

## Functions with Python Turtles

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### Textbook

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## Functions with Python Turtles



A [function](#) is a chunk of code that won't run until it's called. The Python Turtles Library is full of different functions that help your program do things. We've been learning how to call these functions all along! The purpose of functions is to make the code more useful in diverse situations.

A function call uses parentheses. Here are some examples of function calls for Python Turtles:

```
1 turtle.forward()
```

This calls a function that moves the turtle forward. Placing a number value inside the parentheses helps customize the function. The value in the parentheses of a function call is called an argument.

### Other Examples of Functions in Python Turtles

- `turtle.forward()`
- `turtle.right()`

- `turtle.left()`
- `turtle.circle()`
- `turtle.pensize()`
- `turtle.fillcolor()`
- `turtle.speed()`
- `turtle.penup()`
- `turtle.pendown()`

As you can see, we have been using functions all along! These functions are called pre-defined functions because they were already built in the Python library. Now we will learn to create our own functions.

## Create Your Own Function

You can also create your own function! To create a function you use the keyword `def`, which is short for define.

Let's create a function named `my_function`.

```
1 def my_function():  
2     turtle.forward(100)  
3     turtle.left(90)
```

Now we have a function named `my_function`. You'll notice that nothing happens when we run this code. This is because functions are like a very obedient dog—it only comes when it's called. So now that we have created the function, we need to call it.

This is what a function call looks like:

```
my_function()
```

```
1 def my_function():  
2     turtle.forward(100)  
3     turtle.left(90)  
4  
5 my_function()
```

If we call it four times it will make a square! So instead of coding the same 2 commands over and over, we can put it in a function and use it wherever we want to.

```
1 def my_function():  
2     turtle.forward(100)  
3     turtle.left(90)  
4  
5 my_function()  
6 my_function()  
7 my_function()  
8 my_function()
```

## Creating a Function without Calling It?

It's okay for the function to be created but not used. It could be used later. In fact, some outside libraries are full of useful functions that have been created and are just waiting for a programmer to call them. The Python Turtles library is a good example.

Storing code in functions is one of the most useful aspects of functions.

## Simplifying Code by Using Functions

Functions are used in programming to avoid repeating the same code over and over. Instead of writing the same instructions multiple times, you can write them once inside a function, and then reuse that function whenever you need it. This makes your code cleaner, easier to read, and faster to update. By using functions, you save time and effort, and your code becomes more organized.

## Checkpoint

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### Functions with Python Turtles

Practice adding a function to your code.

1. Include the necessary code to start up a Python screen. (Import the library and generate a screen.)
2. Create a function named `my_cool_function`.
3. Inside the function, give the turtle three commands.
4. Call the function named `my_cool_function`.
5. Call the function a second time.

### Requirements:

- Include the necessary code to start up a Python screen. (Import the library and generate a screen.)
- Create a function named `my_cool_function`.
- Inside the function, give the turtle three commands.
- Call the function named `my_cool_function`.
- Call the function a second time.

## Questions (8)

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### 1. What is a function in Python?

MULTIPLE CHOICE

Choose the correct answer:

- A. A piece of code that automatically runs when the program starts
- B. A chunk of code that only runs when explicitly called
- C. A variable that stores a specific value
- D. A loop that iterates through a sequence of numbers

MULTIPLE CHOICE

## 2. Which of the following is a valid function call?

Choose the correct answer:

- A. `my_function( )`
- B. `my_function[ ]`
- C. `my_function{ }`
- D. `my_function`

MULTIPLE CHOICE

## 3. How do you create your own function in Python?

Choose the correct answer:

- A. Using the keyword "call"
- B. Using the keyword "funct"
- C. Using the keyword "def"
- D. Using the keyword "dec"

MULTIPLE CHOICE

## 4. What happens when you define a function in Python but don't call it?

Choose the correct answer:

- A. The function runs automatically
- B. It produces an error
- C. The program terminates
- D. The function is stored for future use

MULTIPLE CHOICE

## 5. What is the purpose of using functions in Python?

Choose the correct answer:

- A. To decrease the program's memory usage.
- B. To increase program efficiency.
- C. To make the code more useful in diverse situations.
- D. To increase the program's speed.

**6. True or False: The following code is an example of a function from the Turtles library.**

MULTIPLE CHOICE

`turtle.forward()`

**Choose the correct answer:**

- A. True
- B. False

**7. Debug the following code:**

DEBUG CODE

**Code to Debug:**

```
1 my_function():
2     turtle.forward(100)
3     turtle.left(90)
4
5 my_function()
```

**8. Debug the following code:**

DEBUG CODE

**Code to Debug:**

```
1 def my_function():
2     turtle.forward(100)
3     turtle.left(90)
4
5 my_function()
```

## Challenges (5)

### 1. New Spot

Create a function that will move your turtle to a new spot without drawing.

1. Include the necessary code to start up a Python screen. (Import the library and generate a screen.)
2. Create a function named `new_spot` .
3. Inside the function, add the following 3 commands: `penup()` , `forward(50)` , `pendown()` .
4. Move the turtle forward 60.
5. Call the function named `new_spot` .
6. Move the turtle forward 75.

#### Requirements:

- Include the necessary code to start up a Python screen. (Import the library and generate a screen.)
- Create a function named `new_spot` .
- Inside the function, add the following 3 commands: `penup()` , `forward(50)` , `pendown()` .
- Move the turtle forward 60.
- Call the function named `new_spot` .
- Move the turtle forward 75.

### 2. Square Function

Create a function that draws a square!

1. Include the necessary code to start up a Python screen. (Import the library and generate a screen.)
2. Create a function named `square` .
3. Inside the function, draw a square using `forward(30)` and `left(90)`. (Indent each command in.)
4. Call the function named `square` .
5. Rotate the turtle to the right 20.
6. Call the function named `square` again.

#### Requirements:

- Include the necessary code to start up a Python screen. (Import the library and generate a screen.)
- Create a function named `square` .
- Inside the function, draw a square using `forward(30)` and `left(90)` . (Indent each command in.)
- Call the function named `square` .
- Rotate the turtle to the right 20.
- Call the function named `square` `again` .

### 3. Create Your Own Function!

Now practice creating your very own function! Name it whatever you want. Inside the function, include a print statement and a command for your turtle to do something.

1. Include the necessary code to start up a python screen (import the library and generate a screen.)
2. Create a function with a unique name of your choice.
3. Inside the function, include a print statement and a command for your turtle to do something.
4. Call the function.

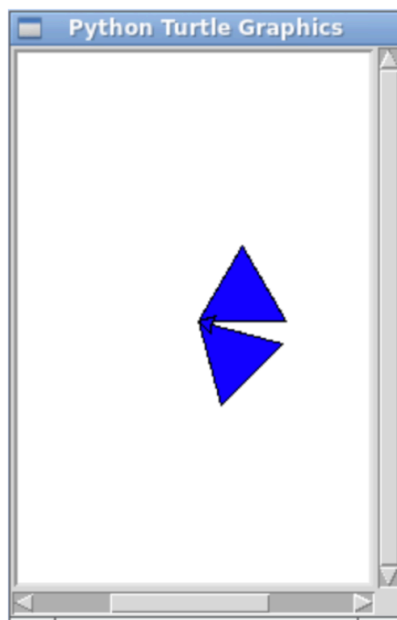
#### **Requirements:**

- Include the necessary code to start up a python screen (import the library and generate a screen.)
- Create a function with a unique name of your choice.
- Inside the function, include a print statement and a command for your turtle to do something.
- Call the function.

## 4. Blue Triangle

Create a program that has a function that makes a blue triangle.

1. Include the necessary code to start up a Python screen. (Import the library and generate a screen.)
2. Create a function named `triangle` .
3. Inside the function, draw a triangle using `forward(50)` and `left(120)` . (Indent each command in so they are inside the function.)
4. Inside the function, include `begin_fill()` and `end_fill()` commands.
5. Inside the function, include a fillcolor of `blue` .
6. Call the function named `triangle` .
7. Rotate to the left 45.
8. Call the function named `triangle` again.



### Requirements:

- Include the necessary code to start up a Python screen. (Import the library and generate a screen.)
- Create a function named `triangle` .
- Inside the function, draw a triangle using `forward(50)` and `left(120)` . (Indent each command in so they are inside the function.)
- Inside the function, include `begin_fill()` and `end_fill()` commands.
- Inside the function, include a fillcolor of `blue` .
- Call the function named `triangle` .
- Rotate to the left 45.
- Call the function named `triangle` again.



## 5. Star Stamp

Create a function that draws a star. Then draw three stars on your page. Make sure to lift the pen up so the stars are separate.

1. Include the necessary code to start up a Python screen. (Import the library and generate a screen.)
2. Create a function named `star` .
3. Inside the function, draw a star. Use 144 degree turns.
4. Call the star function a total of 3 times.
5. Move the turtle between your stars, using `penup()` and `pendown()` .

### Requirements:

- Include the necessary code to start up a Python screen. (Import the library and generate a screen.)
- Create a function named `star` .
- Inside the function, draw a star. Use 144 degree turns.
- Call the star function a total of 3 times.
- Move the turtle between your stars, using `penup()` and `pendown()` .

## Answer Keys & Solutions

### Checkpoint Solutions

#### Functions with Python Turtles

```
1 import turtle
2 turtle.getscreen()
3
4 def my_cool_function():
5     turtle.forward(30)
6     turtle.left(90)
7     turtle.forward(30)
8
9 my_cool_function()
```

### Questions

#### 1. What is a function in Python?

MULTIPLE CHOICE

##### Correct Answer:

- A. A piece of code that automatically runs when the program starts ✗ Incorrect
- B. A chunk of code that only runs when explicitly called ✓ Correct
- C. A variable that stores a specific value ✗ Incorrect
- D. A loop that iterates through a sequence of numbers ✗ Incorrect

##### Explanation:

A function is a section of code reserved until you specifically call it.

#### 2. Which of the following is a valid function call?

MULTIPLE CHOICE

##### Correct Answer:

- A. `my_function( )` ✓ Correct
- B. `my_function[ ]` ✗ Incorrect
- C. `my_function{ }` ✗ Incorrect

D. my\_function

✗ Incorrect

**Explanation:**

Function calls use parentheses.

### 3. How do you create your own function in Python?

MULTIPLE CHOICE

**Correct Answer:**

A. Using the keyword "call"

✗ Incorrect

B. Using the keyword "funct"

✗ Incorrect

C. Using the keyword "def"

✓ Correct

D. Using the keyword "dec"

✗ Incorrect

**Explanation:**

The keyword is short for define

### 4. What happens when you define a function in Python but don't call it?

MULTIPLE CHOICE

**Correct Answer:**

A. The function runs automatically

✗ Incorrect

B. It produces an error

✗ Incorrect

C. The program terminates

✗ Incorrect

D. The function is stored for future use

✓ Correct

**Explanation:**

It's okay for the function to be created but not used. It could be used later.

### 5. What is the purpose of using functions in Python?

MULTIPLE CHOICE

**Correct Answer:**

A. To decrease the program's memory usage.

✗ Incorrect

B. To increase program efficiency.

✗ Incorrect

C. To make the code more useful in diverse situations.

✓ Correct

D. To increase the program's speed.

✗ Incorrect

#### Explanation:

Functions allow chunks of code to be used in very specific ways.

### 6. True or False: The following code is an example of a function from the Turtles library.

MULTIPLE CHOICE

#### Correct Answer:

A. True

✓ Correct

B. False

✗ Incorrect

#### Explanation:

This command comes from the turtles library.

### 7. Debug the following code:

DEBUG CODE

#### Incorrect Code:

```
1 my_function():
2     turtle.forward(100)
3     turtle.left(90)
4
5 my_function()
```

#### Correct Solution:

```
1 def my_function():
2     turtle.forward(100)
3     turtle.left(90)
4
5 my_function()
```

#### Explanation:

This code is missing the function keyword.

## 8. Debug the following code:

DEBUG CODE

### Incorrect Code:

```
1 def my_function():
2     turtle.forward(100)
3     turtle.left(90)
4
5 my_function(
```

### Correct Solution:

```
1 def my_function():
2     turtle.forward(100)
3     turtle.left(90)
4
5 my_function()
```

### Explanation:

This code is missing a parenthesis

## Challenges

### 1. New Spot

#### Solution:

```
1 import turtle
2 turtle.getscreen()
3
4 def new_spot():
5     turtle.penup()
6     turtle.forward(50)
7     turtle.pendown()
8
9
10
11 turtle.forward(60)
12 new_spot()
13 turtle.forward(75)
```

### 2. Square Function

#### Solution:

```
1 import turtle
```

```
2 turtle.getscreen()
3
4 def square():
5     turtle.forward(30)
6     turtle.left(90)
7     turtle.forward(30)
8     turtle.left(90)
9     turtle.forward(30)
10    turtle.left(90)
11    turtle.forward(30)
12    turtle.left(90)
13
14 square()
15 turtle.right(20)
16 square()
```

### 3. Create Your Own Function!

**Solution:**

```
1 import turtle
2 turtle.getscreen()
3
4 def greetings():
5     print("Good morning!")
6     turtle.left(2160)
7     print("Now I'm dizzy")
8
9
10 greetings()
```

### 4. Blue Triangle

**Solution:**

```
1 import turtle
2 turtle.getscreen()
3
4 def triangle():
5     turtle.fillcolor("blue")
6     turtle.begin_fill()
7     turtle.forward(50)
8     turtle.left(120)
9     turtle.forward(50)
10    turtle.left(120)
11    turtle.forward(50)
12    turtle.end_fill()
13
14 triangle()
15
16 turtle.left(45)
17 triangle()
```

## 5. Star Stamp

Solution:

```
1 import turtle
2 turtle.getscreen()
3
4 def star():
5     for my_counter in range(5):
6         turtle.forward(50)
7         turtle.left(144)
8
9 star()
10
11 turtle.penup()
12 turtle.forward(80)
13 turtle.pendown()
14
15 star()
16
17 turtle.penup()
18 turtle.forward(80)
19 turtle.pendown()
20
21 star()
```