Unit Waves and Sound: Day 13: Mechanical Resonance/Flutter

Grade 11

75 min	**Learning Goals** • Clarify the concepts of mechanical resonance. • Clarify the concepts of flutter. • Clarify any misconceptions regarding the collapse of the Tacoma Narrows Bridge. **Curriculum Expectations** • E1.1 analyse how properties of mechanical waves and sound influence the design of structures and technological devices • E3.2 explain the components of resonance, and identify the conditions required for resonance to occur in vibrating objects and in various media (e.g., with reference to a musical instrument, a child on a swing, the Tacoma Narrows Bridge) • E2.7 analyse the conditions required to produce resonance in vibrating objects and/or in air columns (e.g., in a string instrument, a tuning fork, a wind instrument), and explain how resonance is used in a variety of situations (e.g., to produce different notes in musical instruments; to limit undesirable vibrations in suspension bridges)	**Materials** • Various videos showing Tocoma Narrows Bridge collapse and Aeroelastic flutter.
Minds On… 15min	• A review/discussion of mechanical resonance and flutter. • Show video of collapse of Tacoma Narrows Bridge.	Teacher reference:
Action! 40 minutes 20 minutes	• Students will discuss in groups their theories on what physical phenomena are displayed and why the Tacoma Narrows Bridge collapsed. • Groups will share their ideas. As this remains a contentious topic, a lively class discussion is expected. • Show Minute Physics video (Tacoma Narrows Fallacy) • Show Flutter at a Glance video. • Resume class discussion.	Teacher monitors group progress and offers hints as necessary.
Consolidate Debrief 10 minutes	Teacher polls class and addresses any remaining misconceptions.	