

Answer Key Speed / frequency / wavelength

1. see example $f = 7.31 \times 10^{19} \text{ Hz}$

2. $c = \lambda f \quad \lambda = \frac{c}{f} = \frac{3.00 \times 10^8 \text{ m/s}}{6.01 \times 10^{14} \text{ s}^{-1}} = 4.99 \times 10^{-7} \text{ m} \times \frac{1 \times 10^9 \text{ nm}}{1 \text{ m}} = 499 \text{ nm}$

3. $\lambda = \frac{c}{f} = \frac{3.00 \times 10^8 \text{ m/s}}{640 \times 10^3 \text{ s}^{-1}} = 4.69 \times 10^2 = 469 \text{ m}$

4. $\lambda = \frac{c}{f} = \frac{3.00 \times 10^8 \text{ m/s}}{8.0 \times 10^{14} \text{ s}^{-1}} = 3.75 \times 10^{-7} \text{ m} \times \frac{1 \times 10^9 \text{ nm}}{1 \text{ m}} = 375 \text{ nm}$

5. $\lambda = \frac{c}{f} = \frac{3.00 \times 10^8 \text{ m/s}}{7.66 \times 10^{14} \text{ s}^{-1}} = 3.92 \times 10^{-7} \text{ m} = 392 \text{ nm}$

6. $c = \lambda f \quad f = \frac{c}{\lambda} = \frac{3.00 \times 10^8 \text{ m/s}}{6.33 \times 10^{-7} \text{ m}} = 4.74 \times 10^{14} \text{ Hz}$

7. $\lambda = \frac{c}{f} = \frac{3.00 \times 10^8 \text{ m/s}}{4.80 \times 10^{17} \text{ s}^{-1}} = 6.25 \times 10^{-10} \text{ m} \times \frac{1 \times 10^9 \text{ nm}}{1 \text{ m}} = 0.625 \text{ nm}$

8. $\lambda = \frac{c}{f} = \frac{3.00 \times 10^8 \text{ m/s}}{107.9 \times 10^6 \text{ s}^{-1}} = 2.78 \text{ m}$

9. $E = 5.6 \times 10^{-19} \text{ J}$ see example

10. $E = hf = (6.63 \times 10^{-34} \text{ J}\cdot\text{s})(5.02 \times 10^{20} \text{ s}^{-1}) = 3.33 \times 10^{-13} \text{ J}$

11. $E = \frac{hc}{\lambda} = \frac{(6.63 \times 10^{-34} \text{ J}\cdot\text{s})(3.00 \times 10^8 \text{ m/s})}{(6.4 \times 10^{-7} \text{ m})} = 3.1 \times 10^{-19} \text{ J}$

12. $E = \frac{hc}{\lambda} = \frac{(6.63 \times 10^{-34} \text{ J}\cdot\text{s})(3.00 \times 10^8 \text{ m/s})}{(4.06 \times 10^{-11} \text{ m})} = 4.90 \times 10^{-15} \text{ J}$

13.