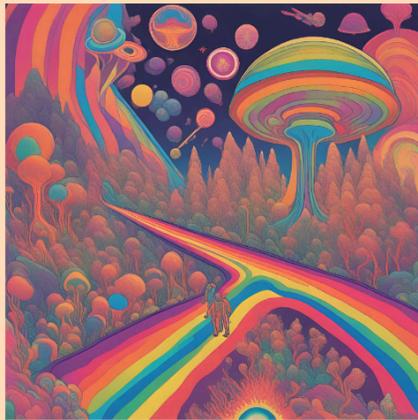
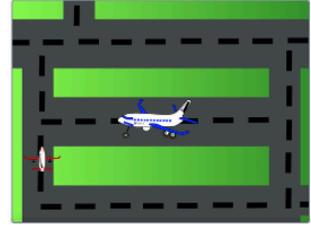


Level **1**

# CODING GUIDEBOOK AND WORKSHEET



SCRATCH



# Phases of a flight



*remix n share*

<http://bit.ly/SC2-PhasesofFlight>

<https://panchatantraprogramming.com/>



Exploration 3 - Have lots of fun as you get in a Pilot's seat and simulate all the phases of a flight - taxiing, takeoff, cruise, descent, landing

## 1. OBJECTIVE

The overall objective is to lay a foundation for coding proficiency, logical thinking, and creativity while emphasizing the practical application of coding concepts in everyday scenarios. Some of the key focus area of this exploration is:

**Simulate Flight Phases:** Enable learners to simulate the phases of a flight: taxiing, takeoff, cruise, descent, landing and translate each phase into specific movements and actions for the sprite.

**Introduction to Algorithm:** Enable learners to write a set of instructions that tells a computer exactly what to do step by step. This introduces them formally to Algorithms.

**Introduction to XY coordinates and motion:** Learn the concept of XY coordinates on the Scratch stage and understand how to specify positions using the X and Y axes.

**Costume Changes for Realism:** Understand the use of costumes to represent different states of the flight (e.g., taxi, in the air). Learn how to switch between costumes to enhance the visual representation of each phase.

**Logical thinking and problem solving:** Develop problem-solving skills by identifying and fixing any issues in the code. Learn how to troubleshoot and debug their projects for a smoother simulation.

**Promote Collaboration:** Encourage collaboration by discussing ideas and helping each other troubleshoot. Share tips and tricks for enhancing the flight simulation project.

## 2. INTRODUCTION ACTIVITY

10 mins

**Question 1: What is the initial phase of a flight where the airplane moves on the ground before taking off?**

- a) Runway Drive
- b) Taxiing
- c) Ascent
- d) Initial Drive

**Question 2: During which phase of the flight does the airplane ascend into the sky after leaving the ground?**

- a) Takeoff
- b) Cruise
- c) Elevation
- d) Taxiing

**Question 3: Which phase of the flight involves the airplane gradually descending toward the ground for landing?**

- a) Downstream
- b) Takedown
- c) Descent
- d) Downjump

### 3. INTRODUCTION

10 mins

Welcome, young aviators, to an exciting journey into the world of coding and aviation!

In this Scratch coding project, you'll embark on a thrilling adventure as you take on the role of a pilot, navigating through the various phases of a flight. From the bustling taxiing on the runway to the exhilarating takeoff, smooth cruising at altitude, gradual descent, and a precision landing, you'll have the opportunity to simulate the complete experience of being in the pilot's seat.

Get ready to explore the fascinating realm of XY coordinates, motion, and costume changes to bring your flight simulation to life. Achieve the flight simulation by utilizing Scratch's Motion Coding blocks to glide the plane across different coordinates. Enhance the experience with various costumes for your airplane Sprite, mimicking different postures to add realism to each phase of the flight.

Let your creativity soar as you learn to code and have loads of fun crafting your own interactive aviation masterpiece. Buckle up, aspiring coders, as we take off into the world of Scratch and aviation excitement!

## 4. PREREQUISITE

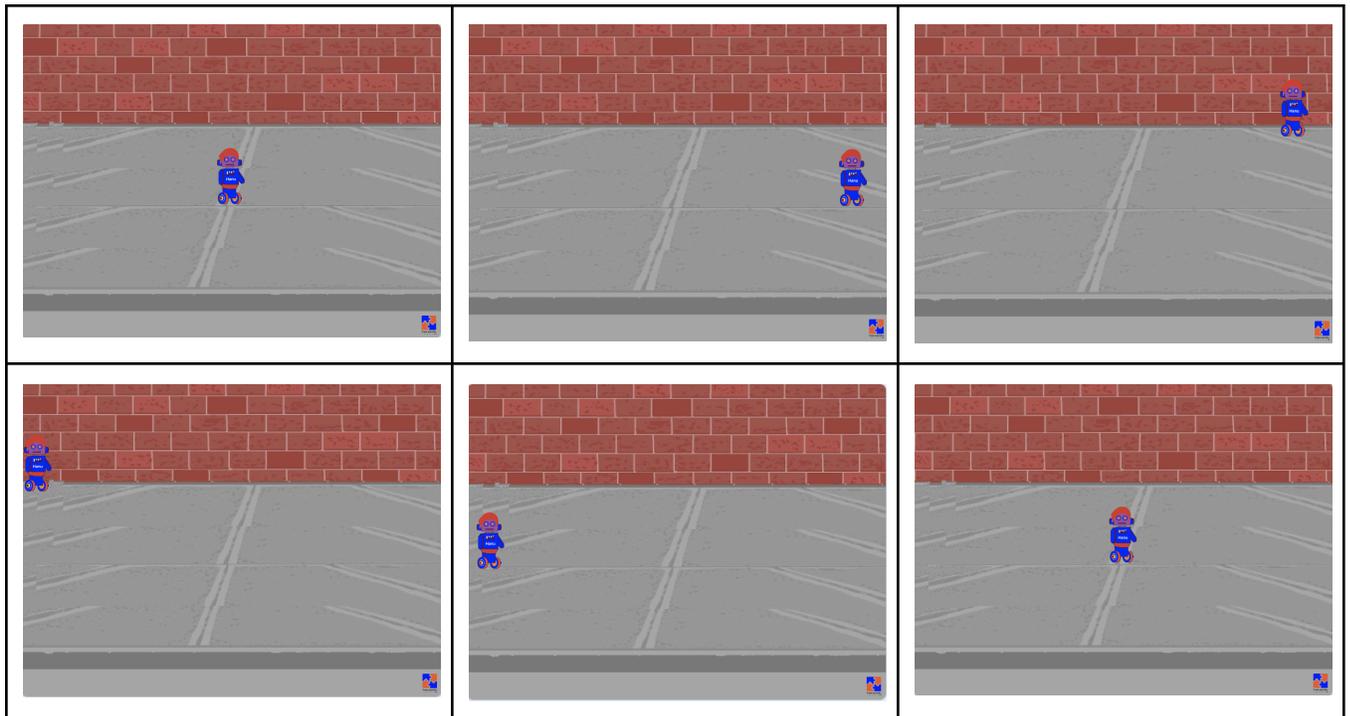
30 mins

In Scratch, as you dive into the world of coding and create interactive projects, you naturally explore a fundamental branch of mathematics known as **coordinate geometry**. Coordinate geometry involves a XY coordinate system, where points are identified by their positions along two perpendicular axes, typically labeled as the x-axis and y-axis.

Let us look at an example to understand by giving instructions to a **Robot**.

The Robo is in the center of the room of 200 X 100 Units width and you want it to

- Move 100 RIGHT
- Move 50 UP
- Move 200 LEFT
- Move 50 DOWN
- Move 100 RIGHT



The Scratch stage serves as a canvas with its own coordinate system, allowing you to precisely position and move sprites by specifying their locations using x and y coordinates. This hands-on experience with coordinates in Scratch not only enhances your coding skills but also provides a practical application of mathematical concepts.

Explore the following tutorial to discover how effortlessly you can grasp the concept of XY coordinates on the Scratch display screen.

XY Coordinates Tutorial Link - <https://youtu.be/HqPBSCNtOmk>  
Scratch Project - <https://scratch.mit.edu/projects/379018609>

## 5. GUIDING INSTRUCTIONS

90 mins

STEP 1 Open the project <https://scratch.mit.edu/projects/523065687/>  
Ensure that you login if not already to your Scratch account.

Click on the Green Button **Remix**



**This will get you your very own project.**

STEP 2 Once inside the Editor, rename your Project. You can give it a creative name.

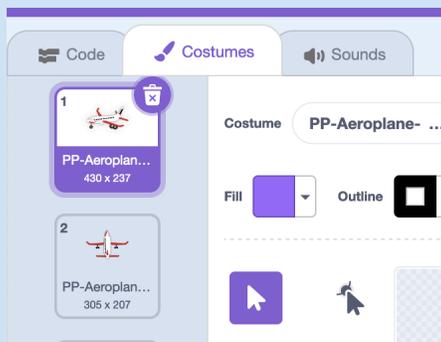
Take a minute and Think of a name.

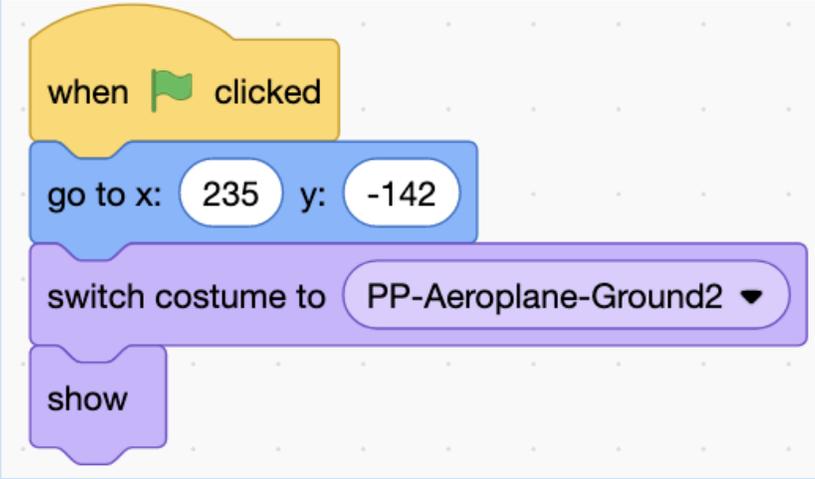
Examples:

- MyAirways - I am the pilot
- SkyQuest: A Journey Through Code and Clouds
- Flight Fantasia: Coders in the Clouds
- FlightCrafters: Code, Create, and Conquer the Skies

These are just examples. You must come up with your own creative name.

STEP 3 Inside your project editor, look at the **Sprite: PP-Aeroplane** and  
Click on **Costumes**



STEP 4	Explore the <b>PP-Aeroplane</b> Costumes and discuss the phase and the corresponding costume amongst your groups.
STEP 5	<p>Look at the Code for the <b>PP-Aeroplane</b></p>  <p>And now within your groups try to understand what does each line of the Code do.</p> <p>Locate the Coding Category where the Coding block belongs to and what does it do.</p> <p>Make changes to it and experiment for yourself.</p>
STEP 6	<p>Now watch the tutorial:</p> <p>Video Link - <a href="https://youtu.be/L7pEwFTtWDM">https://youtu.be/L7pEwFTtWDM</a></p>
STEP 7	Write down the algorithm (step by step instruction) on how will the aeroplane move from its parked state to taxi, take off, cruise, descent and land
STEP 8	Try the Glide block and understand how it works. Experiment with the code and its parameters to see what it does and how it works.
STEP 9	Now code to pilot the aeroplane following the algorithm. You can make changes to the algorithm if you feel it is not navigating your aeroplane

	<p>correctly.</p> <p>Test your project and code at every line of new code to see what it does to the project.</p>
STEP 10	Troubleshoot and make changes to the code as needed.
STEP 11	<p><b>SAVE your project</b></p>  <p>You will see the “<b>Save Now</b>” button appear on top just left to your profile name, whenever any code changes to the coding area.</p> <p>It will auto-save, but you can also try clicking on this and see that it Saves immediately.</p>
STEP 12	<p><b>SHARE YOUR PROJECT</b></p> <p>Click on the Orange Button called “<b>Share</b>” Your project is now visible to others.</p> <p>Remember, sharing is a fundamental aspect of the Scratch community ethos, encouraging collaboration, learning, and celebration of creativity.</p>

Fantastic job, young coders! You've successfully navigated the skies, coding your way through the exciting phases of a flight. From taxiing down the runway to the graceful descent and precision landing, you've mastered the art of creating a dynamic and realistic flight simulation. Your creativity has taken flight as you explored XY coordinates, motion, and costume changes to bring your pilot's seat adventure to life.

## 6. KEY CONCEPTS

30 mins

### ALGORITHM

Have you ever wondered how computers and robots know what to do? Well, it's all thanks to something super cool called "algorithms".

#### What's an Algorithm?

An algorithm is like a recipe or set of instructions that tells a computer exactly what to do step by step. Imagine you're making a potato sandwich. You follow a sequence of steps: boil and mash potatoes, spice up the mixture, butter the bread, place the mixture in between the slices and toast the sandwich. Yumm!!

In the computer world, algorithms are our magical recipes for making things happen.

You use algorithms all the time, even if you don't realize it! Think about packing your school bag. What do you do first? Second? Third? That's your algorithm for packing your school bag! Computers work the same way, following step-by-step instructions to perform tasks.

### ACTIVITY

Let's create a fun algorithm together for packing your school bag.

## EVENTS => when Green Flag clicked



What is it?	Events are like things that happen, triggering different actions or reactions. They are like the special moments or changes that make us do something, and we can choose to respond to them
Where is it?	In the coding area called " <b>Events</b> " you'll spot blocks with rounded tops. These special blocks don't snugly fit into other blocks above them. Instead, they kickstart a series of code to make things happen. All the code underneath runs one step at a time, like a story unfolding, running one step at a time, in a sequence.
Examples from the world	<p>In Scratch, the "Green Flag clicked" block is often used to initiate the start of a script or program.</p> <p>Imagine your Scratch project as a live performance on a theater stage. The moment the audience is ready, and everyone is in their seats, the curtains are closed, hiding the stage and the performers from view. This is like the initial state of your Scratch project when it's not running yet.</p> <p>When you click the green flag in Scratch, it's like the magical cue for the curtains to open in the theater. Suddenly, the stage is revealed, and the performance begins. Similarly, in Scratch, clicking the green flag triggers your code to start running, showcasing the sprites and actions you've programmed.</p>
TRY THIS OUT	What will happen if you Hide the Sprite on the Event "Green Flag clicked"?

## MOTION => goto x: \_\_ y: \_\_



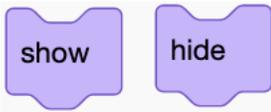
What is it?	In Scratch, the "go to x: [ ] y: [ ]" block is a fundamental command used to move a sprite to a specific location on the stage. Using this block, you can set the sprite's position to any desired point on the stage by specifying the X and Y coordinates. For example, if you want to move a sprite to the center of the stage, you would use "go to x: [0] y: [0]", as (0, 0) represents the center of the stage.
Where is it?	In the coding area called " <b>Motion</b> " you'll spot this coding block.
Examples from the world	<b>Map Navigation</b> Imagine you're using a GPS or a map app on your phone. When you input specific coordinates (latitude and longitude), the app guides you to that precise location. In coding terms, it's like telling the device to "go to" a particular set of XY coordinates on the Earth's surface. <b>Chess or Board Games:</b> In chess or other board games, each square on the board has specific coordinates. When you move a piece, you're essentially instructing it to go to a particular XY location on the board.
TRY THIS OUT	What will happen when you use <b>go to x:500 y:500?</b>

## LOOK => switch costume to “ \_\_\_\_\_ ”

switch costume to PP-Aeroplane-Flight ▼

What is it?	The "Look" category includes blocks that allow you to control the appearance of sprites on the stage. This block enable you to change costumes
Where is it?	In the coding area called " <b>Looks</b> " you'll spot this coding block.
Examples from the world	Just like humans change clothes to match different occasions, moods, or activities, sprites in Scratch can " <b>switch costumes</b> " to alter their appearance. Imagine you have a sprite representing a character in a story or a game. When the character is happy, sad, or ready for a special event, you can use the "switch costume" block to change its look, just like changing clothes to suit different situations. In addition to changing clothes, consider human gestures like sitting, standing, or waving. These gestures are like costumes for humans, influencing how we appear and interact with our surroundings. Similarly, in Scratch, sprites can switch costumes to depict different poses or states.
TRY THIS OUT	Try switching to all costumes one after another and observe what happens?

## LOOK => show/hide



What is it?	The "Look" category includes blocks that allow you to control the appearance of sprites on the stage. The "show" block is used to make a sprite visible on the stage, while the "hide" block conceals a sprite from view, ie it is not visible on the screen.
Where is it?	In the coding area called " <b>Looks</b> " you'll spot this coding block.
Examples from the world	In theater, characters enter and exit the stage based on the requirements of the scene. The characters come to the stage when needed for a particular scene and exit when their presence is no longer required. This entrance and exit of characters can be compared to the "show" and "hide" blocks in Scratch.
TRY THIS OUT	On Green Flag clicked, <ul style="list-style-type: none"><li>- Set Sprite to x: 0, y: 0</li><li>- <b>Hide</b> the Sprite</li><li>- Set Sprite to x: 100, y: 100</li><li>- Show the Sprite</li></ul> <p>Where will you find the Sprite?</p>

## MOTION => glide



What is it?	In Scratch, the "glide _ secs to x: [ ] y: [ ]" block is a motion block that allows a sprite to smoothly move from its current position to a specified destination (X, Y coordinates) over a set duration of time. This block is useful for creating controlled and fluid movement of sprites across the stage.
Where is it?	In the coding area called " <b>Motion</b> " you'll spot this coding block.
Examples from the world	<p><b>Birds:</b> Birds are masterful gliders, using their wings to navigate through the air. They take advantage of air currents and thermals to maintain flight with minimal flapping, showcasing a graceful and energy-efficient gliding motion.</p> <p><b>Airplanes:</b> Airplanes are engineered to glide through the air with controlled and steady movement. During flight, airplanes generate lift through their wings, allowing them to travel long distances. The process involves a combination of propulsion, aerodynamics, and navigation systems. Gliders, a type of unpowered aircraft, also demonstrate the concept of gliding as they descend through the air without an engine.</p> <p><b>Paper Airplanes:</b> A simple yet illustrative example is a paper airplane. When folded and launched, a paper airplane demonstrates the principles of gliding as it moves through the air, influenced by aerodynamics and gravity. Adjusting the design of the paper airplane can affect its gliding performance.</p> <p><b>Frisbees:</b> Frisbees, when thrown, demonstrate gliding behavior. The shape and aerodynamics of a Frisbee allow it to stay aloft and glide smoothly through the air. Players can control the trajectory and distance of the Frisbee by adjusting the throwing technique.</p>
TRY THIS OUT	What will happen when you use glide 10 secs to x: 100 y: 100?

## LOOKS => switch backdrop to \_\_\_\_\_



What is it?	The "Switch Backdrop To" block in Scratch is used to change the background of the stage to a specified backdrop. By selecting this block and providing the desired backdrop name, such as "Ocean" or "Room," the visual environment of the Scratch project instantly transforms, allowing you to create desired scenes in your animations, stories, or games.
Where is it?	In the coding area called " <b>Looks</b> " you'll spot this coding block.
Examples from the world	Theater Stage Changes: In a theatrical performance, backdrops on the stage change to depict different locations or times. When the scene shifts from a classroom to a home, the backdrop transforms accordingly. The "Switch Backdrop To" block mirrors this stage-setting concept.
TRY THIS OUT	What will happen when you use "switch backdrop to _" 2 different backdrops on the same " <b>when Green Flag clicked</b> " Event simultaneously?

## EVENTS => when backdrop switches to \_\_\_\_\_

when backdrop switches to TaxinRunway ▼

What is it?	The "When Backdrop Switches" block in Scratch is an event block that triggers a set of actions when the backdrop of the stage changes. It allows programmers to specify actions that should be executed in response to a particular backdrop being switched to.
Where is it?	In the coding area called " <b>Events</b> " you'll spot this coding block.
Examples from the world	Theater Stage Changes: In a theatrical performance, backdrops on the stage change to depict different location. Example when the scene shifts from a classroom to a home, the people on the stage will shift from teachers/school children to people at home. They will then act out according to the script of the drama.
TRY THIS OUT	What will happen when you use "when backdrop switches to _" a particular backdrop in all the sprites and Hide the sprite.

## 7. Resources

Scratch Project to REMIX	<a href="https://scratch.mit.edu/projects/523065687/">https://scratch.mit.edu/projects/523065687/</a>
Video Tutorial	<a href="https://youtu.be/L7pEwFTtWDM">https://youtu.be/L7pEwFTtWDM</a>
Panchatantra Programming Sprite Library	<a href="https://scratch.mit.edu/studios/25317136">https://scratch.mit.edu/studios/25317136</a>
XY Coordinates Tutorial	<a href="https://youtu.be/HqPBSCNtOmk">https://youtu.be/HqPBSCNtOmk</a>
Scratch Project on XY coordinates	<a href="https://scratch.mit.edu/projects/379018609">https://scratch.mit.edu/projects/379018609</a>

# WORKSHEET

**40 mins**

Exploration - Have lots of fun as you get in a Pilot's seat and simulate all the phases of a flight - taxiing, takeoff, cruise, descent, landing

**Name:**

**Class:**

**Date:**

1 - What is the Title/Name you have given to your project? If you want a moment to change or update it, you can do so.

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2 - Place the aeroplane in all the 4 corners of the Screen and note down the coordinates. Now draw the x-axis and y-axis here and mark the xy coordinates of the 4 corners.



4 - Try to Glide an object from one corner to another corner in 20 seconds, 15 seconds, 10 seconds, 5 seconds, 1 second, 0.5 second, 0.1 second. Write down what you observe.

5 - Try changing more backdrops when the flight is in the cruise state. Make the aeroplane go over fields, water body and cities before it starts descent. What did you learn from this?

6 - What was the most challenging aspect of creating the flight simulation project in Scratch?

## **ASSESSMENT GUIDE**

**5 mins**

Grade the students on their understanding of the concepts, coding and supporting other students. You can use the same Grading system as generally used in the school.

This can also be used as a peer activity by the children, where the children can do the assessment amongst the teams.

You can take prints of the assessment sheet below.

# ASSESSMENT

Exploration 3 - Have lots of fun as you get in a Pilot's seat and simulate all the phases of a flight - taxiing, takeoff, cruise, descent, landing

Name:

Class:

Date:

Algorithm	Clarity in logic	Coding logic	Collaboration	Worksheet
Evaluate the student's understanding of writing down step-by-step instructions.	Evaluate how well the student structures the code to achieve the intended functionality.	Consider the creativity and innovation demonstrated in coding solutions beyond basic requirements.	Evaluate communication skills, including the sharing of ideas, constructive feedback, and collaboration on coding tasks.	Assess the completion and accuracy of any accompanying worksheets or documentation.

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