Explore the Atmosphere

Make an animated report

Planning & research

Before you start coding, it is important to plan and research your project.



What are YOU exploring?

This challenge will help you make a project about the layers of the atmosphere, but you can use these ideas and code blocks to make your project about whatever topic you are interested in exploring. Even if you choose to do the layers of the atmosphere, you will want to customize it and make it your own.

What are the layers of the atmosphere?

Do some research:

What are the layers of the atmosphere? What are some key facts about each layer? How high does each layer go? What is the average temperature? What might you find there?

Do your own search or use these resources:

Earth's Atmospheric Layers by NASA
Atmosphere Layers by ScienceStruck

Take notes as you read. If you want, click here to create a new Google Doc for your notes.

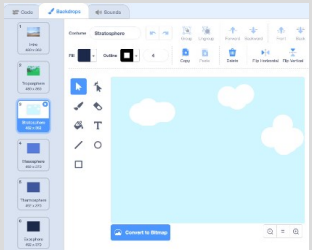
Write a script

The narrator will tell you about where you are in each place you go on this trip. Write a script in your planning document for each location you will visit.

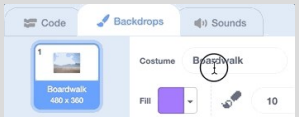
For example, the script for the troposphere might be something like this:

> *The troposphere is where all the plants and animals live.*
> *Most of the earth's weather happens in the troposphere.*
> *The air is relatively warm and there is a lot of water in the air.*
> *It gets colder as you go up...*

Choose, paint, or upload backdrops for the layers of the atmosphere.



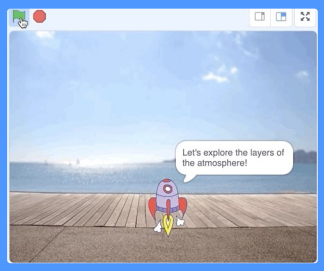
Rename the backdrops to the name of the layer so we know which scene it is for.



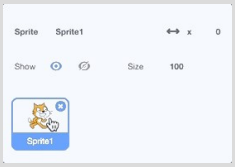
No clues left! Ask a friend?

Opening scene

Set the scene and tell the viewer about the voyage they are about to take.

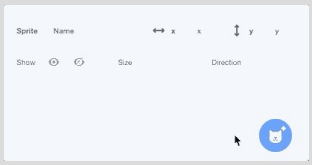


Delete the cat



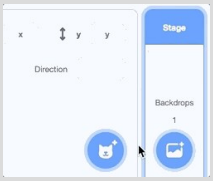
Who will be your travel guide?

Choose a sprite that will be your narrator. If you're exploring the atmosphere, you might want someone who can fly?

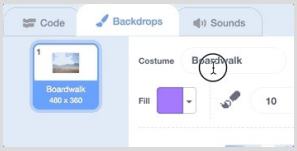


Set the stage

Choose a backdrop where you will begin the trip.

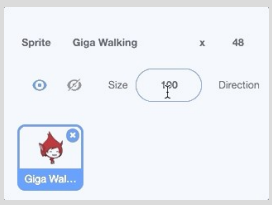


Rename the backdrop to Intro so we know which scene it is for.



Prepare your sprite?

Move your sprite to where it should start. You might want to make your sprite smaller?



When should we start?

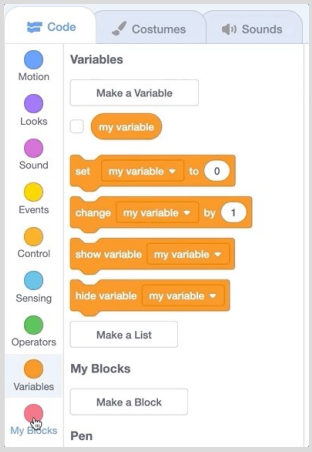


Using 'My Blocks'

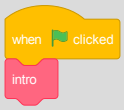
To keep the code more organized, we will use 'My Blocks' so we can name sections of the code. This can make it easier to understand what is

happening with different parts of your code and can help if you need to fix bugs later.

Make a 'My Block' called 'Intro':

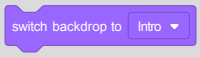


and add it to your project.



Always start on this backdrop

When you start the project, make sure to switch back to the opening backdrop.

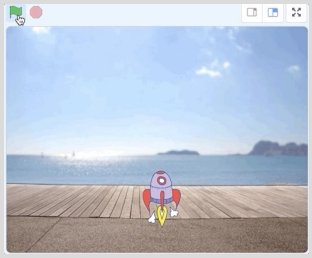


Where does the sprite start?

Drag your sprite to where you want it to start. Scratch will automatically update the x and y coordinates for you.



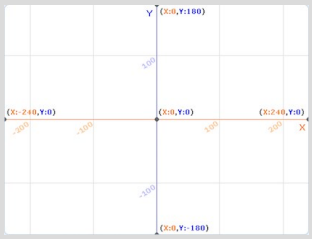
How can you make your sprite talk?



Say what?

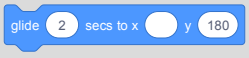
How can you make it fly to the top?

What is the y coordinate at the top?

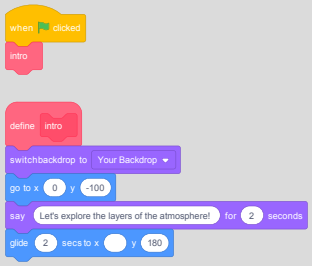


Make it fly smoothly up!

Choose an x coordinate that looks good to you.



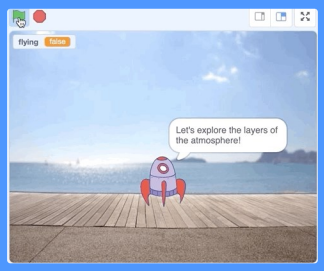
Peek at the code



No clues left! Ask a friend?

Animate your sprite

Switching costumes quickly can make your sprite seem like it is moving.



Basics of animating costumes

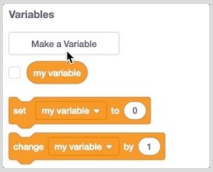
Many of the flying sprites have multiple costumes that you can use to make it look like they are flying. If the one you chose doesn't, you might be able to duplicate it and make your own new costumes? Or skip this step and keep going on your journey.

There are different ways to animate sprites. You might want to look at the walking animation challenge to see one simple way.

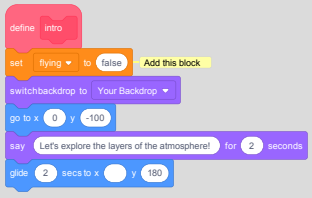
In this challenge, we want to be able to start and stop the animation. We will use a variable to do that.

Make a variable

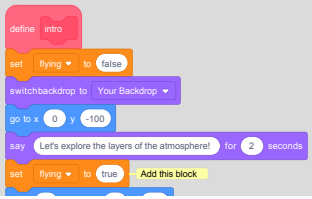
Make a variable named flying.

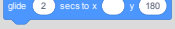


What's the value of the flying variable when you start?



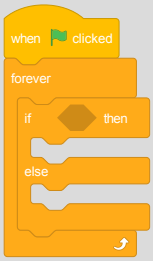
When will you start flying?





How can you keep checking if flying is true?

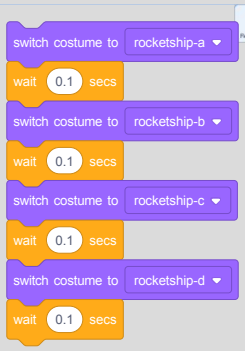
Using the if-then-else block lets us set the default value if we are not flying.



What do you put in the condition for the if block?

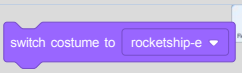


Animate the flying costumes



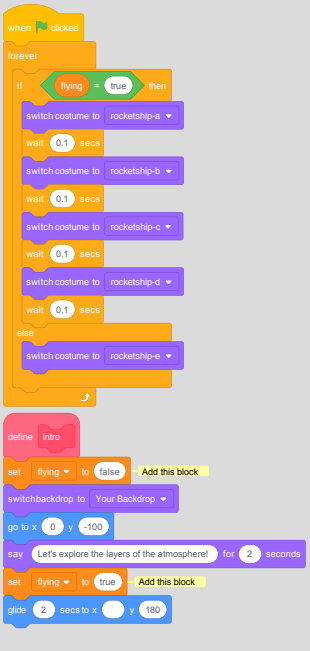
(If you're using a different sprite, the names of your costumes will be different.)

What should happen if you're not flying?



(Or the name of a non-flying costume.)

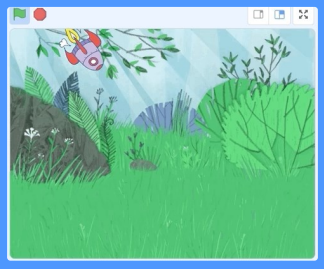
See it all together



No clues left! Ask a friend?

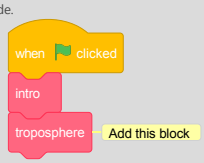
Enter the troposphere

Visit the lowest layer of the atmosphere.



Make a My Block

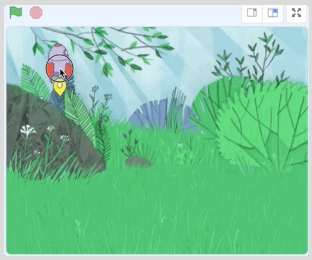
Make a My Block called troposphere and add it to your code.



Show the right backdrop



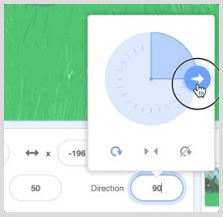
Where should you enter the troposphere?



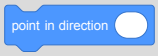
Drag your sprite to the place it should enter from and get this code block. Your numbers will vary depending on where you put it.



Rotate the sprite

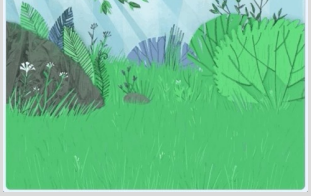


Turn your sprite so it points towards where it will land in the troposphere. Then use that angle in this code block.

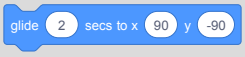


Fly into the troposphere

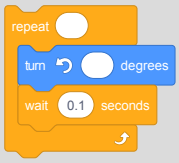




Drag your sprite to the the landing spot. Then get this block. Your numbers will be different.



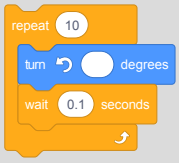
How can we animate turning to face up again?



How many times should we turn?

There are many answers to this; it depends on how fast you want to turn.

If you repeat the turn 10 times, you just need to divide the degrees you want to turn by 10.



How many degrees do you need to turn each time?

Most sprites are vertical at 90 degrees. What direction are you pointing now?

In this example, we turned to face -128 degrees. We need to turn left 142 degrees to face 90 degrees again.

You might find these formulas handy:

> *Rotate left:*
> *270 + the angle you're facing = total degrees*

e.g. 270 + (-128) = 142 degrees

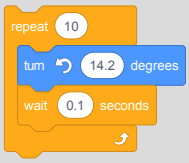
Here's another example. Your sprite is pointing in direction -60 degrees and you want to rotate to the right.

> *Rotate right:*
> *90 - the angle you're facing = total degrees*

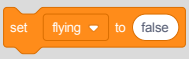
90 - (-60) = 150 degrees

Or use trial and error until you figure it out...

Example rotating code



Land



No clues left! Ask a friend?

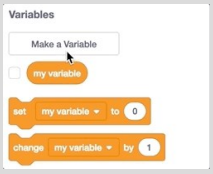
Troposphere facts

Use the information you collected in your research to teach people about this layer of the atmosphere.

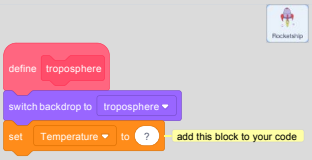


Temperature?

You can use a variable to display the average temperature in the troposphere. Make a variable and name it Temperature.



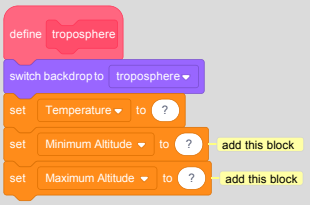
Temperature



Altitude?

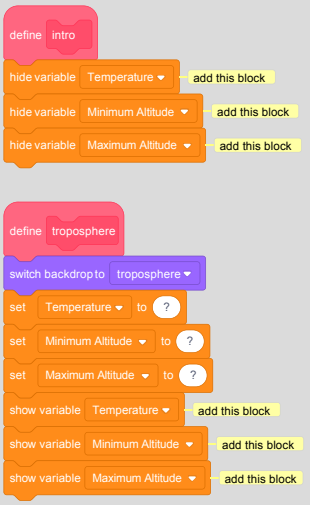
How high does the troposphere go? Make two variables and name them Minimum Altitude and Maximum Altitude.

Altitude



Showing and hiding variables

It will look nicer if we don't show the variables in the intro scene. You can hide them until you get to the troposphere.

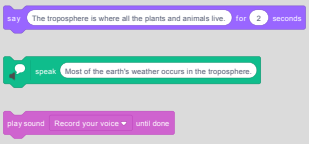


Narration

How can the narrator tell us about the troposphere? Which blocks can you use?

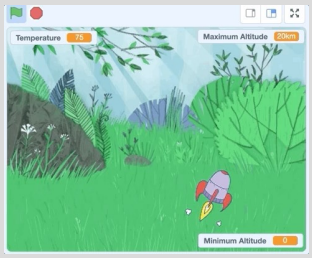
Narration

There are a lot of ways to speak in Scratch. Choose one of these:



Can you add other sprites, like an animal?

In the troposphere you might see animals.



Animate other sprites



Use the wait block to have it appear when you want it to. You can use this same technique to add sprites to other layers also.

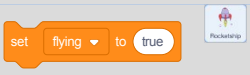
No clues left! Ask a friend?

Leaving the troposphere

It's time to move on to the stratosphere!



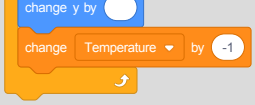
How do you restart the flying animation?



Animate the temperature dropping

You could use a glide block to fly away, but there is another way to move if you also want to animate the temperature dropping as you fly to higher altitudes.

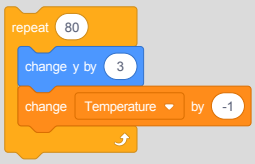




How cold is it at the top of the troposphere? How many times should you repeat this?

One solution

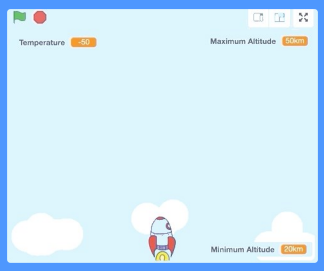
Your code might look something like this:



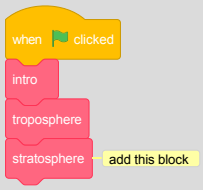
No clues left! Ask a friend?

Above the clouds in the stratosphere

It's time to move on to the stratosphere!



Make a new block

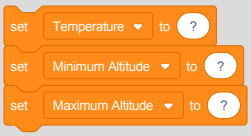


Show the next backdrop



Set temperature and altitude variables

What's it like in the stratosphere?

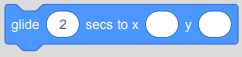


Fly into the scene

Where will you enter from?

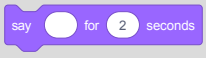


Where will you fly to?



Stratosphere facts

Tell us about the stratosphere



The temperature rises as you leave the stratosphere

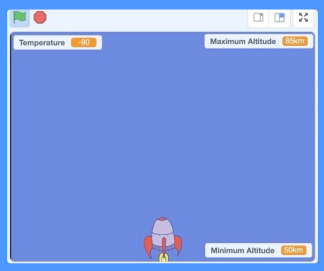
Ozone absorbs energy from the sun and makes it warmer as you go higher in the stratosphere



No clues left! Ask a friend?

Mesosphere

On to the mesosphere!



Repeat the steps for the stratosphere

1. Make a My Block
2. Set variable values
3. Fly into the scene
4. Tell us facts about this layer
5. Leave the scene

Meteors!

Cool fact about the mesosphere: Meteors that enter the atmosphere often burn up here!

Can you animate meteors flying into the stage and burning up? Try to figure it out on your own or use these clues.

Add a meteor sprite

There are many ways to do this. Here's a relatively simple one.

First, add a meteor sprite, either from the library, or paint or upload one.

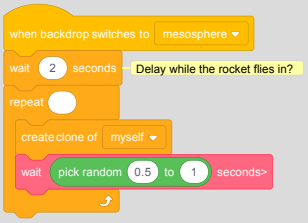
How many meteors?

Meteors often come in showers. We can use the clone block to make lots of meteors.

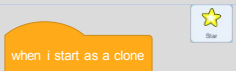
When cloning, you often want to hide the original sprite.



How many do you want to make?



How can you make the clones appear?



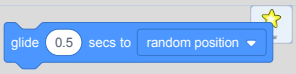


Where should they start?

It depends, but often meteor showers seem to come from just one part of the sky.



Shoot across the sky!



Disappear

Meteors usually burn up in the atmosphere, but you should also get in the habit of deleting clones when you are done with them. Scratch has a limit to how many you can add.



Burning up?

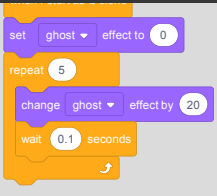
You could animate costumes to make it look like the meteors are burning up, but this looks ok too.



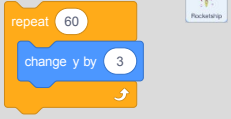
Full meteor code



Challenge Galaxy



Leaving the thermosphere



No clues left! Ask a friend?

What else?

The thermosphere, ionosphere, exosphere...



You can do it!

There are some really cool things in the outer layers of the atmosphere. Now that you know the basic steps, see if you can finish these layers on your own.

Aurora Borealis

The northern lights (or Aurora Borealis) occurs in the thermosphere. Can you make something like this in Scratch?



It's hot up there!

It can get up to 3000 degrees celsius in the thermosphere. Make sure you're safe!

Where would you find satelites?

Can you tell us about satelites and how they orbit the earth?

No clues left! Ask a friend?

Share!

Add your project to the Studio and see how other people made their projects.

Studio

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