



Designing an Experiment

Practicing the Scientific Method

North American Marine Environment Protection Association®

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2014 Lloyd's List Awards ENVIRONMENT AWARD WINNER



Student Survey

1. Which of the following items do you consider to be “marine debris?”
 - a. Feathers
 - b. Sticks
 - c. Plastic Bottle
 - d. Cigarette Butts
 - e. Shells
 - f. Food Wrappers
 - g. Crabs
 - h. Fishing Line
 - i. Wood

2. True or false: Plastic...

a. Is naturally occurring

b. Biodegrades completely

c. Is found in the ocean throughout the water column, from the surface to the floor

d. Is not transported by rivers and ocean currents

3. How would you define marine debris?
4. Which of these are reasons marine debris is problematic?
 - a. Is aesthetically displeasing
 - b. It can transport invasive species
 - c. It is dangerous to wildlife
 - d. It can be dangerous to humans
 - e. Animals mistake it for food and ingest it
 - f. It transports toxins through the food chain
 - g. All of the above
 - h. None of the above

5. Put the following steps of the scientific method in order:

- a. Develop hypothesis
- b. Collect and record data
- c. Design the experiment
- d. Determine research question
- e. Draw conclusions
- f. Conduct background research
- g. Conduct the experiment

6. Finish the sentence: A testable question is one that is...

7. What are the two types of variables in a testable question?

8. Write a sentence frame for a hypothesis (Ex. If _____, then _____).

What is Marine Debris?

- Marine Debris is defined as ‘Any persistent, solid material that is manufactured or processed and directly or indirectly, intentionally or unintentionally, disposed of or abandoned into the marine environment or the Great Lakes’ (NOAA, 2007)



Main Sources of Marine Debris

- Beachgoers
- Improper disposal of trash on land
- Stormwater sewers and combined sewer overflow
- Ships and other vessels
- Industrial facilities
- Waste disposal activities
- Offshore oil and gas platforms



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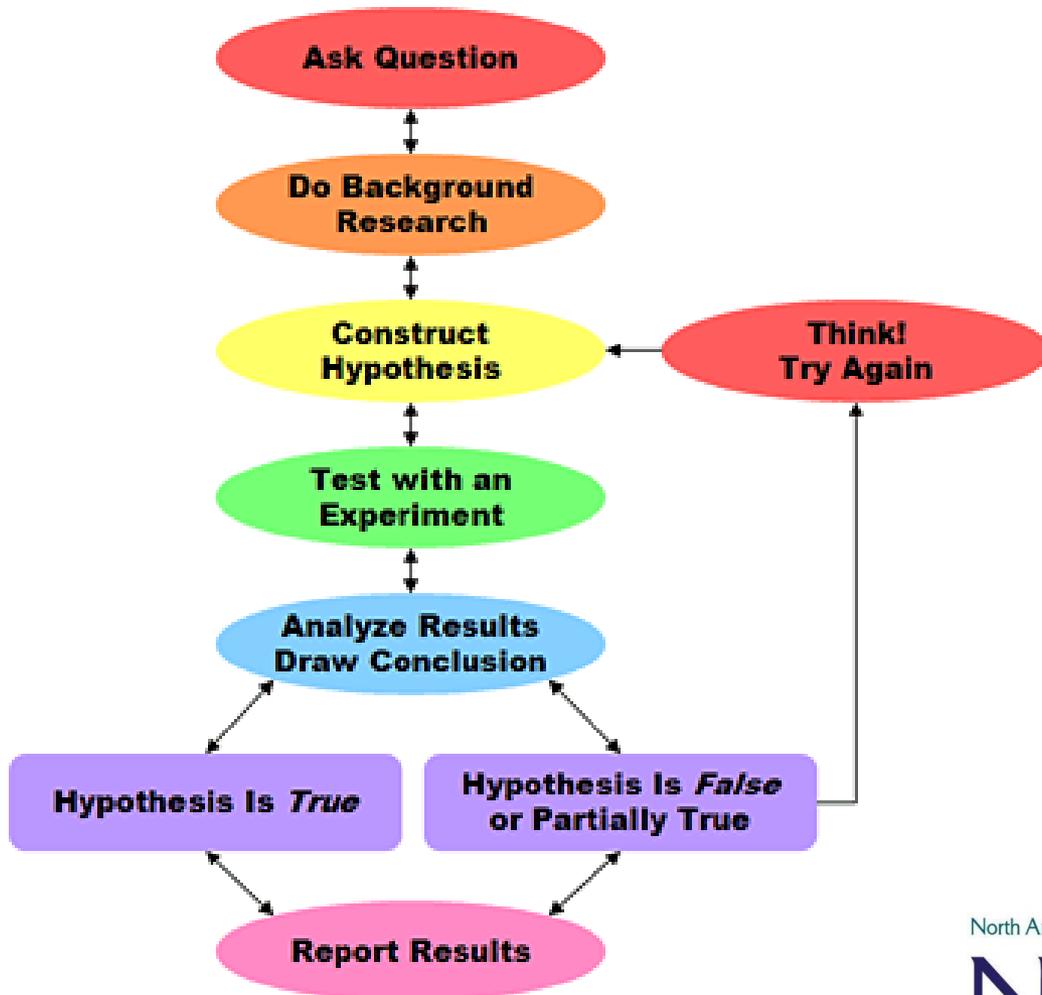
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Effects of Marine Debris

- Entanglement of wildlife
- Ingestion by wildlife
- Habitat Degradation
- Unsightliness
- Costly Cleanup
- Negatively impacts tourism



Scientific Process



What is a “testable question”?

- A testable question is one that can be answered by designing and carrying out an experiment.
- Example: Does changing _____ affect ____?
- Independent Variable: What is being manipulated
- Dependent Variable: What is being tested



Example

- What is the most common type of marine debris in the U.S.?
 - What would you measure?
 - What would you need to change?



Today...

- You are going to design an experiment about *removing or preventing* marine debris
- Brainstorm at least 3 research questions you have about *removing or preventing* marine debris
- Examples:
 - “Does teaching classes about the causes and effects of marine debris lead them to ensure their trash is disposed of properly?”
 - “How many people would it take to effectively clear a 1-mile stretch of beach?”

Remember, research questions need to be **specific** and **testable**.

- “What is the effect of marine debris on wildlife” is NOT specific
 - How would you test this?