Music Blocks Lesson Plan
Oscilloscope

Age:

7-12 years

Lesson duration:

60 minutes

- Introduction: What is an oscilloscope? (15m)
- Part 1: Exploring different instruments (15m)
- Break (5m)
- Part 2: Exploring different notes (20m)
- Discussion (5m)

Number of students:

Up to 10.

Rationale:

Students will explore the Oscilloscope Widget in order to get insight into the relationship between frequency and pitch.

Objectives:

Students will understand the connection between waves and sound, as well as the different waveforms (sine, triangle, sine, etc..

LESSON

Introduction:

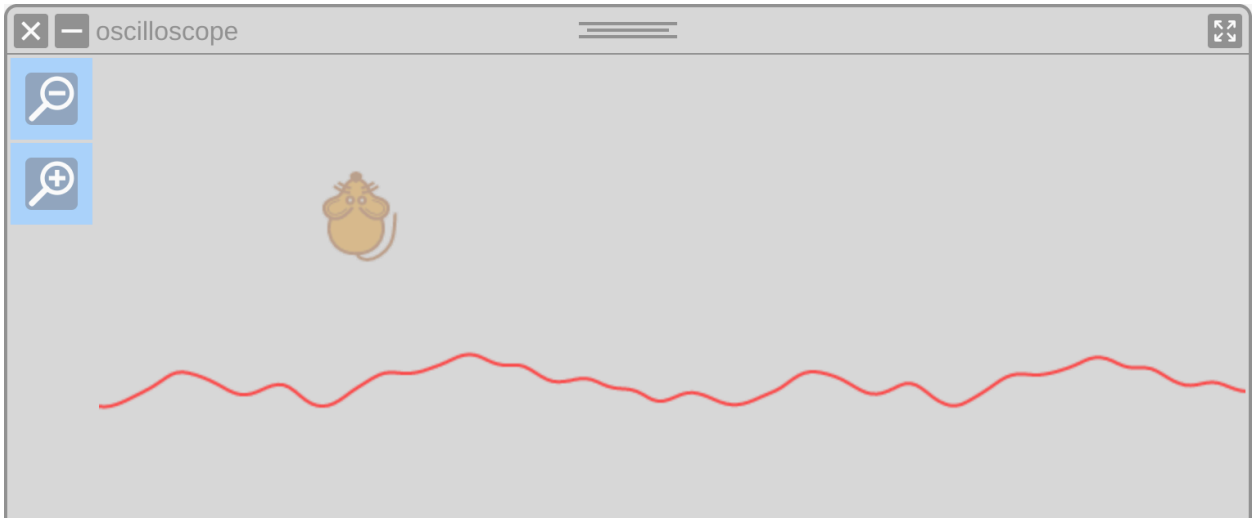
Begin by asking students to sit in a circle and explain that in today's lesson they are going to use the Oscilloscope Widget.

Begin by discussing waves. Where have you seen a wave? Can you describe a wave? Does it have peaks and troughs? Does it move? Is it symmetric? Does it have texture? How else are waves similar or different? Where does a wave come from? Where else might there be waves?

Sound travels in waves through the air. How can we see them?

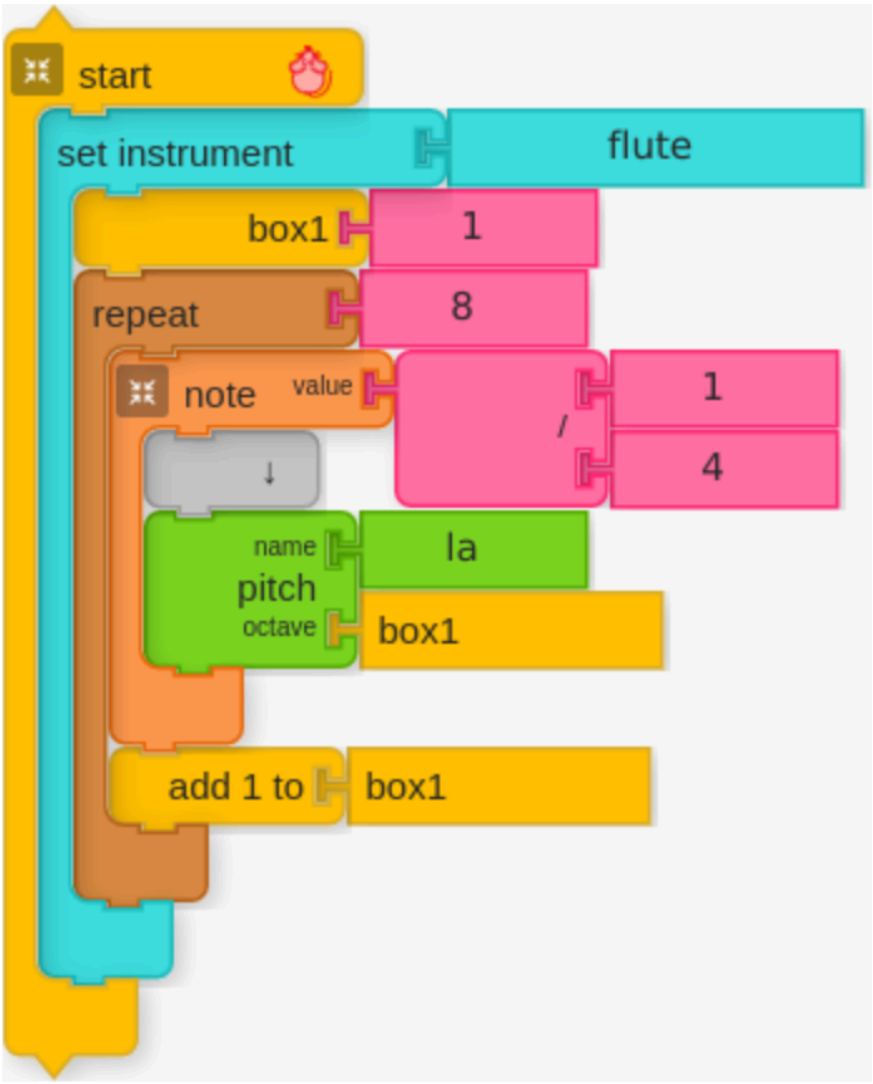
An oscilloscope is a device that displays a two-dimensional plot of one or more signals as a function of time.

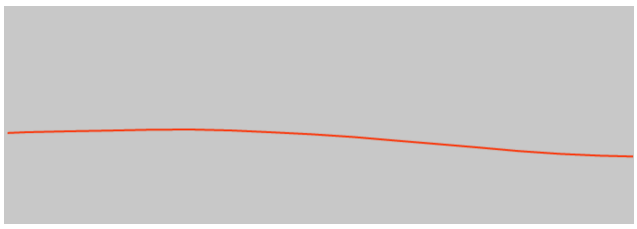
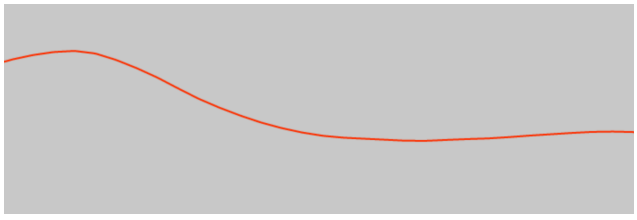
The Oscilloscope Widget shows time on the horizontal axis and amplitude of the wave on the vertical axis.

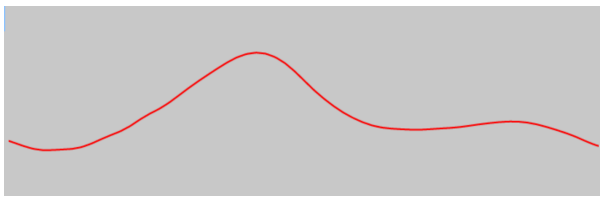
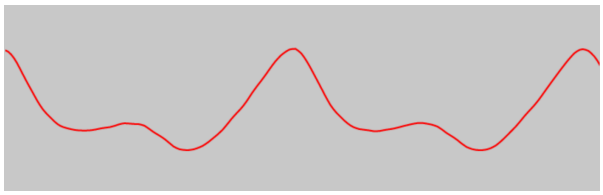
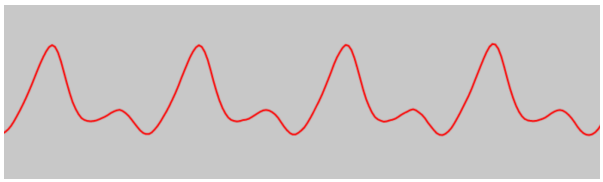
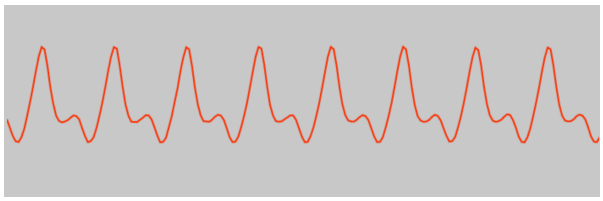
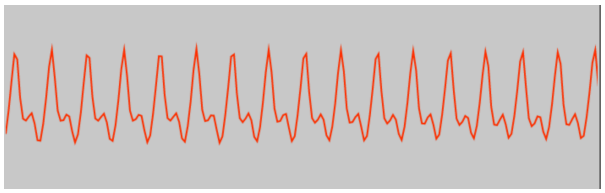
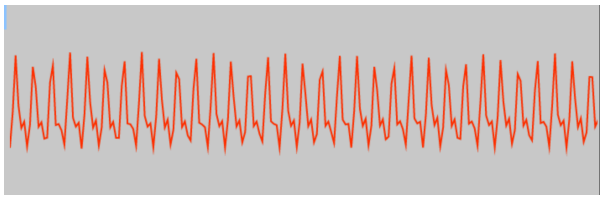


Part 1:

When you increase pitch by octave, the frequency doubles.



Note	Oscilloscope image
A Octave 1 55Hz	
A Octave 2 110Hz	

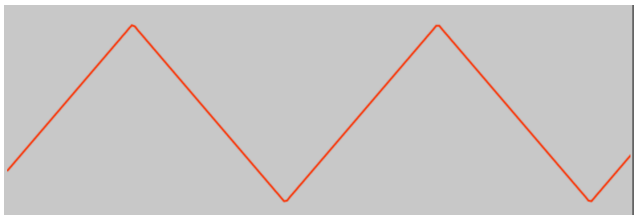
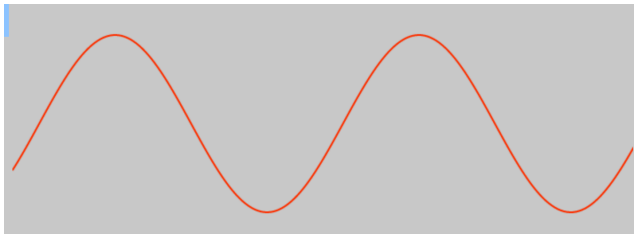
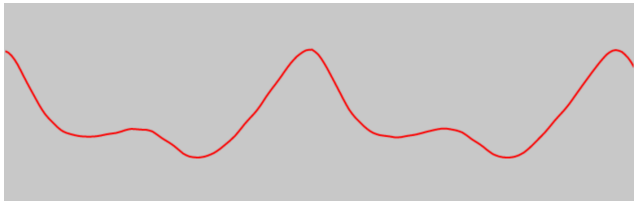
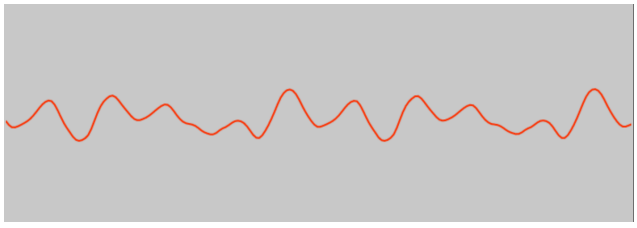
A Octave 3 220Hz	
A Octave 4 440Hz	
A Octave 5 880Hz	
A Octave 6 1760Hz	
A Octave 7 3520Hz	
A Octave 8 7040Hz	

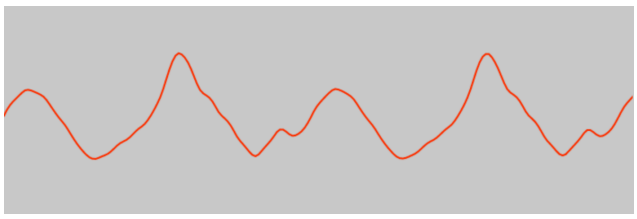
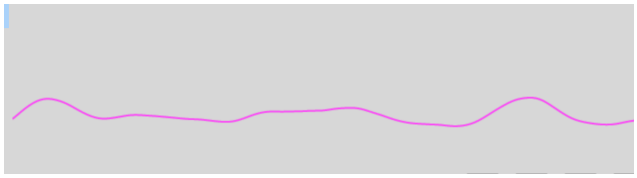
How does the shape of the waveform change as the octave changes?
Can you guess the octave based on the shape of the plot?

Part 2

Variations of A in Octave 4 -- 440Hz

Different instruments (and synths) create waves of different shapes.

Instrument	**Oscilloscope image**
square wave	
triangle wave	
sine wave	
flute	
violin	

saxophone	
dog	

Can you tell which instrument is playing based on the shape of the plot?

Performance/Critique:

1. Have each student explore some musical ideas while the Oscilloscope Widget is opened.
2. Engage in a discussion about what they see. How is a flute different from a violin? Are string instruments similar? What about drums? And of course, check out the “duck” synth.
3. How else can we represent the “shape” of the sounds we hear?

Key events:

- Introduction of key concepts: the oscilloscope, plotting amplitude over time

Materials:

- Music Blocks software

Assessment:

- Observe participation.
- Are the students able to distinguish between different pitches and timbres by looking at the waveform?