



# Welcome to Section!!!

Week One



+  
**Congratulations** z z



# A Little About Me

+



- ★ My name is **Mah Noor Fatima** .  
I'll be your Section Leader for **Code in Place** , and everyone here will be your mates!
- ★ I am working in Software Engineering.
- ★ In my free time I like to Read Books.
- ★ I enjoy Music & Coffee.





# What About You All?

Go ahead and share:

1. Your name
  2. Where you're turning in from
  3. One thing you're looking forward to (it doesn't have to be from Code in Place)!
- 



# Breaking the Ice



In breakout rooms:

- Share your names one more time!!!
- Icebreaker Question: What's your dream project?
- If no one wants to share first, the person who is geographically closest to Stanford shares first!



# Lecture Review



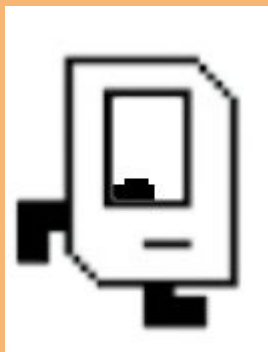


# What We've Learned

Before we get into our sample problem for today, let's review a bit. We've learned:

- The basics about Karel, the magnificent and wonderful robot
- Functions, a way of breaking down big problems into smaller chunks
- Control Flow, loops and conditional statements which guide our programs

This is a **LOT** of content, especially if you are newer to CS!



make\_dough()



shape\_pasta()




cook\_pasta()



## For Loops

```
def main():  
    # repeats the body 99 times  
    for i in range(99):  
        # the "body"  
        put_beeper()
```



The background is a solid orange color. It is decorated with various white and black geometric shapes and lines. In the top left, there is a dashed line and a small white triangle. In the top center, there is a dashed line and a white triangle. In the top right, there is a dashed line, a black zigzag line, a small white circle, and two parallel black lines. In the middle left, there is a white triangle. In the middle right, there is a white triangle and a large black circle. In the bottom left, there is a black plus sign. In the bottom center, there is a black circle and a white triangle. In the bottom right, there is a black line and a white circle.

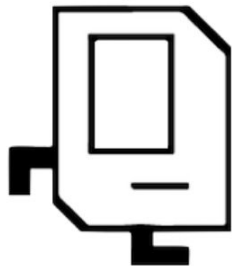
**Let's review and  
refresh these  
concepts a bit!**



# Karel Overview



Hello, my name is Karel! Nice to meet you.



- Karel is a small, but mighty robot!!!
- It has a few basic commands including: **move()**, **turn\_left()**, **pick\_beeper()**, and **put\_beeper()**
- On its own, Karel has limited functionality, but with the help of our code, we can make great things happen!



# Functions Overview



When you think of functions, recall Chris and Mehran's analogy to **making pasta**. Each function has a specific purpose which breaks down a larger problem into smaller chunks—just like steps in making pasta from scratch!

To make a function, you need to define it using the `def` keyword. Afterwards, write the code you want the function to run. Make sure the code is indented below the function name like so:

```
def function_name():  
    # Function code goes here!!!
```

`make_dough()`



`shape_pasta()`



`cook_pasta()`





# Control flow



if

if/else

for

while





# Control flow

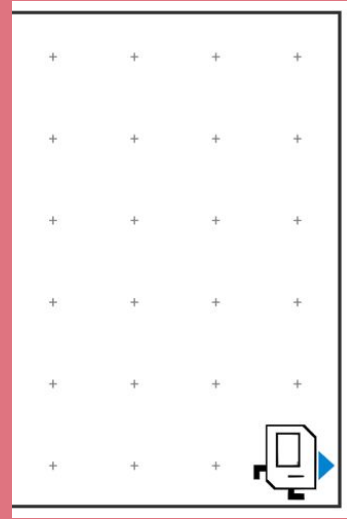
Do something when a condition is met.

if

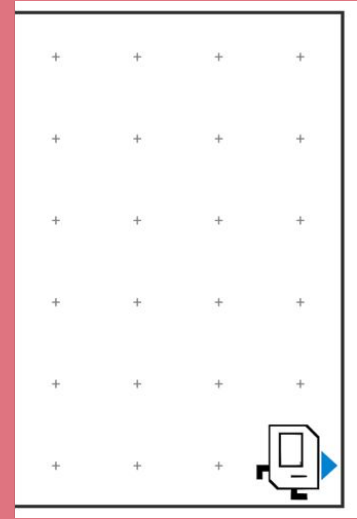
if/else

for

while



```
if front_is_clear():  
    move()
```





# Control flow



if

if/else

for

while





# Control flow

if

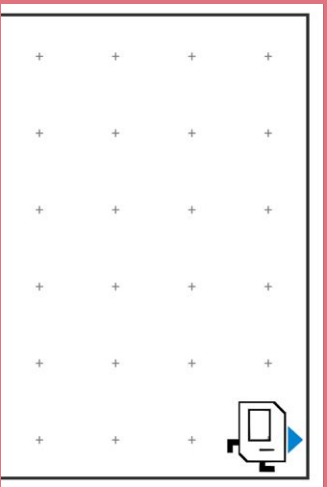
if/else

for

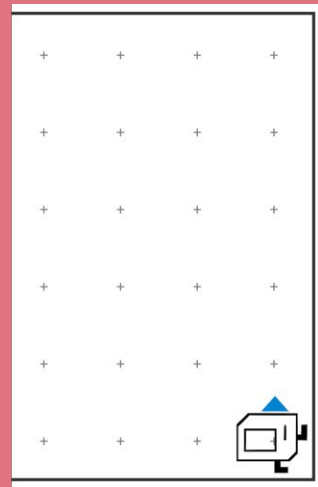
while



Also do something else  
when a condition is not met.



```
if front_is_clear():  
    move()  
else():  
    turn_left()
```





# Control flow



if

if/else

for

while





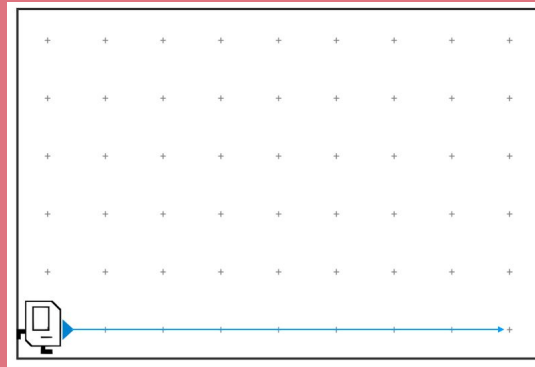
# Control flow

if

if/else

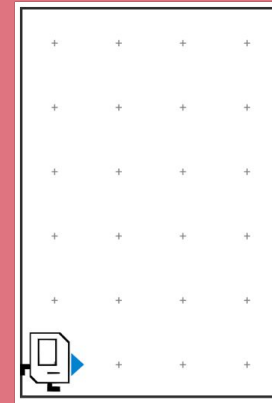
for

while

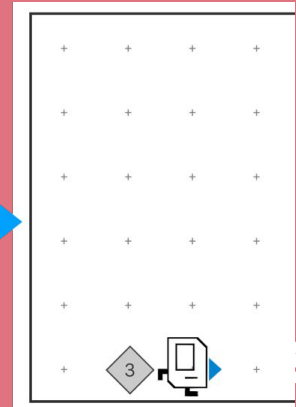


Move forward 8 squares  
`for i in range(8):`

Do something a set  
number of times.



Place 3 beepers  
`for i in range(3):`







# Control flow



if

if/else

for

while





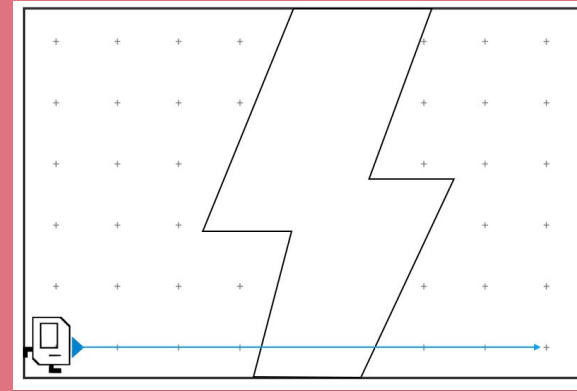
# Control flow

if

if/else

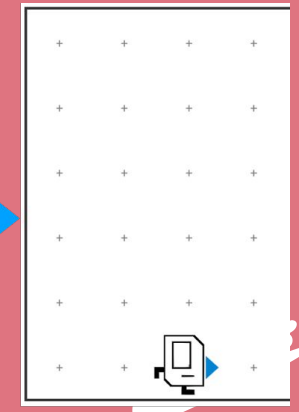
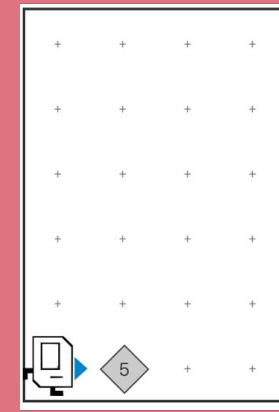
for

while



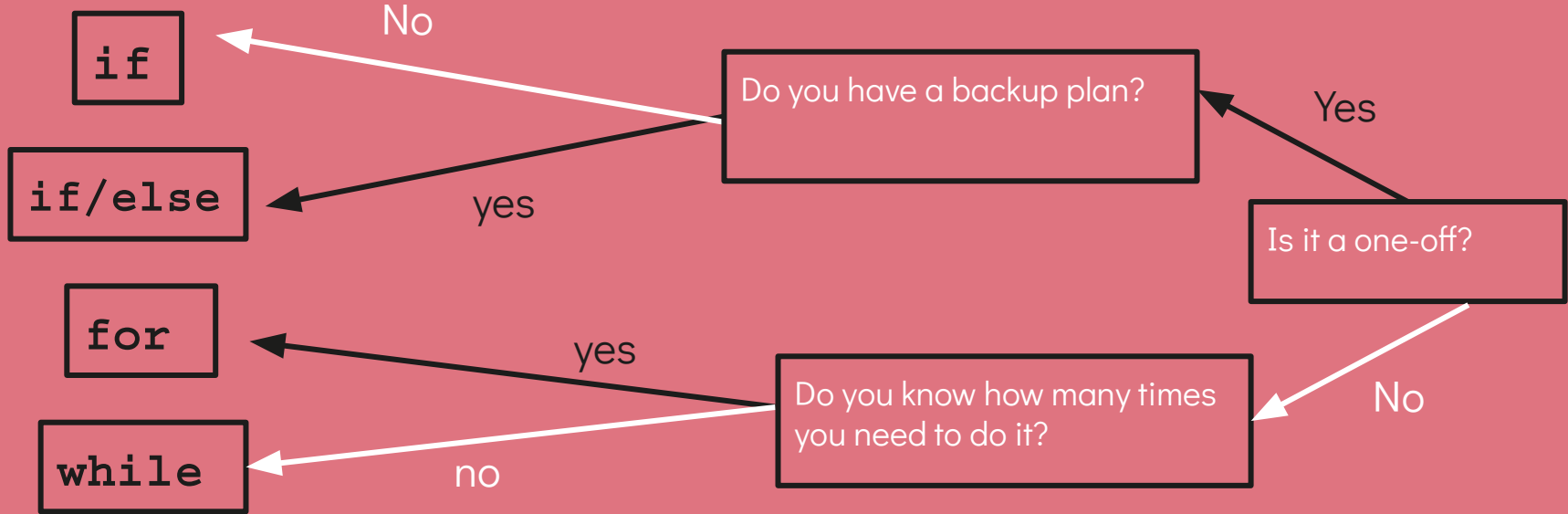
Move forward as long as the front is clear  
`while front_is_clear():`

Do something until condition  
is no longer true.



Pick up beepers while there are still some to pick up  
`while beepers_present():`

# Control flow





# Decomposition





# Decomposition



Define your function like this:

```
def function_name():  
    <write code here>
```

And call it like this:

```
function_name()
```





# Decomposition





# Decomposition



More of an art than a science.

Functions should be short and read like English.

If you repeat things (or find yourself hitting copy/paste), take a step back.

Top-down programming & the leap of faith.





# Decomposition







# Decomposition



```
def main():  
    turn_left()  
    turn_left()  
    turn_left()  
    turn_left()  
    turn_left()  
    turn_left()  
    turn_left()  
    turn_left()  
    turn_left()  
    turn_left()  
    turn_left()  
    turn_left()
```





# Decomposition





# Decomposition



```
def main():  
    turn_left()  
    turn_left()  
    turn_left()  
    turn_left()  
    turn_left()  
    turn_left()  
    turn_left()  
    turn_left()  
    turn_left()  
    turn_left()  
    turn_left()  
    turn_left()
```

```
def main():  
    spin()  
    spin()  
    spin()
```

```
def spin():  
    turn_left()  
    turn_left()  
    turn_left()  
    turn_left()
```



The background is a solid orange color. It is decorated with various hand-drawn geometric shapes in white and black. These include: a dashed line in the top left; a white triangle in the top center; a black zigzag line in the top right; a white circle in the top right; two parallel black lines in the top right; a white triangle in the top right; a large black circle in the bottom right; a white circle in the bottom right; a white triangle in the bottom center; a dashed line in the bottom center; a black plus sign in the bottom left; a white plus sign in the bottom left; a black circle in the bottom left; and a black line in the bottom left.

**Any Questions?**



# Section Problem: Hospital Karel

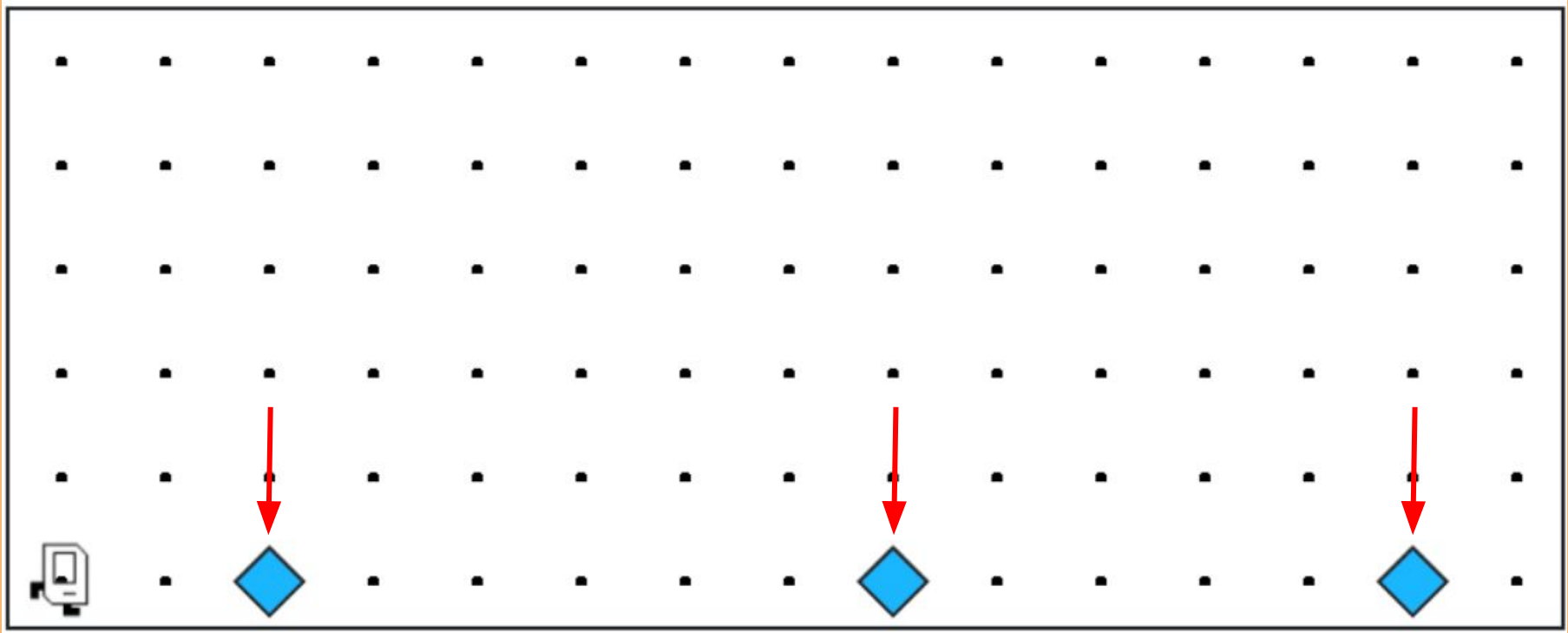


The background is a solid orange color. It is decorated with various white and black geometric shapes and lines. In the top left, there is a dashed line and a small white triangle. In the top center, there is a dashed line with a small white triangle in the middle. In the top right, there is a black zigzag line and a small white circle. In the middle right, there are two parallel black lines and a small white triangle. In the bottom left, there is a black plus sign. In the bottom center, there is a small white circle and a white triangle. In the bottom right, there is a large white circle and a black arc.

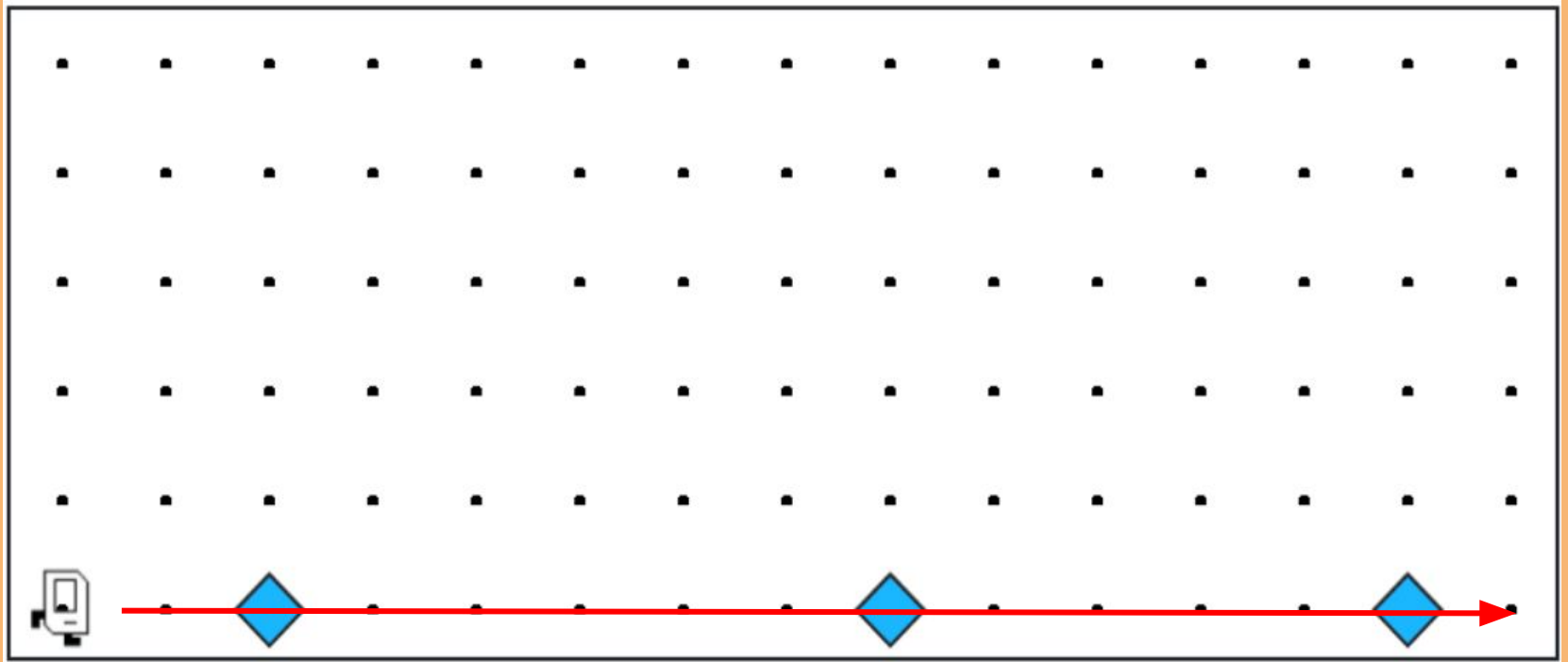
# Setting Context

Countries around the world are dispatching hospital-building robots to make sure anyone who gets sick can be treated. They have decided to enlist Karel robots. Your job is to program those robots.

Each beeper in the figure represents a pile of supplies.



Karel's job is to walk along the row and build a new hospital in the places marked by each beeper.

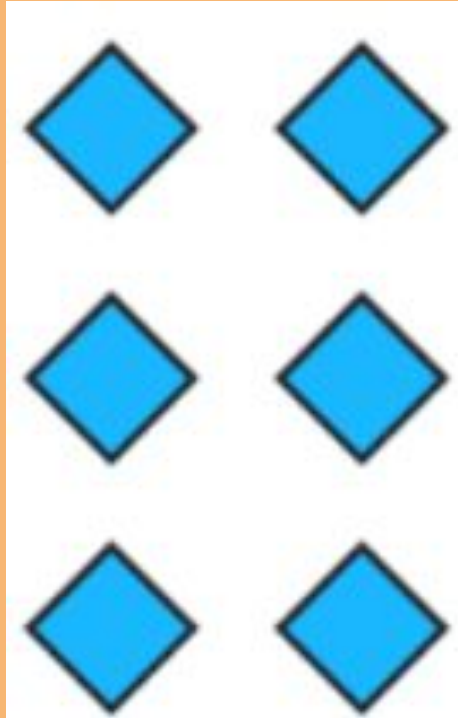




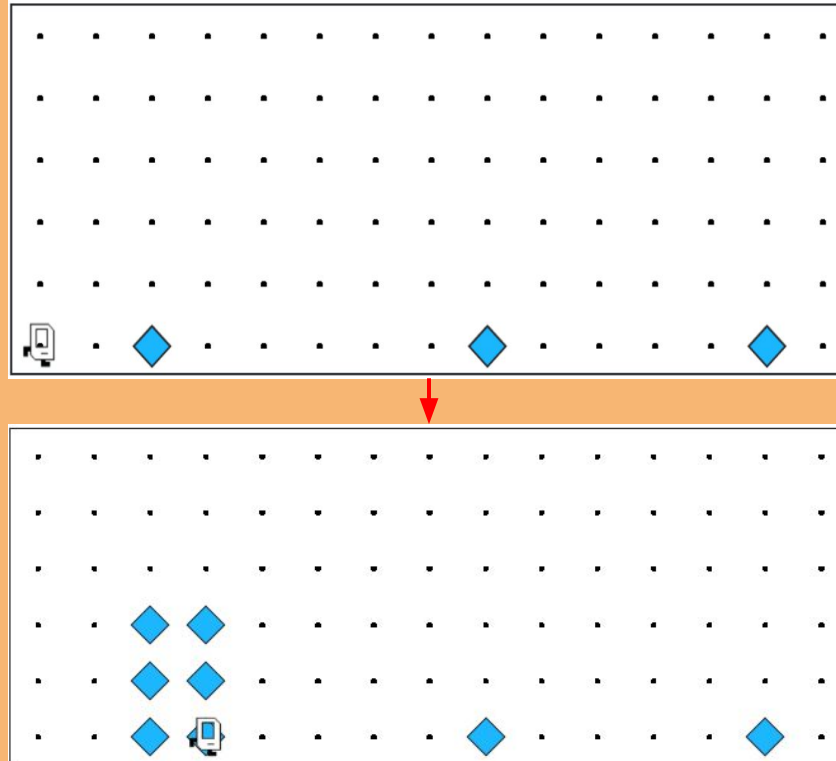
Karel's job is to walk along the row and build a new hospital in the places marked by each beeper.



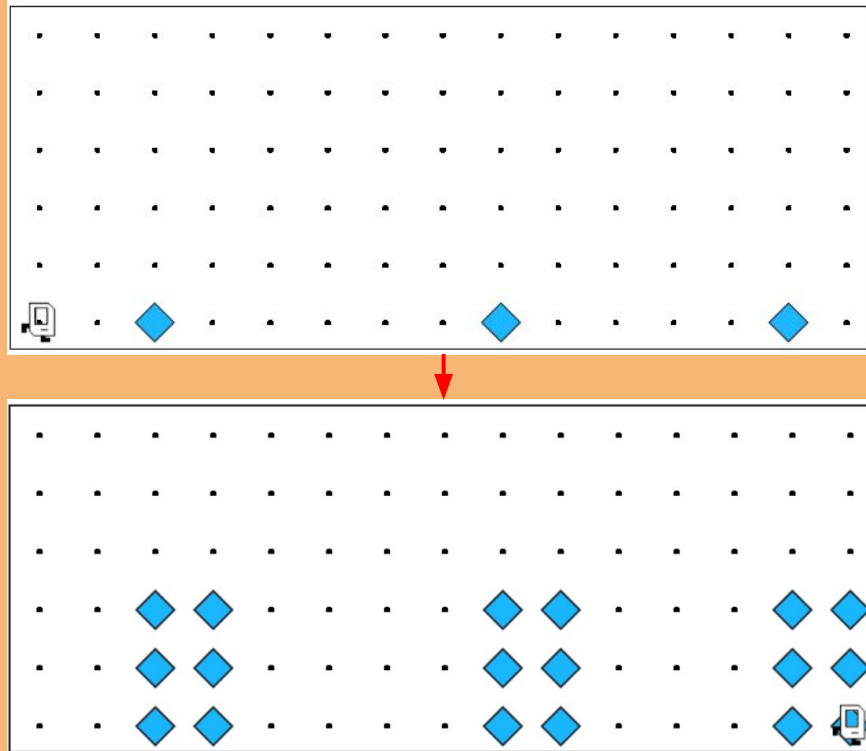
Hospitals look like this: a 3x2 rectangle of beepers!



The new hospital should have their corner at the point at which the pile of supplies was left.



At the end of the run, Karel should be at the end of the row having created a set of hospitals. For the initial conditions shown, the result would look like this:





## Notes to Keep in Mind



- Karel starts facing east at (1, 1) with an infinite number of beepers in its beeper bag.
- The beepers indicating the positions at which hospitals should be built will be spaced so that there is room to build the hospitals without overlapping or hitting walls.
- There will be no supplies left on the last column.
- Karel should not run into a wall if it builds a hospital that extends into that final corner.

The background is a solid orange color. It is decorated with various hand-drawn geometric shapes in white and black. These include a dashed line in the top left, a white triangle in the top center, a black zigzag line in the top right, a white circle in the top right, two parallel black lines in the top right, a white triangle in the top right, a black plus sign in the bottom left, a white circle in the bottom center, a white triangle in the bottom center, a black plus sign in the bottom center, a black circle in the bottom center, and a white circle in the bottom right.

# Questions Before We Begin?

The background is a solid pink color. It is decorated with various white and black geometric shapes and lines. In the top left, there is a dashed black line and a white triangle. In the top center, there is a white triangle and a dashed black line. In the top right, there is a black zigzag line, a white circle, and two parallel black lines. In the middle right, there is a white triangle. In the bottom left, there is a black plus sign. In the bottom center, there is a white circle and a white triangle. In the bottom right, there is a black curved line and a white circle.

**Let's get to work!**