GENERAL PHYSICS 2
Remote Laboratory Activity No. 1
ELECTRIC CHARGE PARTICLES

Electrically charged particles are commonly classified according to its nature as positive (+) and negative (-) to demonstrate its distinguished characteristics and interaction potentials between other particles, neither as repulsive nor attractive.

Learning Target/s

At the end of the remote laboratory activity, I should be able to:

- Show the interaction between electrostatic charged particle

Resource Requirements

- Thread
- A wool fabric/cloth, tissue paper
- Plastic Ruler
- 1 inch Aluminum Foil Strip
- 1 inch Bond Paper strip
- 1 pc Ballpen tube
- Metal rod/thick copper wire
- Drinking glass
- Computer/Laptop with Internet Connection

Procedures and Analysis

Activity 1.

Note:
Perform this activity with the supervision and help of your guardian/parent. Execute these tasks in an area with low humid areas. Effects may not be able to observe in a humid environment. Ask your guardian/parent to take a photo documentation while performing the remote laboratory activities.

1. Using a thread, hang a 1-inch bond paper strip at the edge of the table, let it free to move and away from nearby obstructions.

2. Place horizontally the wire in the drinking glass. Place this near to the bond paper strip (but not touching the strip).

3. Get a wool fabric/cloth (or tissue paper) and rub the ruler in at least 15 times. Place this near the end of the wire parallel to the paper strip. What do you observe to the paper strip?

4. Allow the ruler to touch the paper strip. Get a wool fabric/cloth (or tissue paper) and rub again the ruler. Place the ruler near the paper strip but do not let touching the end of the wire opposite the paper strip. Repeat the procedures in Step 1 to 4 at least 3 times and write your observations.

5. Perform again the Steps 2 to 4 to other materials like metallic foil stripes, nail, balloon, and ballpen tube. Write your observations.

Data and Observations
Paste your photo documentation while performing the remote laboratory activities for each test materials in the space provided.

Paper Strips

Foil stripes

Nail

Balloon

Ballpen Tube

Activity 2.

1. Open a search engine in your laptop/computer (must be connected in the internet) and go to https://phet.colorado.edu/sims/html/charges-and-fields/latest/charges-and-fields_en.html.

2. In the upper right panel of the application interface, click the "Electric Field" and "Direction Only" tab to mark check.

3. In the lower middle panel of the interface, click and drag to the center panel a "red button marked with a plus (+) symbol" (this represents a positive-charged particle). Place a screenshot in the space below and write your observation.

4. Click the "undo" symbol in the lower right and "Direction Only" in the upper right panel. Click and drag to the center panel a "blue button marked with a negative (-) symbol" (this represents a negative-charged particle) from the lower center panel. Place a screenshot in the space given and describe what have you observe to the direction of the arrows.

5. Reset by clicking undo. Place a "red button" to the center panel and click the "measuring tape" in the lower right panel of the interface and placed this to the center panel where the positive-charged particle is located. Click and drag down the "+" symbol until reached approximately 100-cm. Place a "blue button marked with a negative (-) symbol" to the 100-cm mark. Attach a screenshot to the space provided and describe your observations?

Metacognitive Prompt

1. **Which part of the procedure or concepts is familiar or new to me?**
2. **What were the strategies that I used to effective to finish the task?**
3. **What are the challenges in completing the experiment? How did I manage to overcome it?**

4. **How does the laboratory experiment connect to what I already know about electric charge?**

5. **What follow up questions do I have?**

Conclusion

GENERAL PHYSICS 2
Remote Laboratory Activity No. 2
COULOMB'S LAW

In fascination with electrostatic particles, Charles Agustin de Coulomb discovered the relationship between the magnitude of charged particle and its repulsive or attractive tendencies towards other particles in an electrostatic surface.

Coulomb's Law states that the *"electrostatic force, **F** is directly proportional to the product of the magnitude of charge particles, **q** and inversely proportional to the square of distance between them, **r**."*

Learning Target/s

At the end of the remote laboratory activity, I should be able to:

- Describe experiments to show the magnitude of interaction between electrostatic charged particle

Resource Requirements

- Thread
- A wool fabric/cloth, tissue paper
- 2 identical-sized balloons
- Plastic Ruler

Procedures and Analysis

Activity A. Demonstrating Coulomb's Law Using Balloons

Note: Perform this activity with the supervision and help of your guardian/parent. Execute these tasks in an area with low humid areas. Effects may not be able to observe in a humid environment. Ask your guardian/parent to take a photo documentation during the course of remote laboratory activities

1. Get the two (2) balloons and filled it with air. Using a 5-meter thread tie the Balloon A to Balloon B. Get the midpoint of the thread and hang the balloons in an open area without nearby obstructions.
2. Using a wool fabric/cloth, rub the Balloon A in at least 15 times. Let the balloons free to move. What do you observe?

3. Using a ruler, get the distance of the two balloons.

4. Repeat the Steps 1 to 3 at least 3 times.

Data and Observations

A. Instructions: Based on your observations while conducting the remote laboratory activity, fill in the data needed in the Table 1 below.

Table 1. Demonstrating Coulomb's Law Using Balloons

No. of Trials	Frequency of Rubbing the Balloons	Separating Distance of the Balloons (in meter)
1		
2		
3		

B. Instructions: Paste your photo documentation while performing the remote laboratory activities in the space provided.

Trial 1

Trial 2

Trial 3

Metacognitive Prompt

1. **Which part of the procedure or concepts is familiar or new to me?**
2. **What were the strategies that I used to effective to finish the task?**
3. **What are the challenges in completing the experiment? How did I manage to overcome it?**
4. **How does the laboratory experiment connect to what I already know about Coulomb's Law?**

5. What follow up questions do I have?

Conclusion

GENERAL PHYSICS 2
Remote Laboratory Activity No. 3
ELECTRIC FIELD VECTOR AND ELECTROSTATIC POTENTIAL SURFACES

Electric field lines are used to depict and understand the interplay of forces exerted by two separate charged particles. When designing electric field patterns, lines begin with positive charges and end with negative charges, an arrow to represent the directions and the lines do not intersect in any way.

Learning Target/s

At the end of the remote laboratory activity, I should be able to:

- Describe experiments to show the electric field vector and electrostatic potential surfaces

Resource Requirements

- Computer/Laptop with Internet Connection

Procedures and Analysis

1. Open a search engine in your laptop/computer (must be connected in the internet) and go to https://phet.colorado.edu/sims/html/charges-and-fields/latest/charges-and-fields_en.html.

2. In the upper right panel of the application interface, click the "Electric Field" and "Direction Only" tab to mark check.

3. Place a "red button" (positive-charge particle) in the center panel and drag the equipotential meter (from the middle right panel) to the place where the "red button" is located. Make sure that the cursor (in "+", cross symbol) of the equipotential meter is placed to the red button. Then, place another "red button" in the same place where the first button is located. Add one more "red button" in the same location. Continuously add "red button" and observed what happened to the direction of the electric field vector and the equipotential values. Write your observations and attach a screenshot on the space below.

4. Reset by clicking undo. Place a “blue button” (negative-charge particle) in the center panel. Measure the equipotential values. Then, place another “blue button” in the same place where the first button is located. Add one more “blue button” in the same location. Continuously add “blue button” and observed what happened to the direction of the electric field vector and the equipotential values. Write your observations and attach a screenshot on the space below.

5. Reset by clicking undo. Place five (5) “red buttons” in the center panel. Measure the equipotential values. Then, place another five (5) “blue buttons” in the same place where the first set of buttons are located. Gradually remove the “blue buttons” and observed what happened to the direction of the electric field vector and the equipotential values. Write your observations and attach a screenshot on the space below.

Data and Observations

A. Instructions: Based on your observations while conducting the remote laboratory activity, fill in the data needed in the given tables below.

A.1 Indicate the equipotential values of positive-charge particles as the number of particles increases

Table 1. Equipotential Values of Positive-Charge Particles

No. of Positive-Charge Particle	Equipotential Values
1	
2	
3	

A.2 Indicate the equipotential values of negative-charge particles as the number of particles increases

Table 2. Equipotential Values of Negative-Charge Particles

No. of Negative-Charge Particle	Equipotential Values
1	
2	
3	

A.3 Indicate the equipotential values of negative-charge and positive-charge particles as the number of particles varies

Table 3. Equipotential Values of Negative-Charge and Positive-Charge Particles

No. of Negative-Charge Particle	No. of Positive-Charge Particle	Equipotential Values

Metacognitive Prompt

1. **Which part of the procedure or concepts is familiar or new to me?**
2. **What were the strategies that I used to effective to finish the task?**
3. **What are the challenges in completing the experiment? How did I manage to overcome it?**
4. **How does the laboratory experiment connect to what I already know about Electric Field?**
5. **What follow up questions do I have?**

Conclusion