

Name: _____ Block: _____ Energy Homework

Formulas	Variables / Constants
$c = \lambda \nu$	$c = \text{speed of light} = \frac{3.00 \times 10^8 \text{ m}}{\text{s}}$ $\lambda = \text{wavelength, measured in nanometers}$ $1 \text{ nm} = 10^{-9} \text{ m}$ $\nu = \text{frequency, measured in } \frac{1}{\text{s}} = \text{s}^{-1} = \text{Hz}$ $1 \text{ THz} = 10^{12} \text{ Hz}$
$E = h\nu$	$E = \text{energy, measured in Joules (J)}$ $h = \text{Planck's constant} = 6.626 \times 10^{-34} \text{ J}\cdot\text{s}$ $\nu = \text{frequency, measured in } \frac{1}{\text{s}} = \text{s}^{-1} = \text{Hz}$ $1 \text{ THz} = 10^{12} \text{ Hz}$

- Violet light has a wavelength of $4.50 \times 10^{-7} \text{ m}$. What is the frequency?
- How much energy does violet light give off, use the information from question #1.
- Red light has a frequency of 401 THz. What is the wavelength?
- How much energy does red light give off, use the information from question #3.
- Which color, violet or red, gives off the most amount of energy? _____
- Which color, violet or red, has the shortest wavelength? _____
- Which color, violet or red, has the highest frequency? _____
- Calculate the energy of a photon of radiation with a frequency of $8.5 \times 10^{14} \text{ Hz}$.
- Calculate the wavelength for the photon in question #8.

10. Put answers in table below:

Question number	Wavelength (m)	Frequency (s ⁻¹)	Energy (J)	Determine type of radiation for each
1				
3				
8				

11. Rank these parts of the electromagnetic spectrum from lowest energy (1) to highest (7):

Gamma Infrared Microwave Radio Visible Ultraviolet X-ray

12. Rank these parts of the electromagnetic spectrum from lowest frequency (a) to highest (g):

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13. Rank these parts of the electromagnetic spectrum from shortest wavelength (A) to longest (G):

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14. Describe the relationship between wavelength and frequency.

15. Is the relationship between wavelength and frequency directly proportional or inversely proportional?

16. Describe the relationship between wavelength and energy.

17. Is the relationship between wavelength and energy directly proportional or inversely proportional?

18. Describe the relationship between frequency and energy.

19. Is the relationship between frequency and energy directly proportional or inversely proportional?

20. Summary: Circle the correct answer to show the relationship between the variables.

(long/short) **wavelength** (λ) = (high/low) **Frequency** (ν) = (high/low) **Energy** (E)