

Name:

Date:

Period:

Unit 09 Review Problems (Sound & Light)

$$v = f\lambda$$

$$f = f_s \left(\frac{v \pm v_o}{v \mp v_s} \right)$$

$$\frac{1}{d_i} + \frac{1}{d_o} = \frac{1}{f}$$

$$M = \frac{h_i}{h_o} = \frac{-d_i}{d_o}$$

Speeds of Sound:

air: 340 m/s

water: 1530 m/s

iron: 5100 m/s

-
1. You are driving **north** at 17 m/s when you see a police car in your rearview mirror that is also driving **north**, but at 32 m/s.

(a) If the police car produces a frequency of 6000 Hz, what frequency do you hear?

(b) You pull over to the side of the road and come to a stop as the police car approaches, what sound do you hear now?

(c) You are still at rest at the side of the road, but the cruiser now passes you. What sound do you now hear?

2. Red light has a wavelength of 5.90×10^{-7} m. What is the frequency of red light?

3. Find the wavelength of a 10 000 Hz sound when it travels through the air.

Answers:

1. (a) 6955 Hz

(b) 6623 Hz

(c) 5484 Hz

2. 5.08×10^{14} Hz

3. 0.034 m

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4. Consider a converging lens with a focal length of 2 cm. An object is 10 cm away.

(a) What is the distance between the lens and the image?

(b) What is the magnification of the image?

(c) Is the image real or virtual? How do you know?

5. Consider a *diverging* lens with a focal length of 3 cm. An object is 4 cm away.

(a) What is the distance between the lens and the image?

(b) What is the magnification of the image?

(c) Is the image real or virtual? How do you know?

Answers:

4. (a) 2.5 cm

(b) -0.4

(c) real

5. (a) -6.0 cm

(b) 1.5

(c) virtual