MIND TREKKERS

Fuel Gauge Model Lesson Plan

Amount of time Demo takes: 2-5 minutes

Materials

1. 10 AA batteries (2 for the LEDs, 8 for pumps)
2. Fuel gauge board

Set up instructions:
Fill the tank with water. Put the float into the level sensor by removing the lid and putting it in.

SAFETY!
1. Safe demo.

Lesson’s big idea

● The purpose of this demonstration is to illustrate how fuel gauges in cars and other vehicles function.

Background information

1. Magnetic reed switch: an electrical switch that closes when a magnetic field is present (right).
2. Level sensor: tells you the height of the water/fluid in the tank.
3. This is analogous to how fuel sensors in cars work. We use LEDs to indicate fuel levels; in real cars, however, the sensors are hooked up to resistors instead of lights. The fuel gauge needle in your car responds to the voltage going through it -- the voltage changes as the resistance changes.
4. As the level of fuel drops or increases, the float is raised along with it. The magnet thus moves past different reed switches, triggering them to send signals to the car.

Instructional Procedure

1. Invite students to turn on the pumps -- fill and empty the tanks to watch the LEDs light up as the level changes.
2. There is also a magnet on a string that can be raised and lowered to illustrate that magnets (not the fluid) are what trip the reed switches.
   a. There are magnets inside the float that sits in the water, which is what sets off the sensors.
3. Explain the difference between this fuel gauge and the ones in cars.

Assessment, Sample questions you can ask:

1. What are magnetic reed switches?
2. Where else could we apply this kind of technology?
3. How does the fuel gauge in a vehicle operate?
Clean Up

- Remove the lid and take out the float.
- Pack everything away neatly and carefully.

References

- Many thanks to the senior design team that designed this demonstration!

National K-12 Science Education Standards

- Levels K-4: Light, heat, electricity, and magnetism
- Levels 5-8: Motions and forces
- Levels 9-12: Motions and forces
- Also meets K-12 standards for understanding about science and technology