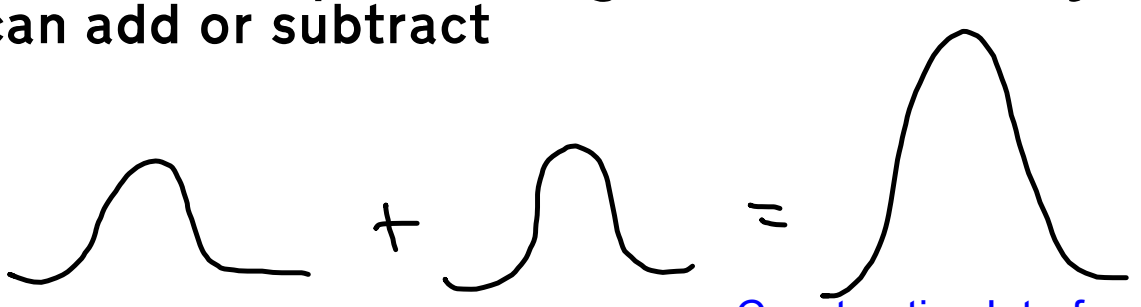
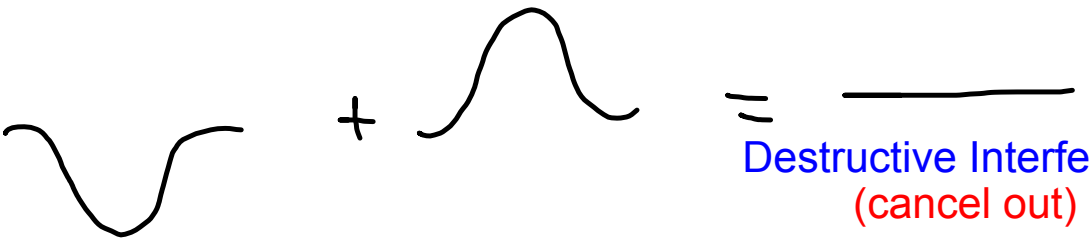
INTERFERENCE

When waves pass through each other, they can add or subtract



Constructive Interference
(add together)



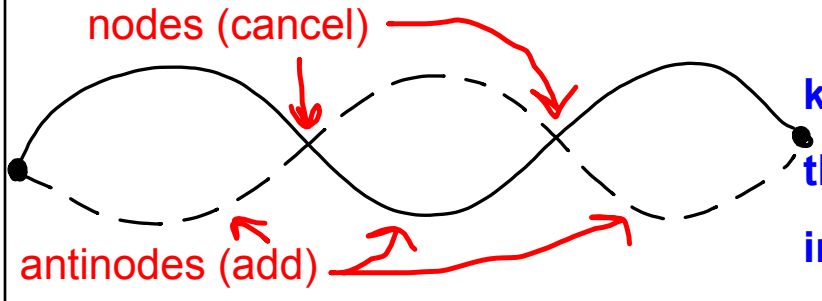
Destructive Interference
(cancel out)

STANDING WAVES

When a wave interferes with its own reflection

send wave

it bounces

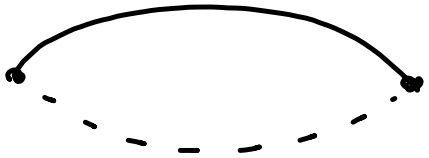


keep sending them

the wave appears to stop

in place

Harmonics for 2 fixed ends



1st Harmonic

2nd Harmonic (1 wavelength)

3rd Harmonic

NATURAL FREQUENCY

Every solid (not mushy) object has a natural frequency

Affected by: mass, size, shape, material

Smaller, less massive -> higher frequency

Larger, more massive -> lower frequency

FORCED VIBRATION

One vibrating object forces another to vibrate

RESONANCE

When you force an object to vibrate AT its natural frequency - you get the most response

Musical instruments need three ingredients:

1. Something to start the vibration
2. Something to contain standing waves
3. A body to resonate with the waves

Stringed instruments

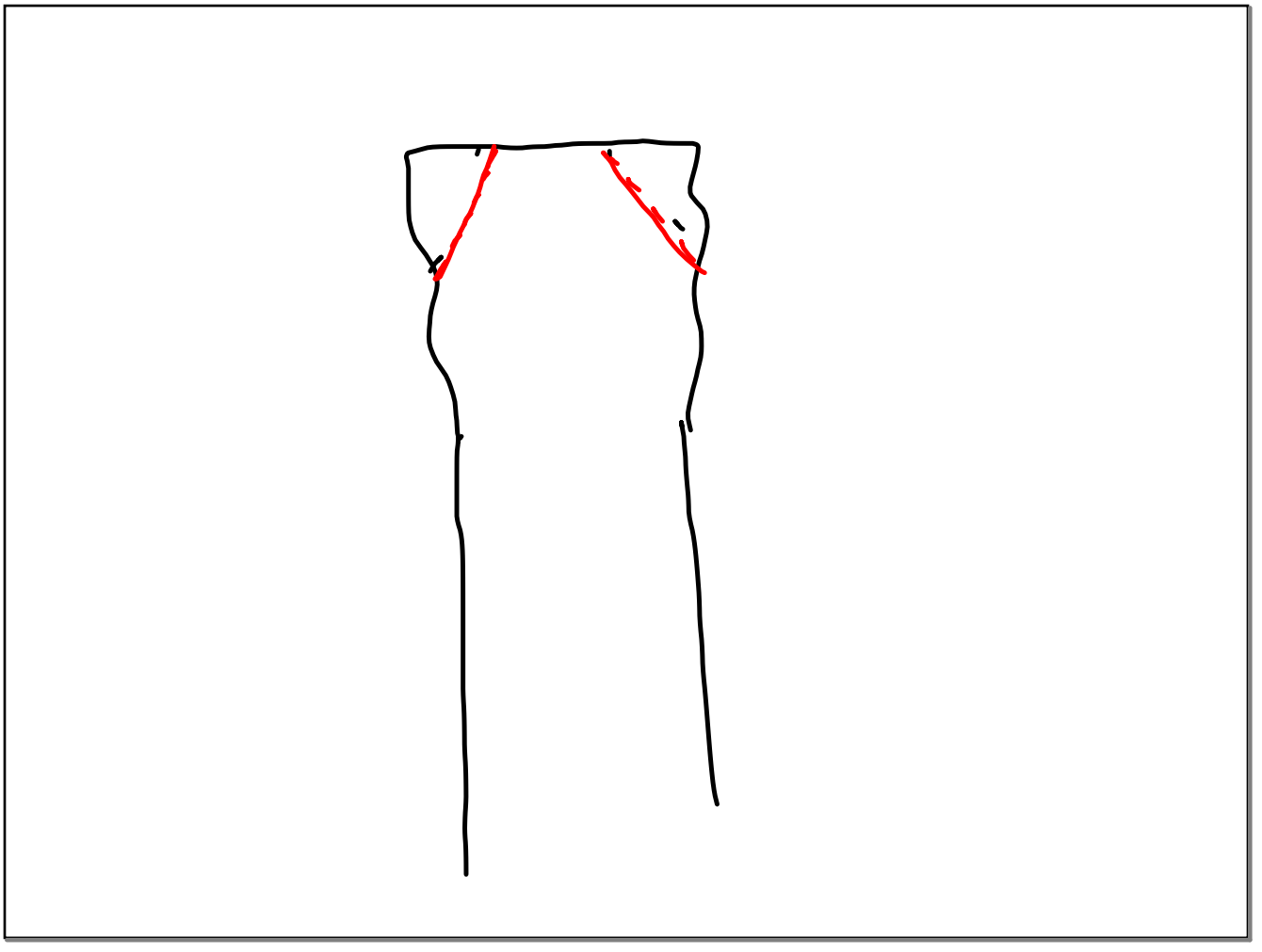
Brass instruments

Woodwind instruments

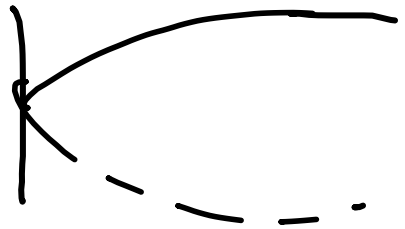
Percussion instruments

example:

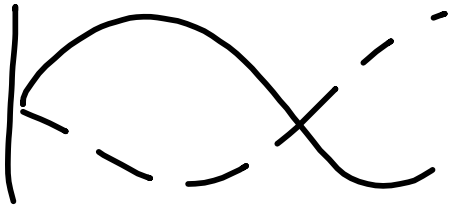
1. Buz your lips
2. The air in the trumpet
3. Medium to small body means midrange to high pitches



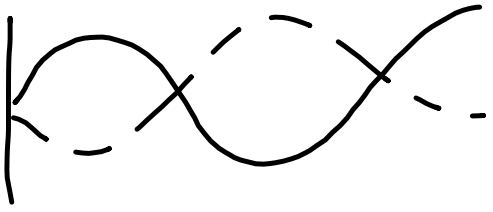
Harmonics for 1 open end



1st Harmonic (0.25 wavelength)



2nd Harmonic (0.75 wavelength)



3rd Harmonic (1.25 wavelengths)