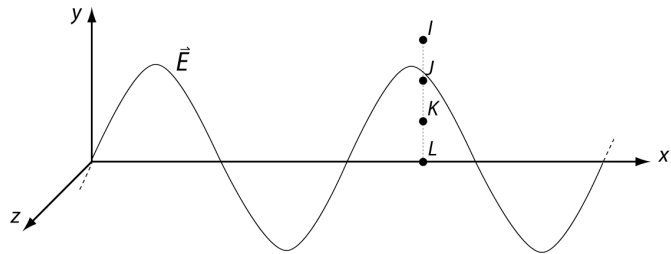


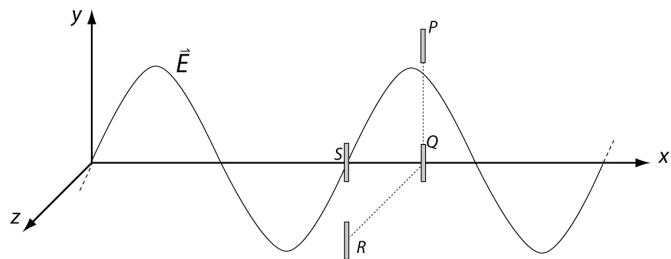
1. The figure on the right shows an electromagnetic *plane* wave at one instant in time. The wave travels in the $+x$ -direction. Four points in space are labeled I, J, K, L.



For the instant shown, rank the points I , J , K , and L according to the magnitude of the *electric field* at these points, from largest to smallest. If the electric field is zero at any of these points, state that explicitly. For example, if you think K is the largest, and the rest are the same, you should answer $K > I = J = L$.

Explain your answer.

2. The figure on the right shows an electromagnetic *plane* wave at one instant in time. The wave travels in the $+x$ -direction. Four antennas are labeled P , Q , R , and S . Antennas P , Q , and S lie in the x - y plane. Antennas P , Q , and R have the same x -coordinate, but R is located out of the page in the x - z plane. All four antennas are oriented parallel to the y -axis.



Rank the *time-averaged signals* received by the antennas P , Q , R , and S , from largest to smallest. If the time-averaged signal is zero at any of these points, state that explicitly. (*Hint: the “time averaged signal” is the signal averaged over several cycles of the wave.*)

Explain your answer.