PREFLIGHTS **LESSON 2 – ELECTROMOTIVE FORCE AND MOTIONAL EMF**

LEARNING OBJECTIVES:

1. **Define electromotive force in terms of the forces on charges around a circuit.**
2. **Describe how emf can be created by moving a conductor through a magnetic field.**

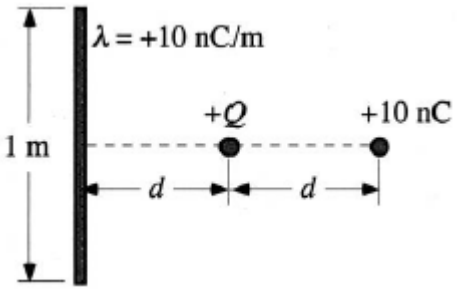
1) Consider problem 7.6 in Griffiths. Briefly describe how you would do this the wrong way by creating a perpetual motion machine.

2) How would you correct your wrong solution from the previous question? You might find it helpful to reference Figure 4.31 and discuss the curl of **E**.

3) Consider problem 7.8 in Griffiths. What is the flux of **B** through the square loop? What is $d\Phi/dt$ as the loop moves away from the wire?

4) Describe how you would do problem 7.8 in Griffiths without using the flux rule. You might want to look at Equation 7.11.

5) ***Note: This is a review question from Physics 361.*** A point charge labeled +*Q* is sitting midway between a +10 nC point charge and a rod of length 1 m with a uniform charge distribution. Explain whether each of the following modifications to this initial situation will **increase**, **decrease**, **change the direction**, or **not change** the net force acting on +*Q* in the original situation. For ease of grading, please use the bold-faced words to describe the change in the net force.



a. The rod is moved to the left, increasing its distance from +*Q*.

b. The length of the rod is reduced while keeping the same total charge.

c. The +10 nC point charge is replaced by a +12 nC point charge.

d. The charge on the rod is changed to negative.

e. The charge density on the rod is reduced to +8nC/m.

f. The length of the rod is doubled while keeping the same charge density.

g. The rod is replaced by a +10 nC point charge placed on the dashed line a distance *d* to the left of +*Q*.

6) What did you find difficult or confusing in the pre-class work? If nothing was difficult or confusing, tell me what you found most interesting. Please be as specific as possible.

7) Document whatever help you received on the preclass work.