



## Achievements and Competencies

### Learning Outcomes

Grades 7-9	Grades 10-12
Heat	Fields
Optics	
Characteristics of Electricity	

Achievements and Competencies are based on the Common Framework of Science Learning Outcomes (K-12) set by the Canadian Council of Ministers of Education (1997).

### Specific Expectations

#### **Grade 7**

##### PHYSICAL SCIENCE

###### Heat

113-4 Analyze the design of a technology and the way it functions on the basis of its impact on their daily lives (e.g., describe how central heating or air-conditioning systems have affected their lives).

In this activity, students are to describe and understand how the Van de Graaff generator allows the fluorescent light bulb to illuminate. This information then allows the student to discuss how lights and electricity work in their homes.

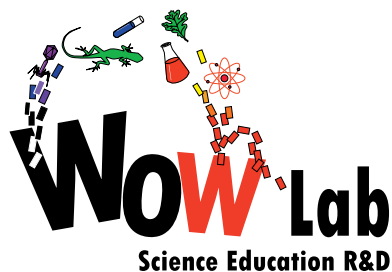
#### **Grade 8**

##### PHYSICAL SCIENCE

###### Optics

209-6 Use tools and apparatus safely (e.g., use lasers appropriately, and consider potential dangers related to the use of various devices producing electromagnetic radiations, such as microwave ovens and ultraviolet lamps).

In this activity the students must use the Van de Graaff to light up a fluorescent light bulb. The student must place the light bulb radially to the Van de Graaff in order for the light bulb to light up. This shows the students how the Van de Graaff works and helps them to understand the direction of the electrical field produced.



a WOW Lab

# BLUEPRINT

## Invisible Energy - Achievements and Competencies

210-11 State a conclusion, based on experimental data, and explain how evidence gathered supports or refutes an initial idea (e.g., conclude that solutes in water affect refraction, and explain the effect of various concentrations of solutes on diffraction).

Using the information they gathered throughout the activity, students need to explain why the light bulb does not light up when held tangentially to the Van de Graaff, but does light up when it is held radially. Students also need to explain if this activity would work using an incandescent light bulb based on their findings.

### **Grade 9**

#### PHYSICAL SCIENCE

##### Characteristics of Electricity

308-14 Identify properties of static electrical charges.

In this activity students need to be able to explain how an electric charge works, how it creates an electric field and how electric charges interact with each other.

308-15 Compare qualitatively static electricity and electric current.

In this activity students need to be able to describe how the static electricity produced creates an electric field for the fluorescent light bulb to light up in.

### **Grade 11 & 12**

#### PHYSICS

##### Fields

328-4 Compare Newton's universal law of gravitation and Coulomb's law, and apply both laws quantitatively.

In this activity the students apply Coulomb's Law to describe the electrostatic interaction between electrically charged particles.

328-5 Analyse, qualitatively and quantitatively, the forces acting on a moving charge and on an electric current in a uniform magnetic field.

In this activity the students analyze the interaction of the electric field and the fluorescent bulb to describe how the field lights up the bulb.