

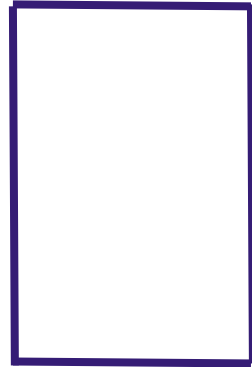
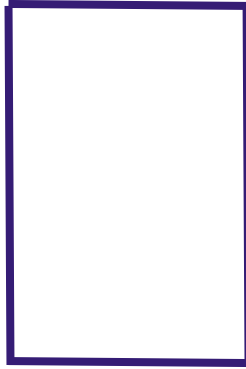
FN.1

Concept of Functions as Named Blocks of Code

Functions

Organizing Code by
Naming Groups of Instructions

Organizing Instructions



Organizing Instructions

Move forward by 100 steps



Organizing Instructions

Move forward by 100 steps
Turn left



Organizing Instructions

Move forward by 100 steps
Turn left
Move forward by 200 steps
Turn left



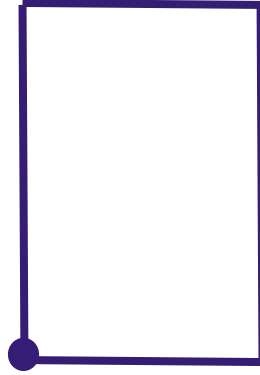
Organizing Instructions

Move forward by 100 steps
Turn left
Move forward by 200 steps
Turn left
Move forward by 100 steps
Turn left



Organizing Instructions

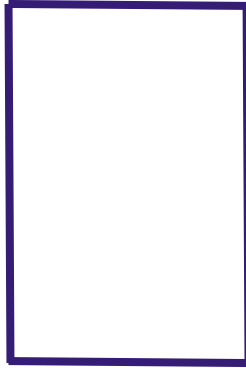
Move forward by 100 steps
Turn left
Move forward by 200 steps
Turn left
Move forward by 100 steps
Turn left
Move forward by 200 steps
Turn left



Organizing Instructions

Move forward by 100 steps
Turn left
Move forward by 200 steps
Turn left
Move forward by 100 steps
Turn left
Move forward by 200 steps
Turn left

Pick up pen
Move to new location
Put down pen

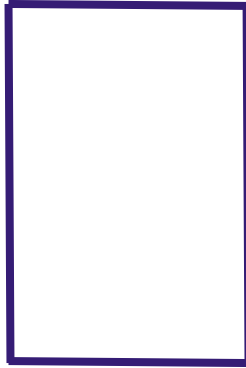


Organizing Instructions

Move forward by 100 steps
Turn left
Move forward by 200 steps
Turn left
Move forward by 100 steps
Turn left
Move forward by 200 steps
Turn left

Pick up pen
Move to new location
Put down pen

Move forward by 100 steps
Turn left

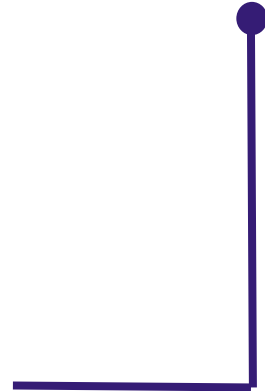
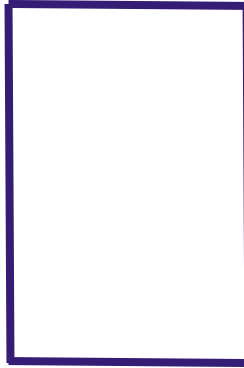


Organizing Instructions

Move forward by 100 steps
Turn left
Move forward by 200 steps
Turn left
Move forward by 100 steps
Turn left
Move forward by 200 steps
Turn left

Pick up pen
Move to new location
Put down pen

Move forward by 100 steps
Turn left
Move forward by 200 steps
Turn left

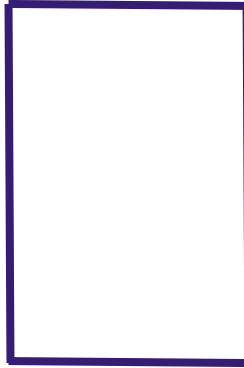


Organizing Instructions

Move forward by 100 steps
Turn left
Move forward by 200 steps
Turn left
Move forward by 100 steps
Turn left
Move forward by 200 steps
Turn left

Pick up pen
Move to new location
Put down pen

Move forward by 100 steps
Turn left
Move forward by 200 steps
Turn left
Move forward by 100 steps
Turn left

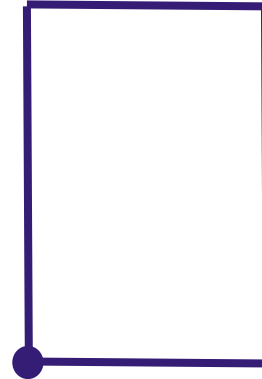
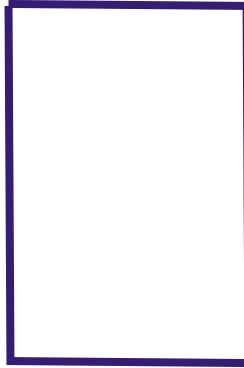


Organizing Instructions

Move forward by 100 steps
Turn left
Move forward by 200 steps
Turn left
Move forward by 100 steps
Turn left
Move forward by 200 steps
Turn left

Pick up pen
Move to new location
Put down pen

Move forward by 100 steps
Turn left
Move forward by 200 steps
Turn left
Move forward by 100 steps
Turn left
Move forward by 200 steps
Turn left

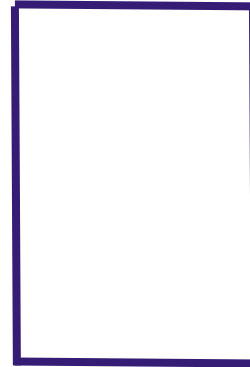
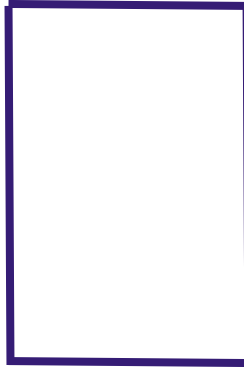


Organizing Instructions

Move forward by 100 steps
Turn left
Move forward by 200 steps
Turn left
Move forward by 100 steps
Turn left
Move forward by 200 steps
Turn left

Pick up pen
Move to new location
Put down pen

Move forward by 100 steps
Turn left
Move forward by 200 steps
Turn left
Move forward by 100 steps
Turn left
Move forward by 200 steps
Turn left



Organizing Instructions

```
Move forward by 100 steps
Turn left
Move forward by 200 steps
Turn left
Move forward by 100 steps
Turn left
Move forward by 200 steps
Turn left
```

```
Pick up pen
Move to new location
Put down pen
```

```
Move forward by 100 steps
Turn left
Move forward by 200 steps
Turn left
Move forward by 100 steps
Turn left
Move forward by 200 steps
Turn left
```

Problem

Repeated Blocks of Identical Instructions

- Makes code longer (more to read, harder to absorb overall point)
- Doesn't explicitly demonstrate organization.

Organizing Instructions

```
Move forward by 100 steps
Turn left
Move forward by 200 steps
Turn left
Move forward by 100 steps
Turn left
Move forward by 200 steps
Turn left
```

```
Pick up pen
Move to new location
Put down pen
```

```
Move forward by 100 steps
Turn left
Move forward by 200 steps
Turn left
Move forward by 100 steps
Turn left
Move forward by 200 steps
Turn left
```

Problem

Repeated Blocks of Identical Instructions

- Makes code longer (more to read, harder to absorb overall point)
- Doesn't explicitly demonstrate organization.

Solution

- Group the instructions together explicitly and give them a single name.
- Run those instructions using the name, rather than copying the code and running it.

Organizing Instructions

```
Move forward by 100 steps
Turn left
Move forward by 200 steps
Turn left
Move forward by 100 steps
Turn left
Move forward by 200 steps
Turn left
```

```
Pick up pen
Move to new location
Put down pen
```

```
Move forward by 100 steps
Turn left
Move forward by 200 steps
Turn left
Move forward by 100 steps
Turn left
Move forward by 200 steps
Turn left
```

Function: named block of instructions
with a particular purpose

```
function draw_rectangle is
begin
    Move forward by 100 steps
    Turn left
    Move forward by 200 steps
    Turn left
    Move forward by 100 steps
    Turn left
    Move forward by 200 steps
    Turn left
end
```

Organizing Instructions

Function: named block of instructions
with a particular purpose

```
draw_rectangle()
```

```
Pick up pen  
Move to new location  
Put down pen
```

```
draw_rectangle()
```

```
function draw_rectangle is  
begin  
    Move forward by 100 steps  
    Turn left  
    Move forward by 200 steps  
    Turn left  
    Move forward by 100 steps  
    Turn left  
    Move forward by 200 steps  
    Turn left  
end
```

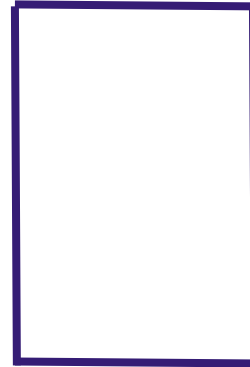
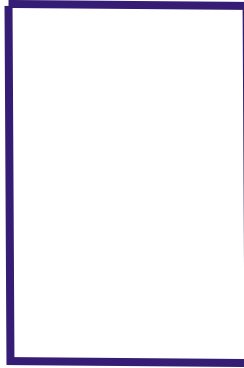
Organized Instructions

```
function draw_rectangle is
begin
  Move forward by 100 steps
  Turn left
  Move forward by 200 steps
  Turn left
  Move forward by 100 steps
  Turn left
  Move forward by 200 steps
  Turn left
end
```

```
draw_rectangle()
```

```
Pick up pen
Move to new location
Put down pen
```

```
draw_rectangle()
```



Functions are Everywhere!

Built into languages

- Print statements

- Functions that read in data files

As part of libraries

- Functions implementing machine learning methods to analyze data

- Functions implementing helpful plots

In the code that we write to effectively use languages and libraries