WebAssign
CH17-HW02-FALL2010 (Homework)

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PHYS 272-FALL 2012, Fall 2012
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Current Score : 23 / 23 **Due :** Friday, September 21 2012 11:59 PM EDT

1. 2.5/2.5 points | Previous Answers MI3 17.3.X.049

Locations A, B, and C are in a region of uniform electric field, as shown. Along a path from A to B, the change in potential is -2600 V. The distance from A to B is 0.29 m.

What is the magnitude of the electric field in this region?

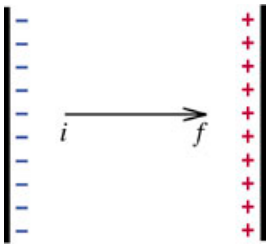
$|\vec{E}|$ = 8965.52 ✓ V/m ✓

- *Read the eBook*
- Section 17.3

2. 1/1 points | Previous Answers MI3 17.4.X.008

In the figure, along the path from *i* to *f*, what is the direction of the electric field?

- (•) left
- ( ) down
- ( ) up
- ( ) cannot be determined
- ( ) right



Is $\Delta V = V_f - V_i$ positive or negative?

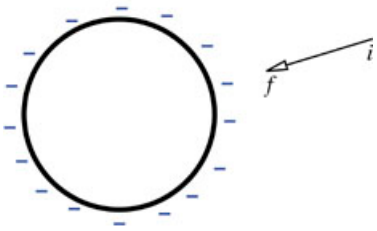
- (•) positive
- ( ) negative
- ( ) undefined because ΔV is zero

- *Read the eBook*
- Section 17.4

3. 1/1 points | Previous Answers MI3 17.4.X.048

In the figure, along the path from *i* to *f*, what is the direction of the electric field?

- (•) down toward the left
- ( ) cannot be determined
- ( ) up toward the right

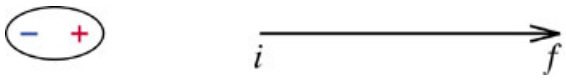


Is $\Delta V = V_f - V_i$ positive or negative?

- ( ) positive
- ( ) undefined because ΔV is zero
- (•) negative

- *Read the eBook*
- Section 17.4

4. 1.5/1.5 points | Previous Answers MI3 17.4.X.009



In the figure, along the path from *i* to *f*, what is the direction of the electric field?

- (•) right
- ( ) cannot be determined
- ( ) up
- ( ) down
- ( ) left

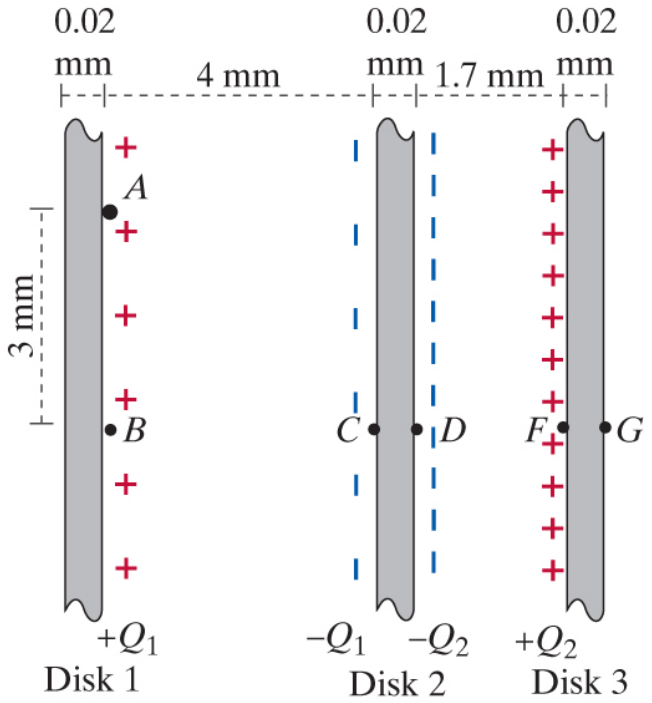
Is $\Delta V = V_f - V_i$ positive or negative?

- ( ) positive
- ( ) undefined because ΔV is zero
- (•) negative

- *Read the eBook*
- Section 17.4

5. 11/11 points | Previous Answers MI3 17.5.P.065

Three charged metal disks are arranged as shown (cutaway view). The disks are held apart by insulating supports not shown in the diagram. Each disk has an area of 2.5 m^2 (this is the area of one flat surface of the disk). Use the value 8.85e-12 $C^2/(N \cdot m^2)$ for ε_0.The charge Q_1 = 3e-8 coulombs, and the charge Q_2 = 4e-7 coulombs.



What is the magnitude of the electric field in the region between disks 1 and 2?

$|\vec{E}_{12}|$ = 1355.93 ✓ V/m

What is the direction of the electric field between disks 1 and 2? +x ✓

Which of the following statements are true? Choose all that apply.

- [x] Along a path from *A* to *B* $\vec{E} \perp \Delta\vec{l}$
- [ ] $V_B - V_A = -((Q_1/2.5)/\varepsilon_0)*(0.003)$ volts
- [x] $V_B - V_A = 0$

✓

To calculate $V_C - V_B$, which path should you choose?

- (•) A path starting at B and ending at C
- ( ) It doesn't matter whether the path starts or ends at B
- ( ) A path starting at C and ending at B

✓

The sign of $V_C - V_B$ should be:

- (•) Negative, because $\Delta\vec{l}$ is in the same direction as $\vec{E}$
- ( ) Zero - no sign.
- ( ) Positive, because $\Delta\vec{l}$ is opposite to the direction of $\vec{E}$

✓

What is the potential difference V_C - V_B?

V_C - V_B = -5.424 ✓ volts

What is the potential difference V_D - V_C?

V_D - V_C = 0 ✓ volts

What is the potential difference V_F - V_D?

V_F - V_D = 30.734 ✓ volts

What is the potential difference V_G - V_F? V_G - V_F = 0 ✓ volts

What is the potential difference V_G - V_A? V_G - V_A = 25.31 ✓ volts

The charged disks have tiny holes which allow a particle to pass through them. An electron which is traveling at a fast speed approaches the plates from the left side. It travels along a path from *A* to *G*. Since no external work is done on the system of plates + electron,

$\Delta K + \Delta U = W_{ext} = 0$

Consider the following states: Initial, electron at location *A*. Final, electron at location *G*.

What is the change in potential energy of the system?

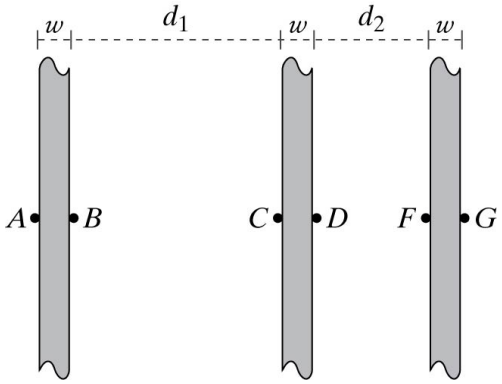
ΔU = -4.05e-18 ✓ joules

What is the change in kinetic energy of the electron?

ΔK = 4.05e-18 ✓ joules

- *Read the eBook*
- Section 17.5

6. 6/6 points | Previous Answers MI3 17.5.P.067



Three very large charged metal plates are arranged as shown. The radius of each plate is 4 meters, and each plate is w = 0.05 mm thick. The separation d_1 is 6 mm, and the separation d_2 is 2 mm. Each plate has a tiny hole in it, so it is possible for a small charged particle to pass through all the plates.

You are able to adjust the apparatus by varying the electric field in the region between location *D* and location *F*. You need to adjust this setting so that a fast moving electron moving to the right, entering at location *A*, will have lost exactly 5.4e-18 joules of kinetic energy by the time it reaches location *G*. Using a voltmeter, you find that the potential difference $V_C - V_B$ = -17 volts.

Consider the system of (electron + plates). Neglecting the small amount of work done by the gravitational force on the electron, during this process (electron going from *A* to *G*):

$\Delta K + \Delta U$ = 0 joules

What is the change in potential energy for the system during this process?

ΔU = 5.4e-18 joules

$V_G - V_A$ = -33.75 volts

$V_F - V_D$ = -16.75 volts

What is the magnitude of the electric field in the region between location *D* and location *F*?

$|\vec{E}|$ = 8375 V/m

What is the direction of the electric field in this region? right

- *Read the eBook*
- Section 17.5