The E field of a plane EM wave is

\[ E(z, t) = \hat{j}E_0 \sin(kz + \omega t) \]

The magnetic field of this wave is given by

1. \[ B(z, t) = \hat{i}B_0 \sin(kz + \omega t) \]
2. \[ B(z, t) = -\hat{i}B_0 \sin(kz + \omega t) \]
3. \[ B(z, t) = \hat{k}B_0 \sin(kz + \omega t) \]
4. \[ B(z, t) = -\hat{k}B_0 \sin(kz + \omega t) \]
5. Don't Have A Clue
Answer: 1. \[ \mathbf{B}(z, t) = \hat{\mathbf{i}} B_0 \sin(kz + \omega t) \]

From the argument of the \( \sin(kz + \omega t) \), we know the wave propagates in the \(-z\) direction.

So we have \[ \hat{\mathbf{E}} \times \hat{\mathbf{B}} = \hat{\mathbf{j}} \times ? = -\hat{\mathbf{k}} \]

\[ \Rightarrow \hat{\mathbf{B}} = \hat{\mathbf{i}} \]
The B field of a plane EM wave is

\[ B(y, t) = \hat{k}B_0 \sin(ky - \omega t) \]

The electric field of this wave is given by

1. \( E(y, t) = \hat{j}E_0 \sin(ky - \omega t) \)
2. \( E(y, t) = -\hat{j}E_0 \sin(ky - \omega t) \)
3. \( E(y, t) = \hat{i}E_0 \sin(ky - \omega t) \)
4. \( E(y, t) = -\hat{i}E_0 \sin(ky - \omega t) \)
5. Don't Have A Clue
Answer: 4. \( \mathbf{E}(y,t) = -\hat{i}\sin(ky - \omega t) \)

From the argument of the \( \sin(ky - \omega t) \), we know the wave propagates in the +\( y \) direction.

So we have \( \hat{\mathbf{E}} \times \hat{\mathbf{B}} = ? \times \hat{k} = \hat{j} \)

\[ \Rightarrow \hat{\mathbf{E}} = -\hat{i} \]