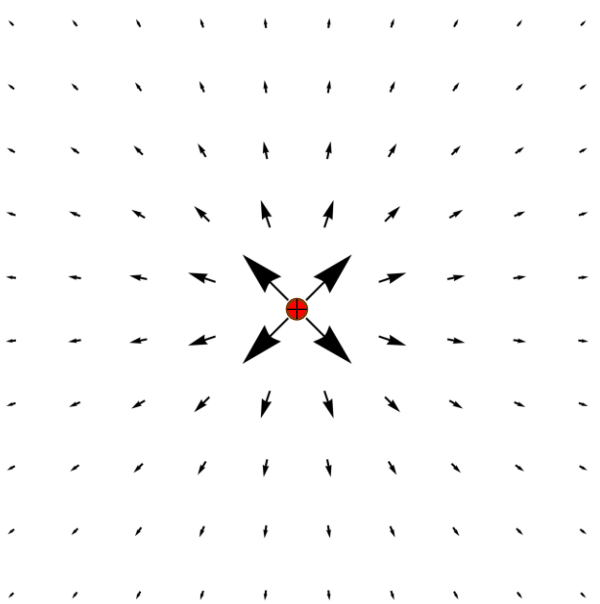
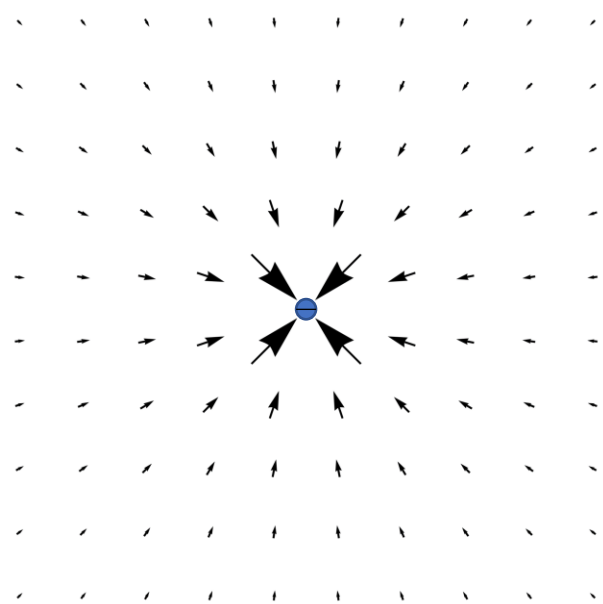
Electric field

Similar to a way in which a fire changes the temperature of its surroundings, an electric charge changes the space by creating an **electric field**. The electric field tells us the force that a positive test charge would feel if it were placed in each point in space. The force at each point is defined by Coulomb's law. Moreover, since forces are vectors, the electric field is what we call a **vector field**.

The simplest cases are the electric fields produced by a positive or negative charge:



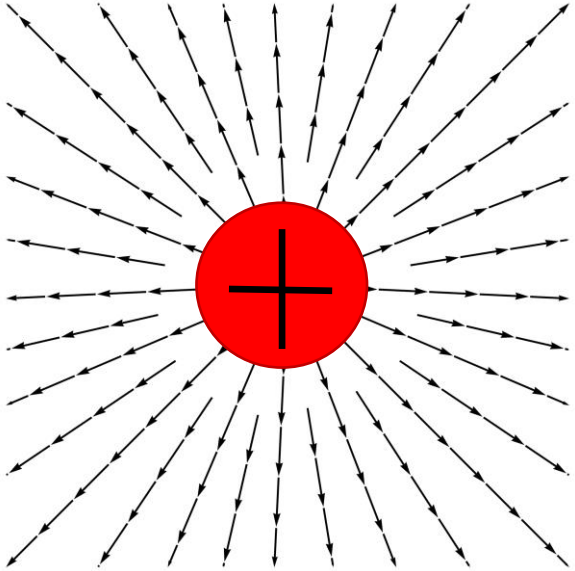
Positive charge



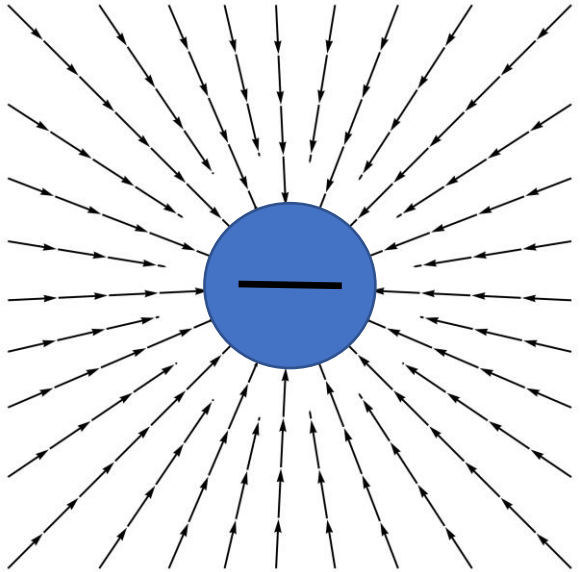
Negative charge

Electric field lines

In order to simplify the visualization of the electric field, we can draw **electric field lines**:



Positive charge

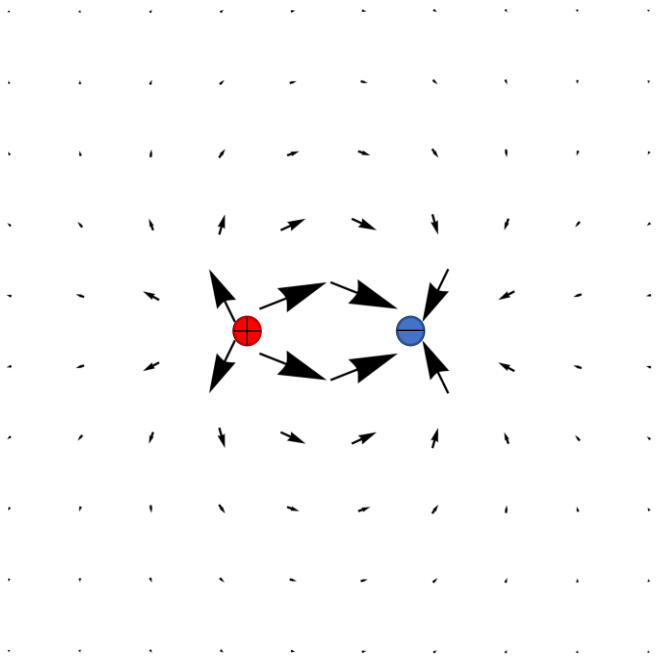


Negative charge

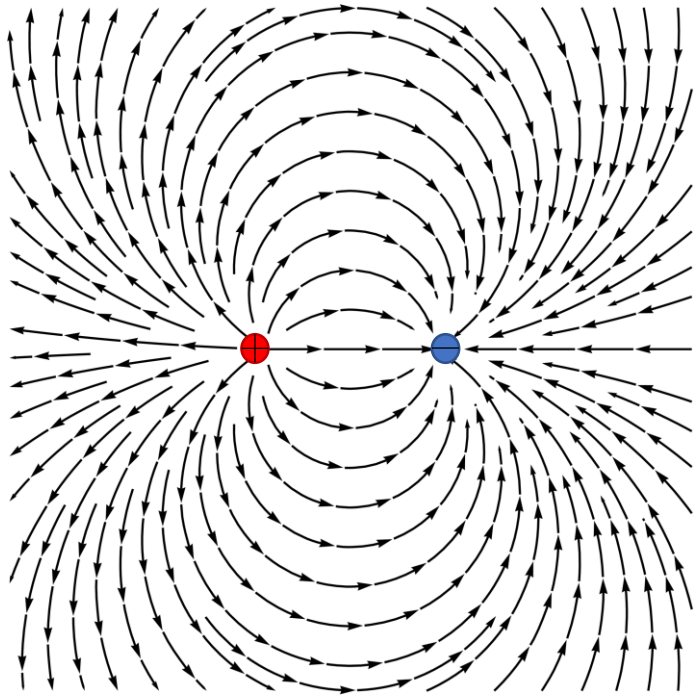
In this case, the direction in which our test charge moves is tangent to each line, and the strength of the force is proportional to the “density of lines”.

More than one charge

The electric field takes into account the presence of all charges in our system. If we have more than one charge, the shape of the electric field will change accordingly.



Electric field of a positive and negative charges put together

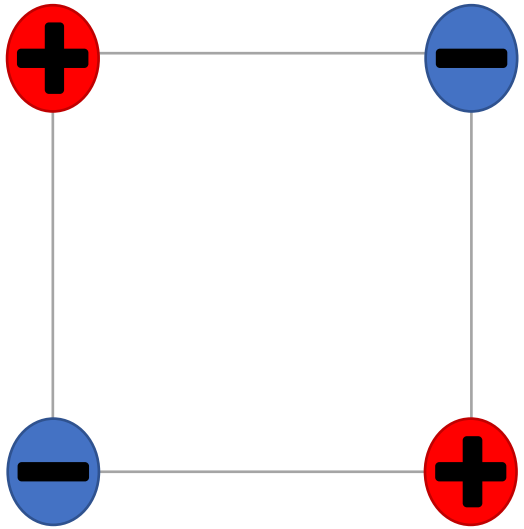


Electric field lines of a positive and negative charges put together

Homework

Problem 1. Draw the electric field in the case of **two positive** charges separated by a distance L.

Problem 2. Four charges of equal magnitude (two positive and two negative) are placed on the corners of a square with sides L. Find the electric field strength at the center of the square.



Bonus: Draw the electric field lines of this configuration. Hint: Think of it as two pairs (since you already know how one pair looks like)