

Question 1

Consider the following sources of light. Each produces light of one wavelength:

| | Wavelength | Power |
|----------|-------------------|--------------|
| Source A | 650 nm | 10 W |
| Source B | 650 nm | 20 W |
| Source C | 500 nm | 10 W |
| Source D | 500 nm | 20 W |

Which of the following best ranks these in terms of the energy per photon?

1. $A = B > C = D$
2. $A = B < C = D$
3. $A = C > B = D$
4. $A = C < B = D$

Question 2

Visible light has wavelengths in the range 350 nm – 700 nm. Consider a source of light with wavelength 600 nm that produces power 1.0 W.

Which of following most closely represents the energy of a single photon of this light?

1. $1 \times 10^{-19} \text{ J}$
2. $1 \times 10^{-10} \text{ J}$
3. $1 \times 10^{-5} \text{ J}$
4. 1 J
5. $1 \times 10^5 \text{ J}$
6. $1 \times 10^{10} \text{ J}$

Question 3

Consider the following sources of light. Each produces light of one frequency:

| | Frequency | Power |
|----------|---------------------------------|-------|
| Source A | $4.0 \times 10^{14} \text{ Hz}$ | 30 W |
| Source B | $8.0 \times 10^{14} \text{ Hz}$ | 15 W |

Let N_A be the number of photons produced by A every second and similar N_B that produced by B every second. Which of the following is true?

1. $N_A = \frac{1}{4} N_B$
2. $N_A = \frac{1}{2} N_B$
3. $N_A = N_B$
4. $N_A = 2N_B$
5. $N_A = 4N_B$