

# Using the Question Formulation Technique: A STEM Lesson

**Grade level: 9-10**

## Introduction

Developed by the Right Question Institute, the Question Formulation Technique (QFT) provides a simple, yet powerful way to get students to ask their own questions and build off their peers' questions. In this lesson, students will view images from EBSCO's Science Reference Source database and apply the QFT.

## Objectives

By the end of the lesson, students will be able to:

- Practice brainstorming skills and open-mindedness.
- Develop questions from a prompt.
- Describe and identify closed-ended, open-ended, and testable questions.
- Prioritize questions based on the value of the potential answer.
- Collaborate with peers to identify a focus for research.
- Summarize the key points of a primary or secondary source.

## Standards

### Common Core State Standards

- CCSS.ELA-Literacy.RH.6-8.2 – Determine the central ideas or information of a primary or secondary source; provide an accurate summary of the source distinct from prior knowledge or opinions.
- CCSS.ELA-Literacy.WHST.6-8.8 – Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and follow a standard format for citation.
- CCSS.ELA-Literacy.RST.6-8.2 – Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
- CCSS.ELA-Literacy.SL.6.1 – Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly.

### Next Generation Science Standards

- Any applicable middle school Disciplinary Core Ideas based on the subject matter of the images.
- MS-PS1-3 – Gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or now supported by evidence.

### Materials

- Computer/laptop/tablet
- Access to Science Reference Source
- Writing materials

### Procedures

1. Find QFocus images to start the Question Formulation Technique (QFT).
  - Use Science Reference Source's image collection to search for images. Almost anything can be the focus, e.g., pollution, mars, frog, etc.  
*Keep in mind, the image you choose will spark questions, but students may surprise you and go in a direction very different from what you expected.*
  - Images can be combined with a quote, a fact, or some other statement.
2. Group students into question-forming teams. Explain to students that they will soon see an image to use as their focus for the question formulation process. But first they must know and follow these 4 rules:
  - Ask as many questions as you can
  - Do not stop to discuss, judge, or answer any questions.
  - Write questions exactly as they are stated.
  - Change any statements to questions.
  - If needed, take the time to discuss these rules and what may be challenging about the rules and why it's beneficial to follow the rules.
3. Show the Qfocus to students for 4 minutes. Ask students to record as many questions as they come up with.
4. Ask students to review their questions, reminding them to change any statements to questions. Define *open-ended* and *closed-ended* questions for students to record in their notes. Ask them to identify which of their questions are open-ended and which are closed-ended and label each question in their notes with an "O" or "C."
5. Students will choose one question from their list to convert from a closed-ended question to an open-ended question. Ask a representative from each group to share their converted question and explain how the change could affect the way they search for information that will answer the question.

6. Ask groups to prioritize their questions and choose three to explore in more depth. Ask students to identify one question that is testable and could lead to experimentation. Have students share these questions with the class and explain what makes the question testable.
7. At this point, the technique can be repeated for practice using a new QFocus or could be repeated for refinement using one of the questions as the new QFocus. If continuing to practice the question formation, use the suggested extension activity to begin a new QFT session.
8. Combine all the prioritized questions from one QFT session into a list for all students to view and choose from.
9. Give students time to research their chosen question.

### Directions for Students

1. Choose one question from the priority list to use as your research question.
2. Use Science Reference Source to look up three records that will help you answer your question.
3. Print, email, or save the records to read for homework.
4. Read and summarize (one paragraph for each in your own words) the articles you found and provide a concise (one paragraph or less) answer to your question.

## Assessments

### Formative Assessment

Observe students' discussion about the QFT process. Are they changing the way they think about questions? After the first round of QFT, ask students:

- What was the hardest part of this task? Easiest?
- Why is it important to take time to formulate a good question for research?

### Summative Assessment

Students will provide a report of their chosen priority question, their three definitions, and a summary paragraph of each of the three records they used to answer their question, a concise answer to their question, and a bibliography of the three records.

## Extension Activity

Choose one question and answer to read to the class and use that answer as the QFocus for another round of QFT. Take time to explain how scientific research does not end, but actually just continues with a new question.