Music Blocks Lesson Plan
Circles

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..

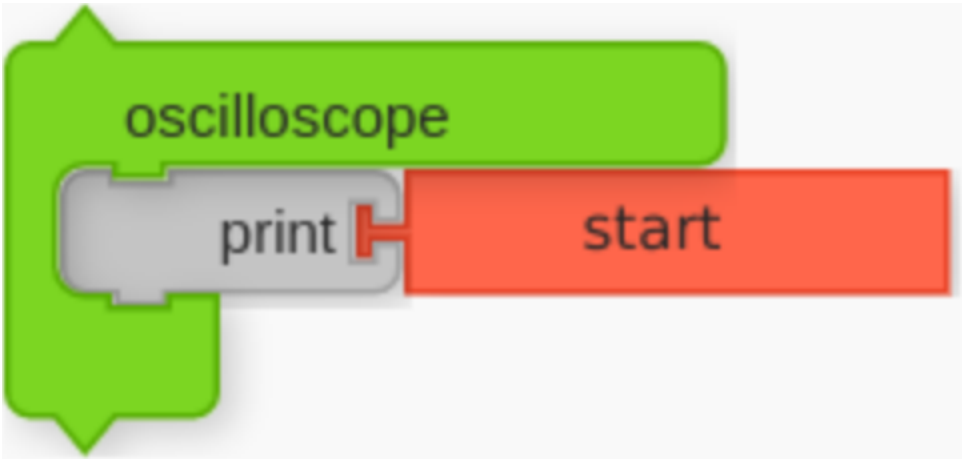
LESSON

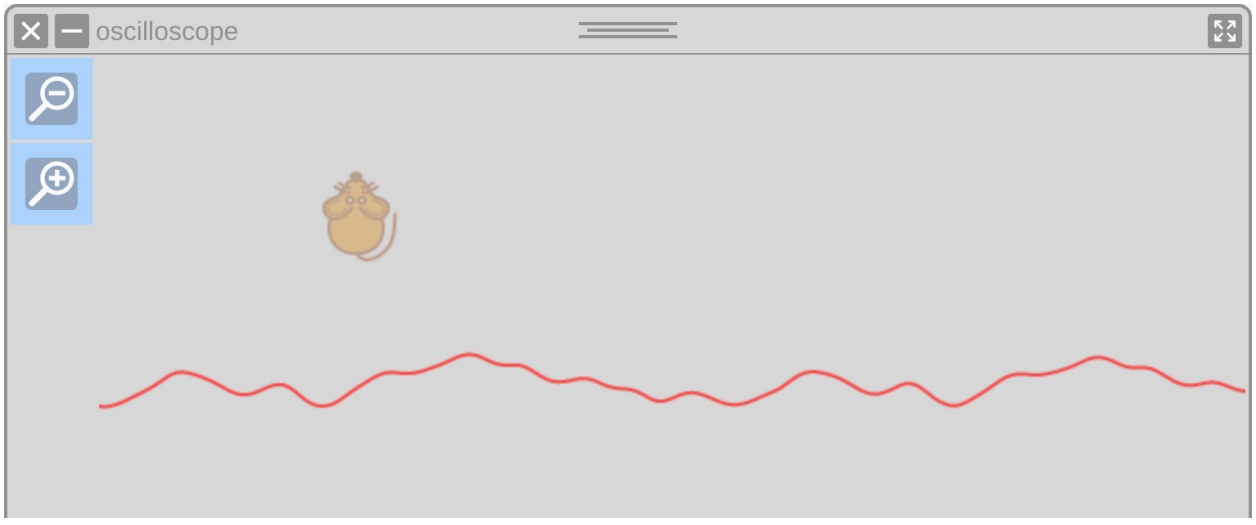
Introduction:

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

the Babylonians used a 360 day calendar. And, as it turns out, the Babylonians also used a base-60 number system (called the sexagesimal system). Just as we use 10 different symbols to represent numbers in our base 10 decimal system, the ancient Babylonians used 60 symbols to represent numbers.

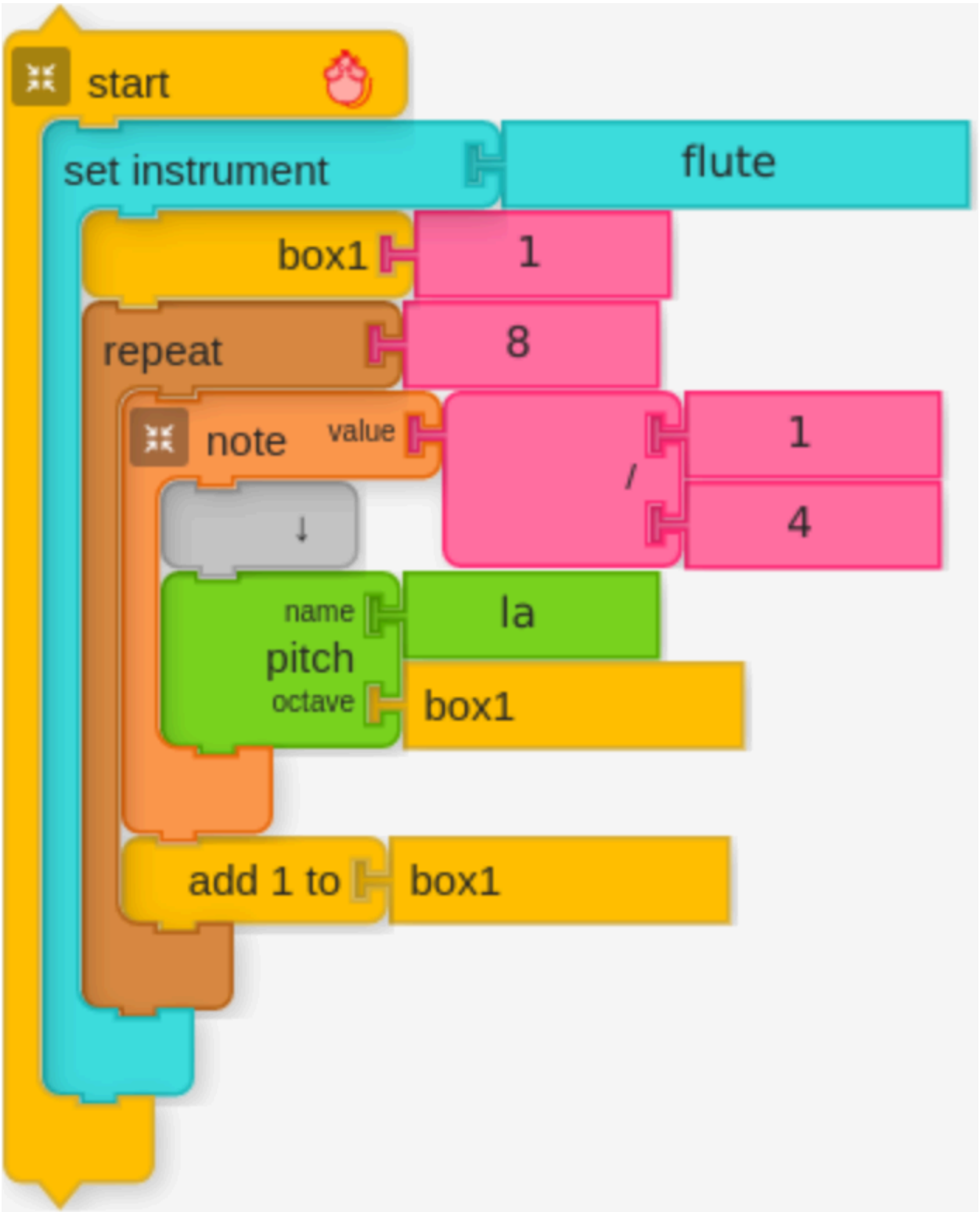
Why does this matter? Well, 60 x 6 = 360. This means that 360 is a nice even multiple of the number base in the Babylonian system (which would have had the same aesthetic value to their brains that a nice even multiple of 10 has to ours). But there's more to it than that. The Babylonians knew about equilateral triangles. And they knew that if you arranged 6 of these equilateral triangles in a certain way with the edge of one aligned on top of the edge of the next, the last one would end up meeting back up with the first. In other words, the total angle formed by 6 of these equilateral triangles would be the same as the angle around a circle. Given the Babylonian usage of 60 as their number base, they decided that each of the angles of an equilateral triangle would be 60 degrees. And thus, when you multiply these 60 degrees by the 6 equilateral triangles that combine to create a sort of circle, you get 6 x 60 = 360 degrees. And thus, 360 degrees in a circle.



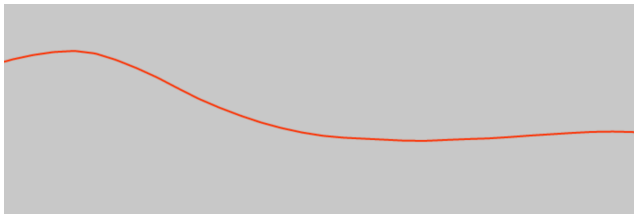
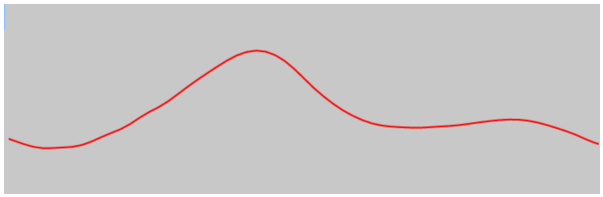
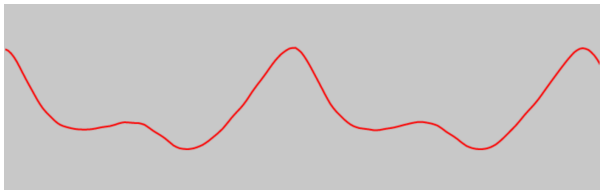
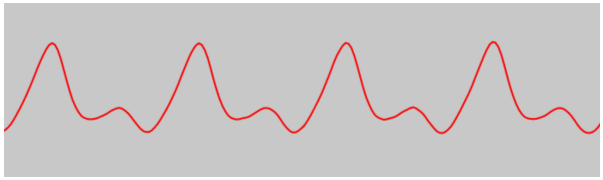
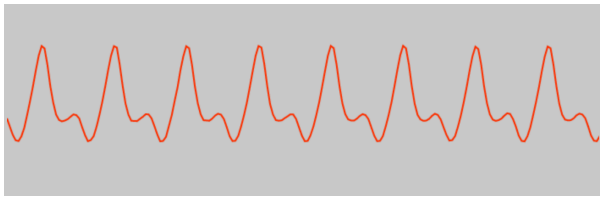
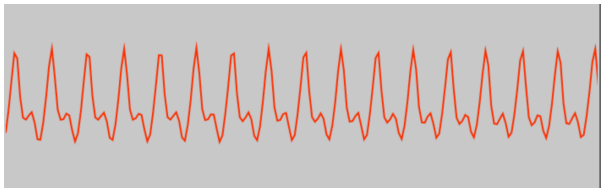


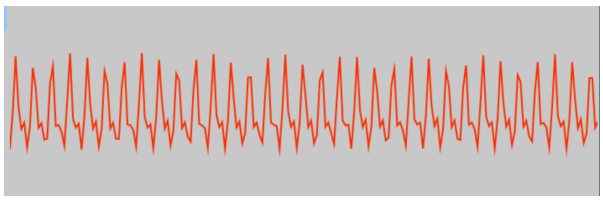
Part 1:

When you increase pitch by octave, the frequency doubles.



Note	Oscilloscope image

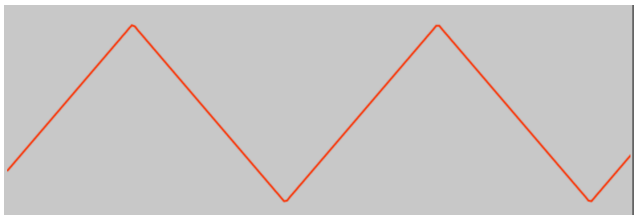
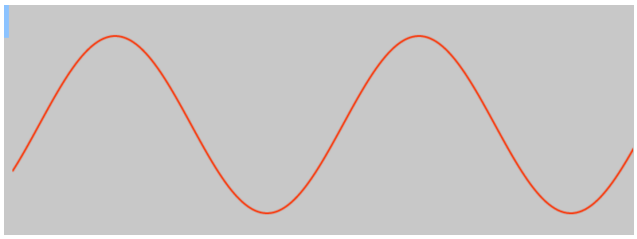
A Octave 1 55Hz	
A Octave 2 110Hz	
A Octave 3 220Hz	
A Octave 4 440Hz	
A Octave 5 880Hz	
A Octave 6 1760Hz	
A Octave 7 3520Hz	

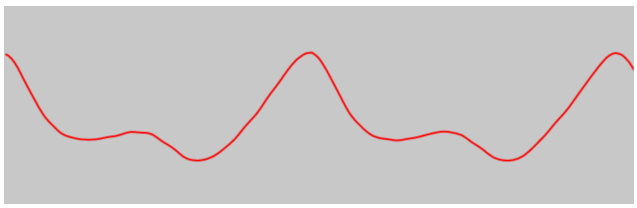
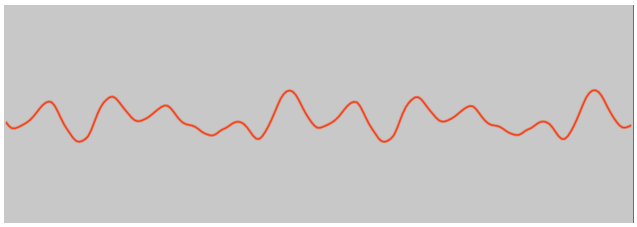
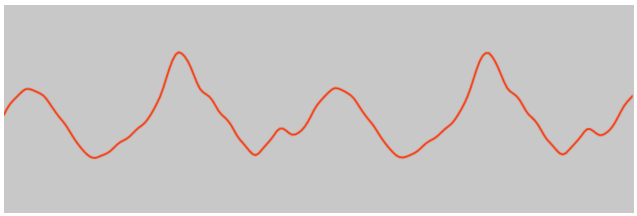
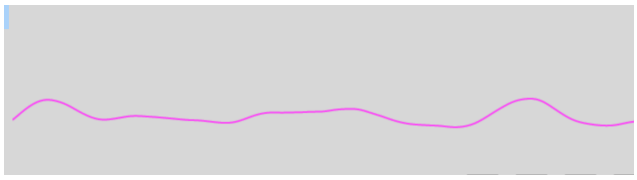
A Octave 8 7040Hz	

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

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?