Gold Seal:

Copernicus Education Gateway

Author(s): ***Michael Lucky Voiselle***			***Lesson Title:*** ***THE ANSWER IS OBVIOUS***			
Grade Span			***ICLE Application Model***			
K-4	***5-8***	***9-12*** ***XX***	***A***	***B***	***C***	***D*** ***XX***

Instructional Focus:

Listening Students listen for a variety of purposes appropriate to the grade level.
Science as Inquiry Students demonstrate knowledge and skills necessary to perform scientific inquiry.
Habits of Mind Students develop habits of mind including curiosity, open-mindedness and persistence.
Communication Students communicate and apply scientific concepts.

Performance Task

Your task is to organize into groups of 4 and analyze the accompanying diagram (The Answer is Obvious Chart). Brainstorm with your group first recording observations (what do you see), and secondly what can you infer (what do you think is happening) from the diagram. Record all thoughts from each group member in your science journal. Thirdly, are the inferences stated by group members possible? Why or why not? You have 10 minutes to complete this portion. Remember in a brainstorming session, there is no right or wrong. Everyone's opinion is valuable.

You are to stop here and write a 1-page summary that includes all responses in a well-written summary free from spelling and grammatical errors. Using Newton's 3rd Law of Motion, you are to describe the brainstorming session in as much detail as possible as to why the diagram is actually possible or not.

Your next task is to brainstorm with your group to develop a working model of the action in the diagram. You are to draw plans including a list of equipment necessary to make your model. Present your diagram to your instructor for approval. If approved, begin constructing your model for experimentation. {Think of the basic necessities for your model: a platform such as a boat, skate, small light-weight wagon, or light wood base with wheels; a wind source such as a battery operated fan or vacuum blower; and a sail such as cardboard or cloth} [These ideas are optional to present to the students. You may want them to use their ingenuity, which will raise the level of ICLE Application Model to the D quadrant.]

You are to construct your group model, test the diagram's viability, and answer the following questions in your science journal. Record all observations, problems, solutions to problems, and answers to questions in that journal. Your final task will be to develop a conclusion summary. This write-up must summarize the experiment from the brainstorming sessions, to building the model, to answering all questions. You will be required to draw diagrams to aid in your explanations. You may use any resources available to you including encyclopedias, textbooks, experts, and the Internet.

1. What happened when the fan was turned on as shown in the diagram?
2. What will the skate or boat do if you take the sail off and turn the fan on?
3. What forces are acting on the boat with the fan and sail on?
4. What forces are acting on the boat with the fan on and the sail off?
5. What is the fan propeller blowing against when the sail is taken off?
6. What happens when you leave the sail on and take the fan off the apparatus while the fan is blowing into the sail?
7. What forces are acting on the apparatus with the fan off and allowed to blow against the sail?
8. What can you conclude about Newton's Third Law of Motion from this experiment?

ICLE Essential Skills

Make observations using senses and instruments. Inferences and interpretations are arrived at based on observations. Classify observable properties and organize observations in a meaningful and logical way. (s5)
Understand and apply statics (i.e., the relation between forces acting on an object at rest) and dynamics (i.e., the relation between the forces acting on an object and the resulting motion). (s84)
Know and apply the principles of scientific inquiry. *(Implicit in this statement are the processes of prediction, estimation, developing hypotheses, drawing conclusions, evaluation, and following ethical principles and professional procedures.)* (Not Ranked s114)
Plan and apply real or hypothetical models and constructions to facilitate investigation and learning and the solution to practical problems. (Not Ranked s115)
Apply in writing the rules and conventions of grammar, usage, punctuation, paragraphing and spelling. (ela1)
Identify, collect and/or select pertinent information while reading. (ela5)
Present information in well-organized fashion that will be clear to the target audience. (ela 11)
Use brainstorming, role playing, and standard problem solving strategies to define a problem and suggest solutions. (ela19)

Scoring Guide:

RATE CRITERIA: 3=Excellent, 2=Satisfactory, 1=Unsatisfactory, 0=Does not attempt or does not understand

CRITERIA	**SCORE**
Group work and experimental procedure	_____
Brainstorm write-up well written and free from spelling and grammatical errors	_____
Diagrams of working model neatly done, labeled, and equipment list included	_____
Student aided group in creating a working model of a wind powered craft	_____
Second summary included diagrams and answered all questions	_____
Second summary free from spelling and grammatical errors and well written	_____
Student demonstrated an understanding for Newton's Third Law of Motion	_____

Keywords

English Language Arts	Mathematics	Science
Reading **Research**	**Algebra**	**Earth Science** **Models/Construction Team Work** **Scientific Inquiry**
Writing **Grammar** **Spelling** **Technical Writing**	**Geometry**	**Life Science**
Communications **Brainstorming Discussion** **Listening**	**Statistics**	**Chemistry**
Literature	**Calculus**	**Physics** **Motion** **Newton's Laws** **Scientific Process**
Other	**Trigonometry**	**Other**
	Other	

Chart

The Answer Is Obvious, Isn't It?