# Thursday Reading Assessment: Unit 5, Electromagnetism

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## 1 Memory Bank

- $c = f\lambda$ ... The relationship between speed of light, $c$, the frequency, $f$, and the wavelength, $\lambda$.
- $c = 299,792,458$ m s$^{-1}$, or $c \approx 0.3$ m ns$^{-1}$.
- $\bar{S} = E^2/(2c\mu_0)$ ... Average **intensity**, or W m$^{-2}$, of electromagnetic energy.

## 2 Electromagnetic Waves and Energy

1. (a) What is the wavelength of a 1 GHz radio wave? (b) What is the frequency of a 900 MHz cell phone signal? (c) What is the speed of light in ice, if we observe a frequency of 100 MHz, and a wavelength of 1.69 m?

2. In part (c) of the previous exercise, what is the ratio of the speed of light in ice to the speed found in the memory bank? *This is known as the index of refraction.*

3. What is the intensity of a wave created by an E-field with magnitude 1000 V m$^{-1}$ at the source?

4. How do you think the previous result scales with distance from the source?