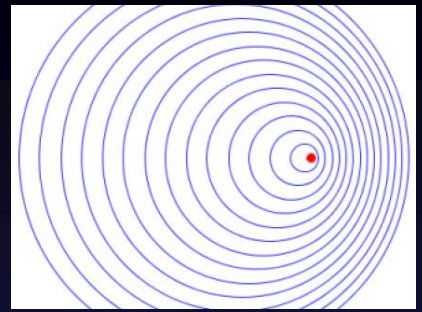


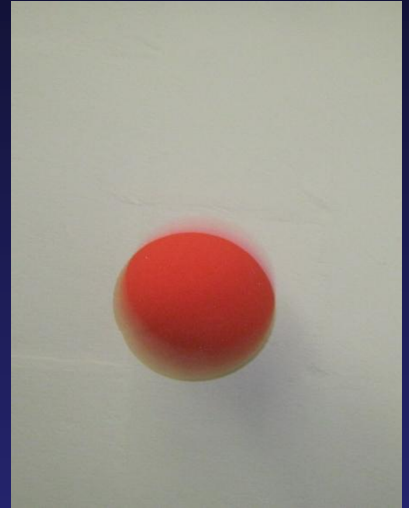
# DOPPLER BALL

## What to do

1. **Play catch with the Doppler ball**
2. **Spin the Doppler ball around your head**



The Doppler Effect is the shift in frequency which waves experience if the source and detection of the waves experience relative motion toward or away from each other. Assume that a stationary source emits waves at some regular frequency or wavelength. Then a stationary detector will receive these waves at that frequency or wavelength. However, if the source is moving relative to the detector, the frequency at which the waves arrive changes. This change is shown in the image at the top of the page. If the source is moving away from the detector (the left of the image) the frequency at which waves arrive is longer than the actual emission frequency, so a lower frequency is detected. Toward the detector (the right) the waves are arriving faster than they are being sent, so waves at a higher frequency are detected. If the detector is moving and the source is stationary then the same effect occurs because there is still relative motion.



The Doppler Ball has a battery operated component inside it, which emits a constant tone. If the ball is thrown between two people the Doppler Effect can be heard. As the ball moves away from the thrower the sound becomes lower pitched to them, while the catcher hears the sound at a higher pitch.

The Doppler Effect can also be seen when an object moves across a still body of water. The waves propagating forward from the motion have a different frequency to the waves which travel in the opposite direction to that of the moving object.

The waves travelling forward, because they are being emitted closer to one another, have a higher frequency than the waves moving backward, which appear slower. Perpendicular to the motion of the object, the waves will appear at the frequency at which they are emitted.



If the ball is attached to a piece of string, it can be swung around in circles above you. The Doppler shift will cause the sound to become higher pitched when the swing is toward you and lower pitched when the ball is swinging away.

