

### Electric Field

Read from **Lesson 4** of the **Static Electricity** chapter at **The Physics Classroom**:

<http://www.physicsclassroom.com/Class/estatics/u8l4a.html>

<http://www.physicsclassroom.com/Class/estatics/u8l4b.html>

**MOP Connection:** Static Electricity: sublevels 10 and 11

- The standard metric units of measurements for electric field strength are \_\_\_\_\_.
- The direction of the electric field vector is defined as \_\_\_\_\_  
\_\_\_\_\_.

Use the electric field equations to answer the following questions.

- A test charge of  $+1.0 \times 10^{-6}$  C experiences a force of 0.050 N. The electric field strength is \_\_\_\_\_.
- A test charge of  $+1.0 \times 10^{-6}$  C experiences a force of 0.10 N. The electric field strength is \_\_\_\_\_.
- An object with a charge of  $2.0 \times 10^{-4}$  C creates an electric field. A test charge of  $+1.0 \times 10^{-6}$  C experiences a force of 0.050 N. The electric field strength is \_\_\_\_\_.
- An object with a charge of  $2.0 \times 10^{-4}$  C creates an electric field. A test charge of  $+2.0 \times 10^{-6}$  C experiences a force of 0.10 N. The electric field strength is \_\_\_\_\_.
- An object with a charge of  $4.0 \times 10^{-4}$  C creates an electric field. A test charge of  $+1.0 \times 10^{-6}$  C experiences a force of 0.10 N. The electric field strength is \_\_\_\_\_.

- An object with a charge of **Q** creates an electric field. A positive test charge, **q**, is used to test the strength of the field. Use this scenario to answer the following questions:



- If the charge of the test charge **q** is doubled, then it will experience \_\_\_\_\_ (2X, 4X, 1/2, 1/4-th, the same) force; the electric field strength at this location will be \_\_\_\_\_ (2X, 4X, 1/2, 1/4-th, the same as) the original value.
  - If the charge of the object **Q** is doubled, then the test charge will experience \_\_\_\_\_ (2X, 4X, 1/2, 1/4-th, the same) force; the electric field strength at this location will be \_\_\_\_\_ (2X, 4X, 1/2, 1/4-th, the same as) the original value.
  - If the distance between the charge and the test charge is doubled, then the test charge will experience \_\_\_\_\_ (2X, 4X, 1/2, 1/4-th, the same) force; the electric field strength at this location will be \_\_\_\_\_ (2X, 4X, 1/2, 1/4-th, the same as) the original value.
- Use your understanding of electric force and electric field to fill in the following table.

	Charge creating the E field (C)	Charge used to test the E field (C)	Force experienced by test charge (N)	Electric Field Intensity (N/C)	Distance (fictional units)
a.	$4.0 \times 10^{-4}$ C	$1.0 \times 10^{-6}$ C	0.20 N		d
b.	$4.0 \times 10^{-4}$ C	$2.0 \times 10^{-6}$ C		$2.0 \times 10^5$ N/C	d
c.	$8.0 \times 10^{-4}$ C	$1.0 \times 10^{-6}$ C	0.40 N		d
d.	$8.0 \times 10^{-4}$ C	$2.0 \times 10^{-6}$ C		$4.0 \times 10^5$ N/C	d
e.	$8.0 \times 10^{-4}$ C		0.60 N		d
f.	$8.0 \times 10^{-4}$ C	$1.0 \times 10^{-6}$ C		$1.0 \times 10^5$ N/C	2d
g.	$8.0 \times 10^{-4}$ C	$2.0 \times 10^{-6}$ C			2d
h.	$8.0 \times 10^{-4}$ C		0.10 N		2d
i.	$4.0 \times 10^{-4}$ C			$8.0 \times 10^5$ N/C	0.5 d
j.	$4.0 \times 10^{-4}$ C				0.5 d