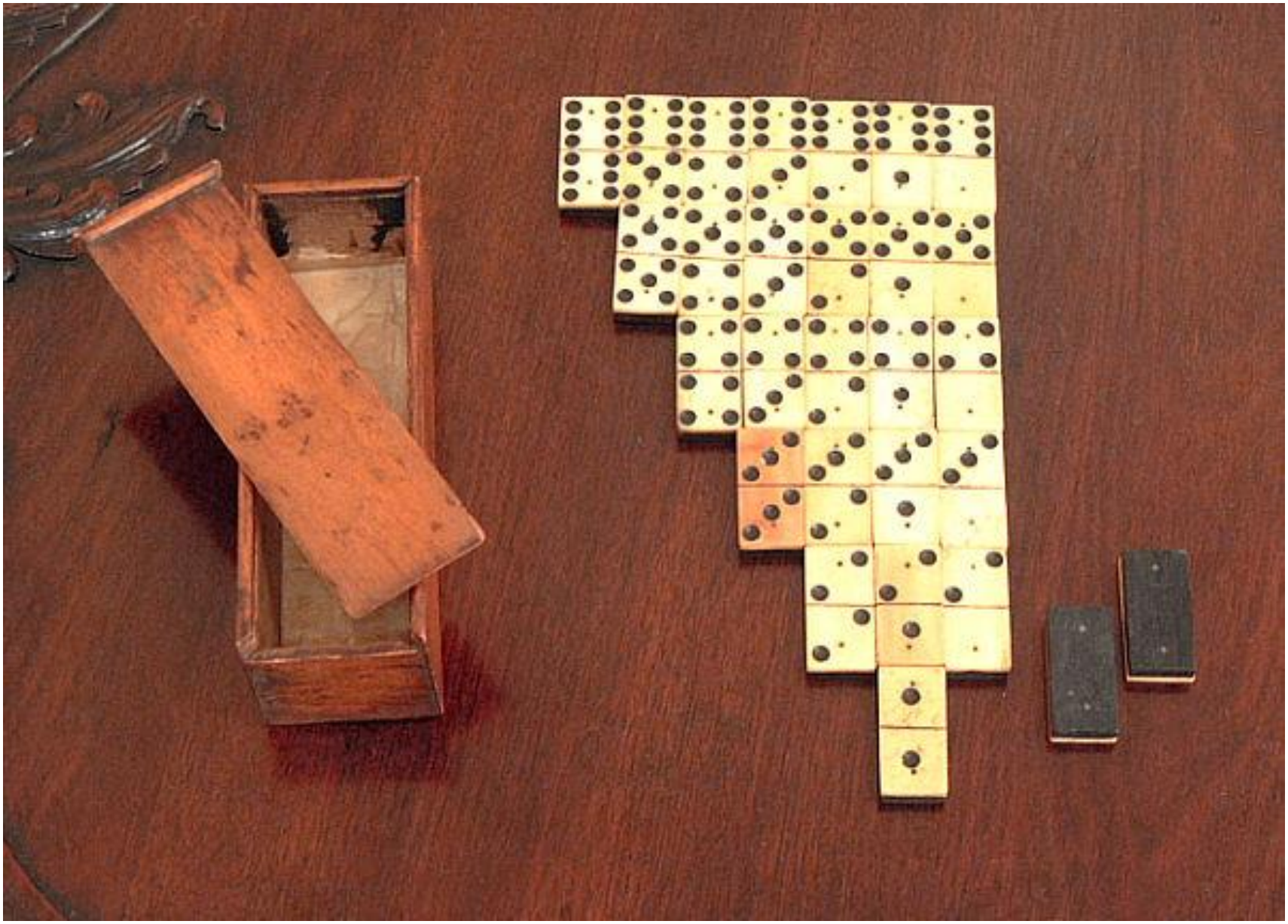
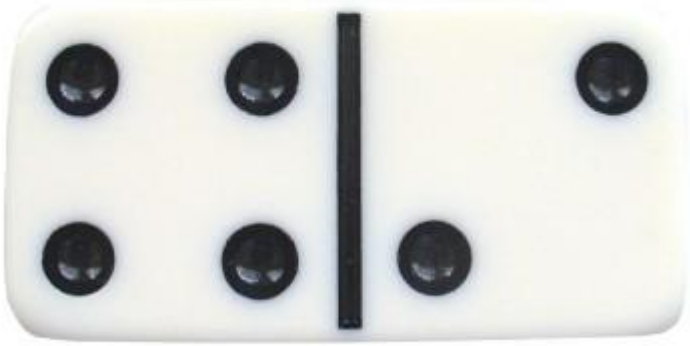


How many dominos are there?

Each domino has two sets of dots

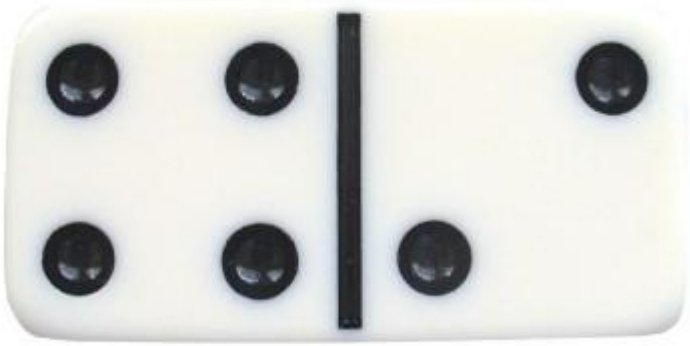
A set of dots is in the range zero (blank) to 6



How many dominos are there?

How many pairs of numbers are there of the form

$$0 \leq x \leq y \leq 6$$



```java
//
// How many dominos are there?
// Expressed as a CP
//
// Can we prove this is correct using a counting argument?
//
import org.chocosolver.solver.Model;
import org.chocosolver.solver.Solver;
import org.chocosolver.solver.variables.IntVar;

public class Domino3 {

    public static void main(String args[]) {
    Model model = new Model("domino3");
    Solver solver = model.getSolver();

    IntVar v1     = model.intVar("v1",0,6);
    IntVar v2     = model.intVar("v2",0,6);

    model.arithm(v1,"<=",v2).post();

    while(solver.solve())
        System.out.println("["+v1.getValue() +" : "+ v2.getValue() +"]");

    //System.out.println(solver.getMeasures());
    }
}
//
// (a) why are dominos enumerated in this order?
//     - solver.setSearch(Search.inputOrderLBSearch(v1,v2));
// (b) So, how many solutions?
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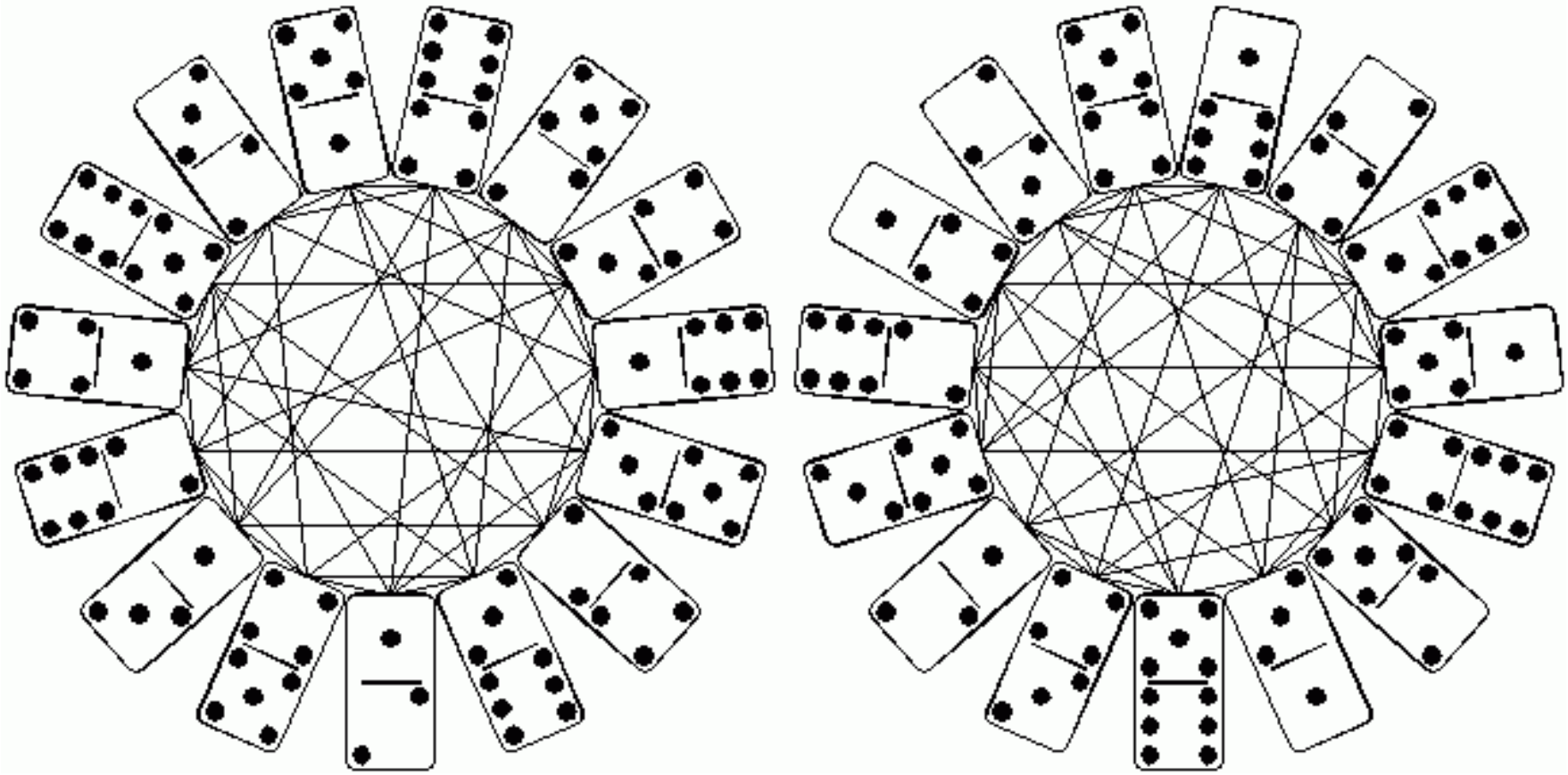
Compile & Run



```
//
// How many solutions are there to the equation
// x + y + z = 11 where x,y,z in [0..11]
//
// Prove result is correct.
//
```

```java
//
// How many solutions are there for the equation x + y + z = 11
// where x, y and z are positive integers?
//
import org.chocosolver.solver.Model;
import org.chocosolver.solver.Solver;
import org.chocosolver.solver.variables.IntVar;

public class XYZ11 {

    public static void main(String args[]){
    Model model   = new Model("x+y+z=11");
    Solver solver = model.getSolver();

    IntVar x = model.intVar("x",0,11);
    IntVar y = model.intVar("y",0,11);
    IntVar z = model.intVar("z",0,11);

    model.sum(new IntVar[]{x,y,z},"=",11).post();

    while(solver.solve()) System.out.println(x +" "+ y +" "+ z);

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Compile & Run

Using stars and bars count number of solutions to

$$x + y + z = 11$$

what is wrong
with trees