

1. Polyrhythms
 - a. Counting 2-Against-3 [Car91, p22]
 - i. Tapping thighs
 1. Instructions
 - a. Count from one to six, over and over, in an even steady rhythm.
 - b. On **one**, tap both thighs.
 - c. On **two**, don't tap.
 - d. On **three**, tap your right thigh.
 - e. On **four**, tap your left thigh.
 - f. On **five**, tap your right thigh.
 - g. On **six**, don't tap.
 - h. (When you rest on **two** and **six**, take a breath or nod your head if you feel like tapping.

2. Suggestions
 - a. Instead of counting to six, count to three.
Count, “**One** and **two** and **three** and **one**”
 - i. Your right hand taps on which words?
 - ii. Your left hand taps on which words?
 - b. Lean back, stop counting out loud, and watch your hands.

ii. Single-hand patterns

1. Try stopping your left hand while the right hand keeps tapping. The left hand counts how many times before the whole cycle repeats?
2. Try stopping your right hand while the left hand keeps tapping. The right hand counts how many times before the whole cycle repeats?
3. If you feel like it, try to figure out how to do this with the right hand counting in **two** and the left in **three**.

iii. Writing

1. Each box represents a beat.
2. If you hear a tap, color the box.
3. If you don't hear anything, don't write anything.

b. Counting 3-Against-4 [GK95, p15]

i. Tapping thighs

1. Count from one to twelve, over and over, in an even steady rhythm.
2. On **one**, don't tap.
3. On **two**, don't tap.
4. On **three**, tap your left thigh.
5. On **four**, tap your right thigh.
6. On **five**, don't tap.
7. On **six**, tap your left thigh.
8. On **seven**, don't tap.
9. On **eight**, tap your right thigh.
10. On **nine**, tap your left thigh.
11. On **ten**, don't tap.
12. On **eleven**, don't tap.
13. On **twelve**, tap both thighs.

ii. Single-hand patterns

1. Try stopping your left hand while the right hand keeps tapping. The left hand counts how many times before the whole cycle repeats?
2. Try stopping your right hand while the left hand keeps tapping. The right hand counts how many times before the whole cycle repeats?

iii. Writing

1. Each box
represents a beat.
2. If you hear a
tap, color the box.
3. If you don't
hear anything,
don't write
anything.

- c. When do you hear the notes on the same beat?
- d. Standard least common multiple activity
 - i. LCM of 2 and 3
 - ii. LCM of 3 and 4

iii. “That’s
weird!
And you
knew that
was
gonna
happen!”

2. Waves

a. Transverse wave

i. Phone cords

1. Instructions

a. One person holds each end of the cord.

b. One person gives the rope a quick up-and-down or side-to-side jerk with his/her hand.

2. Questions

a. What do you observe?

b. Which way does the wave travel?

c. Which way does the flag move?

b. Longitudinal wave

i. Slinkys

1. Instructions

a. Each person holds a slinky on the table.

b. Give a pulse on one side and watch what happens.

2. Questions

a. What do you observe?

b. Which way does the wave travel?

c. Which way does the flag move?

3. Sound waves

- a. Source of sound sends vibration outward into the air.
- b. Vibration shoves the air particles away from their original positions.
- c. At these points of compression, there are many air molecules crowded together and the pressure is high.
- d. At the points of rarefaction, the air molecules are more spread out and the pressure is low.
- e. Longitudinal sound wave travels through the air, hits your eardrum, and allows you to hear the sound.

ii. Dominoes

1. Instructions

a. Each

person sets
up a row of
a dozen
dominoes.

b. Knock the
first one
over.

2. Questions

- a. What do you observe?
- b. Which way do the dominoes fall?
- c. Which way does the wave travel?
- d. What kind of wave is this: transverse or longitudinal?
- e. What moved down the row of dominoes?

3. Audacity

- a. What makes one **sound** different from another?
- b. What type of wave is a sound wave?
- c. Show correspondence between longitudinal waves and transverse waves.

d. What makes one
sound wave different
from another?

i. Amplitude

1. Show two
different
amplitudes on
phone cords.

ii. Wavelength

1. Show two
different
wavelengths on
phone cords.

4. Math or science?

- a. <http://en.wikipedia.org/wiki/Mathematics>
- b. Mathematics is the academic discipline, and its supporting body of knowledge, that involves the **study of such concepts as quantity**, structure, space and change....
- c. Other practitioners of mathematics maintain that **mathematics is the science of pattern**, and that mathematicians seek out patterns whether found in numbers, space, science, computers, imaginary abstractions, or elsewhere.
- d. Today, mathematics is used throughout the world as an essential tool in many fields, including natural science, engineering, medicine, and the social sciences such as economics and psychology.