DOPPLER EQUATION

# Formula for Doppler Effect

*vo* is positive if the observer is moving toward the source and negative if moving away.

*vs*  is positive if the source is moving toward the observer and negative if moving away.

*v,* thespeed of sound is 343 m/s at room temperature.



1. What variable is known if the…
	1. observer is stationary?
	2. source is stationary?
	3. sound is traveling through room temperature air?
2. A siren with a frequency of 570 Hz is moving toward a driver in a car at 45 m/s.
	1. Sketch a model
	2. Predict if the observed sound will be higher or lower frequency.
	3. Complete the chart with known values. Place a “?” for the unknown.

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| --- | --- | --- |
| *v =* | *vo =* | *fo =* |
|  | *vs =* | *fs =* |

* 1. What is the apparent frequency of the siren as it moves toward the driver and away from the driver?

# Answer the following questions.

Start by listing the knowns and unknowns. Show your work!

1. A police car's siren has a frequency of 700 hertz. If you are standing on the sidewalk as it approaches you at a speed of 15.0 m/s, what frequency would you hear?
2. In the previous problem, what frequency would you hear if the police car was moving away from you at a speed of 25 m/s?
3. A security alarm is wailing with a frequency of 1200 hertz. What frequency does a police officer hear if they are driving toward the alarm at a speed of 40.0 m/s?
4. In the previous problem, what frequency would the burglar hear, if they were running away from the alarm at a speed of 10 m/s?