

MAISA and the REMC Association of Michigan Best Practices in Technology Integration Plan

Title: Friction Flyers

Subject(s) science, technology

Intended Grade Level(s) 3 - 6

Description:

The main goal of this unit will be to emphasize problem solving and focus on the principles of magnetism and friction. Students will complete two activity sections of a commercial program **Gizmos and Gadgets!**, entitled “magnetism puzzles” and “force puzzles”. Upon completion of these activities, students will work in partner groups to design and build their own magnet-driven race cars (lesson one). Once they have completed their cars and learned how to propel them, they will design and build ramps (lesson two). They will apply different surfaces to these ramps to see what affect friction has on their vehicles.

Curriculum Benchmarks:

MI.SCI.I.1.E.2 .Develop solutions to unfamiliar problems through reasoning, observation, and/or experiment.

MI.SCI.I.1.E.6 . Construct charts and graphs and prepare summaries of observations.

MI.SCI.IV.1.E.4 . Describe energy and the many common forms it takes (mechanical, heat, light, sound, electrical, magnetic, chemical, nuclear).

MI.SCI.IV.1.E.5 . Describe the interaction of magnetic materials with other magnetic and non-magnetic materials.

MI.SCI.IV.3.E.1 . Describe or compare motions of common objects in terms of speed and direction.

MI.SCI.IV.3.E.2 . Describe how forces (pushes or pulls) are needed to speed up, slow down, stop, or change the direction of a moving object.

MI.SCI.IV.1.E.5. Describe the forces exerted by magnets, electrically charged objects, and gravity.

MI.SCI.IV.3.E.3. Design strategies for moving objects by application of forces, including the use of simple machines.

Materials/Hardware/Software:

Software: **Gizmos and Gadgets!** by The Learning Company

Equipment: Macintosh or IBM compatible computer

Materials: empty paper clip or Jell-o boxes
sandpaper
paper clips
bar and button magnets
hole punch
plastic straws
large pieces of corrugated cardboard
small wooden thread spools
waxed paper
aluminum foil
plexiglass sheets

Activities/Procedures:

Lesson One:

Review previous knowledge of magnetism:

Review with students the principles of magnetism. Remind them that magnets can attract and repel each other and that magnetic forces can also be used to push and pull objects. Also, review how bar magnets work, stressing that when poles are facing each other, the magnets will repel or push apart. The opposite will be true if you place the north and south (opposite) poles of magnets together, causing them to attract or pull toward each other.

Introducing the Activity:

After reviewing the principles of magnetism, explain to students that they will be completing a puzzle section entitled “magnetism puzzles” from the commercial program, **Gizmos and Gadgets!**

Procedure:

Upon completing the puzzles, have each child get a copy of “Activity Card 2” and “Activity 2 Data Sheet” provided in the Teacher’s Guide of **Gizmos and Gadgets!** Remind them to carefully follow the directions on the activity card to assemble their vehicle using the materials listed above.

Once the vehicles are complete, remind students that the button magnet should be taped to the front of the vehicle, and to make sure their vehicle is on a smooth level surface. Instruct them to use the bar magnet to find ways to make their vehicles move toward and away from them. It may take several trials to get vehicles to move properly. Once they have been able to make their vehicles move, have them complete the data sheet with a partner.

Lesson Two:

Review Previous Knowledge of Friction:

Remind students that friction works in opposition to the forces that produce motion and exists between the object and the surface along which it moves. Stress that friction can reduce speed of motion, cause heat, and produce wear and tear on objects.

Introducing the Activity:

After reviewing the basic principles of friction, have students complete the “force puzzles” section of **Gizmos and Gadgets!** Tell them they are going to be using friction to make the vehicles they constructed in lesson one run at different speeds.

Procedure:

Upon completion of the “force puzzles” section, have students, working in pairs, construct a simple ramp from a large sheet of corrugated cardboard. Once they have constructed the ramps, have them divide the surface of the ramp into four equal sections. Cover one section with sandpaper, one with waxed paper,

one with aluminum foil, and the final with a strip of plexiglass. Elevate each ramp to the same height using books or other objects.

Have students make predictions as to which of the four surfaces will allow their magnet driven vehicles to move at the fastest speed, slowest speed, etc. Have them test their predictions, by racing each other, using a different surface as each lane. Repeat their races several times over the different surfaces. Have them graph the race results and then form a conclusion about how friction affects the speed of their vehicles.

Assessment/Evaluation:

Since the main goal of the lesson was to emphasize problem solving and focus on the principles of magnetism and friction, students will be able to demonstrate this knowledge through

- successful completion of the inter-active puzzles from the **Gizmos and Gadgets!** program

- constructing and making their vehicles move

- building and modifying their ramps and vehicles to produce various outcomes

- completing "Data Sheet One" and graphing race outcomes

- Orally discussing and sharing the results to provide evidence that the planned student learning has occurred.

Other skills students will utilize are co-operative learning, using physical science concepts, and scientific-thinking processes. Use of the commercial program **Gizmos and Gadgets!** will provide demonstration of such technology concepts as keyboarding, installing and saving programs, using CD Roms and/or disks, building graphic simulations, using menu bars, and saving completed work.

Follow-up Activities:

Students might like to decorate their vehicles and find ways to modify the vehicles to change magnetic force. They might also like to see how the

weight of their vehicles could increase friction. You can also challenge your students to try other surfaces for the ramps and see if they can find ways to increase and decrease the amount of friction exerted upon their vehicles.

Name: Becky S. McFarlane

School District: Monroe Public Schools

School: Custer Elementary School #1

**Address: 5003 W. Albain Road
Monroe, MI 48162**