

## Bring The Real-World into Middle School Science and Math

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**Abstract:** Entice those reluctant middle school students into active explorations of science and mathematics with real-world learning tools. Help them learn about motion, gravity, energy, and waves by investigating amusement park rides, games, concessions, and amusements through the Emmy award winning teaching kit, *Science is the Solution*. In the materials, *Weather or Not*, students can explore atmosphere, weather, climate, and storm tracking, to examine the science concepts of mass, pressure, solar influences, the water cycle, and the relationships between temperature, pressure zones, and wind. These teaching kits include EMMY award winning videos, interactive CD-ROM's, activity-oriented Web sites, and detailed print teacher guides and classroom activities. Materials and activities from both teaching kits will be used during this dynamic presentation. Join us in a hands-on, real-world exploration of science and math.

### Acknowledgements

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### Introduction

Reform strategies in the teaching of science and mathematics call for the teacher to be a guide for learning instead of a purveyor of knowledge. Much has been said about these new methodologies, and models have been created for the implementation of these strategies. National groups such as the American Association for the Advancement of Science (AAAS) and the National Council for Teachers of Math (NCTM) have advocated that students need to be actively engaged in their learning. Tests such as TIMSS, TIMSS-R, and state proficiency tests have been constructed to examine and assess these strategies and slowly teaching methods are beginning to reflect these recommendations.

These teaching/learning kits have been developed to align with the strategies and to provide the middle school teacher with materials and activities for actively engaging their students in science and mathematics in the world that surrounds them. These kits are both multimedia educational programs that address national standards for science and mathematics curricula in grades 6 through 9. *Science is the Solution* uses amusement park rides, games, and concessions and *Weather or Not* uses weather forecasting and the science of meteorology as a "context for learning." The programs use multiple media components, including video, interactive CD-ROM, web resources, and print materials that merge to form a compelling learning environment. Teacher background information, teaching suggestions, and additional resources are provided in the accompanying guide. These materials have been successfully used in middle school classrooms throughout Ohio and have been acclaimed as outstanding teaching resources by teachers in urban, suburban, and rural areas and of value in the involvement of minority and low-income students in their studies.

The focus of *Science is the Solution* and *Weather or Not* is based on an approach that uses inquiry as the basis of instruction. The activities are written so that teachers can assess student assumptions and then challenge those assumptions. Students are led to examine the science and math of the world around them – how do roller coasters work, why isn't the moon pulled into Earth's orbit to crash and burn, and will we have warm air pulled from the south, or cool air pulled down from the north? These materials then stimulate students to apply this learning to other aspects of their world.

## ***Science is the Solution* Science and Math Content**

### **Motion**

Force  
Speed, velocity, and acceleration  
Mass & weight  
Centripetal force

Newton's Laws  
Inertia  
Static forces & dynamic forces

Balanced vs. unbalanced forces  
 $F=ma$   
Momentum

### **Energy**

Energy transformations  
Why/how is heat produced

Kinetic & potential energy  
Storing & releasing energy

Energy sources  
Different forms

### **Waves**

What is a wave?  
Speed = frequency x wavelength  
Doppler effect  
Effects of waves we can't see

Properties of waves  
Energy & momentum  
Sounds

Frequency & amplitude  
Longitudinal & transverse waves  
How we see waves

## ***Weather or Not* Science and Math Content**

### **Atmosphere**

What is in the air  
Temperature

Measuring Volume  
Humidity

Pressure

### **Climate**

Solar influence  
Hot air

Solar system influence  
Seasons and light

Earth model  
Examining the world

### **Weather**

Clouds and fog  
Weather predictions

Precipitation

Wind

### **Storm Tracking**

Winter storms  
Tornadoes

Hurricanes  
Tracking storms around the world

Thunder storms  
Weather events