34.23. **Model:** Electromagnetic waves are sinusoidal.

Solve: **(a)** The electric field is $E_y = E_0 \cos(kx - \omega t)$, where $E_0 = 20$ V/m and $k = 6.28 \times 10^8$ m^{-1}. The wavelength is

$$\lambda = \frac{2\pi}{k} = \frac{2\pi}{6.28 \times 10^8 \text{ m}^{-1}} = 1.00 \times 10^{-8} \text{ m} = 10.0 \text{ nm}$$

(b) The frequency is

$$f = \frac{c}{\lambda} = \frac{3.0 \times 10^8 \text{ m/s}}{1.00 \times 10^{-8} \text{ m}} = 3.0 \times 10^{16} \text{ Hz}$$

(c) The magnetic field amplitude is

$$B_0 = \frac{E_0}{v_{em}} = \frac{20 \text{ V/m}}{3.0 \times 10^8 \text{ m/s}} = 6.67 \times 10^{-8} \text{ T}$$