Straw Waves and Energy Transfer

Waves carry energy not mass!

Using straws, tape, and other materials to create models for exploring wave properties and energy transfer.

Introduction:

We will use this model to demonstrate several different science concepts.
Newton's Law of Inertia –states that objects at rest will remain at rest and objects in motion will remain in motion unless acted on by an unbalanced force.
A *force* is a push or a pull.
Push on one of the straws and observe.
Energy is carried by waves. Notice that only energy is moving through the model – *energy transfer*.
The more force applied -the more energy transfer and the greater the motion of the straws.
Reflection and *transmission* observed as the energy moves through of the straws reaching the top and reflecting back down.
Pushing a straw in the middle will also show transmission and reflection.
Some of the energy is transferred to the top, transferred to the bottom and then reflect back to the middle.

Part 1

Discuss way to impart motion on the straw model.
Record methods.
What are the differences and similarities that you observed?

Ask the students:
What other variables can be changed in the straw model?

Record all suggestions and discuss.

Possible variables.

Tape- length, one side or two sides of tape, type of tape, width of tape
Straws – length, type of straw, color, thickness
Mass- mass on the end of the straws, mass at the bottom of the model

Part 2
Ask students to select one variable to explore and share with the group their plan.
Document the their plan.

Part 3
Build a model changing one variable.
Use about a .5 or 1 Meter of tape.
Leave space on tape to hang at the top and space for weights at the bottom.

Part 4
Compare and share out results with group. Show effects of the changed variable.
Did you have more than one variable?
What would you do different?
If time permits, send students back to re-engineer their model.

Part 5
Predict the effects of putting together 2 different models to make one longer model.
Connect your model with another groups model and explore. Observe.
Discuss the observations

Guiding the discussion:
What are ways to speed up the motion?
What's your evidence?
What are ways to slow it down?
What is your evidence?
Describe other changes that occur.

What is a wave?
'Wave' is a common term for a number of different ways in which energy is transferred: In **electromagnetic** waves, energy is transferred through vibrations of electric and **magnetic** fields. In **sound** waves, energy is transferred through vibration of air particles or particles of a solid through which the **sound travels**.

How is energy related to a wave?
The amount of **energy** carried by a **wave** is **related** to the amplitude of the **wave**. A high-**energy wave** is characterized by a-high amplitude; a low **energy wave** is characterized by a-low amplitude. ... Putting a lot of **energy** into a transverse pulse will not affect the wavelength, the frequency or the speed of the pulse.

Do all waves carry energy?
Light, heat, radio, and similar types of **energy** are carried by a variety of **waves** in the ELECTROMAGNETIC SPECTRUM. Some **energy waves** need a medium, such as water or air, through which to travel. The medium moves back and forth as **waves carry energy** through it, but it **does** not actually travel along with the **wave**.

Resource- Physics in the classroom
http://www.physicsclassroom.com/class/waves/Lesson-2/Energy-Transport-and-the-Amplitude-of-a-Wave

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