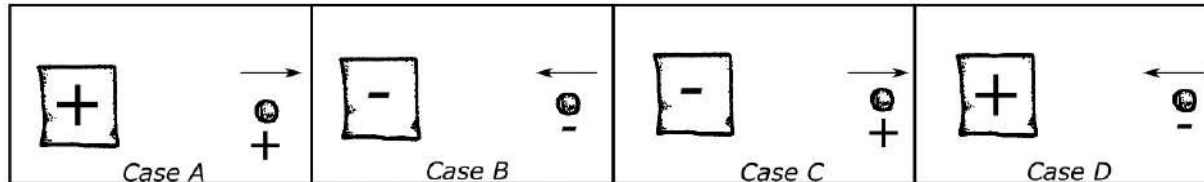


NAME _____

DATE _____

Scenario

Consider a charged box and a charged sphere somewhere in space far from other objects. The box is very massive so that it can be assumed to remain at rest, but the sphere is light and able to freely move. The four cases below show different combinations of signs of charge on the box and sphere as well as the initial direction of the sphere's velocity. Assume that all cases have the same initial speed of the sphere, initial distance from sphere to box, magnitude of charge on sphere, and magnitude of charge on box.

**Data Analysis**

PART A: In which case or cases above is the speed (magnitude of velocity) increasing at the moment shown? Mark all correct answers.

_____ Case A _____ Case B _____ Case C _____ Case D

Justify your answer.

PART B: In which case or cases above is the magnitude of acceleration increasing at the moment shown? Mark all correct answers.

_____ Case A _____ Case B _____ Case C _____ Case D

Justify your answer.

Argumentation

PART C: Carlos and Dominique are asked to rank the net force exerted on the sphere in each of the cases. (For Part C, consider ALL forces acting on the sphere.) Carlos incorrectly says that all four net forces are equal. Dominique correctly says $F_C = F_D > F_A = F_B$.

- i. Even though Carlos is incorrect, he was considering a correct physical principle. Explain the correct idea(s) that could have led to Carlos's conclusion.

- ii. Dominique is correct because she considered something that Carlos did not. State what this additional idea is and explain how it leads to Dominique's correct answer.
