PHYSICS IN MOTION
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Unit 6C
The Doppler Effect
Practice Problems

Name:

Date:

Work each of the following problems. SHOW ALL WORK.

1. **It is known that a siren emits a frequency of 2,000 Hz. If an observer hears a frequency of 1,800 Hz, is the siren moving toward or away from the observer?**

_____

_____

2. **A car horn emits a frequency of 400 Hz in 20 °C air, which has a speed of sound of 343 m/s. If the car is moving toward a stationary observer at 20 m/s, what is the frequency that is observed?**

$$f_{obs} = f_{source}\left(\frac{V \pm V_{obs}}{V \pm V_{source}}\right)$$

f_{obs} = ?

f_{source} = _____

V = _____

V_{obs} = _____

V_{source} = _____

3. **The frequency of a tornado siren is 1,000 Hz. If a cyclist is moving toward the siren at 10 m/s in 15 °C air, which has a speed of sound of 340 m/s, what is the frequency that the cyclist observes?**

$$f_{obs} = f_{source}\left(\frac{V \pm V_{obs}}{V \pm V_{source}}\right)$$

f_{obs} = ?

f_{source} = _____

V = _____

V_{obs} = _____

V_{source} = _____

questions continued on next page

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4. **A tug boat horn emits a frequency of 250 Hz in 18 °C air, which has a speed of sound of 342 m/s. If the tug boat is moving away from a stationary observer at 15 m/s, what is the frequency that is observed?**

$$f_{obs} = f_{source}\left(\frac{V \pm V_{obs}}{V \pm V_{source}}\right)$$

f_{obs} = ?

f_{source} = _____

V = _____

V_{obs} = _____

V_{source} = _____

5. **A jogger runs at 9 m/s, and is trailed by a bumblebee moving at 5 m/s and emitting a frequency of 270 Hz. What frequency does the jogger hear if the speed of sound in air was 336 m/s?**

$$f_{obs} = f_{source}\left(\frac{V \pm V_{obs}}{V \pm V_{source}}\right)$$

f_{obs} = ?

f_{source} = _____

V = _____

V_{obs} = _____

V_{source} = _____