

Name: \_\_\_\_\_

DISC: \_\_\_\_\_

Score: \_\_\_\_\_ / 20

Instructions:

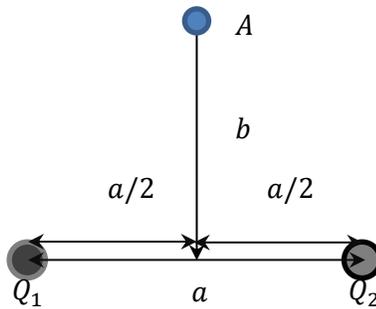
- Do your own work.
- Answer the questions below in the space provided.
- Make sure you show all your work and any equations that you use.
- Please place a box around your answers.
- Remember to give the correct units with all numerical answers

|    |    |    |    |
|----|----|----|----|
| Q1 | Q2 | Q3 | Q4 |
|    |    |    |    |
| 5  | 10 | 5  | 5  |

1. How would you explain the difference between the **electric potential energy** and the **electric potential**? Are these quantities vectors or scalars?

Definitions: 3 pts.  
Vector or Scalar: 2 pts

2. Consider the following situation ( $Q_1, Q_2$  are fixed):



| $a$          | $b$          | $Q_1$               | $Q_2$               | $k$                                     | ELECTRIC POTENTIAL    | WORK     |
|--------------|--------------|---------------------|---------------------|---|-----------------------|----------|
| $3\text{ m}$ | $2\text{ m}$ | $+6.0\ \mu\text{C}$ | $-3.5\ \mu\text{C}$ | $9 \times 10^9\text{ N m}^2/\text{C}^2$ | $V(r) = \frac{kq}{r}$ | $W = Vq$ |

- a. Using the information in the table, find the electric potential at the point A.

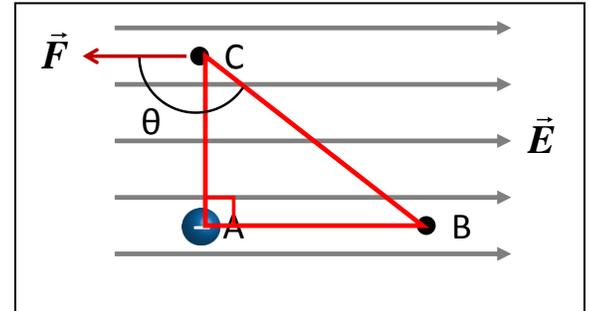
Potential (5 pts):

- b. How much work do you have to do to bring a charge  $q = 1.5 \mu\text{C}$  from far away to the point  $A$ ?

Work (5 pts):

3. Consider the charged particle and uniform electric field shown in the figure. The particle travels from point  $A$  to point  $C$  to point  $B$ . ( $W = F\Delta r \cos \theta$ )
- a. In which step(s) does the *electric force* do work?

Steps (2 pts):



- b. How does the work done by the *electric force* change if the particle travels from point  $A$  to point  $B$  *without* traveling to point  $C$ ? Explain your reasoning.

Change (1 pts):  
Explanation (2 pts):

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