

Chapter 33 End-of-Chapter Problems

Halliday & Resnick, 10th Edition

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Hit me where it Matters

1 Problem 1

A certain helium-neon laser emits red light in a narrow band of wavelengths centered at 632.8 nm and with a “wavelength width” (such as on the scale of Fig. 33-1) of 0.0100 nm. What is the corresponding “frequency width” for the emission?

1.1 Solution

Use the traditional formula for the wavelength. Here, the speed of the wave is the speed of light. We can treat this like an error and raw value issue.

$$v = \lambda f \rightarrow f = \frac{c}{\lambda} \quad (1)$$

$$\frac{\delta f}{f} = \frac{\delta \lambda}{\lambda} \quad (2)$$

$$\delta f = f * \frac{\delta \lambda}{\lambda} = c * \frac{\delta \lambda}{\lambda^2} \quad (3)$$

$$= 2.998 \times 10^8 \text{ m/s} * \frac{0.0100 \text{ nm}}{(632.8 \text{ nm})^2} \quad (4)$$

$$= \boxed{7.49 \text{ GHz}} \quad (5)$$

2 Problem 5

2.1 Solution

3 Problem 7

3.1 Solution

4 Problem 9

4.1 Solution

5 Problem 11

5.1 Solution

6 Problem 13

6.1 Solution

7 Problem 19

7.1 Solution

8 Problem 21

8.1 Solution

9 Problem 29

9.1 Solution

10 Problem 33

10.1 Solution

11 Problem 37

11.1 Solution

12 Problem 41

12.1 Solution

13 Problem 43

13.1 Solution

14 Problem 45

14.1 Solution

15 Problem 49

15.1 Solution

16 Problem 51

16.1 Solution

17 Problem 55

17.1 Solution

18 Problem 59

18.1 Solution

19 Problem 65

19.1 Solution

20 Problem 69

20.1 Solution

21 Problem 71

21.1 Solution

22 Problem 75

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23 Problem 83

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24 Problem 87

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27.1 Solution

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