1) What is the energy of a light (\( \lambda = 4.0 \text{ nm} \)) photon?  
\[ E = \frac{hc}{\lambda} \]  
\[ = \frac{(6.626 \times 10^{-34} \text{ J s})(3 \times 10^8 \text{ m/s})}{4.0 \times 10^{-7} \text{ m}} \]  
\[ = 4.95 \times 10^{-19} \text{ J} \]

2) Which of the following electric fields represents a uniform plane wave traveling in the \( +x \)-direction? 
\[ \text{Answer Options:} \] 
\[ \mathbf{E}(x, t) = \mathbf{E}_0 \mathbf{e}_x \] 
\[ \mathbf{E}(x, t) = \mathbf{E}_0 \mathbf{e}_y \] 
\[ \mathbf{E}(x, t) = \mathbf{E}_0 \mathbf{e}_z \] 
\[ \mathbf{E}(x, t) = \mathbf{E}_0 \mathbf{e}_y \] 
\[ \mathbf{E}(x, t) = \mathbf{E}_0 \mathbf{e}_z \]  
No, the answer is incorrect. 

3) The wave equation for the magnetic field \( \mathbf{B}(x, t) \) corresponding to a uniform plane wave propagating in the \( +z \)-direction is 
\[ \nabla \times \mathbf{E} = -\frac{1}{c} \frac{\partial \mathbf{B}}{\partial t} \] 
\[ \nabla \times \mathbf{B} = \mu_0 \mathbf{J} \] 
\[ \nabla \times \mathbf{E} = \frac{1}{c} \frac{\partial \mathbf{B}}{\partial t} \] 
\[ \nabla \times \mathbf{B} = \mu_0 \mathbf{J} \] 
No, the answer is incorrect. 

4) For the electric field \( \mathbf{E}(x, t) = \mathbf{E}_0 \mathbf{e}_x \) given in Question 2, the corresponding magnetic field component is 
\[ \mathbf{E}_x(\mathbf{x}, t) = \mathbf{E}_0 \] 
\[ \mathbf{E}_y(\mathbf{x}, t) = 0 \] 
\[ \mathbf{E}_z(\mathbf{x}, t) = 0 \] 
No, the answer is incorrect. 

5) Given \( \mathbf{E}(x, t) = \mathbf{E}_0 \mathbf{e}_x \) and \( \mathbf{B}(x, t) = \mathbf{B}_0 \mathbf{e}_y \), determine the polarization of the plane wave. 
\[ \text{Linear} \] 
\[ \text{Right circular} \] 
\[ \text{Left circular} \] 
No, the answer is incorrect. 

6) For the electric field \( \mathbf{E}(x, t) = \mathbf{E}_0 \mathbf{e}_x \) given in Question 2, the direction of propagation of the uniform plane wave is 
\[ \text{X-axis} \] 
\[ \text{Y-axis} \] 
\[ \text{Z-axis} \] 
No, the answer is incorrect. 

7) Using the electric field equations given in Question 3, the relative distance periodicity of the medium is 
\[ \lambda \] 
\[ \frac{\lambda}{2} \] 
\[ \frac{\lambda}{4} \] 
No, the answer is incorrect. 

8) The transverse Poynting vector of the uniform plane wave given in Question 3 is 
\[ \mathbf{S}_p(\mathbf{x}, t) = \frac{1}{2} \mathbf{E}(\mathbf{x}, t) \times \mathbf{B}(\mathbf{x}, t) \] 
\[ \mathbf{S}_p(\mathbf{x}, t) = \frac{1}{2} \mathbf{E}(\mathbf{x}, t) \times \mathbf{B}(\mathbf{x}, t) \] 
\[ \mathbf{S}_p(\mathbf{x}, t) = \frac{1}{2} \mathbf{E}(\mathbf{x}, t) \times \mathbf{B}(\mathbf{x}, t) \] 
No, the answer is incorrect. 

9) The electric field of a uniform plane wave that is propagating in the \( +x \)-direction with the propagation vector making an angle of \( 30^\circ \) with respect to the \( +x \)-axis is 
\[ \mathbf{E}(\mathbf{x}, t) = \mathbf{E}_0 \sin(kx - \omega t) \mathbf{e}_x \] 
\[ \mathbf{E}(\mathbf{x}, t) = \mathbf{E}_0 \sin(kx - \omega t) \mathbf{e}_x \] 
\[ \mathbf{E}(\mathbf{x}, t) = \mathbf{E}_0 \sin(kx - \omega t) \mathbf{e}_x \] 
No, the answer is incorrect.