

Problems of Doppler effect

1) What is the frequency heard by a person driving at 9 m/s toward a blowing factory whistle that is blowing at a frequency of 1665 Hz if the speed of sound is 334 m/s?

Answer: 1710 Hz.

2) The siren of an ambulance has a frequency of 3530 Hz. If the speed of sound is 333 m/s find the frequency you will hear:

a) If the ambulance approaches you at 5 m/s.

a) If the ambulance is moving away from you at 5 m/s.

Answer: a) 3584 Hz, b) 3478 Hz.

3) What is the apparent frequency of a siren emitting a 2090 Hz sinusoidal signal that you are approaching at 12 m/s if the speed of sound is 341 m/s?

Answer: 2164 Hz.

4) A railroad train traveling at 41 m/s emits a note at 3205 Hz. What frequency is heard by an observer on another train approaching at 37 m/s if the speed of sound is 320 m/s?

Answer: 4101 Hz.

5) A cop car's siren has a frequency of 1015 Hz. If you are standing on the sidewalk as the cop car approaches you at a speed of 44 m/s, what frequency would you hear? The speed of sound is 340 m/s.

Answer: 1166 Hz.

6) A car approaching a stationary observer emits 2875 Hz from its horn. If the observer detects a frequency of 3075 Hz, and the speed of sound is 339 m/s, how fast is the car moving?

Answer: 22 m/s.

7) A friend of yours is loudly singing a single note at 1435 Hz while racing toward you at 30 m/s. What frequency do you hear if the speed of sound is 316 m/s?

Answer: 1586 Hz.

8) The engine on a helicopter is making a sound with a frequency of 2550 Hz. The speed of sound is 326 m/s. Calculate the frequency you will hear:

a) If the helicopter is flying towards you at 58 m/s.

a) If the helicopter flies away from you at 58 m/s.

Answer: a) 3102 Hz, b) 2165 Hz.