

## PowerPoint Notes on Wave Properties

### **Slide 1**

### **Slide 2**

### **Slide 3**

These gif files are animations showing the reflection of a wave off a free and fixed boundary. When you display the slide show, the animation should begin automatically.

### **Slide 4**

Students may have the experience of hearing particularly well across a lake on a warm summer night, or of having a hard time hearing across a parking lot on a warm day. Explain how these related to refraction and the diagrams in the slide.

### **Slide 5**

If you consider each wave front a top view of a crest of each wave, you can see the bending of the wave resulting from the changing wavelength at the boundary between the two media. This is an animation that should begin automatically when the slideshow advances to this slide.

### **Slide 6**

### **Slide 7**

### **Slide 8**

### **Slide 9**

### **Slide 10**

### **Slide 11**

This is an animation also. When you display the slides as slide show, you should see the interference pattern changing as the waves propagate away from the two sources shown.

### **Slide 12**

It is helpful to take advantage of one of more of the applets so that students can see (and hear) the combination of the waveforms in motion. Students with a musical background may be familiar with beats from experiences tuning instruments, but others need to hear the beat to understand that it is a variation in intensity arising from a small difference in pitch.

### **Slide 13**

### **Slide 14**

### **Slide 15**

### **Slide 16**

**Slide 17**

This slide shows three applications of the Doppler effect. The first is Doppler radar, which uses the change in frequency due to the relative motion of precipitation to indicate areas where precipitation is occurring. The radar gun, as used to determine the speed of a pitch, uses the change in frequency between a wave emitted by the radar and that reflected off the ball to determine the relative speed of the ball towards the detector. The final picture is the MISA antenna (located near MIT Haystack Observatory), which uses the change in frequency of its emitted radio wave and the reflected wave (off the ionosphere) to determine the velocity of the upper atmosphere.

**Slide 18****Slide 19****Slide 20****Slide 21**

The dotted line represents the pressure-broadened contribution of the ozone from the lower atmosphere. The sharper peak represents the contribution of the ozone from the mesosphere, which is less dense, and therefore, not pressure-broadened.