Warm-up:

Foot Stompin'

Resonance occurs when the frequency of a forced vibration on an object matches the object's natural frequency. This causes a great increase in amplitude, which increases the power transmitted by the object. In 1940, the Tacoma Narrows suspension bridge collapsed when wind-driven oscillations produced resonance in the bridge. Films of its collapse have become favorites among physics teachers and their students. Subsequent designs have incorporated such innovations as separate parallel roadways as a way to keep this type of disaster from happening again.

In the 1800s, English soldiers marching across a small suspension bridge caused it to collapse when their marching set it into resonance. Their marching was in rhythm with the bridge's natural frequency. Since that time, soldiers and marching bands have been told to not march in step when crossing any type of suspension bridge.

Give another example of the disastrous effects of resonance and describe how it happens.

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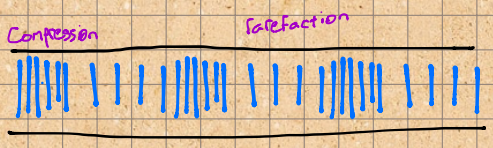
- Origin of sound: all sound waves come from vibrations
  - ↳ Sound is a pressure wave
  - ↳ speed depends on the medium a wave is moving through
- Sound is a longitudinal wave:



* Sound cannot travel without a medium
  - ↳ Star Wars Lied to You 😠
- Where can sound travel faster, in air or in steel?
  - ↳ Can transfer to next molecule more rapidly

- Lightning Vs. Thunder:
  - ↳ Count off between light to sound and divide by 5 to get the approximate distance in miles

↳ Light = $3.0 \cdot 10^8$ m/s

Time for lightning to travel a mile

↳ $\frac{1.6 \cdot 10^3 \text{ m} \mid 1 \text{ s}}{\mid 3.0 \cdot 10^8 \text{ m}} = 5.3 \cdot 10^{-6}$ s

↳ Sound = 343 m/s

$\frac{1.6 \cdot 10^3 \text{ m} \mid 1 \text{ s}}{\mid 343 \text{ m/s}} = 5.1$ s

HW: Ch 26 EOC: 2, 11, 16, 21, 33, & 38