

Science Skills Activity

Exploring Skepticism in Science

Skepticism is the habit of questioning whether accepted ideas or claims are true. Skepticism is important in science because it helps ensure that scientific explanations are based on evidence and logical reasoning.

TUTORIAL

As a skeptical thinker, you will consider the following questions:

- 1. What is the evidence for the claim or explanation?** Find out why an explanation or claim has been accepted by looking at the experiments and data that are used to support the idea. You can find this information by doing research in the library or on the Internet, or by speaking to scientists.
- 2. Is the evidence relevant to the claim or explanation?** Think about whether the evidence that is presented supports the claim or explanation. Sometimes, facts are used to support a claim even when the facts are not related to the claim.
- 3. Is there any evidence that contradicts the claim or explanation?** It is important to know whether there is any evidence that casts doubt on the explanation or claim. Openness and honesty are necessary in science so that all evidence is available for consideration.
- 4. Are there useful facts that are not being considered?** Sometimes, data that might help explain the claim are missing. The missing data may be found by doing research, by conducting experiments, or by making more observations. The new data may support the original explanation or they may lead to an alternative explanation.
- 5. Is there a reasonable alternative explanation?** Skeptical thinking involves the consideration of different explanations for observations and natural phenomena. There may be an explanation different from the accepted one that is a reasonable interpretation of the data.
- 6. Is there evidence to support the alternative explanation?** Before alternative explanations can be considered to replace accepted ones, the alternative explanations must be tested using scientific methods.

An Example of Skeptical Thinking in Geology

Geologists once thought that Devils Tower, in Wyoming, was a volcanic neck—a formation that results when magma cools and hardens within the vent of a volcano. This explanation proposed that differential weathering of the softer, outer part of the volcano left the harder volcanic neck exposed. But no evidence of a volcano could be found in the area around Devils Tower. So, skeptical geologists proposed a reasonable alternative explanation. The alternative explanation is that a body of magma cooled and hardened underground. The igneous rock that formed was surrounded by softer sedimentary rock. The sedimentary rock weathered and eroded away, and the igneous rock of Devils Tower remains.

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YOU TRY IT!

Skepticism can be a useful way of thinking both in science and in everyday life. Study the boulder shown in the photograph below. Next, read the field team members' report of their observations of the area. Then, practice skepticism as you answer the questions that follow.

Field Team Report

The area being studied is mountainous. During the winter months, the area has freezing temperatures at night. There are many boulders that appear to have fallen from the top of the mountains. While the field team was working in the area, team members observed one large rock fall down the mountain and come to rest near the boulder in the photograph. Some boulders in the area are cracked. In many cases, these cracks have split the boulders apart. Members of the field team think that these boulders may have been split by the impact of large rocks falling onto them from above.



1. How does the field team explain the cracked boulders?

2. What evidence is given to support the field team's explanation?

3. Is the evidence given related to the explanation given? Explain your answer.

4. Can you think of evidence that might disprove the explanation? Explain your answer.

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5. Give at least one example of information that is not included in the report or photograph that might be useful to a person evaluating the explanation given by the field team.

6. Write a statement that is a reasonable alternative to the explanation for cracked boulders that was given by the field team.

7. What questions would you ask, or what investigations would you do, to find evidence to support your alternative claim?
