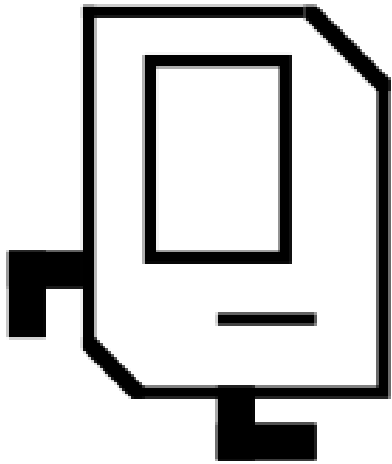


Karel assignment



Omar Mohsin

Atypon Training May -2023

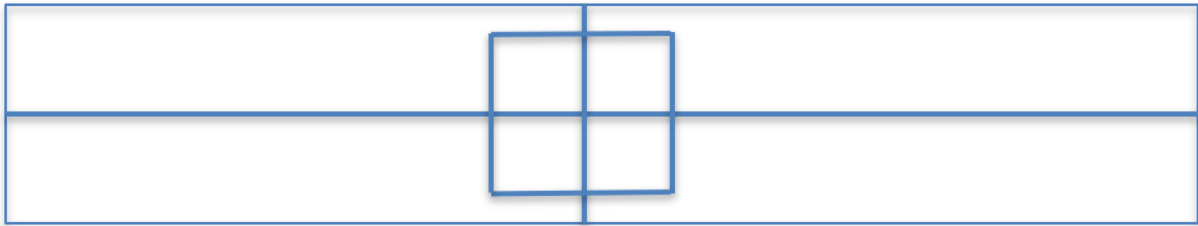
Instructors:

Dr. Motasim Aldiab

Dr. Fahed Jubair

The problem is that we divide a given map into 4 + 4 ,

- The inner chambers should be the biggest possible equals squares.
- The outer chambers should be equal in size, and they should be L-shaped (they shouldn't be rectangles or squares).



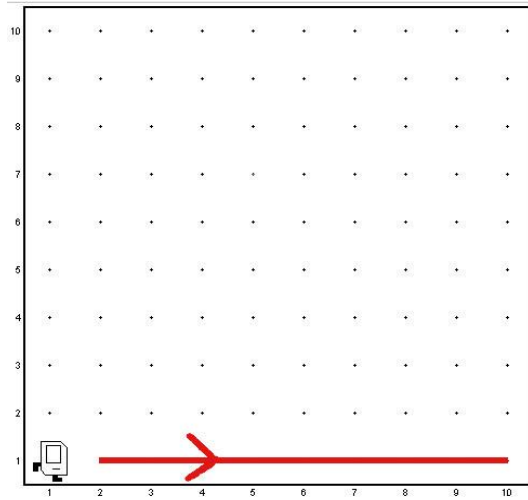
The problem can be split into 3 sub problems:

- 1) Find the map dimensions in `Area()` function : the `Area()` function have to inner method `countX()` will count how many columns in Karel world , and `countY()` will count how many rows in Karel world.
- 2) Divide the map make a cross lines in the middle of X and Y : and if any of those dimensions are even ,Karel will make a double line, otherwise Karel will make a one line , all that in `makeACrossLines()`
And this function has also 2 inner methods
`middleOfX()` : it will make a line in middle of X
`middleOfY()`: it will make a line in middle of Y
- 3) Make a square and the inner chambers should be the biggest possible equal squares, and the outer chambers should be equal in size, and they should be L-shaped , All that in `makeSquare()`

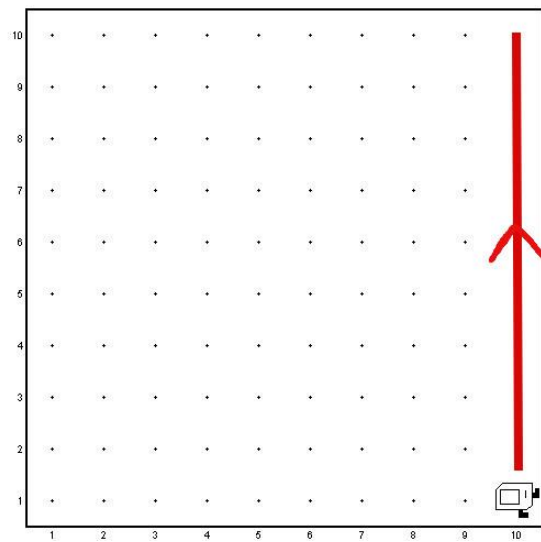
Sub problem 1 `area()` :

This function includes 2 inner functions `countX()` and `countY()`

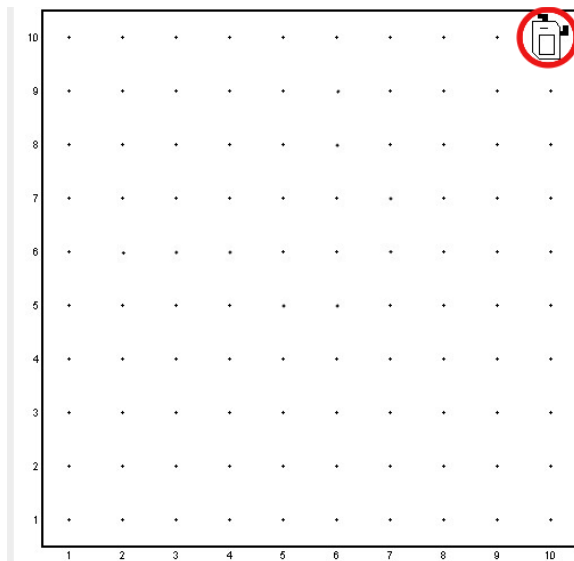
`countX()` : will count number of blocks in x-axis



`countY()` : will count number of blocks in Y-axis



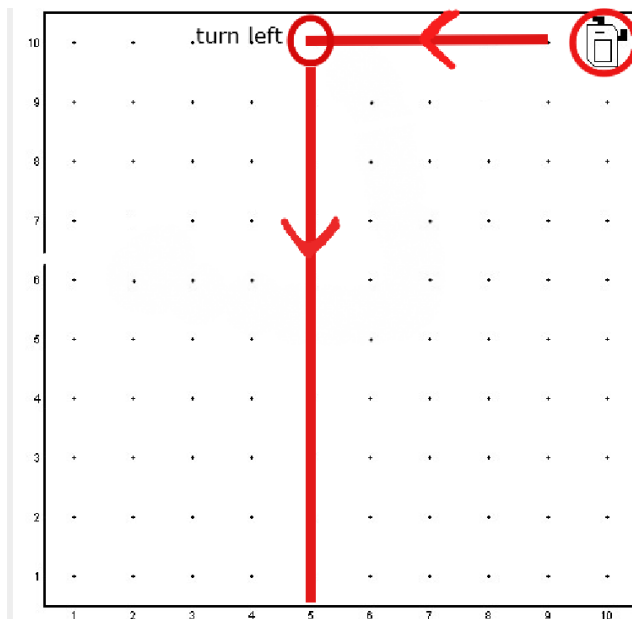
After finish area() function Karel will be here :



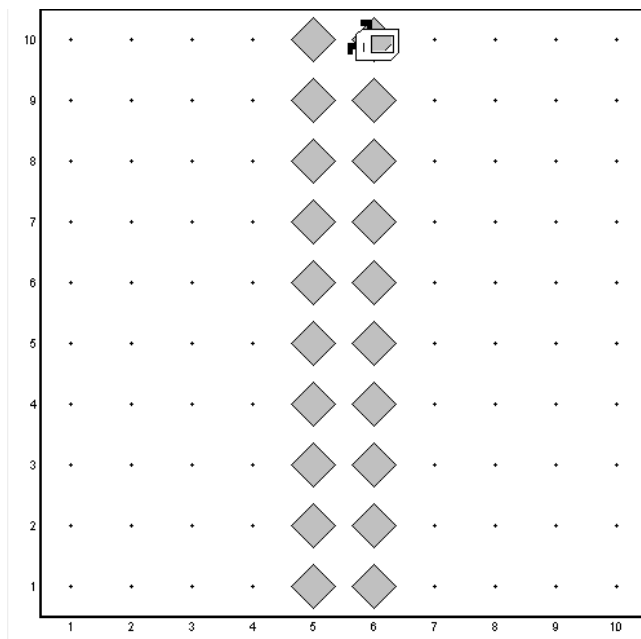
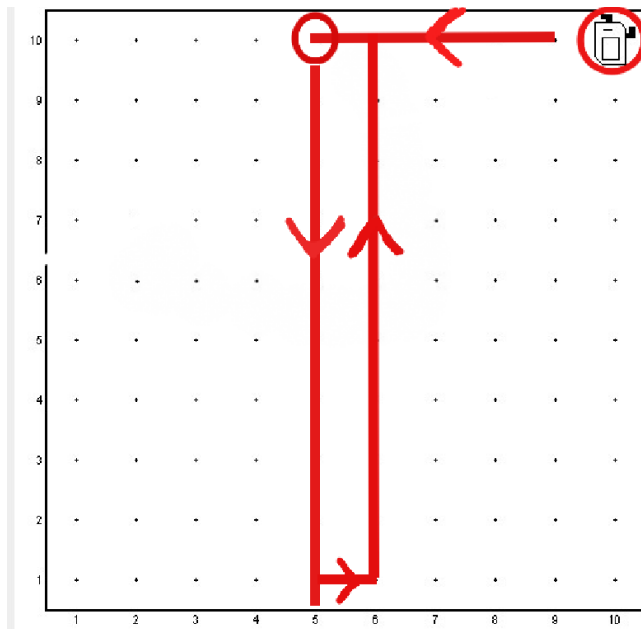
Sub problem 2 **makeACrossLines()** :

This function too has 2 inner function **middleOfX()** and **middleOfY()**

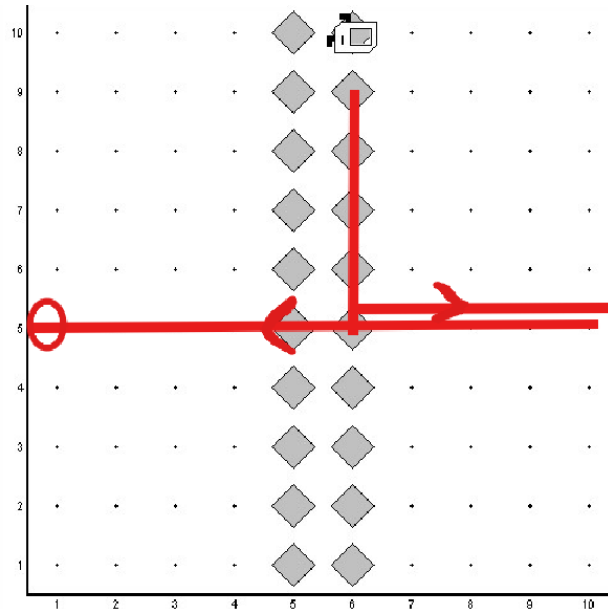
middleOfX() : Karel will move to the middle of the x-axis then turn left then move till the end



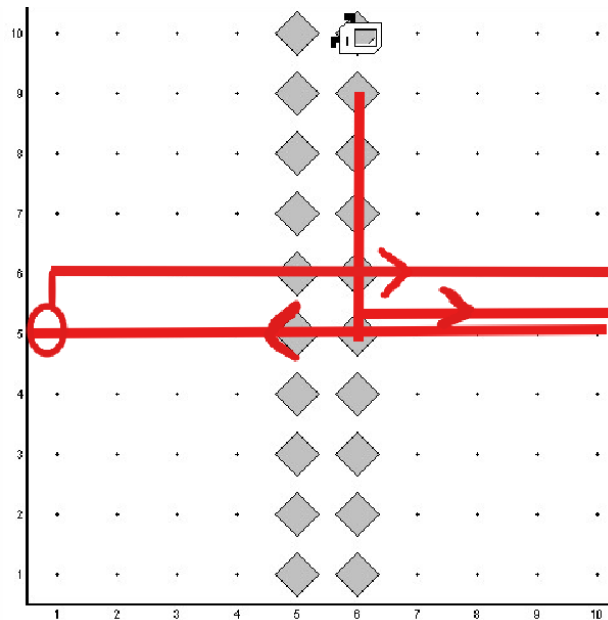
In this case, the number of X blocks is even so Karel will make double line

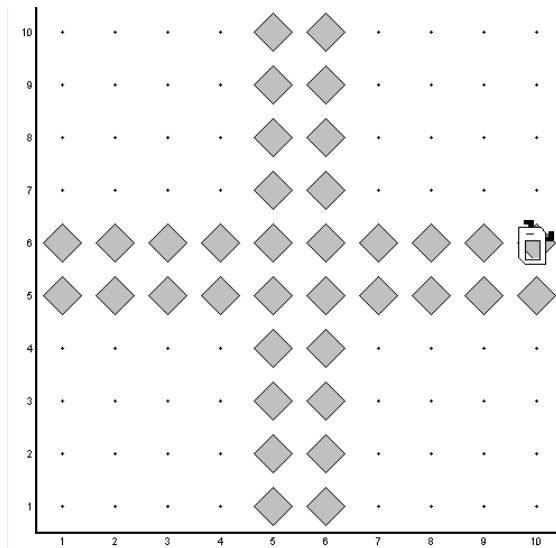


middleOfY() : Karel will move to the middle of the Y-axis then turn left then move till the end then turn around then move till the end



And in this case, the number of Y blocks is even, then Karel will make a double lines





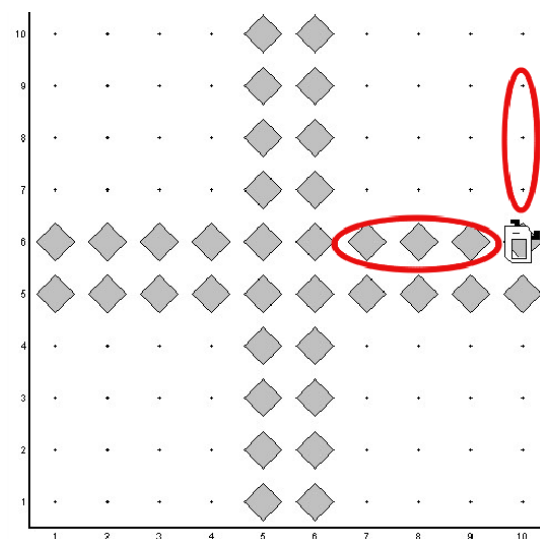
Sub problem 3 **makeSquare()** : this function will make a square

The first thing is calculate the first side of square,

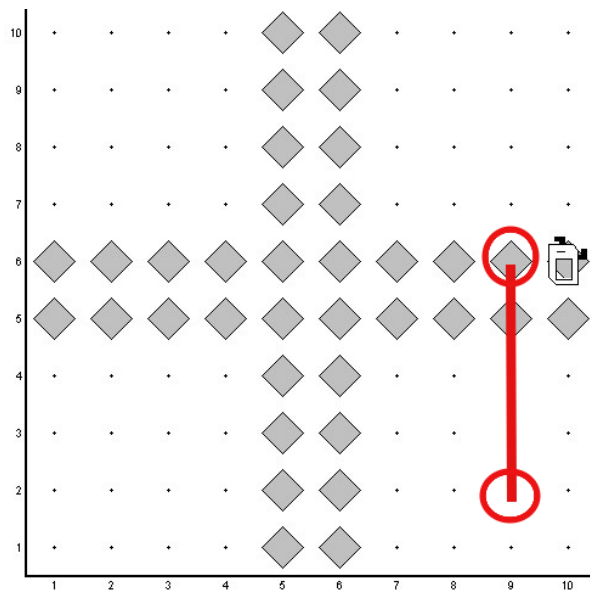
So, the square should be a biggest equals square, Karel has to make a row empty between the inner chamber and the outer chamber.

In this case, 10*10 that means the first side of the square should equal $y/2-1$

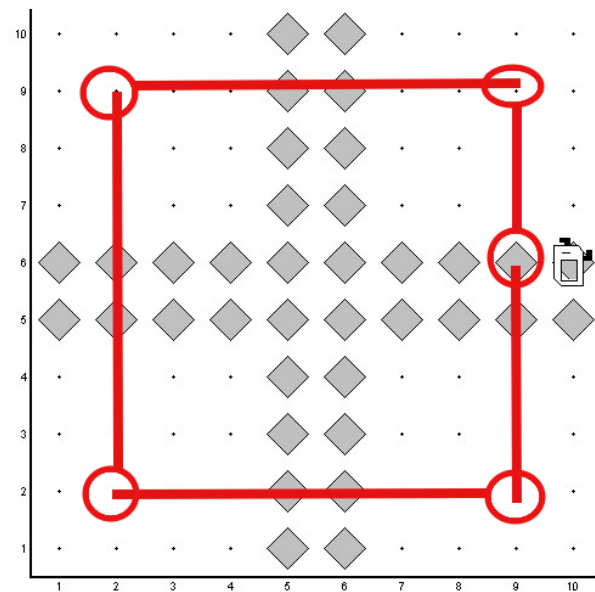
If $Y > X$ first side of the square will be $X/2-1$ or Karel will move just one move to the right and I will discuss this later on

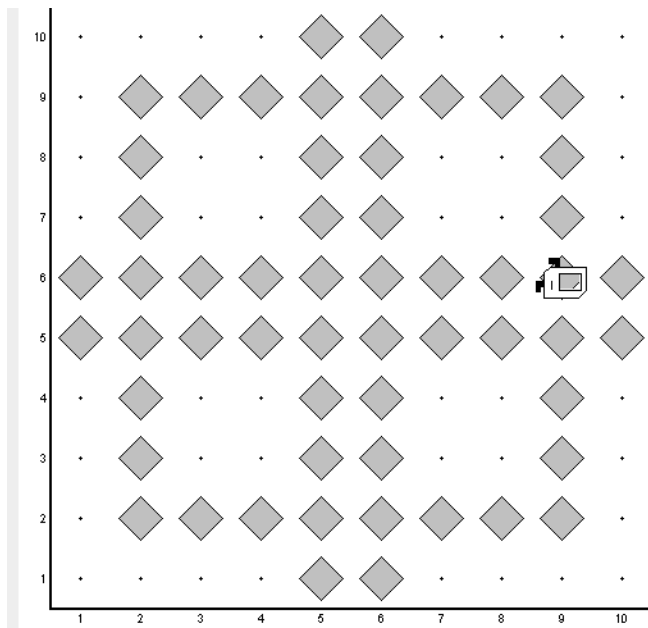


Then Karel will move here then go down $(Y/2-1)$ moves

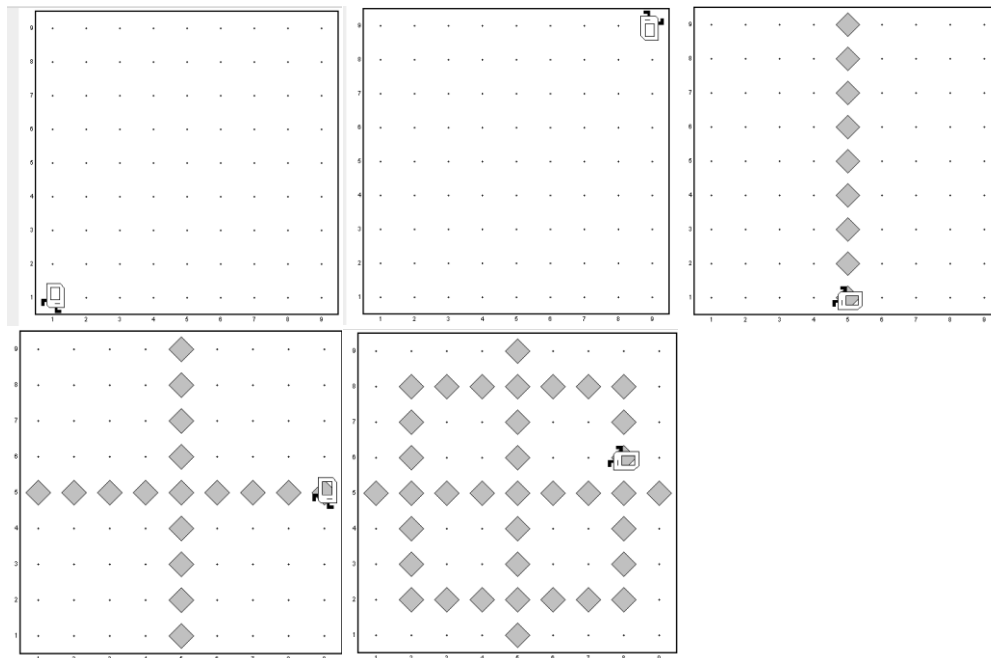


Then turn right and count $Y/2*2-2$ then complete the square



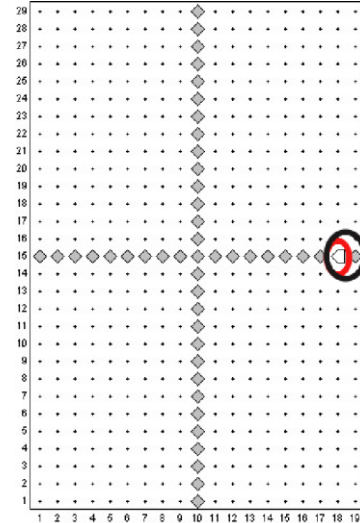
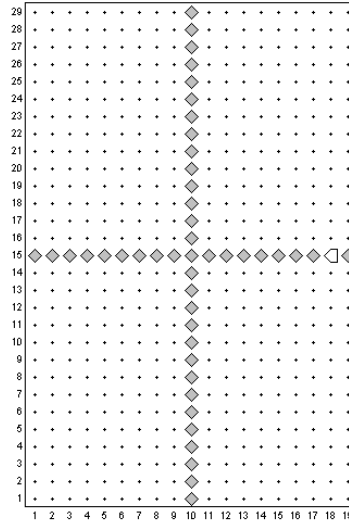
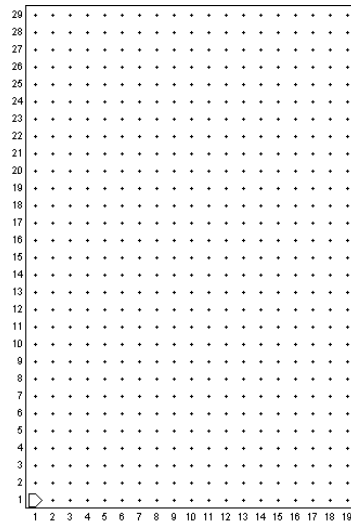


And this when X and Y odd

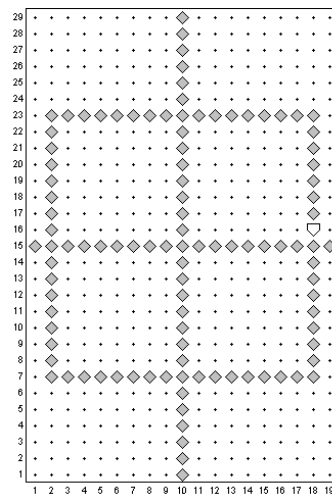


And when $Y > X$, I said before the Karel will move just one move then make a square

And this example of it :

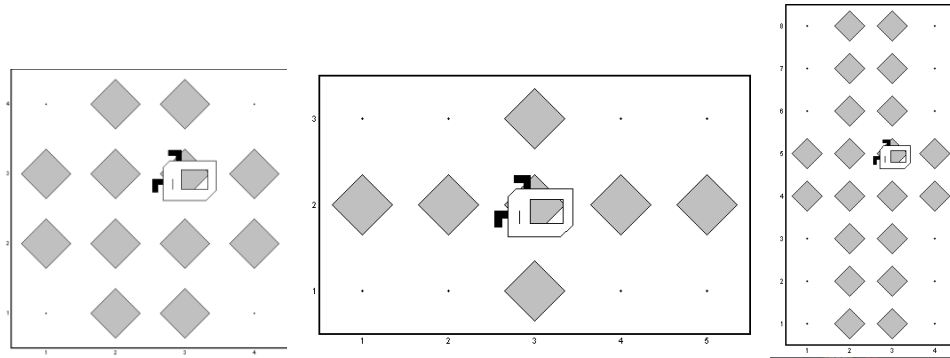


When $Y > X$ Karel has to make the biggest square so Karel has to keep one column empty between the inner and outer chambers



And the world cannot be divided if the X and Y are less than 5

Because the world would look like this



And I do optimization on code, there is a lot of repetition, so I extract it and put it in a new function

So I have totally 9 functions

- 1- countX()
- 2- county()
- 3- area()
- 4- makeACrossLines
- 5- middleOfY()
- 6- middleOfX()
- 7- makeSquare()
- 8- moveThenPutBeeper()
- 9- lineBeepers()

THANK YOU

End