

## Unit 5D

# Electric Potential Energy and Electric Potential Note-Taking Guide **TEACHER**

### ➤ Main Ideas, Key Points, Questions:

*After watching the video segment, write down key points, main ideas, and big questions.*

### ➤ Objective(s):

- *Define electric potential and electric potential energy, and understand how they are different.*
- *Understand how voltage in a circuit depends on electric fields.*

### ➤ Notes:

*During the video segment, use words, phrases, or drawings to take notes.*

### ➤ Summary:

*After watching the video segment, write at least three sentences explaining what you learned. You may ask yourself: "If I was going to explain this to someone else, what would I say?"*

**Answer the following.**

1. How is electric potential defined, and what is another name for it? Circle the correct answer:

- a. electric potential energy, momentum
- b. force acting on a charge, coulomb
- c. **potential energy per charge, voltage**
- d. force per unit charge, kinetic energy
- e. force times electric field, force field

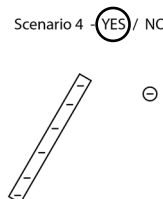
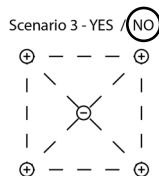
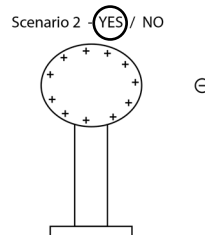
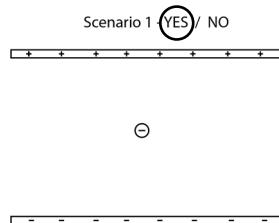
2. What is the difference between electric potential energy and gravitational potential energy? List an object that has one type of potential energy but not the other.

*Electric potential energy is ultimately due to electric charge, while gravitational potential energy is caused by the gravitational fields created by objects with mass. An uncharged, massive object at a non-zero distance above the earth's surface has gravitational potential energy but does not have electrical potential energy.*

3. What is the difference between electric potential energy and electric potential?

*Electric potential energy is the work (force times displacement) that a charge can perform by way of electric force. Electric potential is the electric potential energy divided by the magnitude of the test charge; or the electric potential energy per unit charge.*

4. For the following scenarios, circle YES or NO to indicate whether the negative charge has electric potential energy.



questions continued on next page

Unit 5D\_Notes and Questions TEACHER

**Answer the following.**

5. Explain what it means when an object has potential energy.

*An object with potential energy has the capacity to do work,*

*meaning it can exert a force over some displacement.*

6. In the following statement, circle **INCREASES** or **DECREASES** to indicate how quantities change:

When work is done on a positive test charge to move it from one location to another, electric potential energy (**INCREASES** / **DECREASES**) and electric potential (**INCREASES** / **DECREASES**).

7. Why is electric potential a useful concept? Give your answer in terms of the electric field created by a source charge.

*Electric potential energy depends on two charged objects: the charge creating an electric field*

*and the charge experiencing the field. Electric potential removes the charge experiencing the field*

*from consideration. Therefore, two objects with a different charge in the same electric field will*

*have the same electric potential. Electric potential depends on the field created by a source charge*

*and not on the charges exposed to that field. So electric potential tells us how much a source charge*

*is “pushing” on other charges, independent of what those other charges are.*