

## CLASS EXERCISE #16 - BASTILLE DAY

**(a) What is the direction of the magnetic field of the wave at that point at that time?**

Using the right-hand rule with  $\vec{c}$  north and  $\vec{E}$  up, the magnetic field must be in the east direction.

**(b) What is the wavelength of this wave?**

$$\lambda = c/f = (3.00 \times 10^8 \text{ m/s}) / (5.0 \times 10^{14} \text{ Hz}) = 0.60 \times 10^{-6} \text{ m}$$

or  $0.60 \mu\text{m}$  or  $6.0 \times 10^{-7} \text{ m}$ .

**(c) Determine the period of this wave.**

$$T = 1/f = 1/(5.0 \times 10^{14} \text{ Hz}) = 0.20 \times 10^{-14} \text{ s} = 2.0 \times 10^{-15} \text{ s}$$

**(d) How much time elapses between when the electric field is a maximum in the up ( $\odot$ ) direction and the next time it is a maximum in the up ( $\odot$ ) direction?**

From a maximum in one direction to a maximum in the other direction is one period, or  $T = 2.0 \times 10^{-15} \text{ s}$ .

**(e) How much time elapses between when the magnetic field is a maximum in one direction and the next time it is a maximum in the opposite direction?**

From a maximum in one direction to a maximum in the other direction is half a period, or  $T/2 = 1.0 \times 10^{-15} \text{ s}$ .