CANADA LEARNING CODE

Canada Takes Flight

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Duration: 120 minutes

LEVEL	SUBJECTS	PROVINCES / TERRITORIES	TOOL
Grades 4 - 6	Science and Technology Social Sciences	Across Canada	Scratch

Overview

In this lesson learners will create a game that tells the story of Bill Boeing and Eddie Hubbard's first international flight to deliver mail from Seattle to Vancouver, Canada. Learners will explore several Scratch techniques as they reflect on the history of flight technologies in Canada.

Prep Work

- Review the completed version of the project: http://bit.ly/canada-takes-flight-example
- Watch Video about Bill Boeing and how a little Seattle company began to change the aeroplane industry through their innovations.
- Review the four forces of flight: lift, weight,

Key Coding Concepts

- Algorithms
- Conditional Statements
- Events
- Loops
- Parallel Execution
- Random Numbers
- Sequences
- Variables

Curricular Connections

The use of flight technologies has substantial effects on both society and the environment. In order to understand the principles of flight, learners must first

drag, and thrust.

- Print the solution sheet: http://bit.ly/canada-takes-flight-solution

Lesson

Introduction

From canvas and wood to materials for space, Boeing has continued to invent and engineer ways to extend human abilities. Programming, engineering, and mechanics are all ways that we can extend our abilities and make the impossible possible.

The first international airmail was delivered by Boeing in a flight from Seattle to Canada in May 1919. Throughout the 1920s Boeing played a significant role in expanding the airline industry through developing multiple airplane models including fighter planes, transports, and more. After a hundred years of flight Boeing continues to innovate the aerospace industry. Boeing is now looking towards the sky to take people not only all across planet Earth but maybe to new planets as well!

Discover more at Boeing's History Page

learn about the properties of air that make flight possible.

Assess the benefits and costs of aviation technology for society and the environment, taking different social and economic perspectives into account

Use a variety of forms (e.g., oral, written, graphic, multimedia) to communicate with different audiences and for a variety of purposes

References

History of Boeing in Canada: http://aerospacelegacyfoundation.com/boeing-100-years/

Code Along

- Open up a new Scratch project at scratch.mit.edu and click on “create” (top, left corner).
- Point out the main elements: Stage, Sprites, and Scripts. Demonstrate how to drag and connect blocks.
- Give learners a few minutes to click on blocks and explore.
- Go through 1-2 challenges with the group, where learners are tasked with trying to make something happen in Scratch. For example, “Try to make Scratch move” or “Try to make Scratch say something when the space key is pressed” (See the Code-Along Challenges doc (http://bit.ly/scratch-challenge-solutions-doc) for more examples and solutions)

Activity

In this game you’ll be on board with William Boeing and Eddie Hubbard on the flight to deliver the first international airmail.

Show the example project so learners know what they are working towards. Ask them what they see/hear - what is happening in this project?

Open the starter project (http://bit.ly/canada-takes-flight-starter) and review the Sprites and backgrounds.
Have learners open the starter project on their screens and click "REMIX."

Use the Solution Sheet to Guide learners through the following steps

- Make the Plane Move
- Adding Other Directions
- Collecting Mail
- Wind/Gravity Effect
- Flying to Seattle

- Win Condition

Now you're ready for takeoff! Give the game a whirl.

Assessment

Learning Outcomes

I can create algorithms in Scratch

I can use conditionals to control what happens in my project

I can use loops to make things happen more than once

I can use events to control when things happen in my project

Success Criteria

I remixed the starter project and renamed it with my first name.

My sprite moves in all four directions (up, down, right, left).

I can control my game using keys on my keyboard.

I used broadcast messages to communicate between elements in my game.

My game has a Win condition.

Assessment Ideas

Use Comments in Scratch for learners to explain their steps (right click > add comment).

Have learners use their attached 'flight log' sheet to document their findings.

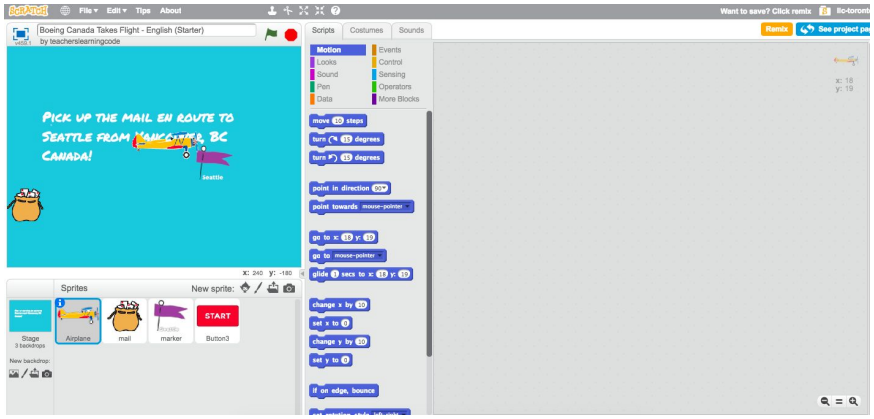
Extensions

- Can learners find a way to keep score within their game?
- Use the backdrops tab to draw a map of your neighbourhood and set it as the background for a new level
- Have learners create a success screen that describes this historic flight.
- Identify how the four forces of flight are incorporated within our code (weight, lift, thrust, drag).

Canada Takes Flight

STEP 1: Open the Starter Project

1. Sign in to Scratch
2. Open the starter project: http://bit.ly/canada-takes-flight-starter
3. Remix the project & change the project name



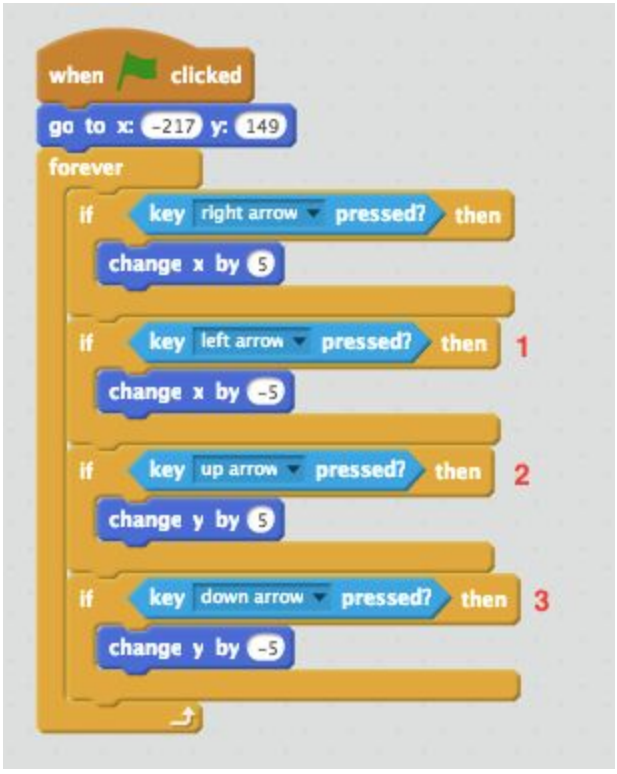
*Starter project has 3 backdrops, 4 sprites, and starter code for the bouncing ball

STEP 2: Make the Plane Move

1. **Explain how the X,Y axis works (Stretch & Scuttle!)** http://teacherslearningcode.com/en/lessons/stretch-and-scuttle
2. Make the plane move right (along x axis)
3. Make this happen when the green flag is clicked
4. Make this happen forever
5. Make this happen if the right arrow key is pressed

STEP 3: Adding Other Directions

1. Duplicate the IF statement - make the plane move left if the left arrow key is pressed
2. Duplicate again - make the plan move up (along the y axis) if the up arrow key is pressed
3. Duplicate one last time - make the plan move down if the down arrow key is pressed
4. Make the plane go back to the top by adding 'go to x,y' (move the plane to the starting point, then drag the block over)



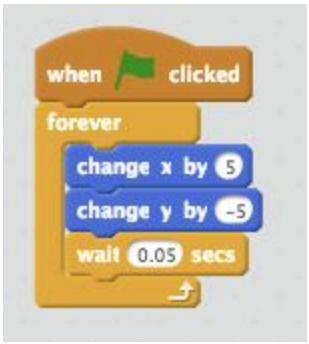
STEP 4: Collecting Mail

1. Create a new broadcast message called "mail" to communicate with the mail sprite
2. Make the plane broadcast this message if touching the mail
3. Put this in the forever loop so the program always checks if they are touching
4. Play a sound before broadcasting

1. Select the mail sprite
2. Make it go to a random position
3. Make this happen when it receives “mail”

STEP 5: Wind/Gravity Effect

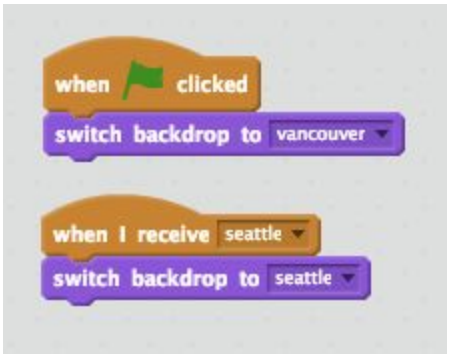
1. Select the plane sprite
2. Make the plane look like it’s falling - make it move down (y axis)
3. Make the plane look like it’s flying forwards - make it move to the right (x axis)
4. Make this happen forever, when the green flag is clicked
5. Make it wait for a short amount of time before looping (to add a choppy effect)



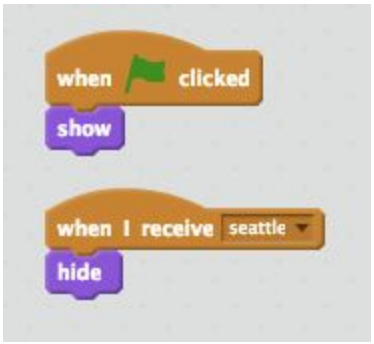
STEP 6: Flying to Seattle

1. Make a new broadcast message called “seattle” to communicate with the other sprites, and tell them when to switch to the next screen
2. Make the plane broadcast this message when it is touching the dark green colour on the right edge
3. Be sure to click on the colour square and then select the dark green by clicking on that area of the backdrop in the stage (the mouse pointed will look like a glove until you select a colour)

1. Select the Stage
2. Make the backdrop switch to seattle when it receives the “seattle” message
3. Make the backdrop switch back to vancouver when the green flag is clicked

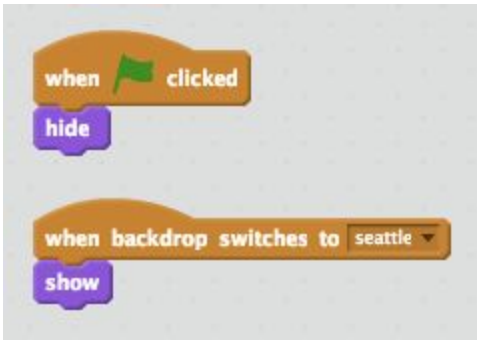


1. Make the mail sprite hide when seattle is broadcast
2. Make the mail show again when the green flag is clicked

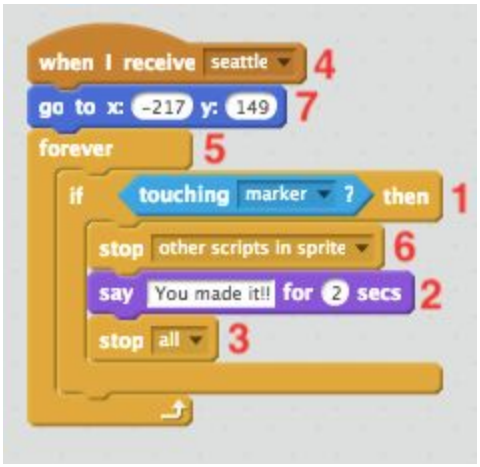


STEP 7: Win Condition

1. Select the marker sprite
2. Make the marker show when it receives the “seattle” message
3. Make the marker hide again when the green flag is clicked



1. Select the airplane
2. If the plane is touching the marker, make it do something
   E.g. say “You made it!”
3. Then, make it stop all of the scripts (end the game)
4. Make this happen when the plane receives “seattle”
5. Add a forever loop, so the program always checks for this
   (Test it out!)
6. To make the plane stop doing everything else (besides this script) add a “stop other scripts in sprite” before the ‘say’ block
7. Make the plane reset to the top using “go to x,y”

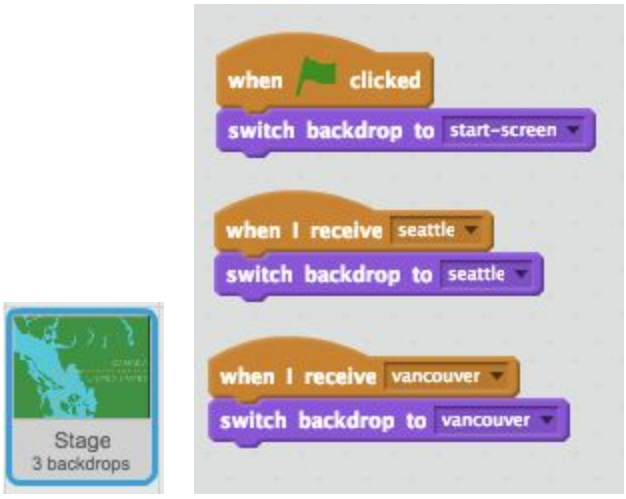


ADD-ON: Opening Screen

1. Select the Start button
2. Make the button show when the green flag is clicked
3. Make the button hide when it is clicked
4. Make it broadcast a new message called 'vancouver' before hiding

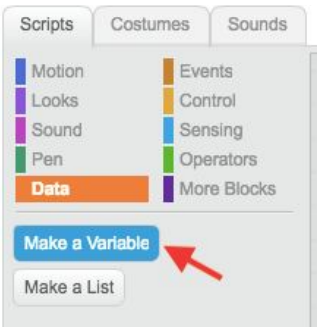
1. Make the game wait until the button is clicked to start (instead of the green flag): Replace all of the existing "when green flag clicked" scripts with "when I receive vancouver" scripts for the airplane and mail
2. Make the airplane hide when the green flag is clicked, then show when it receives the 'vancouver' message
3. Make the mail hide when the green flag is clicked

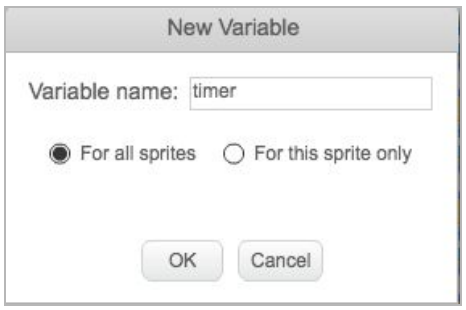
1. Select the Stage
2. Make the game begin with the 'start-screen' backdrop
3. Make it switch to the Vancouver backdrop when it receives 'vancouver'

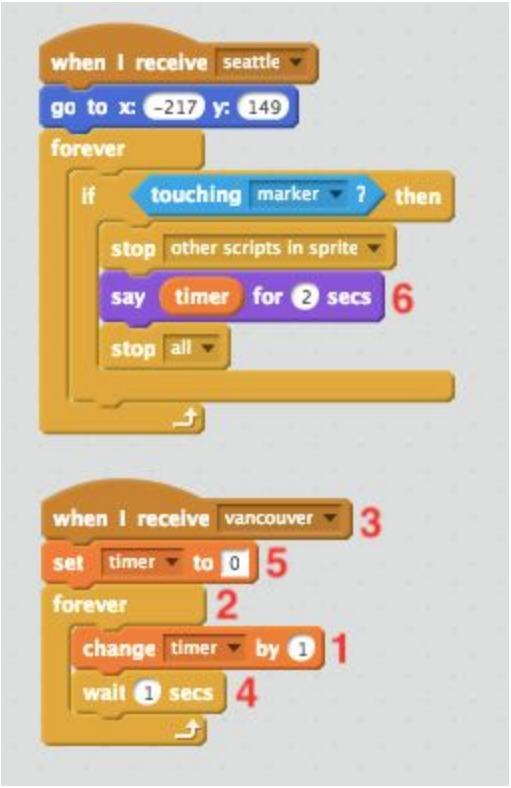


ADD-ON: Timer

1. Make a new variable called 'timer'
2. Make the timer increase by 1
3. Make this happen forever, once 'vancouver' has been received
4. Make the timer wait 1 second before increasing
5. Make the timer reset to 0 when vancouver is received (aka button is clicked)
6. Make the airplane say the time when it reaches the marker







Additional Extension Ideas

- Edit the plane sprite costume or replace it with another sprite to change the story
- Use variables to keep track of the score (e.g. amount of mail collected)
- Use maps to draw a map of your neighbourhood and the looks block 'broadcast' to create new levels!
- Have students create a success screen that describes this historic flight.

See extended example for possible solutions: https://scratch.mit.edu/projects/160217740/