Science Odyssey Lesson Plan: Drawing Logos with Scratch

General Workshop Design

- **Duration**
  - 2 hours

- **Target audience:**
  - Children ages 7-12
  - Volunteers: no prior experience volunteering with KCJ required

- **Programming knowledge**
  - **Instructor:** Scratch programmer with some experience using Scratch as a drawing tool.
  - **Children:** no prior experience with programming or Scratch
  - **Volunteers:** Completed Scratch drawing challenges (erase, reset, circle, square, square spirograph, triangle) prior to the event in order to familiarize themselves with the blocks and concepts being shown.

- **Objectives**
  - Learning basic programming concepts (abstraction, sequencing and repetition) through fun: at the end of the workshop, participant will have a small program to share with friends & family.

  - Instructor's objective: smiles at the end from all the children who should all feel like they have accomplished something fun and interesting (regardless of the complexity of the project they have managed to achieve)

- **Sequence:**
  - Instructor facilitates small drawing challenges using pen, motion, repetition and event blocks. These novice challenges build an understanding of two important concepts in computer programming, sequencing and repetition. Each challenge is followed by a brief discussion. This format encourages experimentation and reflection, and builds confidence in the learning process.

Drawing Logos

Topic: Create a short project inspired by Canadian logos that use geometric designs.

Objective: After completing an introduction to drawing in Scratch, kids will be asked to imagine their own logos for 2067 and start a drawing project that they may complete in the workshop or continue at home.

Pre-requisites: Access to the internet/web.

Duration: 2h – breakdown

- **15-20 min** setup, warm up discussion, and introduction to Scratch
- **30 min** learning about Scratch as a drawing tool. Instructor facilitates various small challenges.
- **10-15 min** looking at three logos drawn in Scratch, Olympic rings, Canadian Maple Leaf '67, and Expo '67
- **45 minutes** free practice:
  The participants continue working on their projects with the help of the instructor and volunteers, using what they have learned in the first section.

Drawing Challenges https://scratch.mit.edu/projects/158712432/#editor

Inspirational Logos https://scratch.mit.edu/projects/157303044/#editor

Setup and Configuration [10 min]
- Participants arrive and setup their computers with the help of the volunteers
- Display the following information on screen:
    1. **WiFi:** how to log in
    2. Go to website: https://scratch.mit.edu/
    3. **Setup an account**
        - "Join Scratch"
        - Username / password: write them down

Warm Up and Discussion [10 min]
The Instructor will look at a selection of logos (e.g. the Olympics logo, the centennial or CANADA 150 logos, or any iconic logo with geometric shapes or patterns) and initiate a brief discussion about logos, why we have them, what purpose they serve. It is worth pointing out that logos use a computational thinking concept called "abstraction."

We can use simple shapes to express things that in real life have a lot more detail (like when we use stick figures to represent people.) We can also use simple shapes to create a symbol that becomes associated with a thing, a country, a brand, an event.

Guided Session [60 min]

Scratch Basic Environment [5 min]

- Introduce the following basic elements of the Scratch screen
- o **Changing the Language** (if required)
- o **Title of the project**: we always want to give it a name
- o **Duplicate, delete, shrink and grow icons** (scissors, grow, shrink at top of screen)
- o **Different sections of the screen**
  - **Stage**: where the action happens
  - **Sprite**: the characters that are part of the program
  - **Script**: where the code is written

- **DO** use the mouse pointer to show the various sections
- **AVOID** showing every detail on screen (as the session progresses, introduce new things one at a time)

Scratch as a Drawing Tool [5 min]

- Choose a sprite that can be used as a "pen."
- Shrink it so it won't block the drawing. Use the shrink feature on upper toolbar.
- Select a **pen down** block and click it. Once this is clicked, any motion block now used will leave a trace.
- Select **move 10 block** What happens? It's a 10px line. Not very long! Continue clicking to see it get longer.
- Connect a **change direction 15** to the **move 10** block. What happens? The line curves and if we continue clicking it will become a circle. Allow kids a few minutes to take out these three blocks and experiment.

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- Select a **repeat 10** block to demonstrate the curve 10 repetitions will produce. In the first challenge we will see how many repetitions it takes to produce a circle using the **change direction 15** to the **move 10** block.

BUT FIRST:

## Create a Clear and Reset Command [5 min]

- To help with their experimentation will create an eraser that will also reset the sprite to the center of the stage. This is a SEQUENCE challenge.
- In the script area, instructor will arrange four blocks, unattached and in no particular order and ask kids to arrange them in the correct order (This can be done on their own, or instructor can take instructions from the kids and see what their suggested arrangement produces.) NOTE: very important that the **pen down** block is actively down, which is the case as long as it's been pressed once. DO NOT introduce **pen up** block until later.
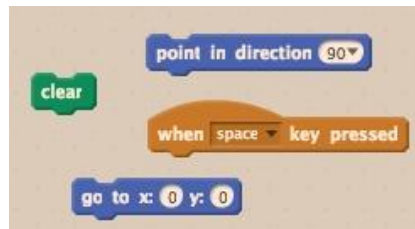
- The wrong sequence will clear, but then draws a line between the last position and the centre position that the sprite is sent to.

- The correct sequence. Whatever line is drawn happens very fast, no one sees it by the time it is cleared!

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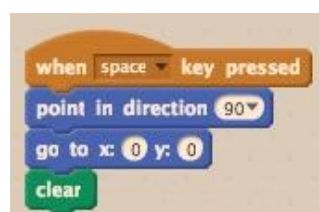
- Important observation: **Event** blocks are always placed first. They run the program.
- X, y coordinates are set for center of the stage. Y is vertical, X is horizontal. You can see the coordinates change if we drag Scratch around the stage with the mouse.
- We keep Sprite at right angle, otherwise we'll be starting our drawings from whatever direction sprite ended up in for previous try.

Draw a Circle [10 min]

- With a correct clear and reset sequence we can start experimenting for a REPETITION challenge to find out how many repetitions it takes to complete a circle using the **move 10** and **turn 15** degree blocks. Kids should be allowed to do this on their own. They may arrive at different strategies.
- Once complete, ask kids to talk about the various strategies they used for finding the answer. (e.g. guessing, putting two repetition 10 units together and then guessing remainder, figuring it out mathematically, etc.)

Draw a Square, then put it inside a circle   [5 min]

- Ask kids to choose which blocks they think would work for a square, and how many repetitions. This can be done quickly by having kids instruct the instructor.
- Now the fun part. Let's put our square inside a circle.
- To the square algorithm (outside the repetition block) connect a **turn 15** degrees block (important that this is in the **OPPOSITE** direction)
- Select another repetition block, set it to 24 and wrap it around the stack. This will produce a super cool spirograph pattern!
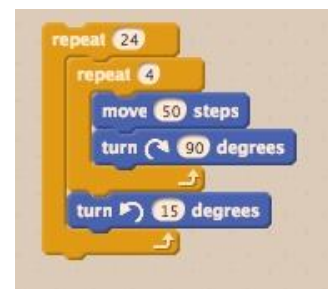
Experiment and Improvise with Other Pen Blocks [10- 15 min]

- Give kids a few suggestions for how they might want to modify these using the `pen` blocks (e.g. `change colour` by 10 degrees, `set colour`, `set line` width.) Encourage kids to play and discover tinkering with these algorithms and the other pen blocks. Advise that they formalize algorithm with `event` blocks so that programs can be run by others.

10 MINUTE BREAK

Draw a Triangle [5 min]

Kids instruct the instructor in number of repetitions and degree. It should be no surprise that the triangle is **3 repetitions**, but it is important to note that 120 degree change in direction (not 60 degrees!). Scratch draws **exterior** angles, not **interior.**

Look at How Scratch is Used to Create Logos we Looked at Earlier [10 min]

Look at algorithms for the Olympic rings, expo 67 and maple leaf (we have a <u>project set up with these</u>. We will give the project # to kids so they can remix them.) Kids spend the remaining time creating their own logos, or tinkering with these ones.

Tinkering and Creation Time [40-50min]