Name _____ Period_____

Electric Field Hockey - Fields and Forces 1 - NGSS Aligned

Learning Goals:

a. Explain how objects apply forces to one another, even when the objects do not touch. Justify your explanation with diagrams (screenshots) and words.
b. Write 2 or 3 scientific questions that are "testable" with the simulation.
c. Evaluate another person's questions to determine if they are testable, relevant, and can be investigated in the classroom or with the simulation.

A. The effect of a single charge on the surrounding space.
Push the puck off the screen using other charges. Do not reset. Clear the screen. Select "Field". Use a maximum of 1 charge at a time (red or blue).

1. Investigate the black arrows, and record your observations.

Observations about the black arrows. *Note: The black arrows are NOT force vectors.*

with blue (+) charge at rest	1. 2. 3.
With red (–) charge at rest	1. 2.
With either charge slowly moving	1. 2.
With no charge on the screen with and without the puck	1. 2.

B. The effect of a single charge on a victim (puck)
Reset, turn "field" on, one blue or one red charge and the black puck on the screen. Change the sign of the puck as needed by clicking the check box "Puck is positive".

2. Experiment and then explain (including how you know) what in the simulation indicates the direction and magnitude of the force on the black puck?

3. Experiment and then explain (including how you know) what in the simulation shows that the black arrows are NOT force vectors?

4. Investigate the relationship between the forces on the puck and the black arrows. *Observations are easiest if you do NOT push "start". Simply move the charges with the mouse.*

Observations. (*Consider cause and effect, differences with positive/negative puck, differences with positive/negative charge, other ideas*).
Write a hypothesis about the possible relationships.
What evidence from the simulation supports your hypothesis?

C. Investigate Energy

Use a positive puck. Place one or two red or blue charges on the screen. Click "start".

Recall what you know about kinetic and potential energy, energy transfers, and energy conservation.

5. Write two applicable questions about energy, energy transfers, and the items represented in the simulation. Questions should be testable with the simulation.

    a.

    b.

    c. Trade your questions with another person (or group) and evaluate their questions according to the criteria. Then, print and sign your name in the evaluator's box.

    Why are their questions relevant (or not)?

    How can the simulation be used to test them?

7. Modify your own questions if needed, then experiment with the simulation to answer your own questions about energy and energy transfers. Record observations, conclusions, and evidence below.