Uniform Electric Fields Practice Name:_____

Reflection and Self-Assessment

Completion: Circle the statement that best describes the completion of this practice.

- I completed every question on the practice.
- I did not complete some questions on the practice because:

_____

Answer Checking: Circle the statement that best describes how you checked your answers

- I checked all my answers against the key at the back and corrected any that were incorrect.
- I did not check all my answers and correct any mistakes because:

_____

Online Worked Solution: Circle the statement that best describes how you used the online worked solutions.

- I did not use the online worked solution at all.
- I used the online solution to understand some questions I got incorrect.
- I used the online solution to help me learn how to answer some questions.

Confidence: Circle the statement that best describes your confidence in answering questions of this type in the future.

- I am confident I can answer nearly any question of this type correctly without using notes or other assistance.
- I am confident I can answer **MOST** questions of this type correctly without using notes or other assistance.
- I am **NOT** confident I can answer most questions of this type correctly without using notes or other assistance.

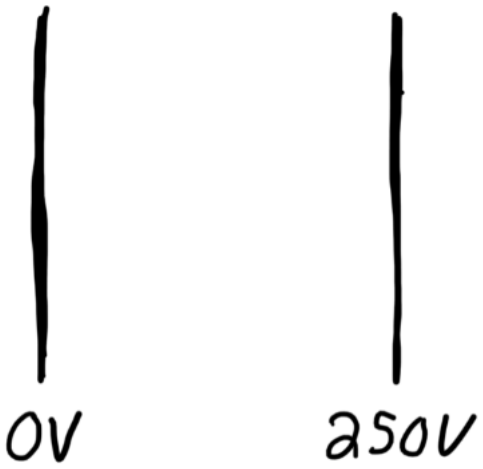
Time: Circle the statement below that best describes the total amount of time you spent actively working on this practice:

Less than an hour	Between one and two hours	Between two and three hours	Between three and four hours	More than four hours

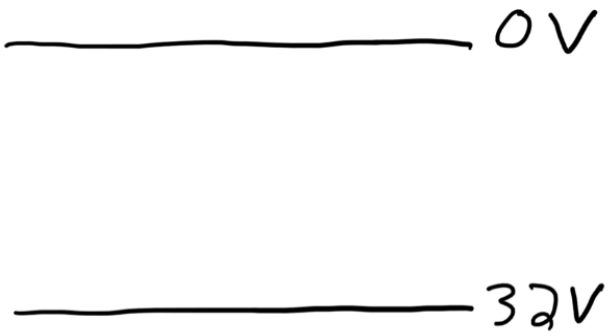
Uniform Electric Fields Practice Name:_____

1. Sketch the electric field with direction indicated between each of the following sets of plates

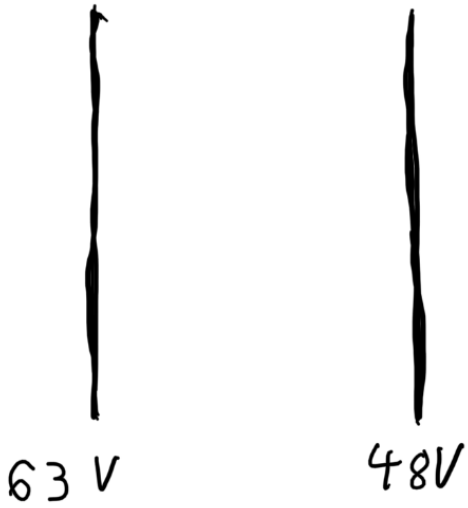
a.



b.



c.



Uniform Electric Fields Practice Name:_____

2. The potential difference between two plates is 325 V, what is the electric field strength between the plates if they are:

    a. 0.25 metres apart

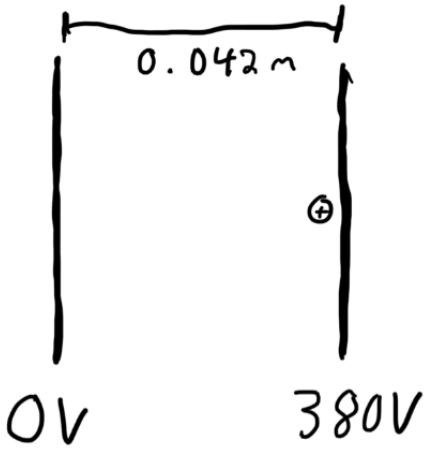
    b. 0.025 metres apart

    c. 0.0025 metres apart

3. What does it mean that the electric field strength between two plates is “uniform”?

Uniform Electric Fields Practice Name:_____

4. A $+4.5\ \mu C$ charge of mass 0.025 kg is placed near the positive plate of a capacitor which has the plates 4.2 cm apart.
   a. What is the electric field strength between the plates?



   b. What is the electric force acting on the charge while it is moving between the plates?

   c. What is the acceleration of the charge while it is moving between the plates if no other forces act on it?

   d. Use the kinematics equation $v_f^2 = v_o^2 + 2ad$ to determine the final speed of the charge.

   e. Use the formulas $W = q\Delta v$ and $E_k = \frac{1}{2}mv^2$ to determine the final speed of the charge (you should get the same answer as you got for d).

Uniform Electric Fields Practice Name:_____

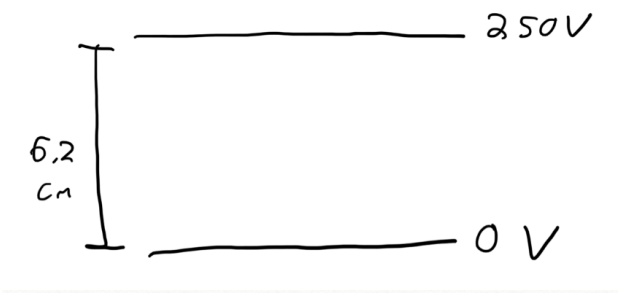
5. What is the potential difference between two plates 6.3cm apart if the electric field between them has a strength of 2500 N/C?

6. What is the potential difference between two plates 2.6cm apart if a 6.6 μC charge experiences an electric force of 0.019 N?

7. What is the distance between two plates if the electric field between them has a strength of $65000\ N/C$ and the potential difference between the plates is 7600 volts?

Uniform Electric Fields Practice Name:_____

8. A pair of plates, with a potential difference of 250 volts and a separation of 6.2 cm are put horizontally on Earth, so that electric force and gravity affect objects between the plates. Determine the net force acting on each of the following objects and the direction they are accelerating (up or down)



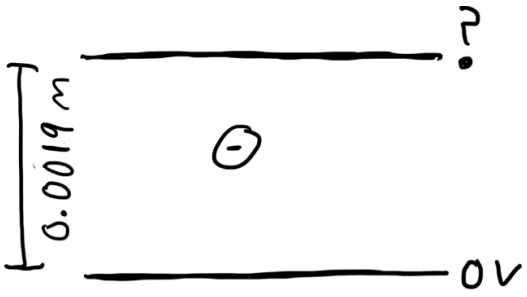
   a. A 0.052 kg object with a charge of $230\ \mu C$.

   b. A 0.082 kg object with a charge of $-62\ \mu C$

   c. A 0.062 kg object with a charge of $-930\ \mu C$

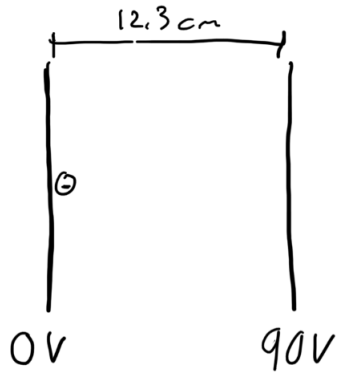
Uniform Electric Fields Practice Name:_____

9. A $-2.3 \times 10^{-9} C$ charge with a mass of 0.0026 kg is perfectly suspended between two plates, with the electric force pushing it up perfectly balanced by the force of gravity pushing it down. What is the potential difference between the plates if the distance between them is 1.9 mm?



Uniform Electric Fields Practice Name:_____

10. Two plates with a potential difference of 90.0 V are separated by a distance of 12.3 cm and placed horizontally on Earth so that objects between the plates are affected both by gravity and by the electric force, a 0.00270kg, -9.30μC charged object is placed on the negative plate.



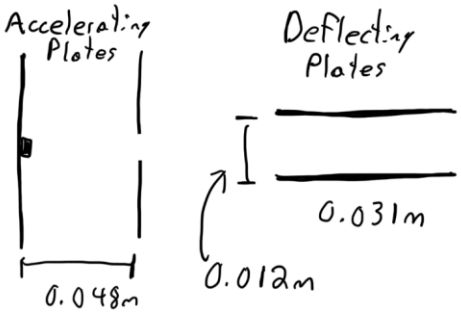
    a. What is the acceleration of the object due to the electric force?

    b. How long will it take the charge to move from the negative plate to the positive plate?

    c. How far will the charge have dropped in that time due to gravity?

Uniform Electric Fields Practice Name:_____

11. A cathode ray tube is a device used in pre-flatscreen TV's, the key idea is to control a beam of electrons which hit different parts of the screen and cause them to change colour. There are two sets of plates used, the first accelerates a beam of electrons, the second deflects the beam of electrons. By controlling the potential differences of the plates, the beam can be very precisely directed.



a. If the distance between the accelerating plates is 4.8 cm, and their potential difference is 120 volts, what will be the velocity of an electron leaving the positive plate if it starts from rest on the negative plate. (Mass of an electron is about 9.11×10^{-31}kg and charge of an electron is about -1.6×10^{-19} C)

b. At the speed found in a, how long will it take an electron to travel the 0.031 m length of the deflecting plates?

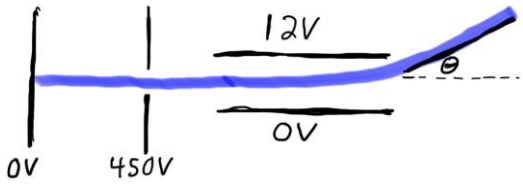
c. If the top deflecting plate has a potential of 25 volts and the bottom plate has a potential of 0 volts, what will the upward acceleration of the electron be while it is between the deflecting plates?

d. Using the acceleration found in c and the time found in b what will be the final vertical velocity of the electrons leaving the deflecting plates?

e. What is the total velocity of the electrons (magnitude and direction) as they leave the deflecting plates?

Uniform Electric Fields Practice Name:_____

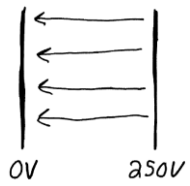
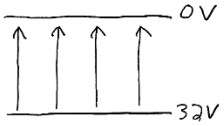
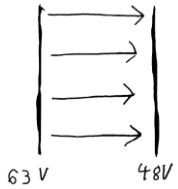
12. In a cathode ray tube, a stream of electrons is accelerated by being pulled across a potential difference of 450 V between two vertical parallel pates.



Then the stream is directed towards 11 cm long horizontal plates which are separated by a distance of 1.2 cm and have a potential difference of 12V between them. Determine the angle of deflection of the electron stream. The mass of an electron is approximately 9.11×10^{-31} kg, and its charge is approximately -1.6×10^{-19}C.

Uniform Electric Fields Practice Name:_____

Uniform Electric Fields Practice Name:_____

Answer Key				
1a) 	1b) 	1c) 	2a) 1300 N/C	2b) 13 000 N/C
2c) 130 000 N/C	3) Everywhere between the plates the strength and direction of the field is the same	4a) 9.0×10^3 N/C	4b) 0.041 N	4c) 1.6 m/s^2
4d) 0.37 m/s	4e) 0.37 m/s	5) 160 V	6) 75 V	7) 0.12 m
8a) 1.4 N down	8b) 0.55 N down	8c) 3.1 N up	9) 21 000 V	10a) 2.52 m/s^2
10b) 0.31 sec	10c) 0.48 m	11a) 6.5×10^6 m/s	11b) 4.8×10^{-9} sec	11c) 3.7×10^{14} m/s^2
11d) 1.7×10^6 m/s	11e) 6.7×10^6 m/s, 15° above right	12) 7.0° above		