Violet

* Remember sig figs *

#1

g: $4.50\times10^{-7}\,m = \lambda$

W: $\nu = ?\,s^{-1}$

$h = c = \lambda\nu$

$c = 3.00\times10^{8}\,\frac{m}{s}$

$\frac{c}{\lambda} = \frac{\lambda\nu}{\lambda} \rightarrow \nu = \frac{c}{\lambda}$

$\nu = \frac{3.00\times10^{8}\,m}{s\cdot 4.50\times10^{-7}\,m}$

$\nu = \frac{6.67\times10^{14}}{s} = 6.67\times10^{14}\,s^{-1}$

#2

g: $6.67\times10^{19}\,s^{-1} = \frac{6.67\times10^{19}}{s}$

W: $E = ?\,J$

n: $E = h\nu$

$h = 6.626\times10^{-34}\,J\cdot s$

$E = h\nu = 6.626\times10^{-34}\,J\cdot s \cdot \frac{6.67\times10^{14}}{s}$

$E = 4.42\times10^{-19}\,J$

Red

#3

g: $401\,THz = 401\,Ts^{-1}$

W: $\lambda = ?\,m$

n: $c = \lambda\nu$

$c = 3.00\times10^{8}\,\frac{m}{s}$

$1\,Ts^{-1} = 10^{12}\,s^{-1}$

Step1: Δ Ts^{-1} to s^{-1}

Bigger

$401\,Ts^{-1} = \underline{\quad ? \quad}\,s^{-1}$

$\rightarrow$ 12 places

401000000000000 then put in sci NOT

$\nu = 4.01\times10^{14}\,s^{-1}$

Step2:

$\frac{c}{\nu} = \frac{\lambda\nu}{\nu}$ $\lambda = \frac{c}{\nu} = \frac{3.00\times10^{8}\,m}{s\ 4.01\times10^{14}\,s^{-1}}$

$\lambda = 7.48\times10^{-7}\,m$

#4 $\nu = 4.01\times10^{14}\,s^{-1}$

$E = ?\,J$

$E = h\nu$

$h = 6.626\times10^{-34}\,J\cdot s$

$E = h\nu = 6.626\times10^{-34}\,J\cdot s \cdot 4.01\times10^{14}\,s^{-1}$

$E = 2.66\times10^{-19}\,J$

#5 Which color, violet or red, gives off the most amount of energy?

Violet: 4.42×10^{-19} J or red: 2.66×10^{-19} J

#6 Which color, has the shortest wavelength?

Violet: $\lambda = 4.50 \times 10^{-7}$ m or red: 7.48×10^{-7} m

#7 Which color, violet or red, has the highest frequency?

Violet: $6.67 \times 10^{14}\ s^{-1}$ or red: $4.01 \times 10^{14}\ s^{-1}$

#8

g: 8.5×10^{14} Hz $= 8.5 \times 10^{14}\ s^{-1} = \nu$

w: $E = ?$ J

n: $E = h\nu$

$h = 6.626 \times 10^{-34}$ J·s

$E = h\nu = 6.626 \times 10^{-34}\ J \cdot \cancel{s} \cdot \frac{8.5 \times 10^{14}}{\cancel{s}}$

$E = 5.6 \times 10^{-19}$ J

#9

g: 8.5×10^{14} Hz $= 8.5 \times 10^{14}\ s^{-1}$

w: $\lambda = ?$ m

n: $c = \lambda\nu$

$c = 3.00 \times 10^{8}\ \frac{m}{s}$

$\frac{c}{\nu} = \frac{\lambda \cancel{\nu}}{\cancel{\nu}}$

$\lambda = \frac{c}{\nu} = \frac{3.00 \times 10^{8}\ m}{\cancel{s}\ 8.5 \times 10^{14}\ \cancel{s}^{-1}}$

$= 0.000\ 000\ 35$ m

$\lambda = 3.5 \times 10^{-7}$ m

10. Put answers in table below:

Question number	Wavelength (m)	Frequency (s^{-1})	Energy (J)	Determine type of radiation for each
1	4.50×10^{-7} m	6.67×10^{14} s^{-1}	4.42×10^{-19} J	violet visible
3	7.48×10^{-7} m	4.01×10^{14} s^{-1}	2.66×10^{-19} J	Red visible
8	3.5×10^{-7} m	8.5×10^{14} s^{-1}	5.6×10^{-19} J	Infrared

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

Gamma	Infrared	Microwave	Radio	Visible	Ultraviolet	X-ray
7	3	2	1	4	5	6

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

Gamma	Infrared	Microwave	Radio	Visible	Ultraviolet	X-ray
g	c	b	a	d	e	f

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

Gamma	Infrared	Microwave	Radio	Visible	Ultraviolet	X-ray
A	E	F	G	D	C	B

14. Describe the relationship between wavelength and frequency.

Short λ = high ν

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

16. Describe the relationship between wavelength and energy.

Short λ = high E

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

18. Describe the relationship between frequency and energy.

high ν = high E

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

20. Summary: Circle the correct answer
(long/short) **wavelength(λ)** = ((high/low) **Frequency (ν)** = (high/low) **Energy (E)**

or long λ = low ν = low E