



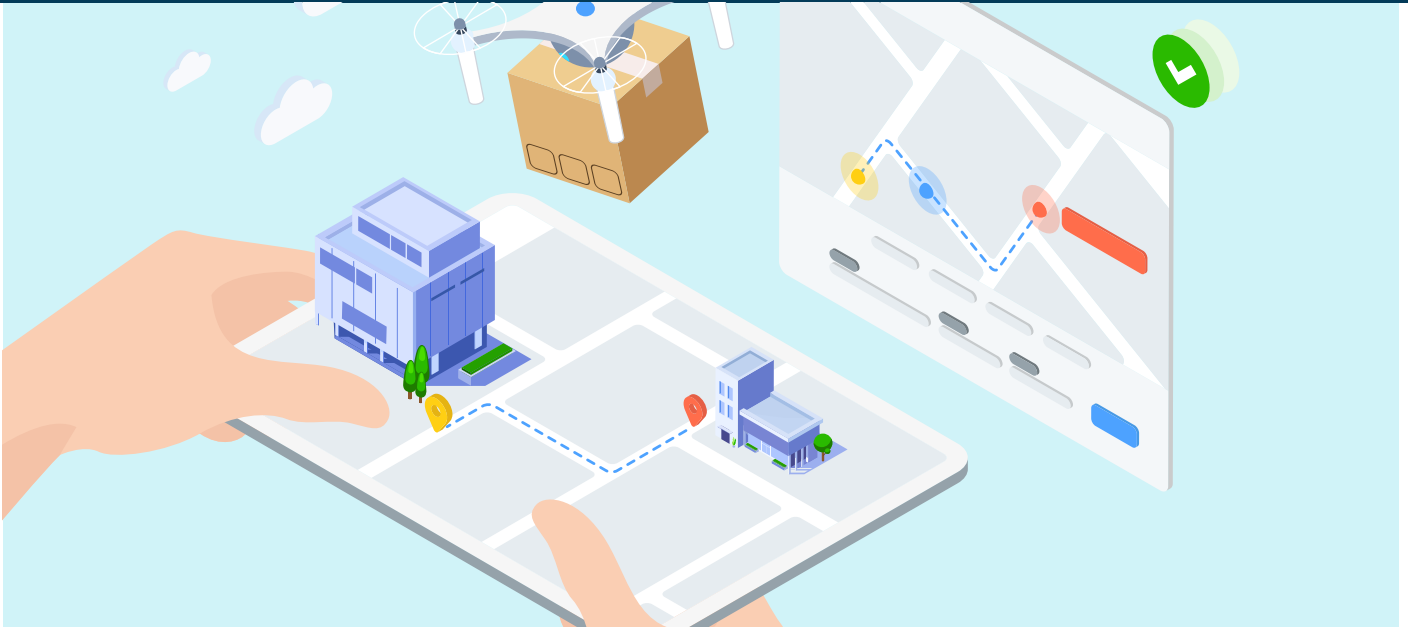
# DroneBlocks

## Getting Started Guide

2022

All you need to get started using Tello drones and DroneBlocks in your classroom! This Getting Started Guide will have you taking to the skies in no time!

# Lesson 02: Coding With DroneBlocks



Welcome to lesson 02!

Now that you can identify your drone and know what kind you have, we can get the good stuff... flight!

One of the reasons Tello has taken education by storm is because they can fly. Flying robots in the classroom! What a time to be alive.

There are several ways to fly your tello. In this lesson we are going to cover the different ways you can program your Tello for autonomous flight. How cool is that!?

## Objectives



At the end of this lesson you will be able to do the following:

1. Connect to your Tello and update it's firmware
2. Create and launch a mission with Block Coding
3. Create and launch a mission in the Simulator
4. Create and launch a mission with JavaScript
5. Create and launch a mission with Python

Can you believe it?! Let's get into the lesson!



# Connecting To Tello - Overview

In this section we are going to be connecting to our Tello drones.

First things first, let us turn our Tello and make an observation. The first thing you should observe is the LED next to the camera begins blinking. These are not random blinks, but rather a series of status indicators. The sequence of lights and their meaning is this:

Before you have connected to the drone:

Off = Drone is not powered up. It is off.

Cycling **red**, **green**, **orange** = drone is booting up.

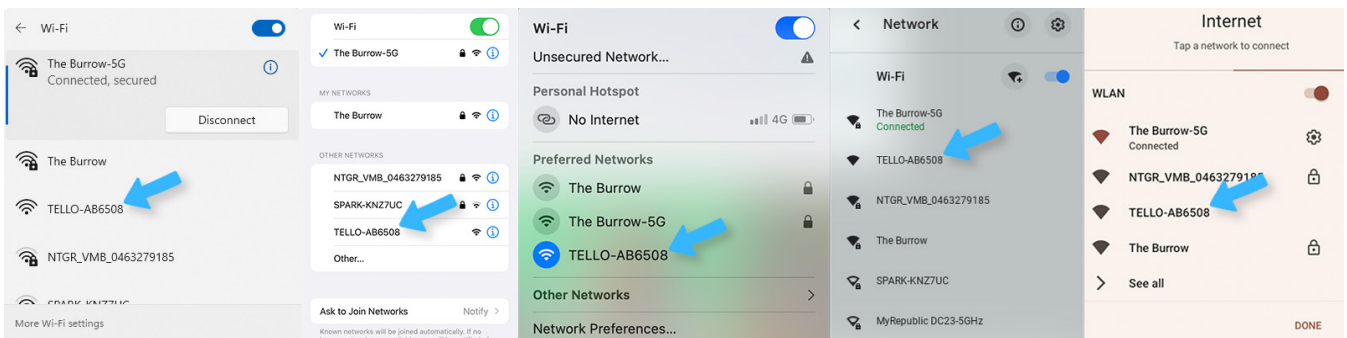
Flashing **orange** = waiting for wireless Connection by broadcasting wireless network.

\* By default, there is no password required to connect to this Tello wireless network

The usual sequence of events should be as follows:

1. Insert battery
2. Press power button
3. Status LED cycles **red**, **green**, **orange**
4. Status LED flashes **orange**
5. Connection to drone is established
6. Launch your mission code

Number 5 is completed by joining the Tello Wireless network from your current device (Tablet, Phone, Chromebook, PC or MAC). You do this just like you would join any other wireless network. Below on some screenshots of what different devices look when connecting:



One very important thing to note is that once you connect your tablet, phone, Chromebook, PC or Mac to the Tello, you will **no longer be connected to the Internet**. The Tello's wireless network is a **direct connection** between itself and your device.

Often people connect to their Tellos and then want to pull down a saved mission. You need to open the DroneBlocks App and download your saved mission BEFORE you connect to the Tello.

Amazing! Now that you can connect it's time to update the firmware so we can start coding and flying!



# Tello App for Firmware Updates

Inside each Tello drone lives a set of instructions known as the “firmware”. This firmware tells the drone how to read our code, how to connect, how to fly etc...

Whenever there is a glitch or bug, often these can be fixed with a firmware update. You’re going to do just that!

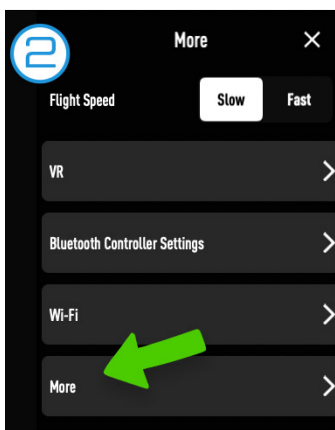
When you bought your Tellos, they were shipped from the factory with latest available firmware at the time. Since then, there have been several updates. You will need to download and install these updates before you can use the DroneBlocks App, It is really easy and straight forward.

On your mobile phone or tablet, go to the App Store / Play Store and download the Tello Mobile App:

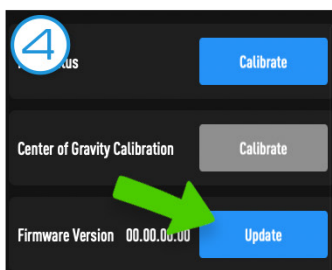
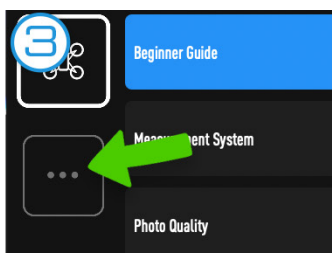


Once the app is download, open it and then connect to your Tello using knowledge from previous page.

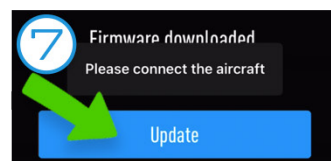
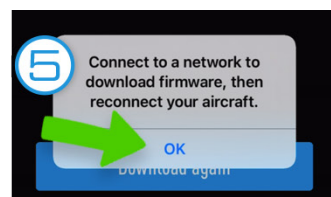
Once you’re connected to the Tello you will see through the camera of the drone. Amazing work! Now it is time to update the firmware. Follow these 7 steps below.



1. Select [settings icon](#) (gear / cog)
2. Select [More](#)

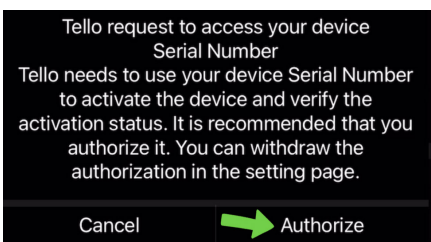
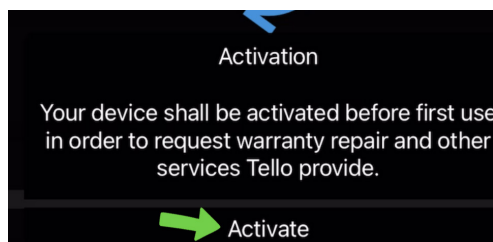


3. Select [...](#) button
4. Select [Update](#)  
This will ask you to connect to Internet (see 5)



5. Connect to Internet
6. Select [Start](#)
7. Connect to Tello and select [Update](#)

Well done on updating your drones firmware. Now there is just one last thing to mention. During the update process you may be presented with the option to “Activate” your drone. You need to do this before you can use it. Select “Activate” and then select “Authorize” and let it process for a few minutes.



Incredible work!

In the next page we are finally going to launch a drone!

# DroneBlocks App

Now that you've updated your Tello's firmware, you are ready to take to the skies, one block at a time!

The DroneBlocks app is a block coding app which lets you drag and drop blocks of code onto a stage to create a program or mission.

Head on over to "<https://droneblocks.io/app>".

This will take us to the page with the links for iOS, Android and the Chrome extension, depending on your device type.

**DroneBlocks For IOS, Android, And Chrome**

DOWNLOAD FOR IOS

DOWNLOAD FOR ANDROID

DOWNLOAD CHROME EXTENSION

If you have managed devices, send your IT provider the link & ask them to "[deploy droneblocks to your classroom devices](#)". By default your Chromebooks might not allow for the installation of new extensions. If you run into this, contact your IT provider about allowing Chromebook extensions to be installed.

Well done on downloading the DroneBlocks app. Isn't it cool?

So many colors!

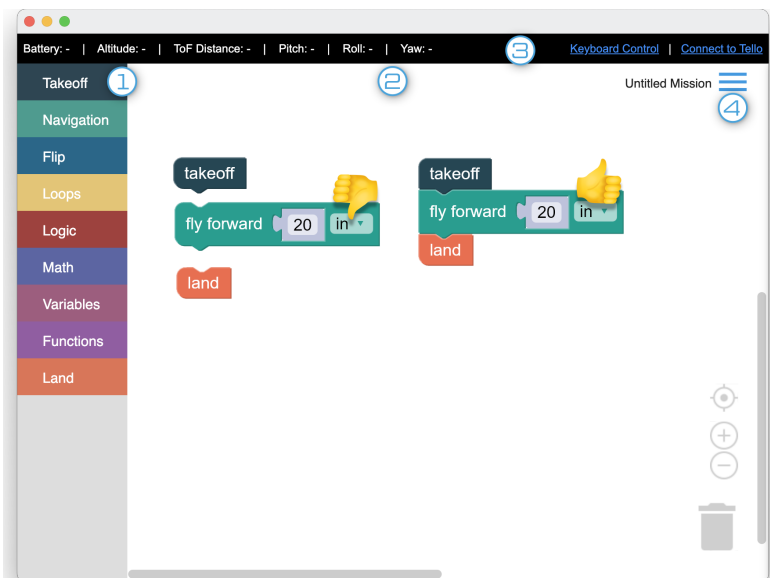
Let's look at what the DroneBlocks app actually does!

## 1. Block Palette

This where all the different blocks at your disposal can be found. If you want your drone to do something, this is what you will be using.

## 2. Stage

This is where you drag your blocks to make your mission. The great thing about the blocks is that they connect together like puzzle pieces. I've made an example of a basic mission here. Remember, the blocks need to be connected together for the code to run.



## 3. Status Bar

This bar gives you all the sensor information of the Drone while its connected. It also has the Connect to Tello button which you will use to connect to your drone.

## 4. Menu or Hamburger

This is where you can login, create a new mission, save the current mission etc. We are about go over this in more detail

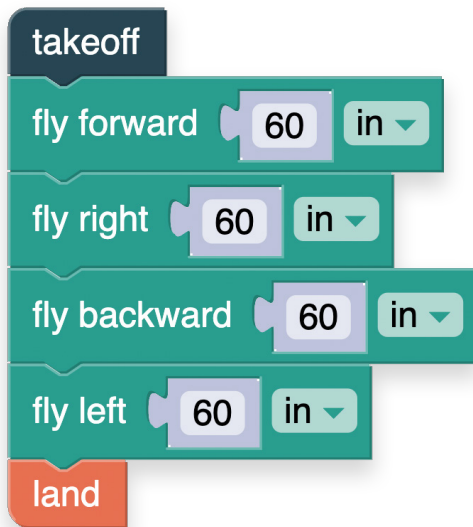
Thats enough explaining, lets get into it and fly!





# DroneBlocks App

Now that you know a bit about the app, lets get into the flying. For our first mission, we are going to do the classic “Box Mission”



Simply drag 6 blocks to the stage:

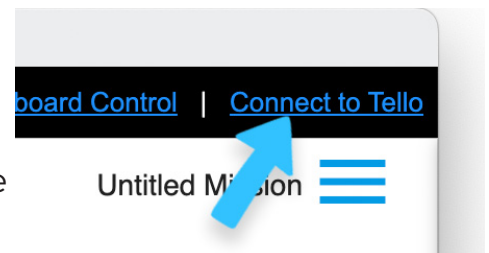
1. takeoff
2. fly forward
3. fly right
4. fly backward
5. fly left
6. land

Masterpiece! Bravo. You have now got the code that will tell Tello to fly in a square... or a box.

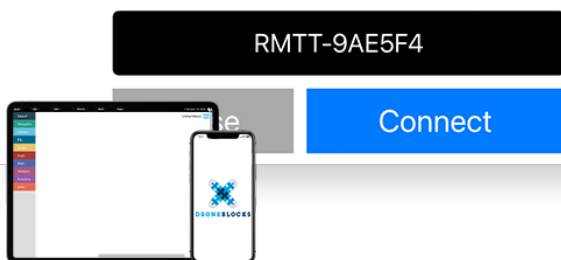
Now we need to get the code into the drone.

Click on [Connect to Tello](#) in the Status Bar to get instructions depending on the device type.

[Connect to Tello](#) on mobile looks a little different than the extension version.



Please follow these steps to connect Tello to DroneBlocks. First, power up Tello and make note of the SSID in your network settings. By default it will look like TELLO-XXXXXX or RMTT-XXXXXX. Enter the SSID (case sensitive) in the text field below and click the blue



## Tello Connection Instructions

1. Power up Tello.
2. Go to your computer's network settings and look for the Tello network.
3. Connect to the Tello network. No password will be required.
4. Wait a few seconds for the network connection to be established.
5. Click the Connect button below and you should see Tello's battery percentage in the top left of DroneBlocks.

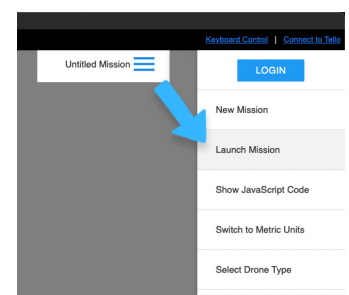


Once you've connected successfully to your Tello, the status bar will show your current battery percent. On mobile devices, you will start to see the drones camera appear. On the chrome extension version you do not have access to the Tello's camera. Great news is that the DroneBlocks Desktop version is coming soon and it has full camera access.

The only thing left to do is click on the hamburger and Launch Mission.

And the Tello takes to the skies... amazing!

Now let's look at how we save and share code.



Well done on completing the “[Box Mission](#)”. The code is perfect, simple and it worth saving! Let’s do that now.

Click on [Hamburger](#) and then Login.

The DroneBlocks login page pop ups and will ask you to sign in with either a Google account or an email address.

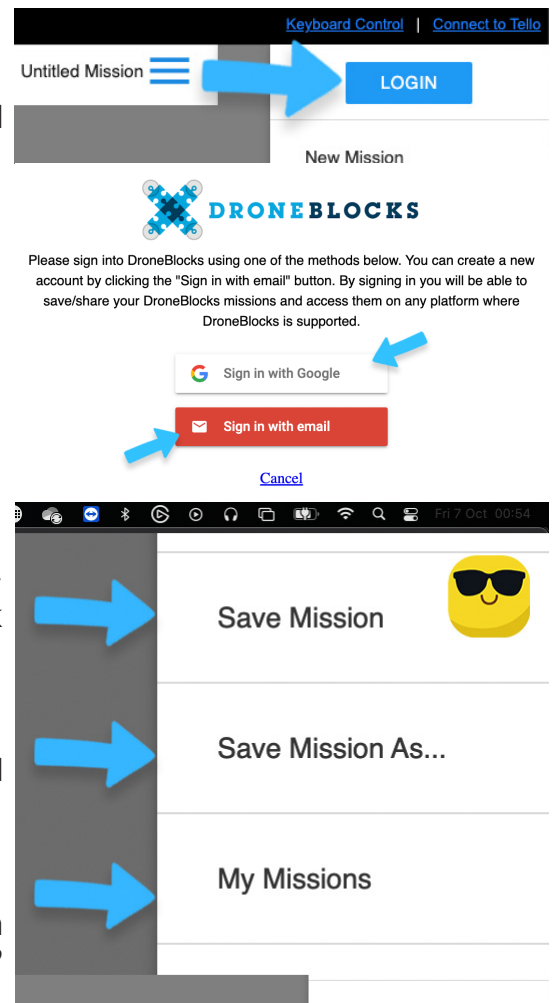
Make a note of what method and email address you use so that you never loose your code.




Once you have successfully login, you will notice some more options become available in the menu.

**Save Mission:** This will save your current mission. The first time you click save, you will be asked to give your mission a title. Enter in mission title and click Save. Each time you click Save, your mission will be saved under that mission title.

**Save Mission As:** This will always ask you enter a mission title. This option is like the “Save As” or “Save a Copy” option in your favorite word processor.

My Missions will show you the list of your saved missions. This is very cool because it gives you the option to share your code with other DroneBlocks Coders!




#	Title	Created	Make Public	
1	Box Mission Win	October 7, 2022 9:11 AM	Off <input type="checkbox"/> On	  

The Tello Missions pop up will show you all your saved missions. On the right hand side of the page you have 3 icons.

 **Edit:** Loads the saved code on to the stage.

 **Share:** Creates links to share your code with others.

 **Delete:** Deletes the mission.

Well done! Let’s have a look at how we share our code and then you’re done with this section!



Click on Share and you will get this pop up:



This “copy link icon” will copy the link so you can paste it in an email, instant message or any classroom app.

This lets you share your code with students or other educators.

There are two types of links:

**iPad Share Link** and **Desktop Share Link**. One link starts with **droneblocks://** while the other starts with **https://**.

The iPad Share Link will open your saved mission in the DroneBlocks app, depending on the device you open it on.

The Desktop Share link will open your saved mission in your default web browser. Yes! You can code in your web browser, as well as save missions once you’ve logged in with your account.

This is so cool because you can have the entire class editing DroneBlocks code on inexpensive devices. Students can also login to their DroneBlocks account and save their code.

This is great for accessibility in the classrooms. The only limitation for web browser DroneBlocks is:

**You cannot send your code to Tello from the Web browser!**

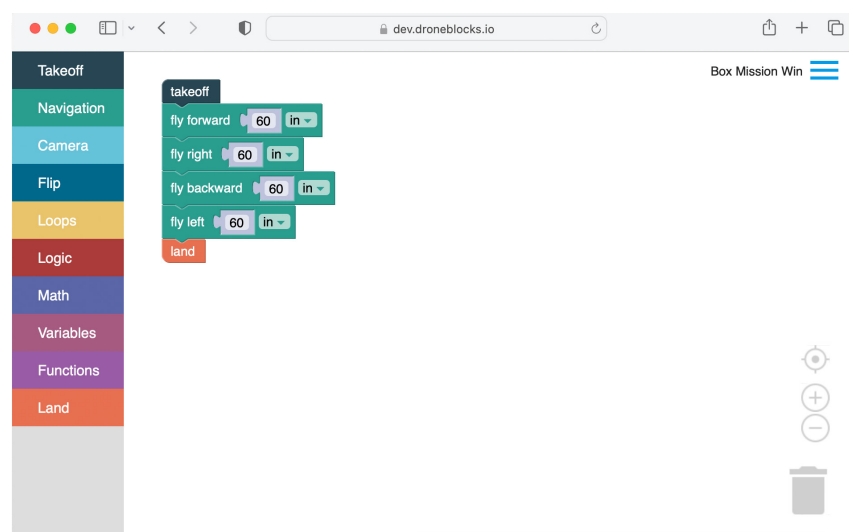
For safety reasons, web applications like DroneBlocks cannot connect to external devices, such as drones.

Never fear, there is a solution for that.

1. Have students edit and save code on the web browser. Once they have completed their code, they can login on a classroom tablet / other device, load the now completed mission and then launch it on the Tello.

2. Simulate a drone flying.

That’s right! We have a simulator! Let’s go check it out.





The DroneBlocks Simulator is one of my favorite things! You can drag and drop code to the stage and then a virtual drone launches carries out your mission. How cool is that?

Let's check it out!

There are three environments you can select for the current simulator (V2.0):

## Minimal.

An open platform used to test code.

## City.

A really cool city with lots of learning opportunities for students. You can have students land on one of the many hidden launch pads. Students can create and share various missions with each other. It's great for some real world drone use. For example:

1. How many cars are in the mall parking lot?
2. How far away are the train / bus stations?
3. What's the shortest path from the mall to the hospital?

## Mars.

This is an out of this world simulator! Students fly a drone around Mars while learning STEM lessons. This simulator has an entire course dedicated to it. You will see more of this in Lesson 3.

One of my favorite things is that all the code you create in the Simulator can be sent to an actual Tello. The code is the same. This means you can simulate events inside the simulator and you can replicate those events in the classroom! How cool is it?!

The Simulator is designed to work on any modern day Internet Browser which means it will work on PC, Mac, Linux, Chrome-books and some tablets. The idea behind this was to make DroneBlocks, block coding and the concepts of flying drones more accessible. Classrooms might only be large enough to fly 3 to 5 drones at a time. Using the simulator AND Tello drones is a great way to keep the entire class engaged in the lesson.

Every month the password for the Simulator changes. You can find that password here in the Simulator course.

There is also a link on the top right that takes you to the original Simulator V1.0. Check it out and see what you think. The code works exactly like the V2.0 simulator.

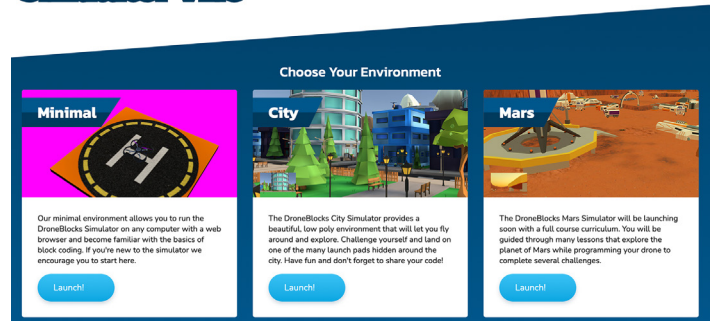
Now you're ready to talk about JavaScript!



Simulator V1

## DroneBlocks Simulator V2.0

We are excited to announce our V2 drone simulator with improved physics, graphics, and functionality. All of your existing DroneBlocks missions will run in the new simulator and on your Tello drones. Our new simulator requires more computing resources, so we've provided you with multiple environment options.



# JavaScript

Just before we dive into JavaScript, let's jump back to the DroneBlocks App.

Click on the Hamburger icon and select Show JavaScript Code. Boom, JavaScript. Notice that each block has a corresponding line of code.

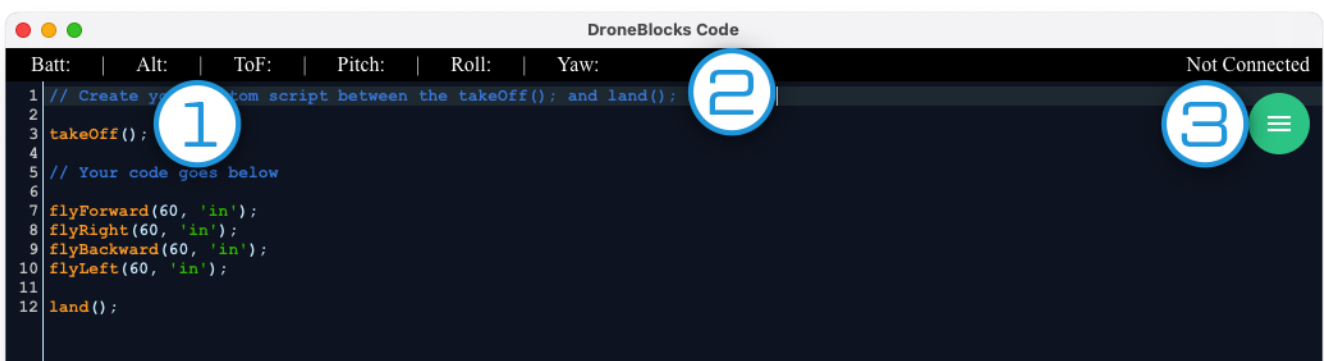
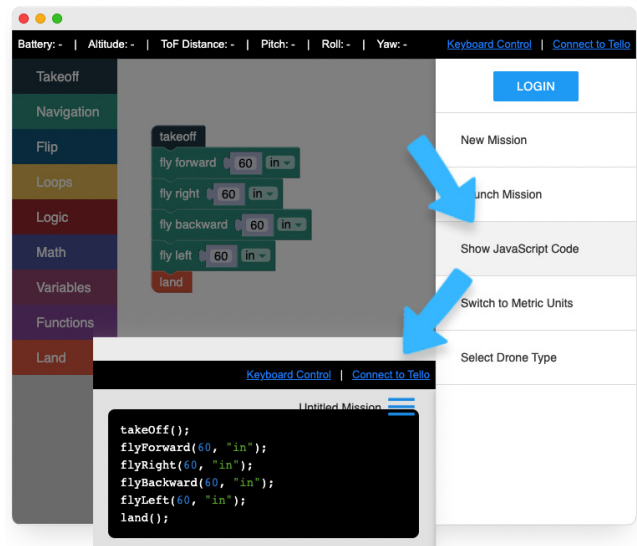
This is such a great way of visually explaining JavaScript to your first time students.

`takeOff();` launches the drone.  
`flyForward(60, "in");` flies forward 60 inches.  
`flyRight(60, "in");` flies right 60 inches. Can you notice the pattern. In Lesson 3 you will get to see the JavaScript course material.

Now it is important to note that when you "Show JavaScript Code" in the DroneBlocks app, you cannot edit the JavaScript. This is where DroneBlocks Code comes in. DroneBlock Code will let you write JavaScript and then send that code to your Tello Drone! It's so cool! Let's check it out.

Go to this link and download the app:  
[DroneBlocks Code Download](#)

Click the link for either PC or Mac. Once you have downloaded the .zip file, unzip it and run the program. Once the program runs, you will see this text editor. Well, it looks like a text editor, only it has line numbers and pretty colors.



1. **Code:** This is the code you type out.
2. **Status bar:** This displays your battery life, altitude etc.
3. **Menu / Hamburger:** This brings up the main menu that has options to launch your code, save / load your code, etc.

Well done! Now let's save and load some scripts!



Clicking on the Menu icon reveals this menu.

Once you have typed up a storm and you want your Tello to take to the skies, simply connect to the Tello's wireless and then click **Launch Mission** from the DroneBlocks Code menu.

This sends your wonderful code to Tello.

Once Tello has done the code / mission and you are happy with your masterpiece, go back in to the **Menu** and click on **Save Script**. Enter a name for your script and click **SAVE**.

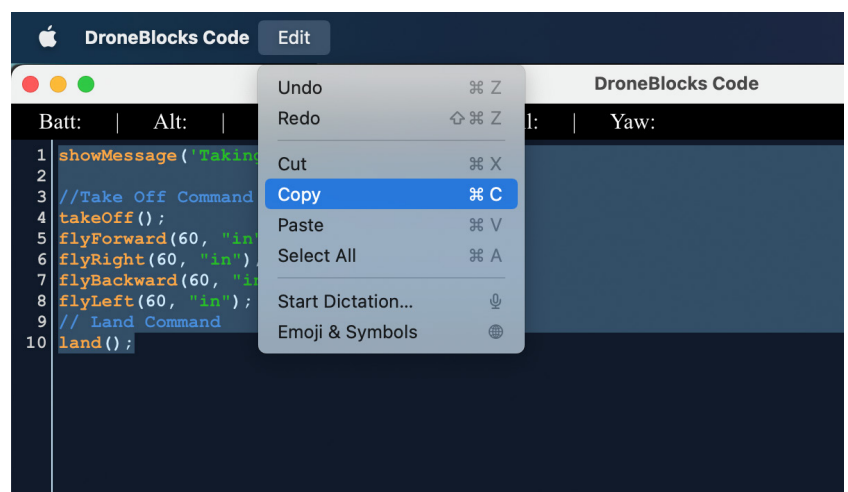
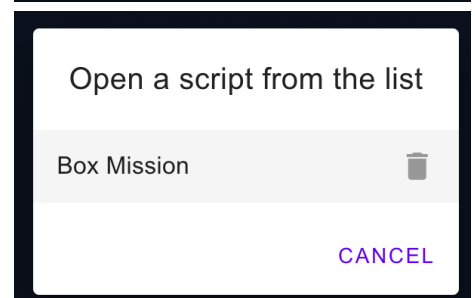
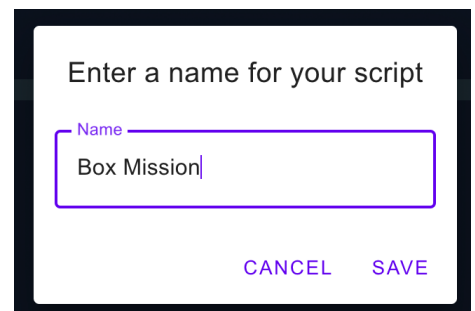
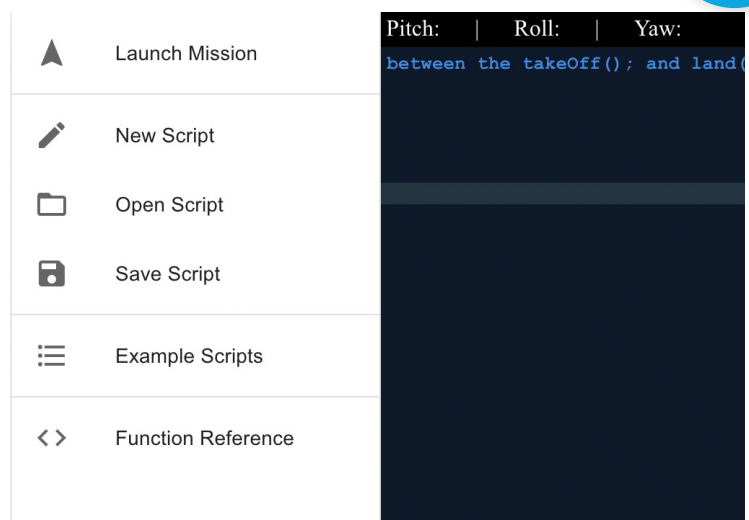
Well done, you have saved your code. To load your code into the editor, click on the **Menu** icon and select **Open Script**.

This will prompt you to select the script from a list of saved scripts. Click on the script you want to load.

Amazing! Now, sharing this code can be done by copying and pasting the content of the code, and sending to your students via an email or your classroom management system.

You can select all your code and copy it with either CMD + C on your keyboard or by going edit -> copy. Once you have pasted the code into your classroom system (such as Google Classroom), your students can copy and paste the code from Google Classroom into DroneBlocks Code App.

How cool is that?!



# Python

Python, like JavaScript, is one of the most popular programming languages in use today.

You can do some very cool things with Python, DroneBlocks and your Tello Drones. It all starts with downloading python. You can download python like so:

<https://python.org/downloads>

Click on [download python](#)  
Click on [open](#)

This will launch the python installer. The installer will guide you through the various installation options.

For now, select all the defaults except for the bottom option that says:

**“Add python.exe to PATH”**

Tick this option and then click on Install Now to proceed.

Once python is installed open your terminal or command prompt and type in:

**“python”**

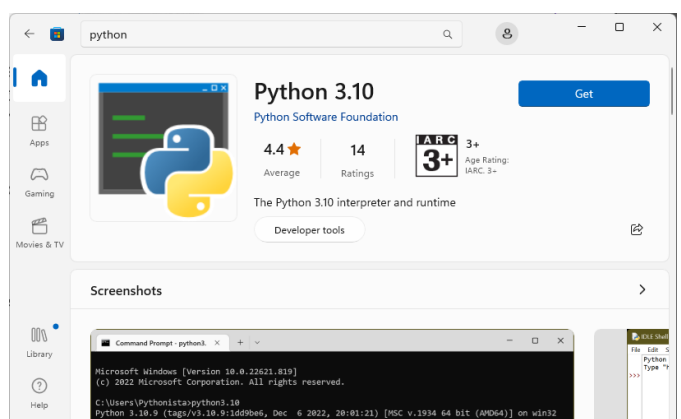
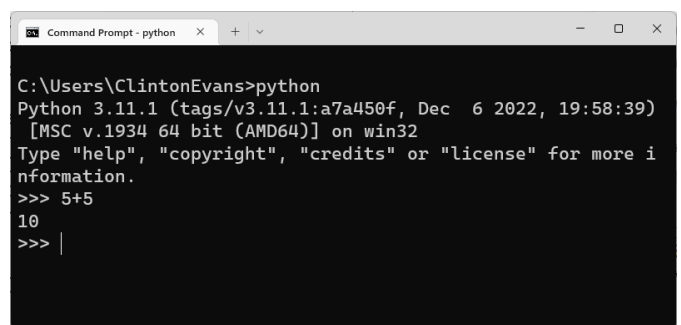
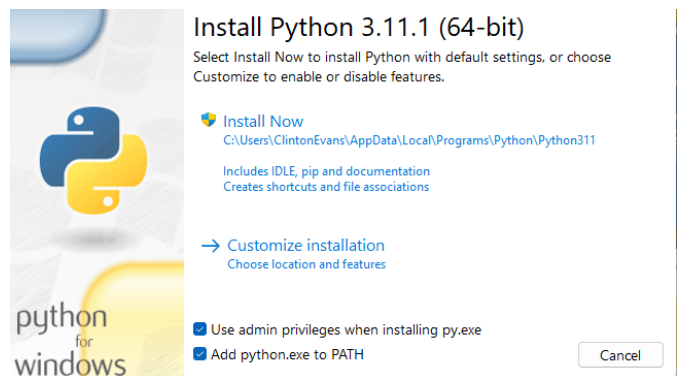
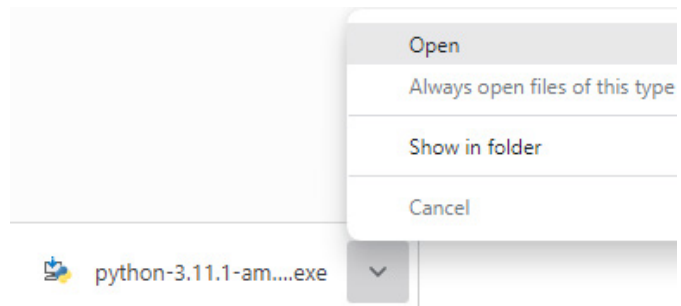
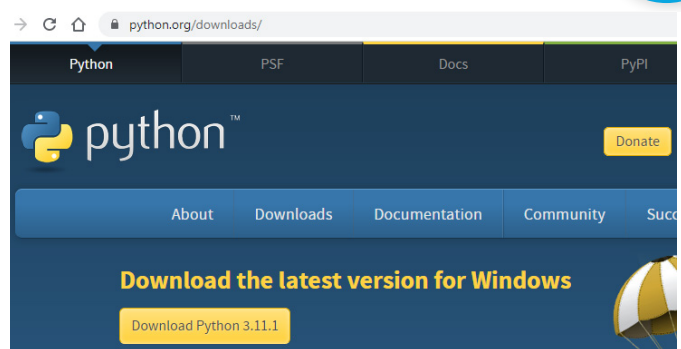
The python shell should load and if you type:

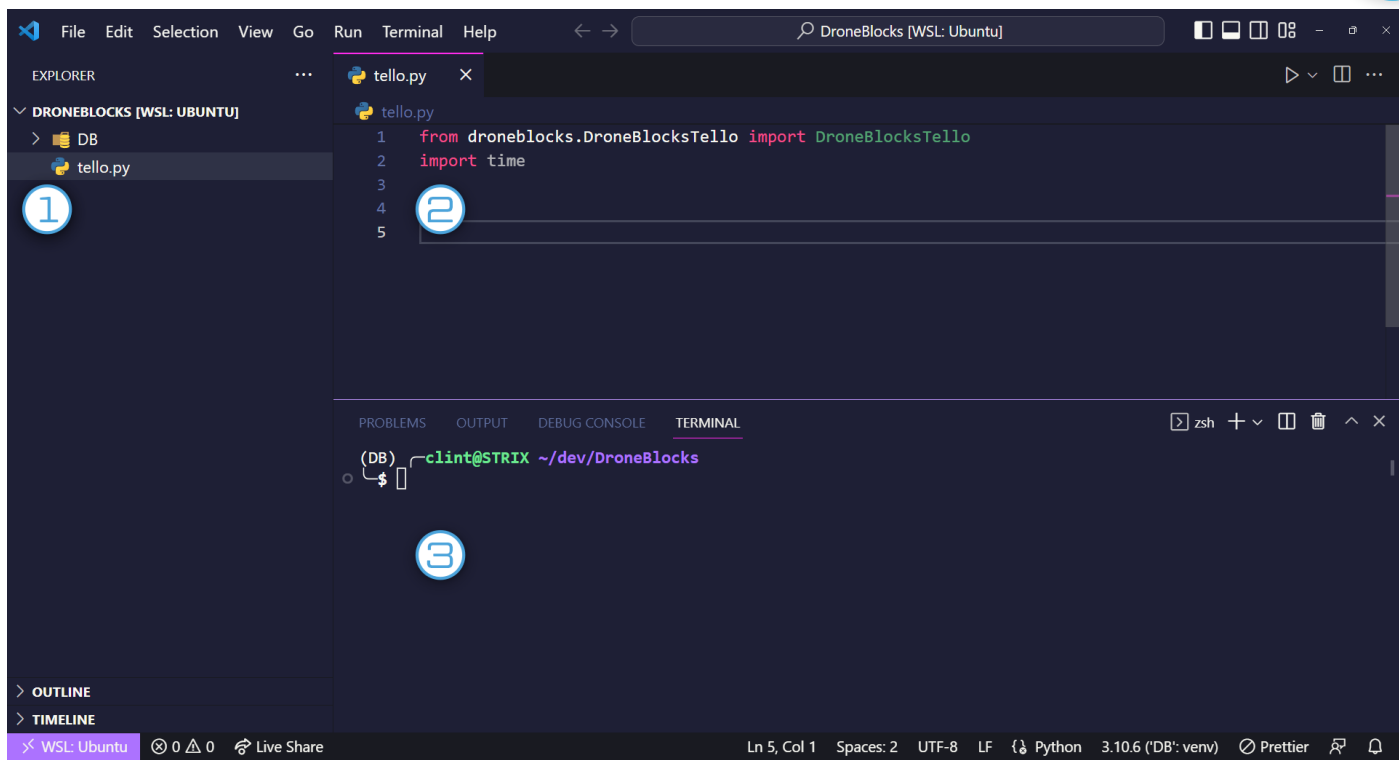
**“5+5”**

**“10”** will be returned.

If you type in **“python”** and a Windows Store page pops up, it means Python did not install correctly. Contact your school’s IT Provider and ask them to assist you to install Python.

Once you have downloaded python head over to <https://code.visualstudio.com/download> and download VSCode. This is a top-tier tool you can use to write python code.





Visual Studio Code is an amazing editor. Let's have a quick look at the layout.

## 1. Explorer

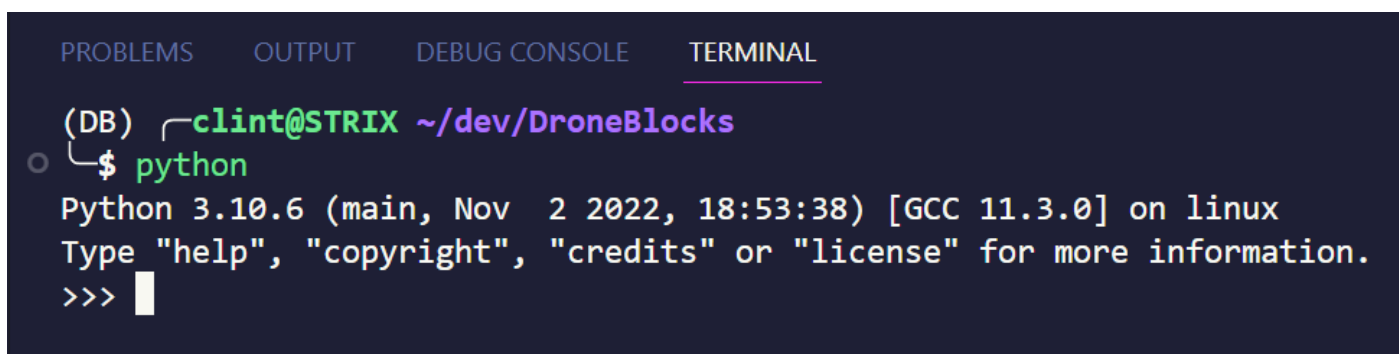
This contains all the files in your project.

## 2. Editor

This is where you type all your python code and save it as a .py file

## 3. This is your terminal.

Your terminal allows you to install packages, run servers, execute commands etc... typing "python" inside here should show you the python shell:



Great work! Once you've gotten this far you are ready to follow along with our lessons in the DroneBlocks curriculum.





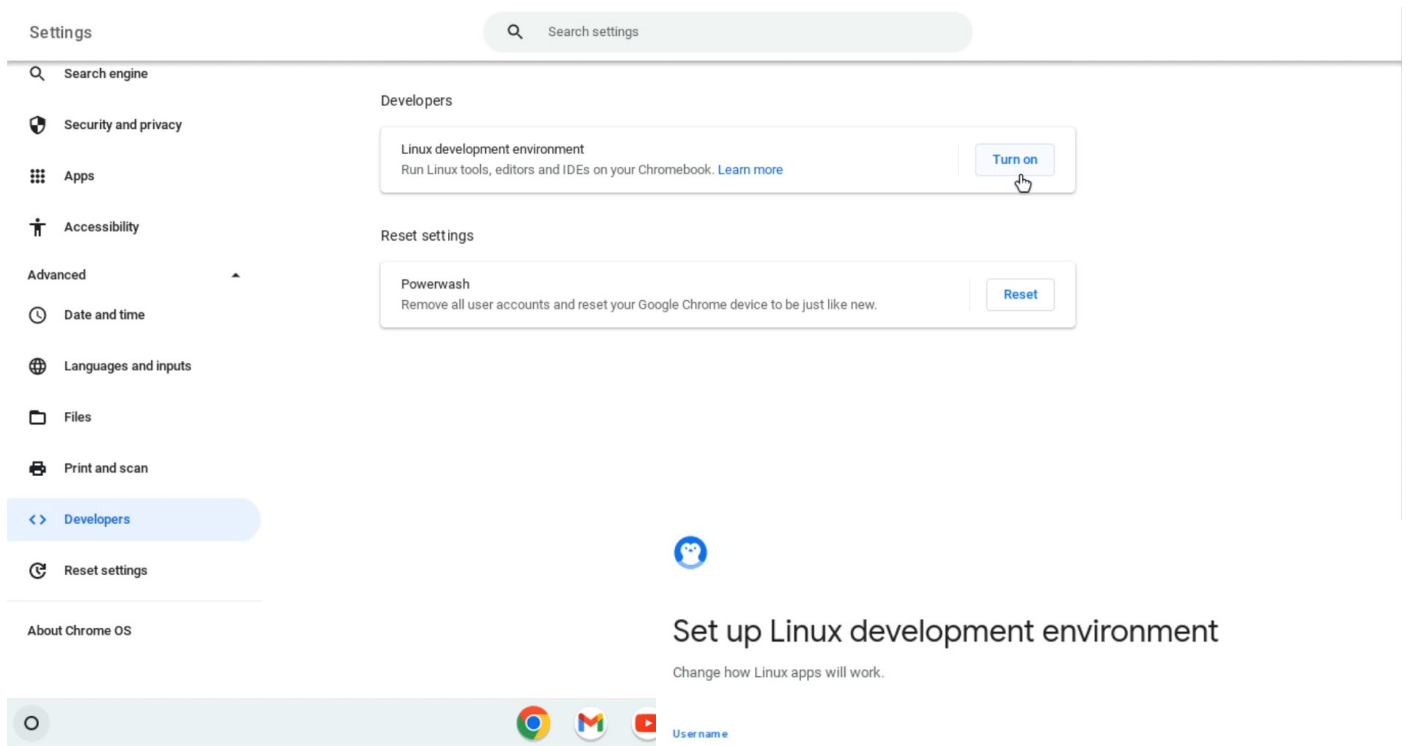
# Python On A Chromebook

Some modern chromebooks have the option to install a “Linux development environment”. This runs a version of Linux in a “sandbox” which doesn’t affect the rest of the chromebook.

To turn this on, click on **launcher icon** on the bottom left and go to settings.

Then click on **Advanced -> Developers**

Then click on **Turn on**.



Click on **Next**

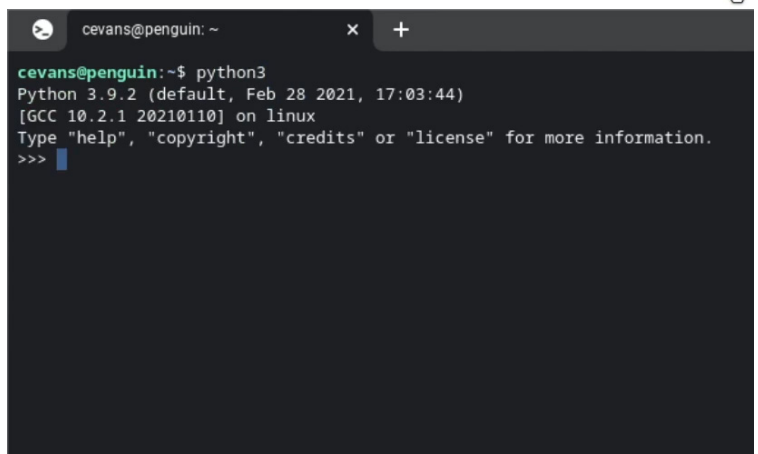
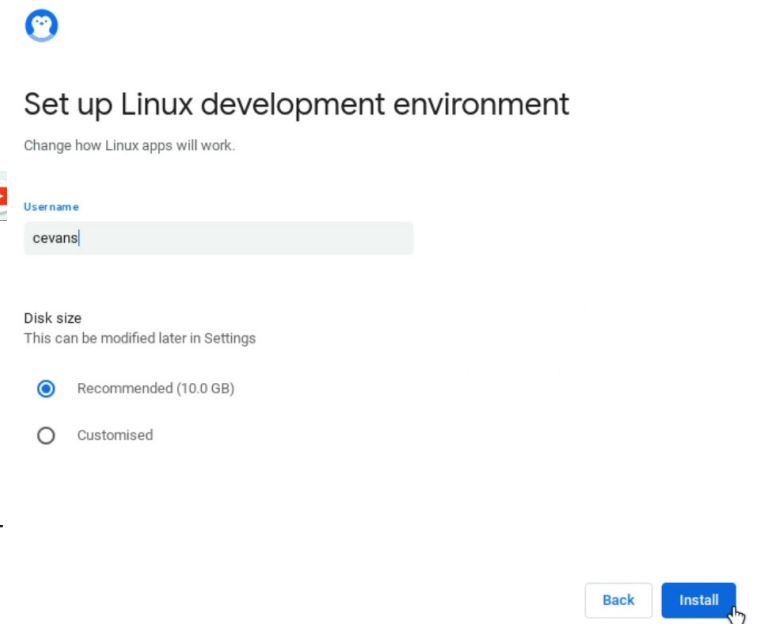
Select a username and leave Disk size on 10GB.

Click **Install**. That’s it.

Once the installation is completed you will see a terminal window appear. Python is installed by default.

Type in “python3” and you should see the python shell appear.

Well done! You’re ready to follow along with the Drone-Blocks lessons.





Well done on making it to the end of this lesson!

Before you sign off, let's quickly see if you can answer the following questions:

Name 3 programming languages that you can use to fly your Tellos with DroneBlocks.

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

What color are the navigation blocks?

A. \_\_\_\_\_

What color is the land block?

A. \_\_\_\_\_

Where would you see your drone's remaining battery life?

A. \_\_\_\_\_

If you saved your mission on a tablet, how would you access that mission on a Chromebook?

A. \_\_\_\_\_

What shape has predominately featured in lesson 2?

\_\_\_\_\_

What is wrong with this picture and how would you fix this code?

```
to 60in_Square
  fly forward 60 in
  fly right 60 in
  fly backward 50 in
  fly backward 60 in
```

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_





Let's have a look at the answers!

Name 3 programming languages that you can use to fly your Tellos with DroneBlocks.

1. Blockly / Block Coding
2. JavaScript
3. Python

What color are the navigation blocks?

Teal

What color is the land block?

Orange

Where would you see your drone's remaining battery life?

Top status menu where it says "battery : %"

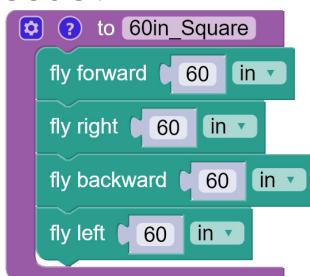
If you saved your mission on a tablet, how would you access that mission on a Chromebook?

Login to DroneBlocks App and click on My Missions

What shape has predominately featured in lesson 2?

Square

What is wrong with this picture and how would you fix this code?



There is a "fly backward 50 in" block which doesn't fit. The function name is "60in square". To make the function live up to it's name, we need to make sure the length of all blocks are 60in. We only need one "fly backward" block, so we will replace the bottom block with a "fly left 60in" block.

