Inquiry Guide with Examples

ASKING QUESTIONS AND DEFINING PROBLEMS

OBSERVE ~ KNOW ~ QUESTION ~ CLAIM

Target Category: physical science
Grades: 3-5

OBSERVE – What did I observe?

Example: Mr. and Mrs. Thomas live in my neighborhood. Their house needs a new roof. I have noticed that there are many different types of roofs on houses in my neighborhood.

KNOW – What do I know?

Example: My parents and I talked about roofs on houses. My parents said that roofs are important because roofs protect the house during the hot summer and the cold winter.

QUESTION – What is my question?

Example: What type of roof is most efficient for keeping a house cool in the summer and warm in the winter?

CLAIM – What is my claim based on my reading about the brain and central nervous system?

Example: Some types of roofing material include: terracotta tiles; wooden shingle; slate shingles; and composite shingles made mostly of fiberglass. It is best to use the roofing material that will decrease use of energy needed to cool or heat the house.

Research question: How energy efficient in a hot weather region are composite shingles made mostly of fiberglass?

Hypothesis: If the cooling effect of house shingles is related to type of roofing material, then heat from sunlight will produce lower temperatures in houses roofed with composite shingles made mostly of fiberglass, which results in lower energy usage and costs.

Independent Variables: Different weight/density of composite house shingles; different color composite house shingles

Dependent Variables: Temperature in house attic (east side and west side) morning, noon, evening; temperature on ground floor (east side and west side) morning, noon, evening.

This topic and problem scenario is based on the work of Catherine Paget and Melissa Thomas in the course 791 STEM Classrooms and Competitions: Asking Questions, and Defining Problems, spring 2016.

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Target Categories: biochemistry, medicine, health
Grades: 9-12

OBSERVE – What did I observe?

Example: Recently I watched a basketball game. A player was knocked down and hit his head on the gym floor. The trainer rushed over to him. The player got up and said he was fine. The trainer examined the player and said the player was out for the rest of the game.

KNOW – What do I know?

Example: I learned in science class that the human brain is an amazing, important organ located in the head. The brain operates the central nervous system. The nervous system is a biological information highway responsible for controlling everything the human body does. The central nervous system talks to all the parts of the body through electrical signals.

QUESTION – What is my question?

Example: How can the human brain be protected from concussion while playing sports?

CLAIM – What is my claim based on my reading about the brain and central nervous system, and brain trauma resulting from playing sports?

Example: A hit on the head, called a concussion, can cause internal injury to the brain. A concussion can disturb the biological information highway leaving the central nervous system unable to talk to the parts of the body. Playing basketball, and other sports, can cause life threating injury if one falls and hits her/his head. Sports' helmets are made to protect the brain.

Research Question: How does the design of sports' helmets effect player safety?

Hypothesis: If effectiveness in protection of sports helmets is related to construction of the helmet, then helmets with the most protection in the forehead region will decrease head injury and the frequency of players leaving the game following head contact with another player or a hard surface such as the ground.

Independent Variable: Different types of head gear (different styles; different manufacturer; different weights; different sizes; different prices)

Dependent Variable: Number of players leaving game following a hit in different schools in the district; length of time out of the game; number of players out for the season

This topic and problem scenario is based the work of Melissa Carlson, Josh Lee, and Mandy Kern in the course 791 STEM Classrooms and Competitions: Asking Questions, and Defining Problems, spring 2016.

Inquiry Guide for Student Use with Teachers and School Librarians

ASKING QUESTIONS AND DEFINING PROBLEMS

OBSERVE ~ KNOW ~ QUESTION ~ CLAIM

Target Categories:
Grade:

Instructions: First, read the provided examples on page 1 and 2. Then, talk about a problem that you have observed and you are interested in with your teachers, school librarian, parents, and/or friends. Your problem may be related to the environment; energy; nutrition; clean water; health and health care. With assistance, determine and write in the target category, your grade, and compete each section (4) below. Once done, you are ready to begin your project using a scientific method to solve a real-life problem. Keep this guide with you. Share it with everyone who assists you. This will help you to stay on track.

OBSERVE – What did I observe?

KNOW – What do I know now?

QUESTION – What is my question?

CLAIM – What is my claim based on my reading about the brain and central nervous system?

Research Question

Hypothesis

Possible Independent Variables	Possible Dependent Variables

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