Interactive Lecture Demonstrations

Prediction Sheet**—Magnetic Forces**

**Directions:** Write your name at the top to record your presence and participation in these demonstrations. For each demonstration, write your predictions on this sheet before making any observations. You may be asked to send this sheet to your instructor.

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| **Demonstration 1:** A Van de Graaff generator is turned on, and it becomes positively charged. A magnet is brought near the generator as shown. Predict the direction of the force exerted by the magnet on the charges on the Van de Graaff.  Only after you have made your prediction, click [here](http://pages.uoregon.edu/sokoloff/Res51.png) to see the magnetic force. Compare the result to your prediction and explain any differences. | |  | |
| **Demonstration 2:** An insulated wire is in a magnetic field pointed into the screen. There is no electric current flowing through the wire. Predict the direction of the force exerted by the magnetic field on the electrons in the wire.  Only after you have made your prediction, click [here](http://pages.uoregon.edu/sokoloff/Res52.jpg) to see the magnetic force. Compare the result to your prediction and explain any differences. | |  | |
| **Demonstration 3:** Now the switch is closed so that the current flows through the wire in the direction shown. Predict the direction of the force exerted by the magnetic field on the electrons in the wire. (Recall that the electrons move in the opposite direction to the conventional current.)  Only after you have made your prediction, open the simulation: <https://www.compadre.org/Physlets/electromagnetism/illustration27_4.cfm>  Click on the start button to start the electrons moving. Then click on uniform magnetic field pointing into the screen. Observe the force on the electrons and compare it to your prediction. Explain any differences. | | A picture containing bird, photo, flock, light  Description automatically generated | |
| **Demonstration 4:** Suppose that the magnetic field is out of the screen. Now the switch is closed so that the current flows through the wire in the direction shown. Predict the direction of the force exerted by the magnetic field on the electrons in the wire.  Only after you have made your prediction, open the same simulation as in Demonstration 3.  Click on the start button  to start the electrons moving. Then click on Switch the direction of the magnetic field (out of the page). Observe the force on the electrons and compare it to your prediction. Explain any differences. | | A picture containing photo, bird, flying, clock  Description automatically generated | |
| **Demonstration 5:** The magnetic field is again into the screen as in Demonstration 3. Now the battery is reversed so that the current flows through the wire in the opposite direction (as shown). Predict the direction of the force exerted by the magnetic field on the electrons in the wire.  Only after you have made your prediction, open the same simulation as in Demonstration 3.  Click on Restart and then on the start button  to start the electrons moving. Then click on Change the direction the electrons are moving and Turn on the magnetic field into the page. Observe the force on the electrons and compare it to your prediction. Explain any differences. | | A flock of birds  Description automatically generated | |
| **Demonstration 6:** In each of the situations shown, a *positive* charge is moving in a magnetic field. Use the right-hand rule to predict the direction of the force or magnetic field (whichever is missing). | | | |
| A picture containing clock, drawing  Description automatically generated | A picture containing clock, airplane, drawing, table  Description automatically generated | | A picture containing clock  Description automatically generated |
| Only after making your prediction, click [here](http://pages.uoregon.edu/sokoloff/Res5A.jpg) to see the correct direction of the force. Compare to your prediction, and explain any differences. | Only after making your prediction, click [here](http://pages.uoregon.edu/sokoloff/Res5B.jpg) to see the correct direction of the force. Compare to your prediction, and explain any differences. | | Only after making your prediction, click [here](http://pages.uoregon.edu/sokoloff/Res5C.jpg) to see the correct direction of the force. Compare to your prediction, and explain any differences. |

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| **Demonstration 7:** In Dewmonstration 6, suppose that the chrge were *negative*. Again use the right-hand rule to predict the direction of the force or magnetic field (whichever is missing). | | |
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| Only after making your prediction, click [here](http://pages.uoregon.edu/sokoloff/ResD.jpg) to see the correct direction of the force. Compare to your prediction, and explain any differences. | Only after making your prediction, click [here](http://pages.uoregon.edu/sokoloff/ResE.jpg) to see the correct direction of the force. Compare to your prediction, and explain any differences. | Only after making your prediction, click [here](http://pages.uoregon.edu/sokoloff/ResF.jpg) to see the correct direction of the force. Compare to your prediction, and explain any differences. |