Forces, Interactions, and Energy, Oh My!

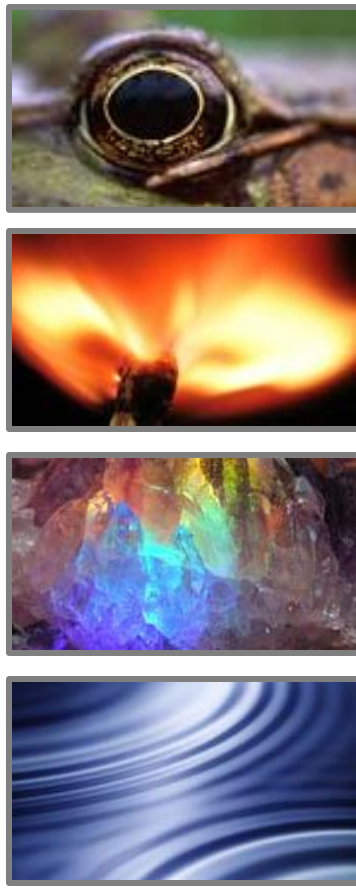
NSTA 2016

ward's science

workshop overview

In this workshop you will:

- Take home some fun, and easy ideas to teach physical science ideas to your elementary students.
- Get a brief introduction to our Wards Single Probes and see how simple they are to incorporate into any science lesson.



workshop rules

- Take home ideas to help you in your classrooms
- Participate
- Share ideas
- Learn from your colleagues
- Have fun
- Win prizes




magnet cars activity

Objective: to demonstrate a magnet's ability to repel and attract other magnets.

NGSS:

K-PS2-1 *Plan & conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object*.

2-PS1-2 *Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose*.

3-PS2-3 *Ask questions to determine cause & effect relationships of electric or magnetic interactions between two objects not in contact with each other.*

3-PS2-4 *Define a simple design problem that can be solved by applying scientific ideas about magnets*.

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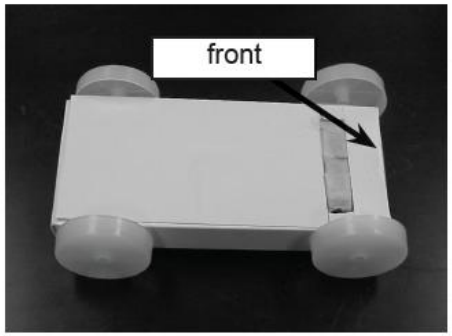
magnet car assembly



1. Gently push the edges of a white car die cut together so it forms a rectangle.
2. Bend the two small tabs at each end in toward the center of the box.
3. Fold the longer tabs at each end of the box along the fold lines.
4. Tuck the long tabs into the box.
5. Push the axle into one plastic wheel.
6. Insert the axle through one set of the parallel holes in the car box.
7. Attach another wheel to the other end of the axel.
8. Repeat these steps for the second set of wheels.
9. Insert a magnet in the slot in the box so that the X is facing short end at the front of the car.

magnet car discover activity

- Place 2 magnet cars on a flat surface so the fronts of the car (& the X's on the magnets) are facing each other. Slowly roll one car toward the other car.

- Turn the magnet in one car around so the O is facing the front of the car. Slowly roll one car toward the other car.

- Now, turn the magnets in both cars around so the X in one car faces the O in the other car. Slowly roll one car toward the other car.

- Turn the magnet in one car around so the O's are facing forward in both cars. Slowly roll one car toward the other car.

magnet car activity

- Place a ruler on a the table and place one car at each end of the ruler.
- Place the magnets in the cars so they will attract if they are brought close together.
- Predict the point on the ruler where you think the magnets will begin to attract.
- Test your predictions:
  - Do not move the car that is nearest to the 1 inch end of the ruler.
  - Slowly roll the car at the 12 inch mark toward the other car. Stop at each inch mark.
  - At what inch did the magnet attract?
  - Repeat the steps, but this time turn the magnets so they will repel.




balloon car activity

Objective: to design, build, explore and test designs of a balloon car.

NGSS:

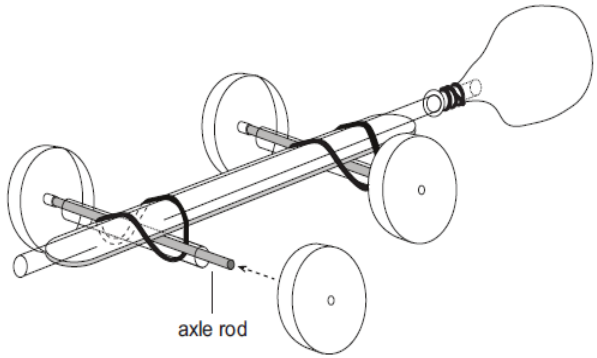
3-PS2-2 *Make observations &/or measurements of object's motion to provide evidence that a pattern can be used to predict future motion.*

4-PS3-1 *Use evidence to construct an explanation relating the speed of an object to the energy of that object.*

CHALLENGE:
DESIGN A CAR THAT WILL TRAVEL THE FURTHEST.

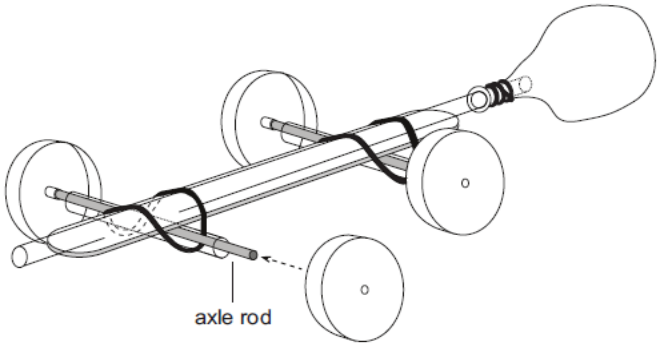



balloon car assembly



1. Cut one of the straws into two 4-5 cm lengths.
2. Cut two axle rods into 7 cm lengths.
3. Insert an axle rod into each 4–5 cm straw.
4. Push plastic wheels onto both ends of both axle/straw combinations.
5. Holding one end of a rubber band in on hand, and the other end in the other hand, twist the rubber band into a “figure 8” and fold it so that is now doubled into two loops. Slip the doubled rubber band around your thumb and one finger of one hand.
6. Slip the openings of the doubled rubber band over one of the wheels and onto a wheel axle.
7. Place the axle/wheel unit on top of a tongue depressor, about 2.5 cm (1 inch) from the end of the tongue depressor.

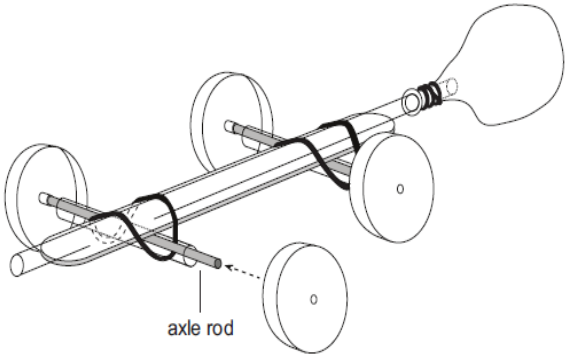
balloon car assembly (continued)



8. Position the looped rubber band so that it is about two thirds of the way down the straw-covered axle. Stretch the doubled rubber band from the axle under the tongue depressor and over the wheel and axle on the other side. At this point, the wheel/axle unit should be attached to one end of the tongue depressor.
9. Using the same procedure as Steps 5–8, attach the remaining wheel/axle assembly to the other end of the tongue depressor.
10. Insert about 2 cm of one end of the long straw into the opening/neck of a balloon. Secure the balloon in place by looping a small rubber band several times around the neck of the balloon containing the straw. Make sure the rubber band does not crush the straw.

balloon car assembly (continued)

11. Position the chassis of the car as shown in the diagram below. Thread the free end of the long straw through the rubber bands holing the axle/wheel assemblies in place. At this point, the straw/balloon should be on the top of the tongue depressor. Each end of the long straw should extend about 1-2 cm beyond each of the tongue depressor. The car is now completely assembled.
12. To move the balloon car, blow into the free end of the long straw until the balloon is the desired size. Quickly place a finger over the opening of the straw to keep the air from escaping from the balloon. Position the car, balloon end in front on the table. The car should begin to travel as soon as you remove your finger from the straw.






crazy coaster activity

Objective: to design, build and test a track for a coaster to learn about energy and motion.
to understand how potential energy is transformed into kinetic energy.




NGSS:

K-2-ETS1-1 *Ask questions, make observations, & gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.*

K-2-EST1-2 *Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem*.

2-PS1-2 *Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose*.

3-5 ETS1-3 *Plan & carry out fair tests in which variables are controlled & failure points are considered to identify aspects of a model or prototype that can be improved.*

crazy coaster activity

CHALLENGE

Working in groups, create a coaster track that:

Uses 3 lengths of track

Contains at least 1 loop

Allows the marble to travel the fastest

wrap up

- Suggestions for alternative materials?

- Suggestions for additional activities, concepts?

- Raffle