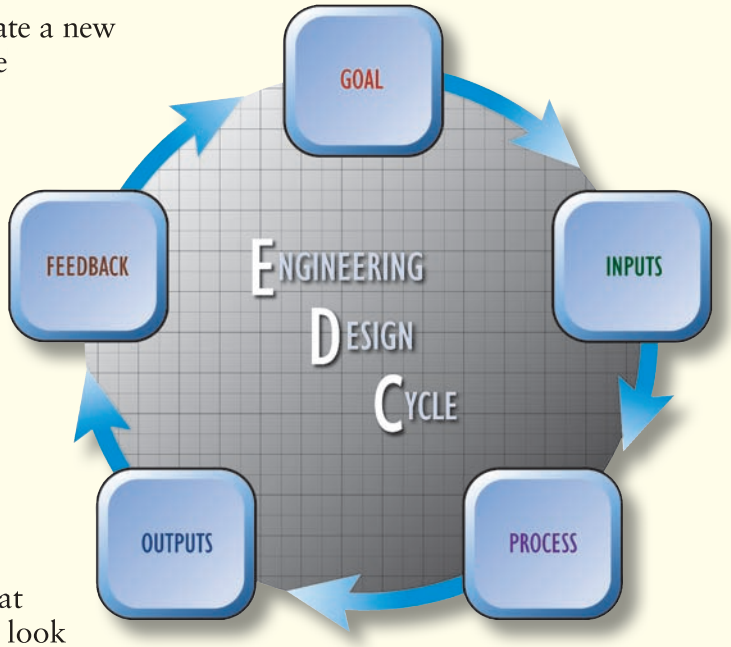
Chapter Mini-Challenge

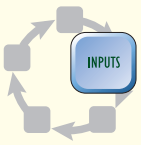
Your challenge for this chapter is to create a new museum exhibit that will educate people about the atom. Your group will have many decisions to make regarding your exhibit. Use the physics from the sections you have completed so far to help you generate ideas for your exhibit. Remember, make it interactive and fun. You only have 30 seconds to get the audience's attention.



You still have more to learn before you can complete the challenge, but now is a good time to give the *Chapter Challenge* a first try. You are now halfway through the chapter and you have learned a lot about the structure of an atom. Your *Mini-Challenge* is to create an entrance poster, an exit poster, written text for education, a potential item for the gift shop, and at least a diagram of what you want your exhibit to look like to help it grab the audience's attention. Your group will then present your work to the class. Everything you create for your *Mini-Challenge* can be incorporated into your final museum exhibit design, so the more work you do now the better your final design will be.

You have a good understanding about the types of particles that are contained in an atom and you have learned a lot about the way those particles are arranged inside of the atom. The sections that you have completed so far may also help you think of hands-on ways to get museum visitors involved in your exhibit.

Go back and quickly read the *Goal* at the start of the chapter. There you will find all of the details for completing the entire challenge. At this point you will focus on the portions you can complete with the physics you have learned so far.



Each of the sections you have completed so far is rich with information you can use to create your museum exhibit. You have learned scientific measuring techniques, history content about the discovery of the atom, and detailed information about the structure of an atom. All you have to do is decide how to present that information in an exciting and interactive way.

Your team should review the physics content from the first four sections to help you create your initial toy design.

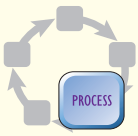
Section 1: You explored the nature of electrically charged objects. You also worked with a model for calculating the forces that charged objects exert on each other, Coulomb's law.

Section 2: You used deductive reasoning to examine the contents of a container without looking inside. This was one of the methods Millikan used to discover that electric charges come only in certain "quantized" amounts.

Section 3: You applied an indirect method to measure the area of a penny to simulate how Rutherford originally discovered and measured the size of an atomic nucleus. You then

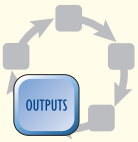
compared your results to the actual value for the area of a penny and explored the ratio of the size of a nucleus to the size of an atom.

Section 4: You examined the different colors of light that are emitted by a specific atom when it is energized. You also learned how each atom can be identified by the colors of light it gives off because the type of light depends on the arrangement of electrons in each particular atom.



This challenge has a lot of products that you are responsible for creating. While you are not required to create the actual museum exhibit, models and diagrams will be very useful to help you explain your ideas. Models can also be very helpful in helping your design team decide on which design ideas you will actually include in your exhibit. For the *Mini-Challenge* as previously mentioned, you should create the entrance poster, the exit poster, written text for education, a potential item for the gift shop, and at least a diagram of what you want your exhibit to look like to help it grab the audience's attention. You might find it useful to assign one "product" to each member of your group to help ensure that each one gets completed. You can work together to develop the content, but having a product champion makes sure that someone is concentrating on each piece of the requirements.

During this challenge, time will be an important constraint for your team. It is difficult to complete so many different tasks in a short period of time. Communicating effectively with the members of your group will be essential. You may also find that in order to meet the presentation deadline you have to move forward with a design idea that is not perfect or completely thought out. The process will be stressful, so it is important to communicate often and as clearly as possible and to be accepting of others in your group. Collaboration on a project is difficult, collaboration on a short schedule is very difficult, and you will need the support of each one of your group members to be successful.



Presenting your information to the class is your design cycle *Output*. For the *Mini-Challenge* you should have a lot of products to present. If you create a model of each product you will find it much easier to explain your ideas. Models will also make your presentation more interesting to watch. Don't forget that the accuracy and completeness of your written educational information is also an important output of your presentation.

Your classmates will give you *Feedback* on the accuracy and the overall appeal of your exhibit idea and the different models you used to help present it. This *Feedback* will become an *Input* for your final design in the *Chapter Challenge*. You will have enough time to make corrections and improvements, so you will want to pay attention to the valuable information they provide.

Remember to correct any parts of your design that didn't meet the design goals of the *Mini-Challenge*. It will be harder to remember what you need to change if you wait until the chapter is complete to go back and correct your mistakes. When you are finished revising, store all of your information in a safe place so that it will be ready to use in the *Chapter Challenge*.

During the second half of the chapter you will learn more details about the structure of the atom and some of the methods scientists used to discover the properties of these "invisible" particles. As you complete the chapter, remember to add ideas to your entry and exit poster as well as to add educational materials to your exhibit. You may also use one of these new sections to inspire more interactive ideas for your exhibit.