Music Blocks Lesson Plan
The Heap

Age:

7-12 years

Lesson duration:

90 minutes

- Introduction: Piling on (15m)
- Part 1: Record and Playback exercise (15m)
- Break (5m)
- Part 2: Composing with the Heap (15m)
- Performance/Critique (10m)

Number of students:

Up to 10.

Rationale:

Students will learn about the concept of a heap. Then they'll use the heap to record and playback interactive music. Finally, they will use observational and compositional skills to explore the heap in exploring additional musical concepts.

Objectives:

Students will understand what is meant by a heap in computation and how it can be used in music. Students will be able to utilize heaps in programming and in composition.

LESSON

Introduction:

Begin by asking students to sit in a circle and explain that in today's lesson they are going to learn about heaps.

Start with a single sheet of paper. Ask a student to write a number on the paper and place it in the center of the circle. Continue adding paper, creating a pile, until each student has added at least two sheets of paper (with numbers) to the pile.

Explain that in Music Blocks, the pile is called a “heap”.
When you add to the heap you are “pushing”.

Ask the students what number is on the sheet of paper at the top of the heap?
Is the top the first or last number that was added?
Ask a student to take the top sheet of paper off of the heap. This is called “popping”.
What is the number on the sheet?
What is the number on the top of the heap?

Discuss “first in/last out” (FILO) and “first in/first out” (FIFO). Which best describes the heap? Why?

Part 1:

A. The Push Block/The Pop Block

1. Ask the students to drag the Push Block from the Heap Palette. (They’ll need to be in “Advanced Mode” to access the Heap Palette.)
2. Have them guess as to what it might do.
3. Have them use the Push Block inside of a Repeat Block. Also include a Show Heap Block.
4. What happens to the heap?
5. In a second Repeat Block, use a Pop Block. Again include a Show Heap Block.
6. What happens to the heap?

B. Record/Playback Graphics

1. In the first Repeat Block, use two Push Blocks: one for pushing Cursor Y and one for pushing Cursor X.
2. In the second Repeat Block, use two Pop Blocks as arguments to a SetXY block.
3. Set both Repeat Blocks to repeat 100 times.
4. What happens?
5. What happens if you swap Cursor X and Cursor Y?
6. Explore with the Reverse Heap Block between the two repeat blocks? Recall the discussion of FILO and FIFO.

Break

Part 2

A. Record/Playback Music

1. Use a Random Block to push notes onto the heap.

2. Play back the composition using Pop Blocks.

B. Heap Length and Index Heap

1. Use the Heap Length Block in the second repeat loop.
2. What does it do?
3. Instead of using Pop, try using Index Heap. You'll want to use a box to increment (or decrement) the index number.
4. Use Index Heap to play back your composition multiple times. Try different transpositions each time.

Performance/Critique:

1. Have each student perform their composition.
2. Engage in a discussion about heaps: how else could you use them?

Extras:

- Experiment with Save Heap and Load Heap.

Key events:

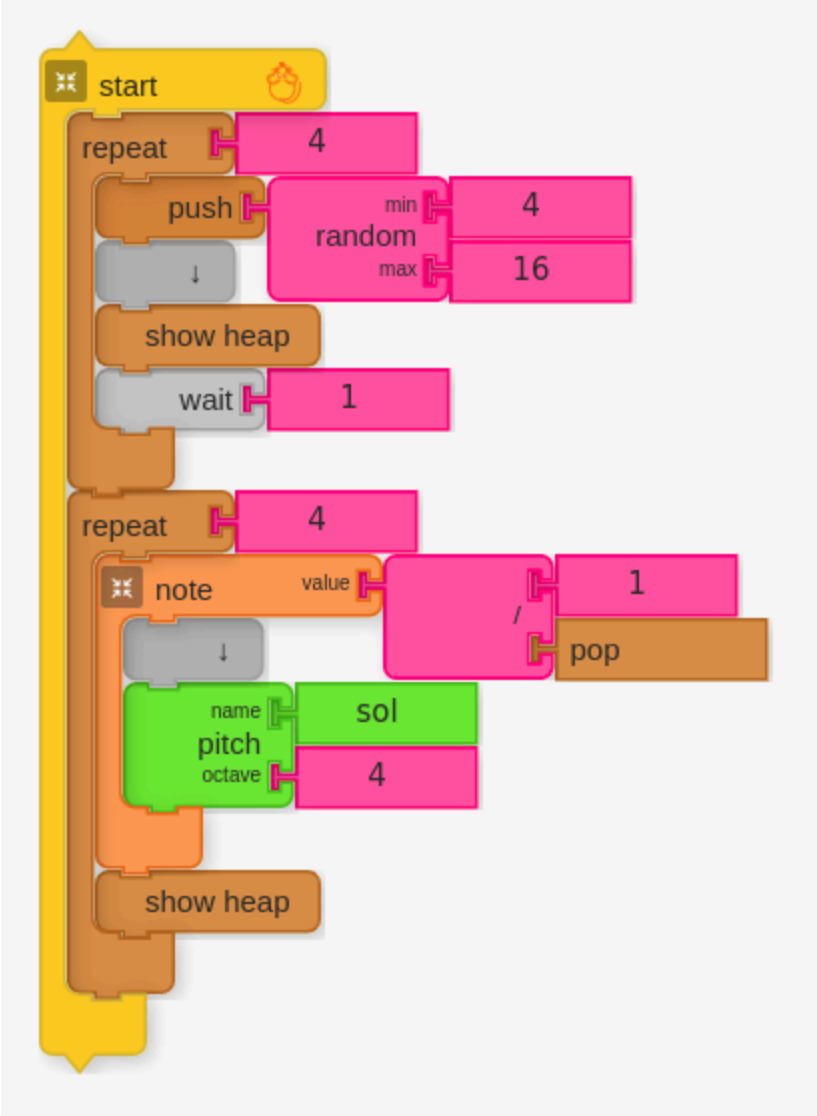
- Introduction of key concept: heap/push/pop/index
- The students create their own programs using arrays.

Materials:

- Music Blocks software
- 10+ sheets of paper

Assessment:

- Observe participation.
- Do the compositions include creative use of heaps?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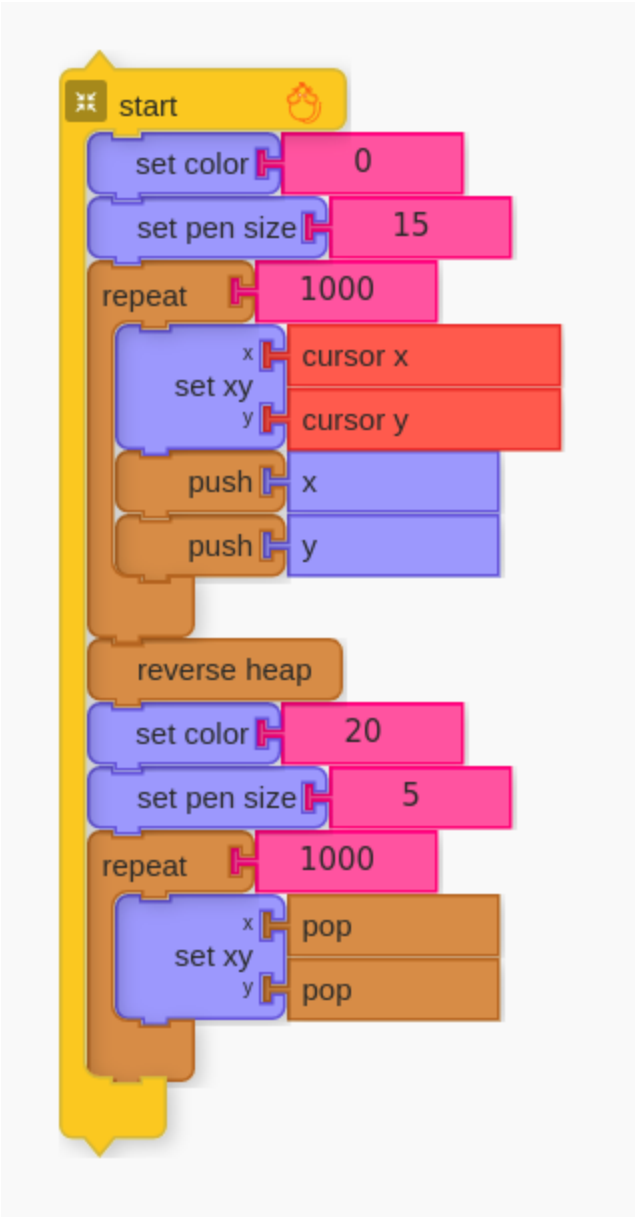
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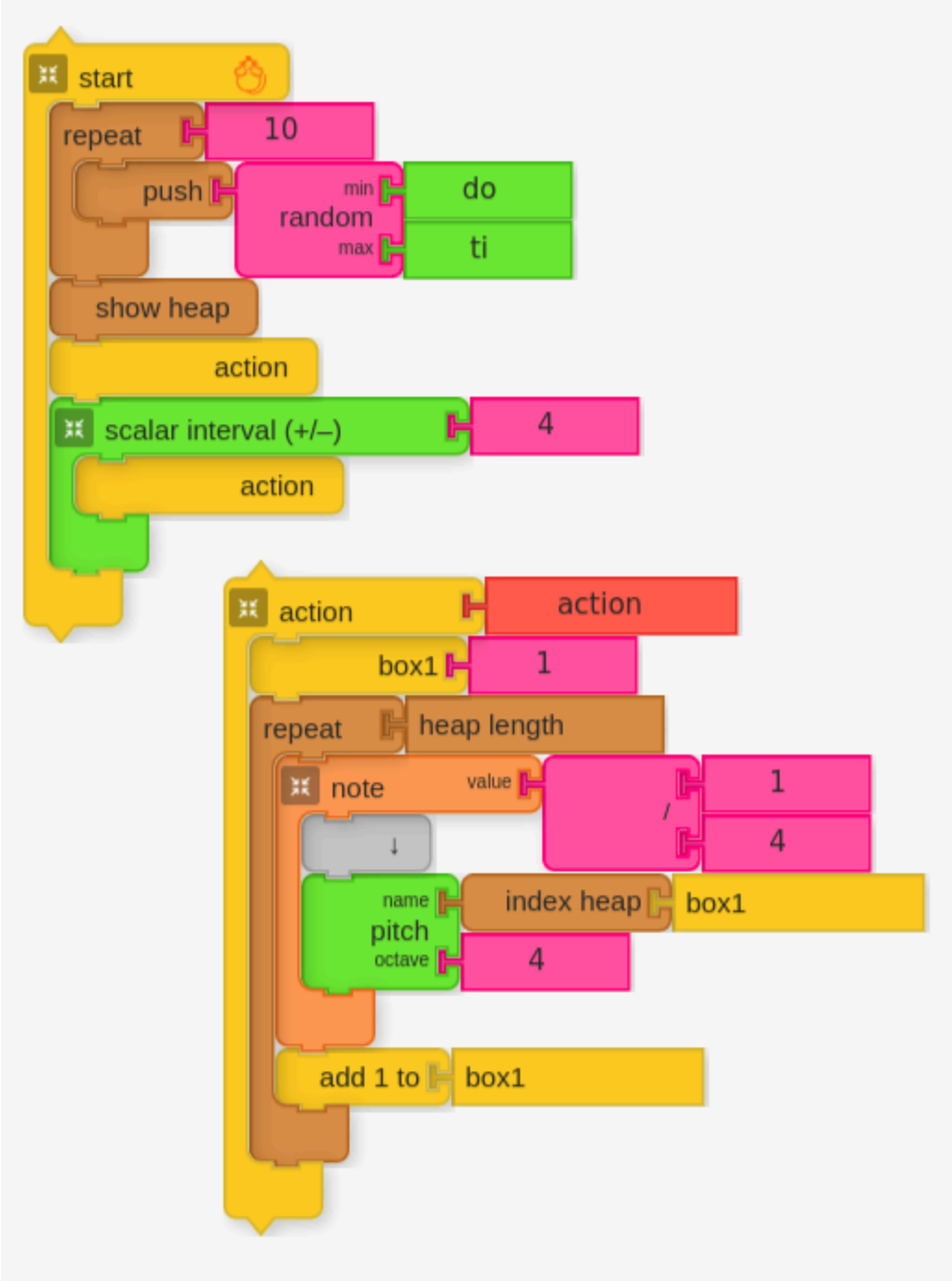
set pen size
5
repeat
1000
x
set xy
y
pop
pop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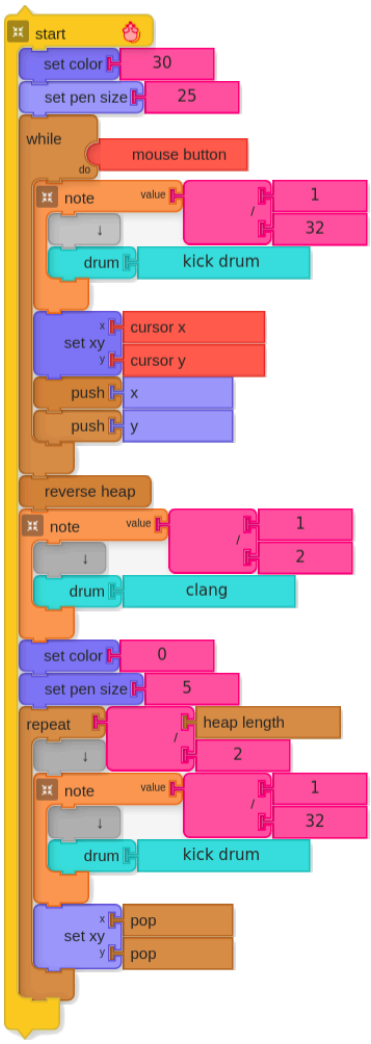
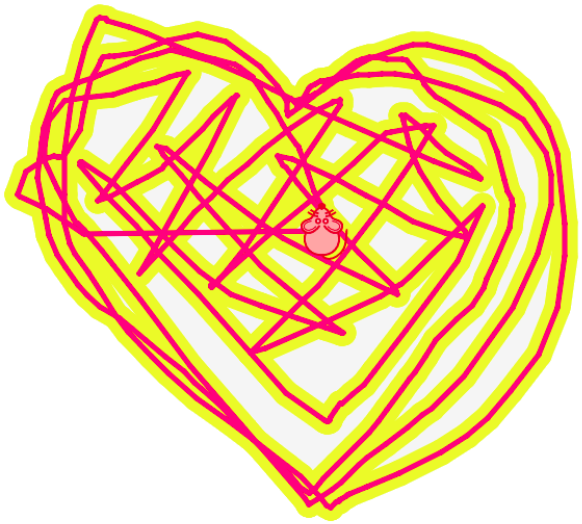
show heap
action
scalar interval (+/–)
4
action
action
action
box1
1
repeat
heap length
note
value
/
1
4
↓
name
pitch
octave
index heap
box1
4
add 1 to
box1





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