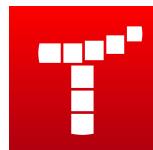


How to Create a New Project

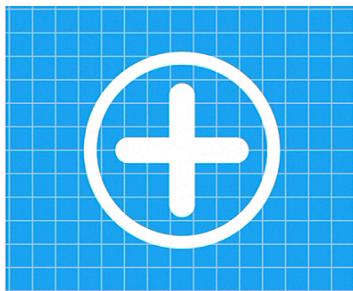
1. Load up the Tynker App



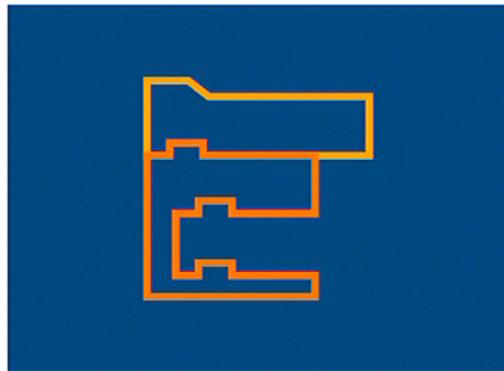
2. Click **Projects**



3. Create New Project



4. Select **Blank Template**



How to Remove an Actor

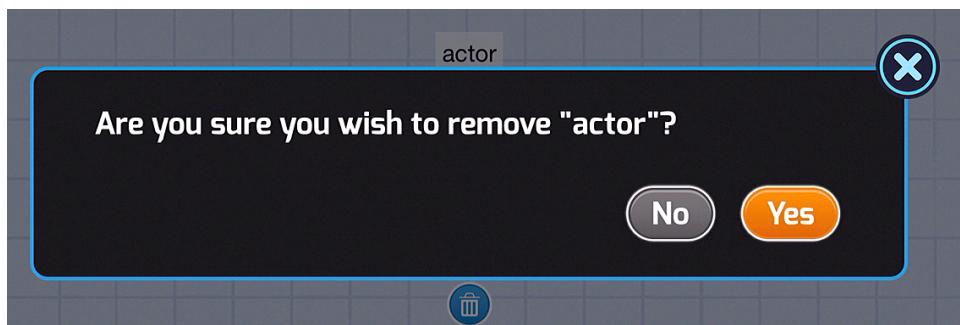
1. Remove the **actor**.



2. Click on the **Trashcan**



3. **Confirm** the Removal by clicking **Yes**

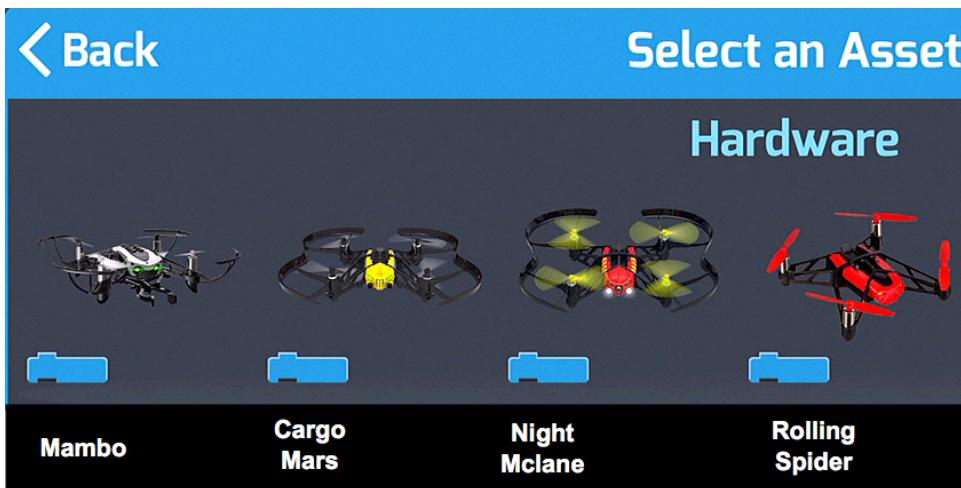


How to add a Drone/Robot

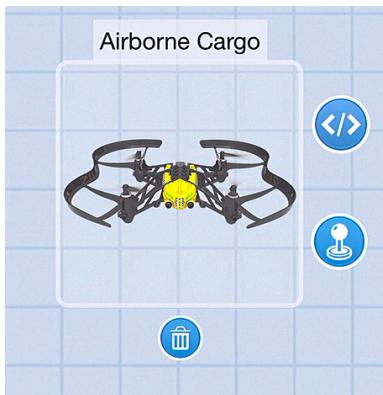
1. In the top right click the **plus button**



2. Select your drone type:

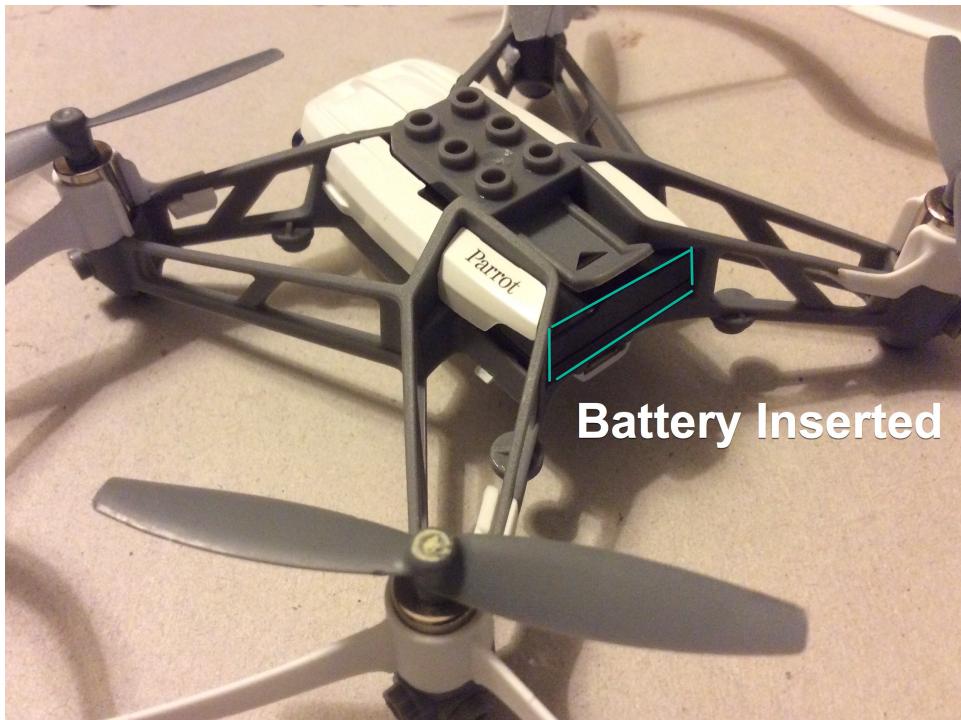


3. In this example, I'm using the **Airborne Cargo**



How to connect the Drone to Bluetooth

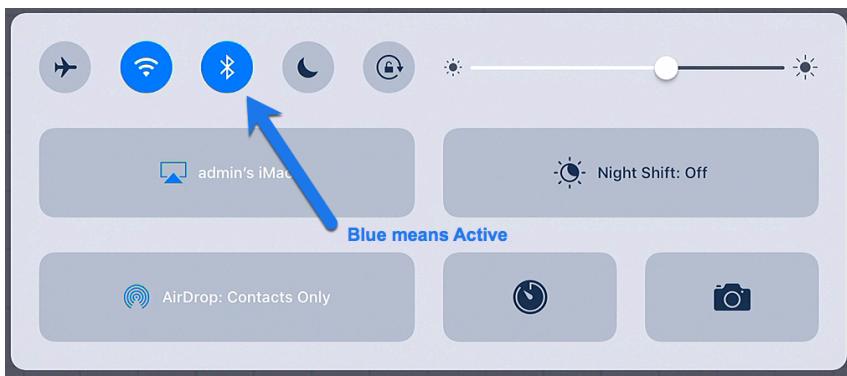
1. Make sure the Drone has battery inserted.



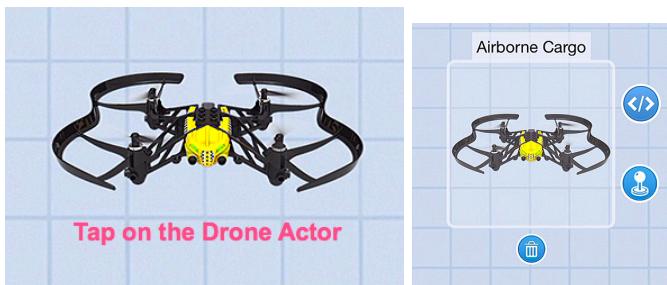
2. Make sure the Drone is on.



3. Make sure your Bluetooth is enabled on your device.



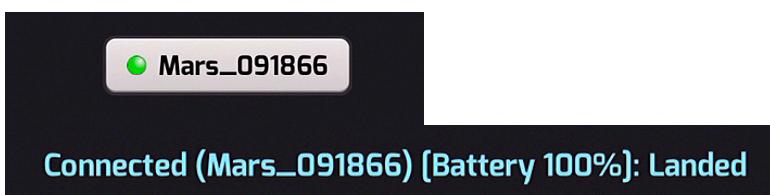
4. Tap on your Drone Actor to make Active



5. Click on the Joystick



6. If your drone is connected you will see something like this...



7. If it is not, then it is likely searching for the drone. Wait till it connects.

Disconnected: Searching for drones . .

8. If it is connected, click the X in the top right to close this window.



9. You are connected!

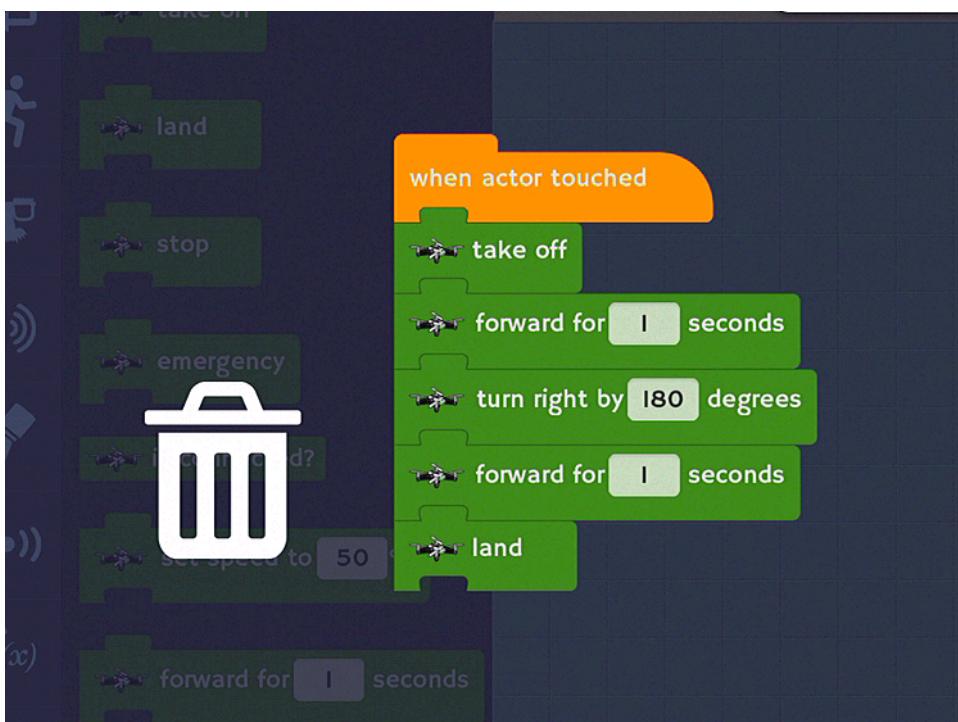
Required for All New Drone Projects

Before we can add our own code, we must remove the current placeholder code.

Click on the **Code Button**

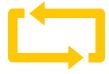


Take your finger, press it down on the **when actor touched** block and drag it over to the right. You should see a trashcan appear.



Lesson 1: Testing the Drone

Before we get into all the fun stuff let's make sure the drone will accept our block code.

Either in the Common blocks  or Loop blocks  add

the **on Start** block



Then attach from the **take-off** from either the

Common blocks



or Library blocks



Next add the Land from either the

Common blocks



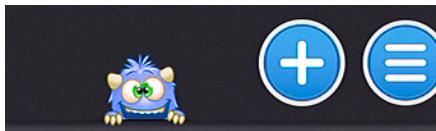
or Library blocks



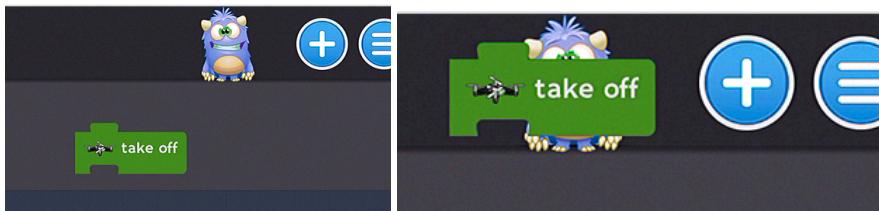
And press the **Play Button**

Lesson 2: Block Help

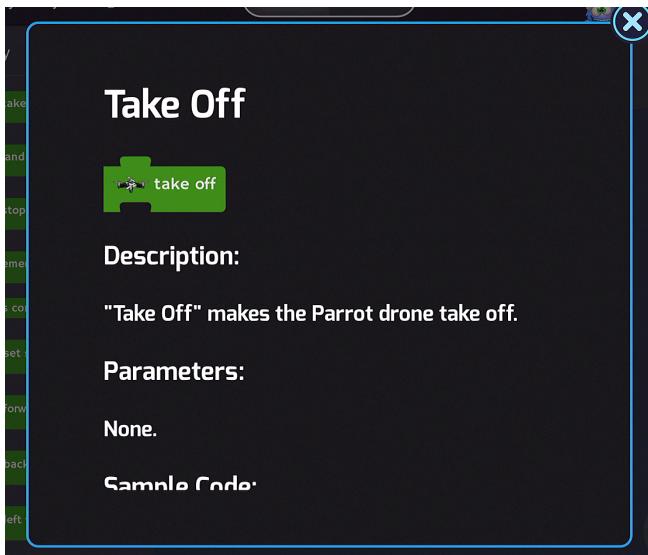
In the future, you when you are building your own block programs you will want to know what a block does. To find this out find the little Monster in the top right of the screen. He is to the left of the plus button.



Take any block on the stage or in a block menu and drag it onto this monster.



When you release a popup will appear that tells you all about the block. Scroll through this popup to read all about the block

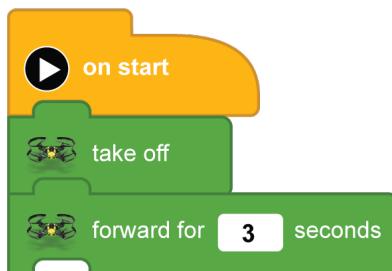


Lesson 3: Flying Forward

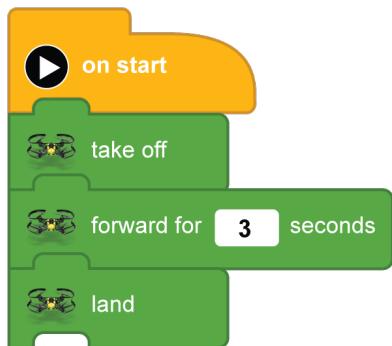
In most of the lessons the first thing we will do is add an **on start** and **take off** blocks. We will also likely finish off with a land and request that you press the play button.



Add a **forward for [1] seconds** and change the 1 to a 3



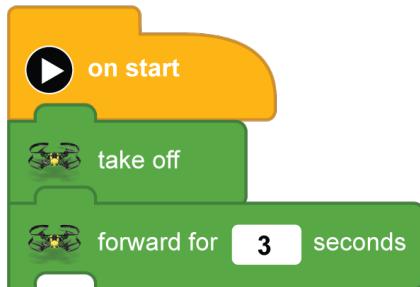
Finish up by adding a land



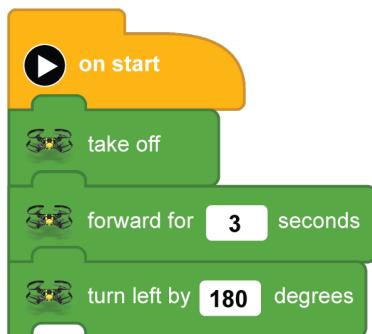
And press the **Play Button**

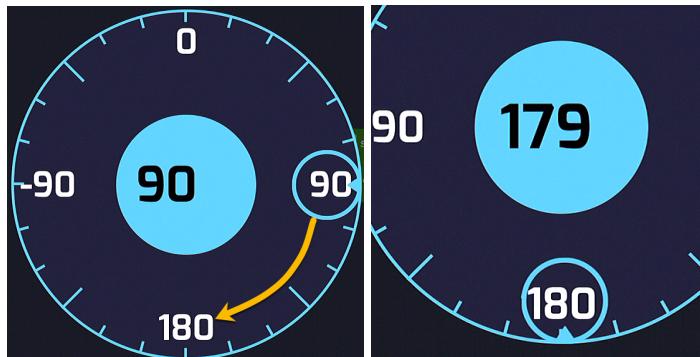
Lesson 4: **Fly forward, turn around, and come back.**

Just like Lesson 3 we will take off, fly forward for [3] seconds. But instead of landing, we will turn around (180 degrees) fly forward for [3] seconds. Then Land.

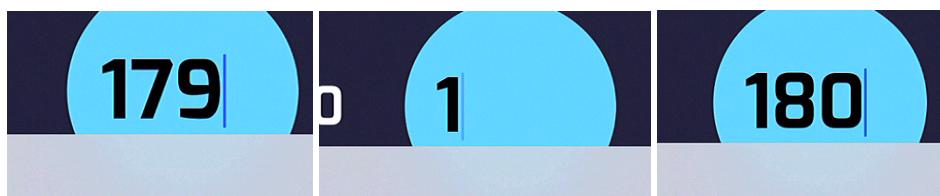


Next snap either a **turn left by [180] degrees**
or a **turn right by [180] degrees**

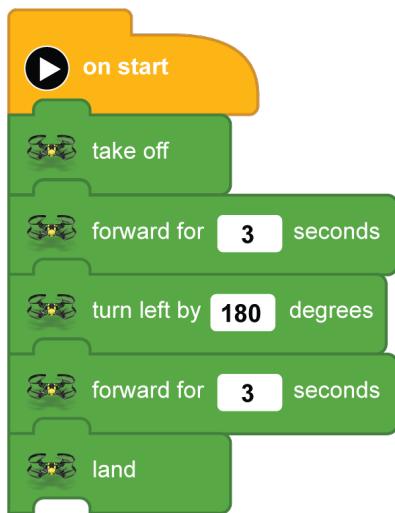




If you can't get it exactly on 180 degrees then click on the number in the center.



Finish it up with a **forward for [3] seconds** and a **land**



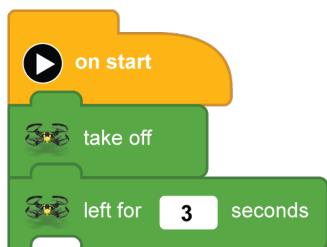
And press the **Play Button**

Lesson 5: Slide to left, slide to right

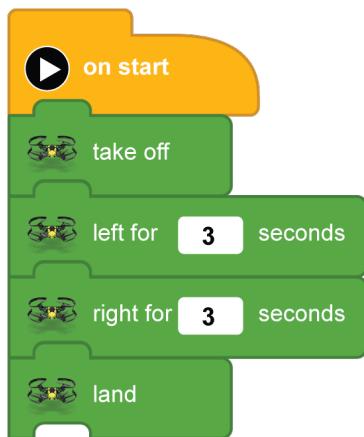
The title says slide, but what we are doing is like a side step to the left. We are not turning just moving to the left and then to the right.



Add a **left for [3] seconds**



Add a **right for [3] seconds** and a **land**



Lesson 6: A Square

We are going to make the drone fly in a square backwards.
Just like all other lessons. We need to take off first. We will add two new blocks. **Backward for [1] seconds** and **stop**

Stop: What is it?

Think of stop like a pause button. If I am flying forward and I add a **Stop** block. The Drone will stop and hover in place. It helps stabilize the drone before doing the next command.

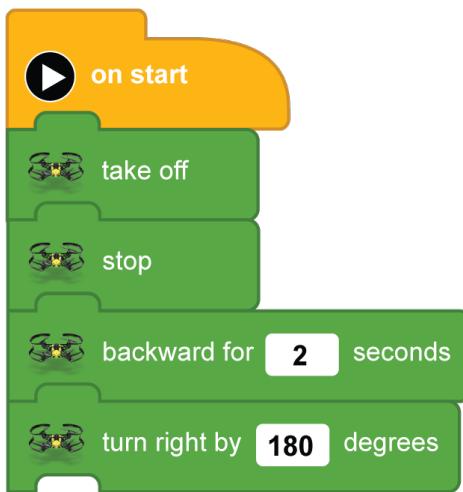


Add a **Stop** block

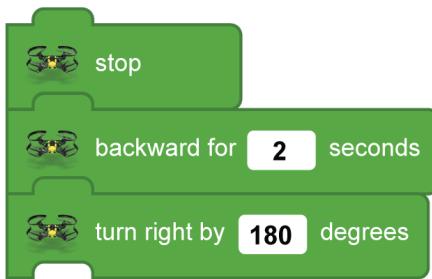


Add two more blocks:

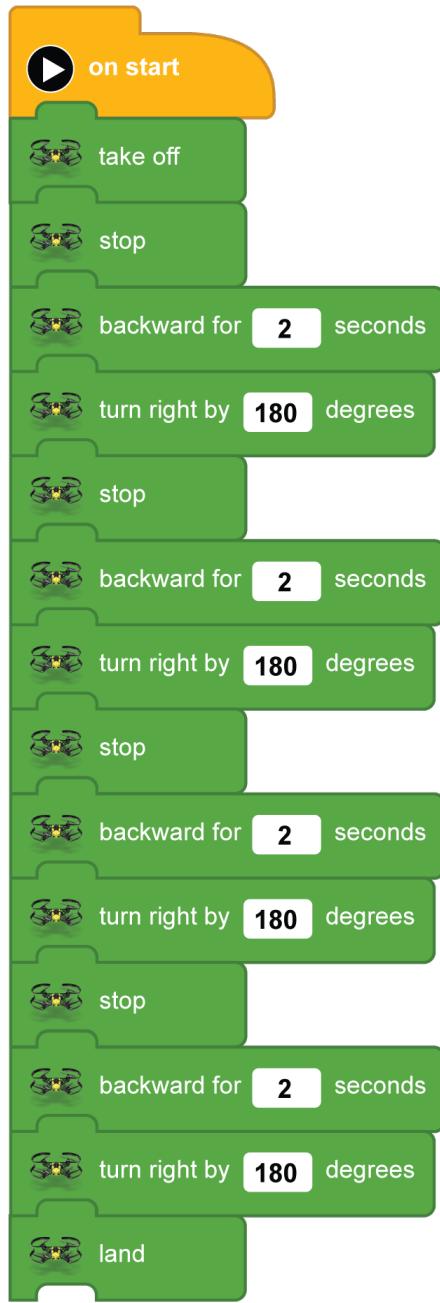
backward for [2] seconds and turn right by [180] degrees



Next add 3 more copies of the stop, backward, and turn right blocks for a total of 4 times fly in box.



And finish it off with a **Land**



And press the **Play Button**

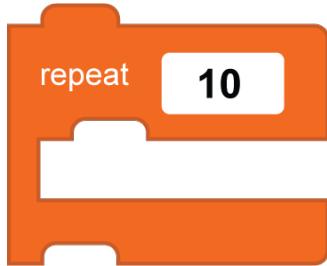
Lesson 7: A Square (Repeat Block)

Did lesson 6 feel like we added too many blocks. Did it feel as if there should have been an easier and better way to add copies. Well, there is a better way. It is the **repeat** block.

The **repeat** block lets us repeat selected blocks over and over as many times as we want.



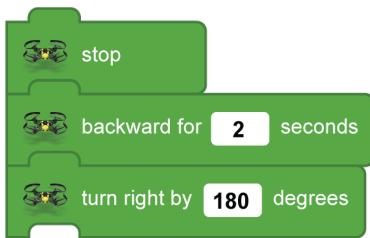
The repeat block can be found in the loop menu
Scroll down till you find this block.



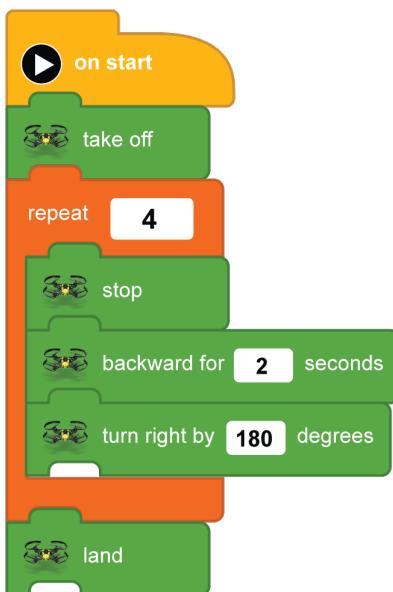
On a New Project: Add a **take off** and Attach a **repeat** under it.



In between the **repeat** block place the blocks we duplicated in Lesson 6.



Change the **repeat** block number to **4** and add a **Land** block below the **repeat** block



Using the **repeat** block lets us shrink the amount of code blocks we need on screen while still doing the same action.



And press the **Play Button**

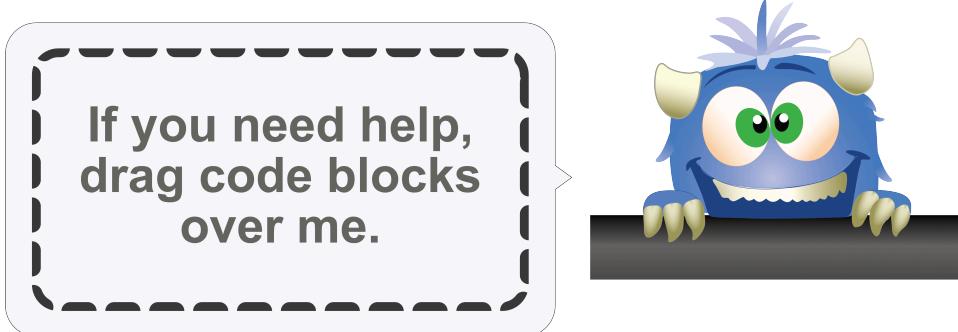
Lesson 8: Fly in Circle

Ok. We've learned to fly in Square. But how do we fly in circle? We need to somehow keep moving while rotating and leaning in towards the same direction. Plus, we need to fly in either forward or backwards to create a circle; otherwise, we will just be turn in the same place...?

Challenge 1

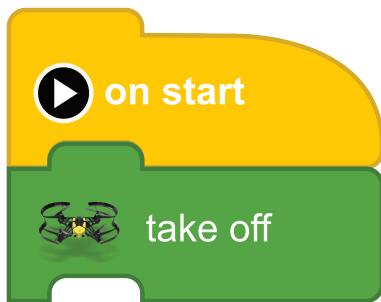
At this point, you are encouraged to try and solve this challenge on your own. If it seems too difficult then continue with the lesson.

Hint: Drag Blocks onto the little monster in the top-right corner



How to:

Like each step, we need an **on start** and **take off**.



Just like the square, we need a repeat block. Add a repeat block under the take off. For now just use [1]

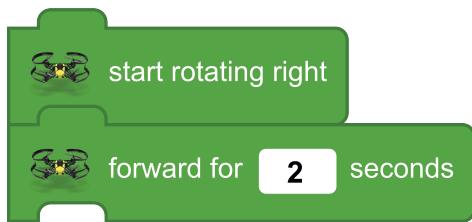


Next, we need to make the drone fly forward and turn at the same time. I'm going to turn right for this example.



Library

In the Library: find these two blocks and place them between the repeat block.

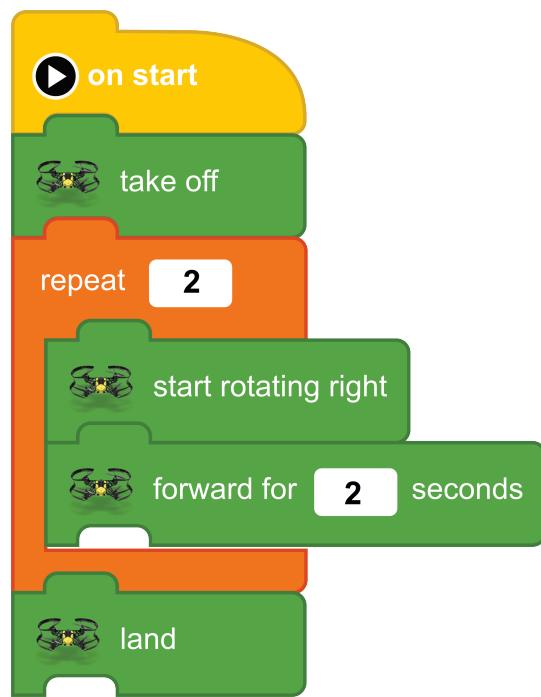


Just as the name says, the Drone will **start rotating right**

The size of the circle is based on the number between the forward block.

Test out the code. Depending on your environment you may need to change the repeat from 1 to 2, 3, or 4.

Add a land block.

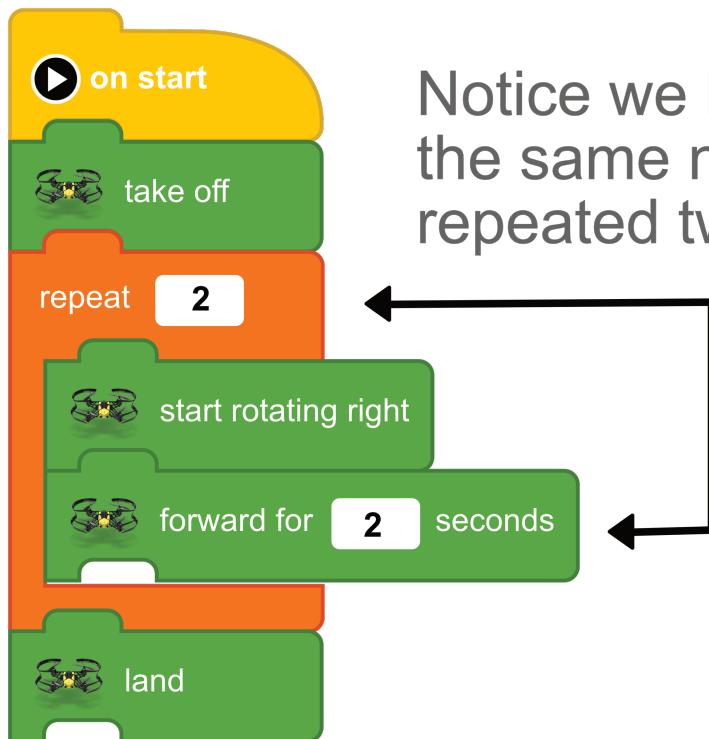


Lesson 9: Variables

What is a variable?

A variable is a block that contains a value. For now, we are just going to be using variable to hold numbers.

In our last lesson, we made the Drone fly in a Circle.
Let's look at the code.



Notice we have the
the same number
repeated two times.

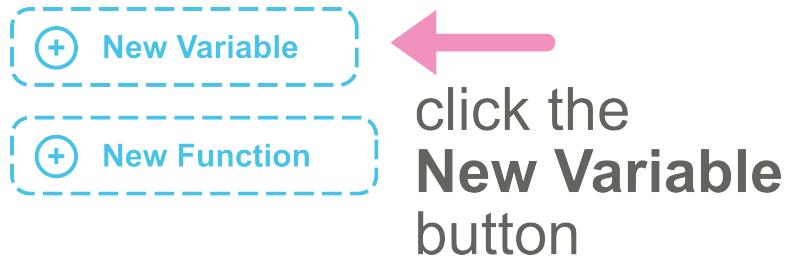
Could you imagine if we had it 10 times or more. We would have type in the same number over and over. If we wanted to change that number just by one, we would have to do it again and again. That's too much work.

An easier way is make a variable and have it equal the number 2.

In the Navigation on the left find the Functions Menu

$f(x)$ Functions

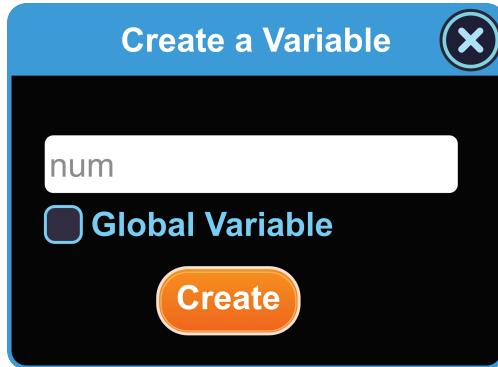
In the function menu create a **New Variable**



When you click the button a pop-up will open.



Give the variable the name num. Uncheck Global Variable if it is checked.



Your new variable block num has been created. It can be found in the function menu between **hardware_drone_maxaltitude** and **set __ of select actor to 0**

hardware_drone_id

hardware_drone_maxaltitude

num



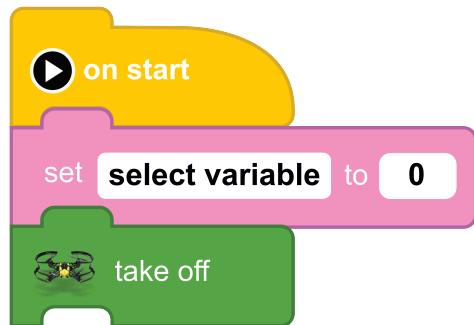
variable num created

set [] of [select actor] to [0]

Next, find the block that looks like the following...

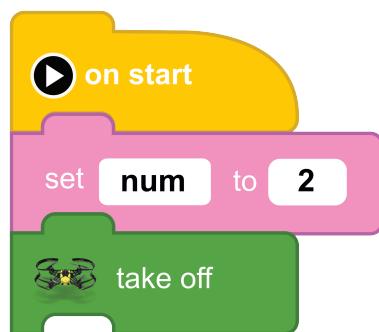
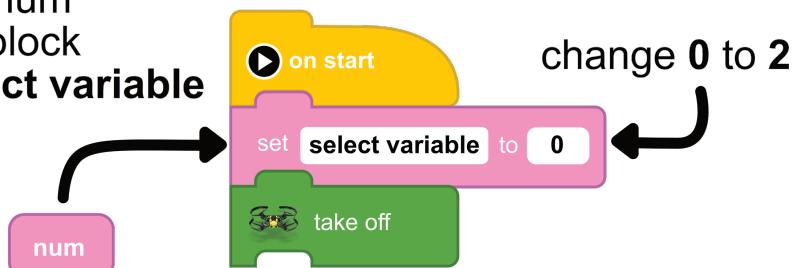
set [select variable] to [0]

Attach this block between **on start** and **take off**

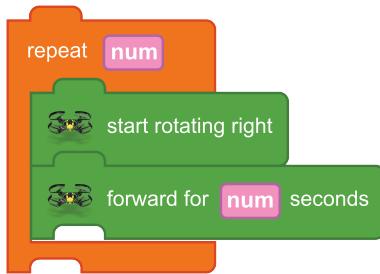


Drag a copy of the **num** variable onto **select variable** and change the two value to 2

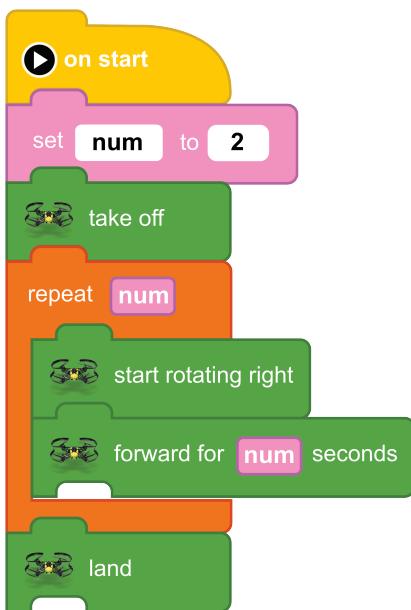
drag the num
variable block
onto **select variable**



Last step, drag a copy of the **num** over the **repeat** number replacing the number value. Drag a second copy over the number **2** on the **forward for 2 seconds' block.**



The code completed.



And press the **Play Button**

After you run the code. Try changing the **num** value from 2 to 4.5 or something else to see the effects.