Student Sheet Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Title: Doppler Effect**

**Introduction:** Can you make the sound of a siren or racecar as it goes by you? Even if you can’t, can you think about what happens to the pitch of the sound as it goes by? That change in pitch is the Doppler Effect. It is important to understand because it relates to all moving objects and can help us understand how we know the universe is expanding from the Big Bang. In this activity, you will see and explore several ways we can understand the Doppler effect.

**Procedures:**

1. Watch as your teacher demonstrates waves with a slinky, phone cord or rope. Draw a wave with a high frequency and a low:

high frequency:

low frequency:

2. What happens to the frequency when the wave makers move toward each other?

How would that sound?

3. What happens to the frequency when the wave makers move away from each other?

How would that sound?

4. Use a computer or watch your teacher use a computer to show the Doppler effect.

These websites show what happens to a moving car:

<http://www.colorado.edu/physics/2000/applets/doppler2.html>

<http://www.colorado.edu/physics/2000/applets/doppler.html>

5. In your own words, why does the pitch of a moving car change as it goes by you?

6. Light travels in waves also. When light is effected by movement, we call it red shift or blue shift because light doesn’t have pitch, it has color. Red has a lower frequency of light and blue is higher. If something is moving away from us, its light spectrum is shifted towards the red end of the spectrum. Fill in the missing labels on this comparison (the waves are not to scale and would be different for sound and light):

Sound pitch

 ? ?



 ? ?

 color

Light

7. Use the Internet or a textbook to create a poster that advertises a rock and roll group called “The Doppler Effect”. Be creative and make it interesting to look at but also include 5 facts about the Doppler effect. Underline the statements or pictures to show where your facts are.

8. Red Shift refers to how the spectrum of light waves shifts towards the red end when an object is moving away from the observer. Look carefully at the spectra below: