Name _____ Class _____ Date _____

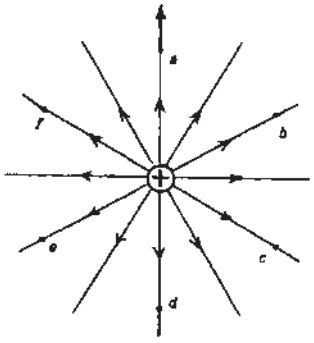
**Concept-Development Practice Page** **33-1**

## *Electric Field*

1. An *electric field* surrounds an electric charge. The field strength at any place in the field can be found by placing a small positive test charge there. Where the force on the test charge is great, the field strength is great; where the force is weak, the field strength is weak. Electric field strength is directly proportional to the force exerted on a positive test charge.

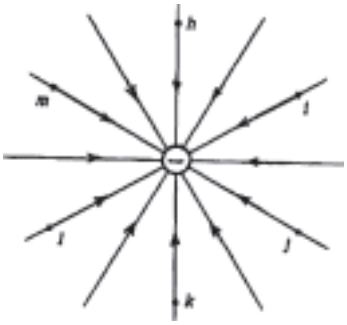
   The direction of an electric field at any point is the same as the direction of the force exerted on the positive test charge.

   Some electric field lines surrounding a positive charge are shown above. They extend radially from the charge. A vector is sketched at point *a* to represent the force that would be exerted on a positive test charge there (its direction shows that like charges repel). Other points *b, c, d, e* and *f,* are all located at the same distance from the positive charge.




   Draw a vector at each of the points *b* – *f* to show the force on the same test charge.

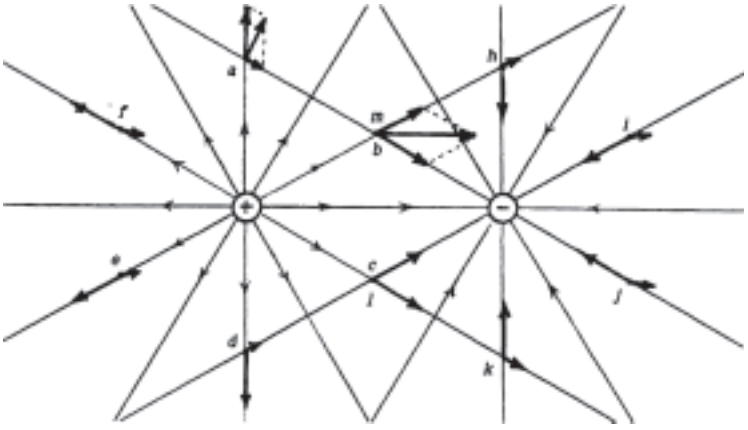
2. The electric field about a negative charge is shown to the right. The field lines point radially inward, in the same direction a positive test charge would be forced. Assume the magnitude of the negative charge is the same as the charge above.




   Draw field vectors at each of the points *h* – *m.*

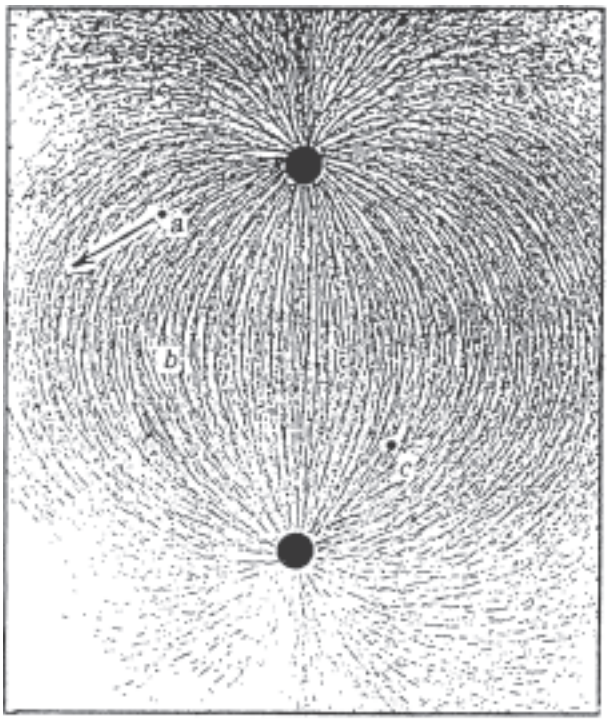
3. The pair of equal and opposite charges of Questions 1 and 2 is shown below. Their individual fields, drawn uninfluenced by each other, overlap to form a field pattern that can be constructed by vector rules. This is shown at locations *a* and *b,* where the two forces combine to a single resultant force. Note that point *b* overlaps point *m*, and also points *c* and *l* overlap. Note how the size of each vector depends on its distance from the charge (inverse-square law). Every point in the field is the result of both the positive and the negative charges.

   By vector rules, show the resultant of all the vector pairs shown. Then sketch in sample vector resultants at a few other places. Does the pattern that emerges agree with the field patterns shown in Figure a on the next page? _____

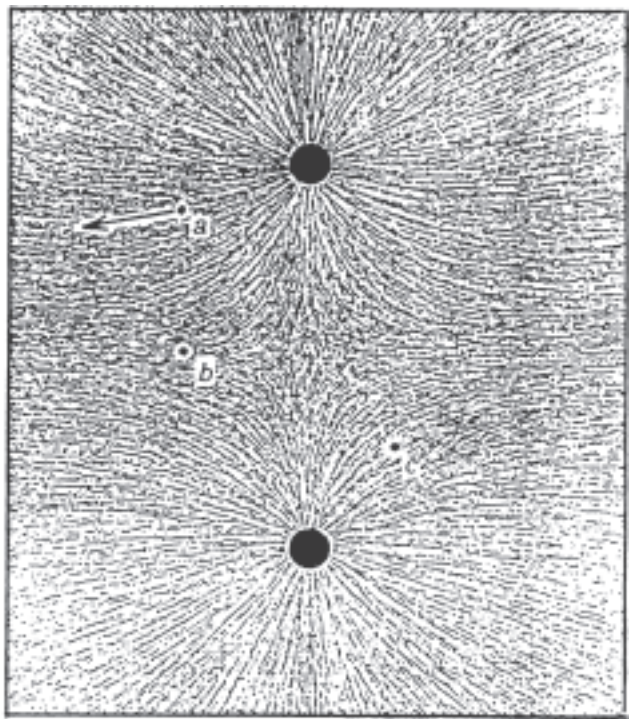



**CONCEPTUAL PHYSICS**

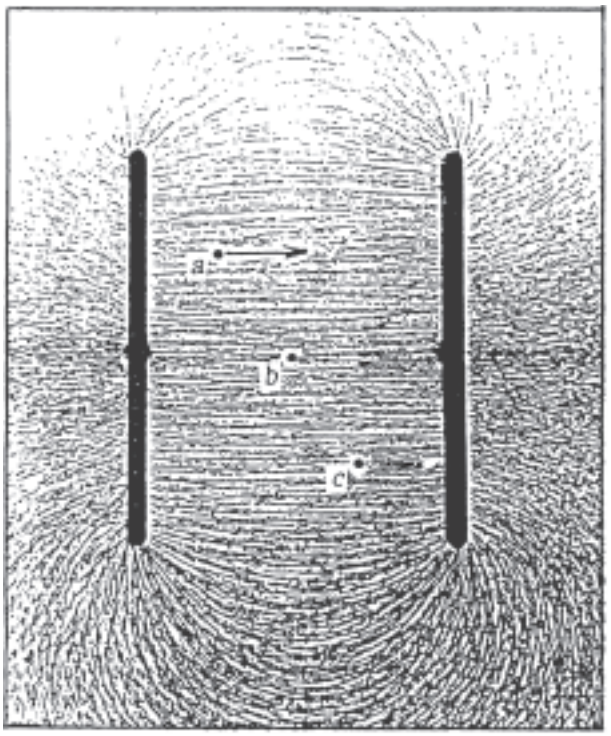
4. A copy of Figure 33.5 in your textbook is shown below. Three points, (*a, b, c*), are indicated on each electric field pattern. Point *a* in each pattern shows the electric field vector at that point. The vector indicates the magnitude and direction of the force that a positive test charge would experience at that point. (A curved field indicates that the force on a nearby test charge would be different in magnitude and direction.) Use the vector at points *a* as a reference and sketch in the electric field vectors for points *b* and *c* in each pattern, using colored ink or pencil.



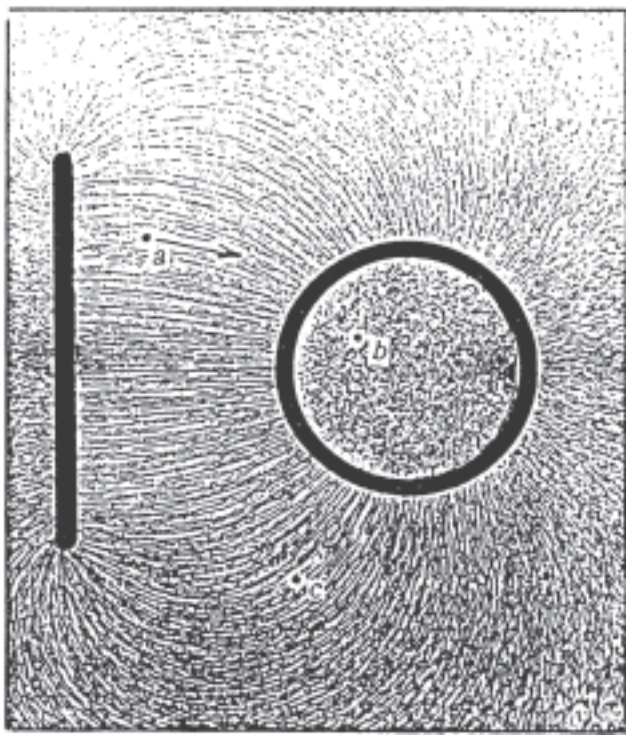

a. Equal and opposite charges




b. Equal like charges




c. Oppositely charged plates




d. Oppositely charged plate and cylinder

**CONCEPTUAL PHYSICS**