**PHYSICS 2021 - 22 January 24, 2022**

**Today’s Agenda (Day 93)**

1. HOUSEKEEPING ITEMS

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1. HOMEWORK CHECK:

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1. CLASS ACTIVITY

🡪BEGIN: Chapter 21

1. Section 21.1 – Measuring Electric Fields
2. Section 21.2 – Application of Electric Fields

HOMEWORK:

* READ: Chapter 21 – Electric Field
* STUDY: Chapter 21 Test

<http://glencoe.mheducation.com/sites/0078807220/student_view0/self-check_quizzes.html>

Ch 20 – Static Electricity

|  |  |  |  |
| --- | --- | --- | --- |
| Electrostatics | Neutral | Insulator | Conductor |
| Electroscope | Charging by conduction | Charging by induction | Grounding |
| Coulomb’s law | Coulomb | Elementary charge |  |

Ch 21 – Electric Field

|  |  |  |  |
| --- | --- | --- | --- |
| Electric field | Electric field line | Electric potential difference | Volt |
| Equipotential | Capacitor | capacitance |  |

REMINDERS:

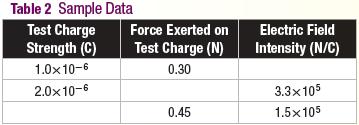
* **QUIZ: Ch 20 & 21 Vocabulary – Jan. 25**
* TEST: Chapter 21 🡪 Jan. 27

**PHYSICS 2021 - 22 SECTION REVIEW**

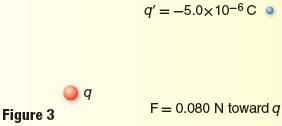
**CH 21 PRACTICE PROBLEMS**

Section 21.1 – Measuring Electric Fields

1. A positive test charge of 5.0×10−6 C is in an electric field that exerts a force of 2.0×10−4 N on it. What is the magnitude of the electric field at the location of the test charge?
2. A negative charge of 2.0×10−8 C experiences a force of 0.060 N to the right in an electric field. What are the field’s magnitude and direction at that location?
3. Suppose that you place a 2.1×10−3-N pith ball in a 6.5×104 N/C downward electric field. What net charge (magnitude and sign) must you place on the pith ball so that the electrostatic force acting on that pith ball will suspend it against the gravitational force?
4. Complete Table 2 using your understanding of electric fields.



1. A positive charge of 3.0×10−7 C is located in a field of 27 N/C directed toward the south. What is the force acting on the charge?
2. A negative test charge is placed in an electric field as shown in Figure 3. It experiences the force shown. What is the magnitude of the electric field at the location of the charge?



1. You are probing the electric field of a charge of unknown magnitude and sign. You first map the field with a 1.0×10−6-C test charge, then repeat your work with a 2.0×10−6-C test charge.

a) Would you measure the same forces at the same place with the two test charges? Explain.

b) Would you find the same field strengths? Explain

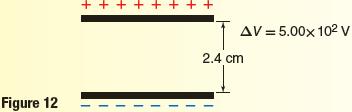
1. What is the magnitude of the electric field at a position that is 1.2 m from a 4.2×10−6-C point charge?
2. What is the magnitude of the electric field at a distance twice as far from the point charge in the previous problem?
3. The electric field that is 0.25 m from a small sphere is 450 N/C toward the sphere. What is the net charge on the  sphere?
4. How far from a point charge of +2.4×10−6 C must you place a test charge in order to measure a field magnitude of 360 N/C?
5. Explain why the strength of the electric field exerted on charge q′ by the charged body q is independent of the charge on q′. Hint: Use mathematics to prove your point.

Section 21.2 – Applications of Electric Fields

1. The electric field intensity between two large, charged parallel metal plates is 6000 N/C. The plates are 0.05 m  apart. What is the electric potential difference between them?
2. A voltmeter reads 400 V across two charged, parallel plates that are 0.020 m apart. What is the magnitude of

the electric field between them?

1. What electric potential difference is between two metal plates that are 0.200 m apart if the electric field between those plates is 2.50×103 N/C?
2. When you apply a potential difference of 125 V between two parallel plates, the field between them is 4.25×103 N/C. How far apart are the plates?
3. You apply a potential difference of 275 V between two parallel plates that are 0.35 cm apart. How large is the electric field between the plates?
4. What work is done on a 3.0-C charge when you move that charge through a 1.5-V electric potential difference?
5. What is the magnitude of the electric field between the two plates shown in Figure 12?



1. An electron in an old television picture tube passes through a potential difference of 18,000 V. How much work is done on the electron as it passes through that potential difference?
2. The electric field in a particle accelerator has a magnitude of 4.5×105 N/C. How much work is done to move a proton 25 cm through that field?
3. A drop is falling in a Millikan oil-drop apparatus with no electric field. What forces are acting on the oil drop, regardless of its acceleration? If the drop is falling at a constant velocity, describe the forces acting on it.
4. An oil drop weighs 1.9×10−15 N. You suspend it in an electric field of 6.0×103 N/C. What is the net charge on the drop? How many excess electrons does it carry?
5. An oil drop carries one excess electron and weighs 6.4×10−15 N. What electric field strength do you need to suspend the drop so it is motionless?
6. Suppose that you apply an electric potential difference of 6.0 V across a 2.2-μF capacitor. What does the magnitude of the net charge on one plate need to be to increase the electric potential difference to 15.0 V?
7. A sphere is charged by a 12-V battery and suspended above Earth as shown in Figure 17. What is the net charge on the sphere?

