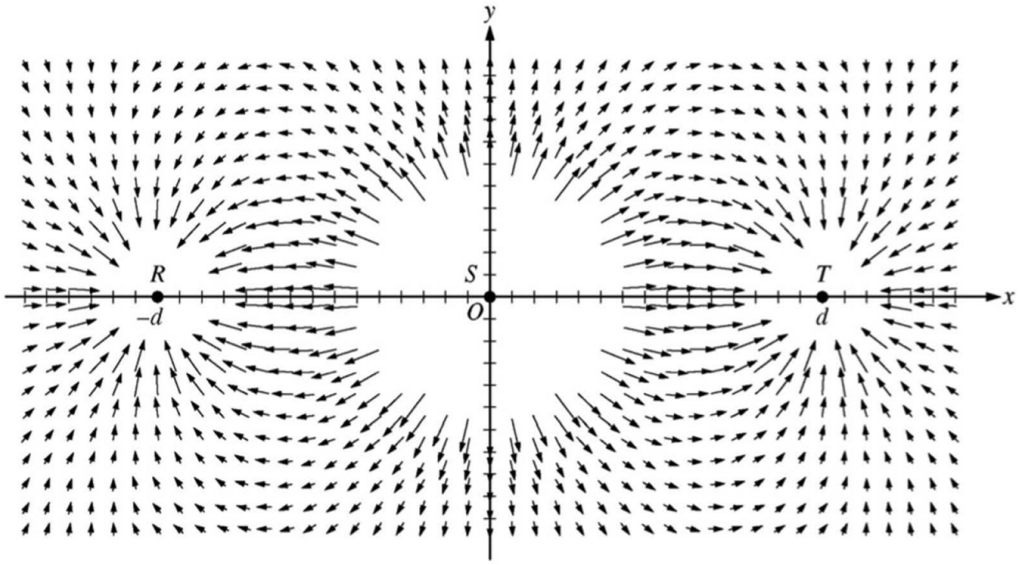


3. The figure above represents the electric field in the vicinity of three small charged objects, R, S, and T. The objects have charges $-q$, $+2q$, and $-q$, respectively, and are located on the x-axis at $-d$, 0, and d. Field vectors of very large magnitude are omitted for clarity.

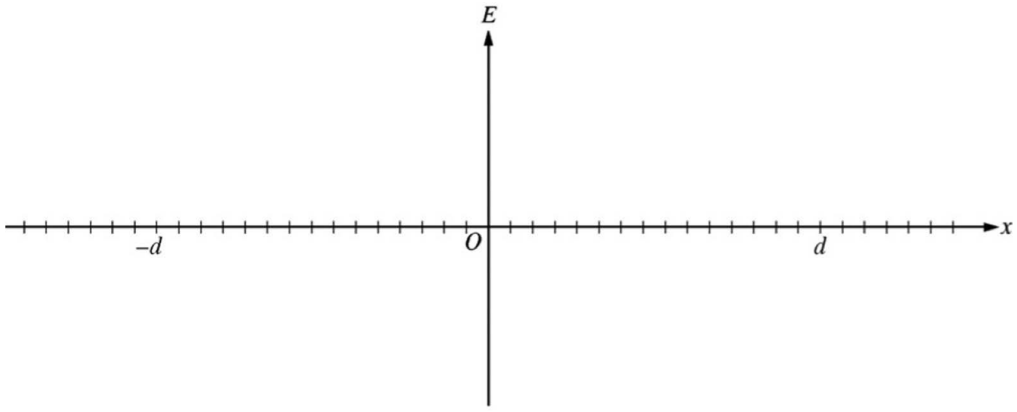
   (a)

   (i) Briefly describe the characteristics of the field diagram that indicate that the sign of the charges of objects R and T is negative and that the sign of the charge of object S is positive.

   (ii) Briefly describe the characteristics of the field diagram that indicate that the magnitudes of the charges of objects R and T are equal and that the magnitude of the charge of object S is about twice that of objects R and T.

   For the following parts, an electric field directed to the right is defined to be positive.

   (b) On the axes below, sketch a graph of the electric field E along the x-axis as a function of position x.



   (c) Write an expression for the electric field E along the x-axis as a function of position x in the region between objects S and T in terms of q, d, and fundamental constants, as appropriate.

   (d) Your classmate tells you there is a point between S and T where the electric field is zero. Determine whether this statement is true, and explain your reasoning using two of the representations from parts (a), (b), or (c).