

# MAGLEV MODEL TRAIN COMPETITION

## PLANNING YOUR EXPEDITION

**Students use models created for Expedition #15 “Build a MagLev Train.” You will need to refer to the group descriptions on the Student Group Worksheets.**

Students will be divided into role playing groups to decide whether or not MagLev transportation should be adopted in Florida. They will also be deciding which of four MagLev designs to implement should the decision be reached to have this type of system in Florida. In this activity, students will answer the question, “Should Florida, whose population will grow to over 15.5 million by the year 2000, develop and build the Florida High Speed Transportation System?” by modeling the decision-making process that goes into high-stakes financial commitment to new technology.

Each group will have a predetermined role to play so this activity has five different Itineraries instead of one. Divide the class into 9 groups as follows: a design group, builders (4 groups), the public, a consortium to market the transportation system, state legislators, and the Department of Transportation. Here is where you may wish to take a look at the talents of individual students to preselect the groups. It is a good opportunity for students to work with other groups. You can study each group description and determine who best suits each category.

[If you have not yet completed the activity on superconductors, you may wish to refer to it at this point or you may wish to refer students to the CD-ROM for vocabulary help.]

There will be one Itinerary for each role. It will describe the role that students are to play, some tasks that the group will be performing, and reasons why certain steps must be done before other groups can get their work done. Be sure to set a deadline for the public presentation of the MagLev models and the town meeting.

1. Remind students that they will need the models created for “Build a Model MagLev Train.”
2. Hand out the Itineraries for the Design Group, Builders (4), The Public, Consortium to Market the Transportation System, State Legislators, and The Department of Transportation. Give each group a chance to look them over and then discuss the worksheets with each group before they begin the activity.
3. Either set up a schedule to meet with each group or walk around visiting with each group on a regular basis for the duration of the Expedition.
4. Once you are comfortable that groups know what to do, you serve in an advisory capacity.
5. Once the public meeting is organized by “The Public”, you will need to make a poster or put on the board the two questions that will be answered in the meeting: Which model should we recommend for Florida? Should we support a MagLev system of transportation in Florida?

## BACKGROUND

Fossil fuels are dwindling. They are also a source of pollution that is threatening our atmosphere. A magnetic levitation system consists of safe, quiet, nonpolluting vehicles. Worldwide there are two types of magnetic levitation trains: those that use superconducting magnets and those that use conventional magnets. Both systems can travel at very high speeds; both systems are nonpolluting. The German system relies on attraction; the Japanese system on repulsion. In both systems propulsion is similar in that the train rides on an electromagnetic wave. The German Transrapid has no wheels; electromagnets on board are attracted to a magnetic surface on top of the track. This lifts the train about 3/8 inch off the ground. The Japanese system rests on a set of wheels. When it reaches 100 mph it levitates 4 inches above the rails. Both systems rely on a lateral guidance system to keep the train in the middle of the track.

The Florida Maglev Consortium, Inc. (FMLC) is a public-private partnership of private high-tech companies, local governments, and the Florida

Department of Transportation that proposed building a high speed transportation system based on magnetic levitation technology. The high speed vehicles were to run from Miami to Orlando to St. Petersburg. FMLC made the following claims: environmental impacts are minor; the system will attract business; and the system will provide safe, fast, and affordable mass transportation.

The Florida proposal uses the superconducting magnet system. The vehicle itself becomes a superconducting magnet that rides in a magnetic field on a “guideway.” The magnetic field shifts (controlled from a substation) and the wheelless train is propelled at great speeds along the guideway. The Florida Maglev system was intended to be inexpensive, fast, and frequent; one feature was to link the high speed train system with airlines, buses, local railway lines, and cruise ships to become part of an overall statewide transportation system.

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## EXCURSIONS

Have students read “Buy Jupiter” by Isaac Asimov (found in Fantastic Reading: Stories and Activities Grades 5-8, Scott, Foresman, & Co., 1984, ISBN 0-673-15936-1) or you can read it aloud to them. Negotiating is an important skill in deciding what scientific innovations or inventions to market to the public. In the story, the Minister of Science is the one who is in charge of negotiations.

Clearly, the government thought the negotiations involved a scientific discovery of some importance. Students will model the relationship between scientific invention and the real-life skills necessary to bring that invention to the public.

LA.A.1.3.1-4, 2.3.1-8, LA.B.1.3.1-3, LA.E.1.3.1-5

**FOR YOUR PLANBOOK: MagLev Model Train Competition**

**Suggested time:** 2-3 hours

**Gear:** MagLev train models (from “Build a Simple MagLev Train Model”), materials to make new train models (see “Build a Simple MagLev Train Model”)

**National Science Content Standards:** A, E, F, G

**Sunshine State Standards Benchmarks:** SC.B.2.3.2, SC.C.2.3.1, SC.C.2.3.2, SC.G.2.3.4, SC.H.1.3.1, SC.H.1.3.3, SC.H.1.3.4, SC.H.3.3.4, SC.H.3.3.5, SC.H.3.3.6, SC.H.3.3.7

**Homework:** Assign this task before beginning the activity. Each student will consider his or her role for this activity and write a paragraph or two identifying what they think their job will be, what kinds of tasks they will have to do, and who they will be dealing with. For example, if the student is assigned the role of member of the design group, they will probably imagine that their group must prepare a materials list, approximate costs of materials, make a plan from which the builders group will work, etc.

**Homework Assessment:** Not only will students be better prepared to work with their groups on this activity, but they will organize their ideas about how people in these positions really work. Encourage students to seek out friends, relatives, or neighbors who might be in these positions. They could call the Department of Transportation, for instance, or a design office that creates plans for others to follow. Students will be translating their classwork to real world experiences. Any description that closely approximates the job is acceptable.

**Assessment:** One way to assess whether or not your students have successfully completed this activity is to devise a checklist. For example, with each group, list characteristics of a successful group experience: all members participated, group defined their task, wrote letters of support, interacted with other groups, defended their position, and participated in public debate, and so forth. If all criteria are met, then the group earns an A; if 5 out of 6 are complete, then they have earned an A-, etc. In this way, students are aware of grading criteria ahead of time and have a shared vision of how to be successful.

Students research, using the worldwide web, specifications of present magnetic levitation train systems. Then have them compare and contrast the systems.

# MODEL TRAIN COMPETITION

## **Itinerary: State Legislators**

Each legislator represents a different district, so depending upon whether you represent a district that is impacted by the new transportation system or not, you must take a stand: Will you support the effort to develop and build a MagLev transportation system in the State of Florida?

1. Determine which of you will be representing a district that will be impacted by the train system and which of you is representing a district that is NOT affected by the train system (you will have to get with the Department of Transportation).
2. Anticipate questions that your constituents will ask you. For example, is the system environmentally safe? Will it bring jobs to our area? What kinds of jobs? Will tourists like this system? Will we get more tourist dollars? What will we get out of this? Is there an alternative to the MagLev technology that other groups have not considered?
3. Decide whether your group will support the effort for a MagLev train system or not. Be prepared to defend your position at the public meeting.
4. Meet with the other groups to gather as much information as you can and then write an editorial for the local newspaper on your position. You could call a local legislator and ask him or her about the kinds of research done to learn about issues and the kinds of questions that they ask.
5. Be prepared to argue pro (support) or con (nonsupport) for the MagLev train system at the public meeting.

# MODEL TRAIN COMPETITION

## **Itinerary: Department of Transportation**

Your group has two main jobs: (1) to determine if MagLev technology is in the best interest of the State of Florida; and (2) to provide guidelines for the Builder Groups to follow.

1. Decide on proposed route(s) for the train and identify the political districts that will be affected by the train system.
2. Develop specifications that the train system must meet; that is, decide what features you think Florida's system needs. Do you need the train to carry large numbers of people long distances? Do you wish the train to be fast, moving people quickly from place to place? Are your concerns environmental? Where in the state do you believe this system would be best utilized? Are you imagining a small train or a large train?
3. Meet with the design group to explain to them the conditions that must be met before the State will approve a design.
4. Write a letter to the members of the State legislators group telling them what kind of system you are supporting and why.
5. If you decide to make changes in the design of the system or in the model itself, let the Design Group know so they can inform the Builders Group.

# MODEL TRAIN COMPETITION

## **Itinerary: The Public**

You will be planning and hosting a public meeting of all concerned groups: the design group, the four builders groups, the group marketing the system, State legislators, and the Department of Transportation. This involves data gathering so that you will know the questions to ask and information to look for.

1. Begin gathering information that will enable you to be effective decision-makers. Look up MagLev train technology; call the Department of Transportation in Tallahassee; or find magazine articles written about Europe's rapid transit system.
2. Visit the Design Group and the Department of Transportation in the classroom to study what they are doing. Take notes so that you are able to back up your opinions at the public meeting.
3. Plan a day and time for the meeting, checking with all groups to make sure that they will be ready. Then design an advertisement for the local newspaper announcing the meeting.
4. Organize the agenda for the meeting and distribute a copy to each group.
5. Develop a list of questions and/or topics for discussion at the public meeting that you will be hosting.
6. Decide who will moderate (ask the questions and make sure everyone has a chance to speak). If all four people are going to participate, divide up the responsibilities.

# MODEL TRAIN COMPETITION

## **Itinerary: Builders**

Your job is to build one of the the MagLev train models based upon the plan given to you by the Design Group. There may be specific guidelines developed by the Department of Transportation group that you may need to follow. There is a certain date that this model must be ready to be presented at a public meeting.

1. Before you are given the design plan, you must discuss among yourselves the best materials to gather in anticipation of the actual work.
2. Get information on MagLev technology by using web sites, phone calls, or print media. You can also interact with the Design group to gather the most data about how your train would be used.
3. After receiving both the design plan and specifications from the Design Group, construct the model. If you need help with this, consult the Design Group. If you are unsure of why specifications are written in a certain way, consult the Department of Transportation.
4. Have your model ready for the public meeting.

# MODEL TRAIN COMPETITION

## **Itinerary: Design Group**

Your job is to choose four MagLev train model designs that will be built and presented to the general public, a marketing group, state legislators, and representatives of the Department of Transportation. This group, including you and the model builders, will be involved in the final discussion as to whether this technology should be used in Florida.

1. Gather all of the designs done for Expedition #15 “Build a MagLev Train Model”.
2. Before choosing the designs to support, meet with the Department of Transportation to get specifications of what features they think are necessary for the State of Florida to approve the plan.
3. Choose the four designs that you think are best suited for public presentation to diverse groups. You may suggest changes or modifications to the existing designs. Each Builder Group will be responsible for building one of the models.
4. Write a letter of support to each Builder Group stating why you support that design.
5. Give each of the four groups one of the design plans that you have approved, accompanied by the letter of support.
6. One person needs to work with each of the four builder groups to oversee the work being done.

# MODEL TRAIN COMPETITION

## **Itinerary: Marketing Group**

In anticipation of approval by the State of Florida, your group is designing a marketing campaign to make the public aware of this technology and informing their decisions.

1. First, discuss ways to anticipate what people will want to know about MagLev train technology.
2. From all the information that you gather from other groups, choose the information that you believe is the most important to transfer to the public (this also includes State legislators who represent the public).
3. Design a logo for the new Florida system of transportation and go to each of the four builders groups to see if they will put your logo on their design. If they want to know what is in it for them, you must have an answer ready. If you wish to try four logos (one for each model that will be presented) do so.
4. Come up with a plan (film, video, radio or tv spots, print advertising, etc.) to market the new trains. How will you educate the public? How will you publicize the new technology? What are the good things about it that you can write about? What are the bad things about it that you can anticipate and explain?
5. Create an example of at least one of your planned marketing techniques to present at the public meeting.

