

*Science students should be able to distinguish scientific questions from social, teleological, and ethical questions.*

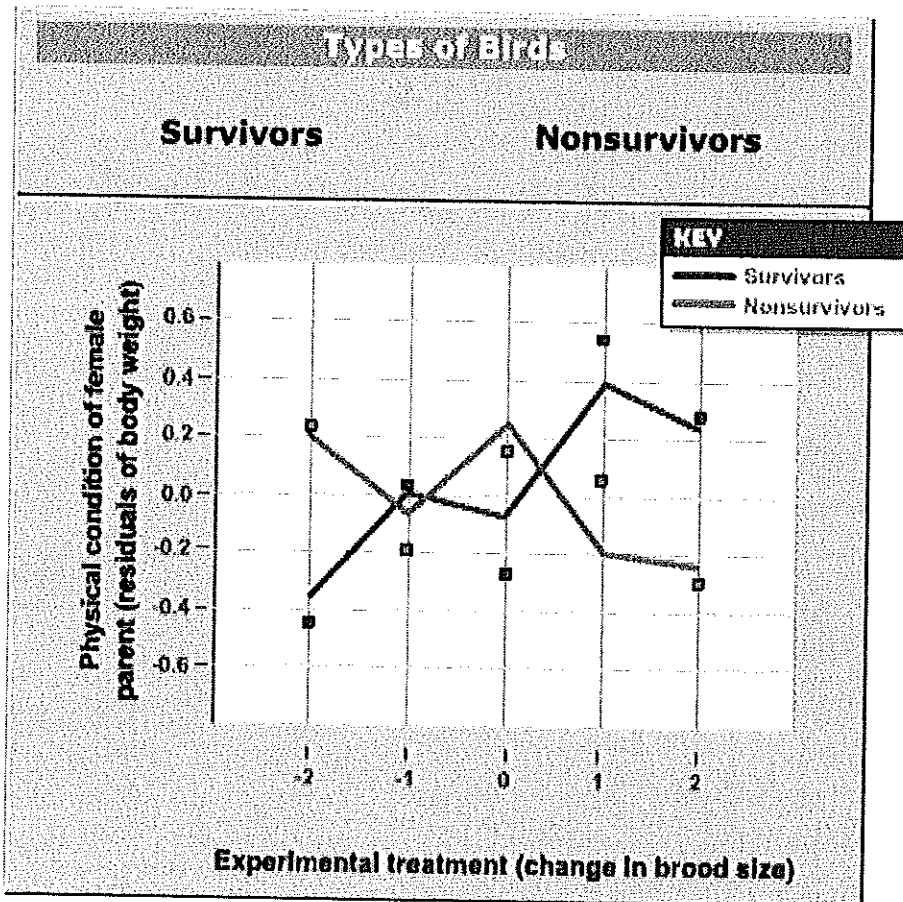
1. Identify the question below that best exemplifies a scientific question, one that can be addressed through evidence and amended due to new experimental data.

- A. Why did the water rise in the jar?
- B. How do plants grow toward light?
- C. Is premarital sex wrong?
- D. Should drug users be sent to prison or rehab facilities?
- E. Can scientists omit data that does not support their hypotheses?
- F. Should hunting endangered species be illegal?
- G. Are global fishing regulations needed?
- H. What percent of HIV patients are homosexual?

2. Now that you have identified the scientific question label the others as either social, teleological or ethical questions. You can leave the scientific question blank.

- A. \_\_\_\_\_
- B. \_\_\_\_\_
- C. \_\_\_\_\_
- D. \_\_\_\_\_
- E. \_\_\_\_\_
- F. \_\_\_\_\_
- G. \_\_\_\_\_
- H. \_\_\_\_\_

3. Examine the graph below. Based upon the data collected, what question do you think the investigator is asking?



4. Using the observations provided below, develop the most reasonable question that one might ask given these specific observations.

1. Some plants accumulate very high levels of nickel (greater than 1% of the dry weight of the plant).
2. Various plants contain elevated levels of Ni when grown in Ni-containing soils, but plants that accumulate more than 1000 mg of Ni per kg of dry tissue weight are called hyperaccumulators.
3. While hyperaccumulators are found in several different families of plants, nearly half occur in the mustard family (Brassicaceae).
4. The ecological role of Ni hyperaccumulation is not known.
5. High levels of Ni in the Ni hyperaccumulating plant *Streptanthus polygaloides* confer a defense against attacks by various insect herbivores. The Ni is toxic to insects that consume the plant.
6. Ni has a high level of biological toxicity and has been used commercially as a systemic fungicide.

5. Using the observations provided below, develop the most reasonable question that one might ask given these specific observations.

1. There has been an increase in deformities found in amphibian populations around the world.
2. We have seen worldwide declines in amphibian populations.
3. Previous research has shown several potential causal factors, including environmental pesticides, parasites, and UV-B radiation.

6. Evaluate the questions below and rank them in order from the weakest (worst) scientific question to the strongest (best). Include a brief explanation why you ranked them in that order.

A. Why have cancer rates increased in the United States?

B. Do certain genes cause cancer?

C. Does the *brca1* gene alone cause breast cancer?

7. Think of an observation that you made in the past and create your own valid scientific question.

KEY

Science students should be able to distinguish scientific questions from social, teleological, and ethical questions.

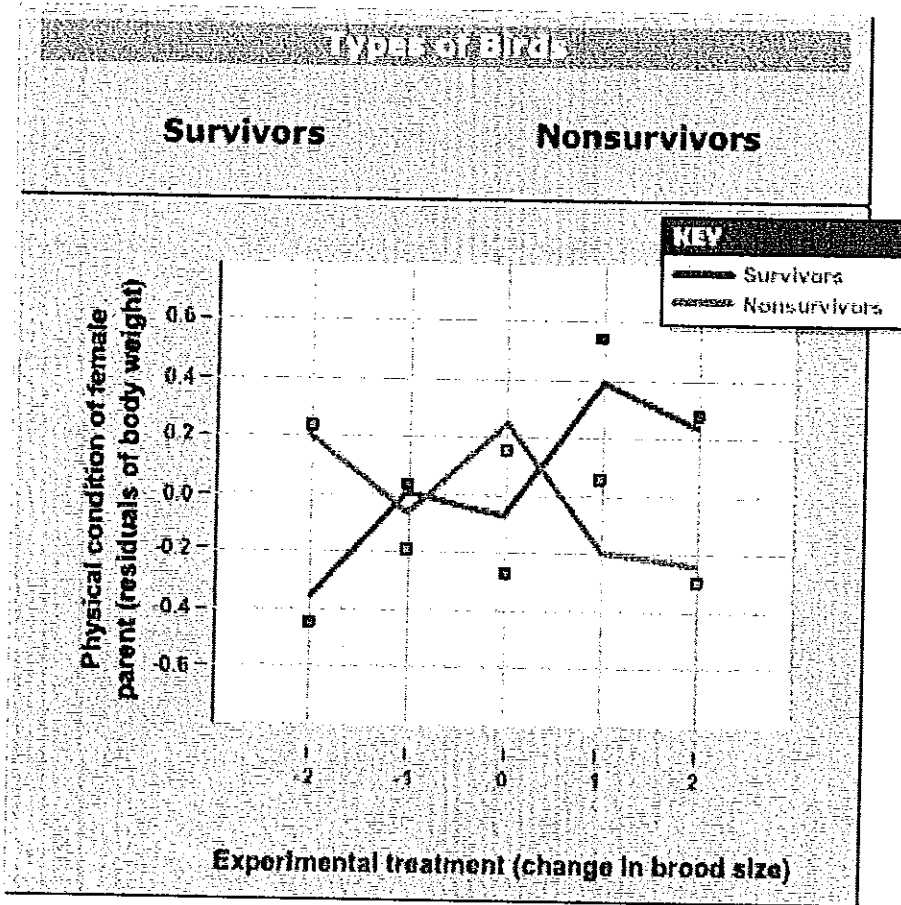
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2. Now that you have identified the scientific question label the others as either social, teleological or ethical questions. You can leave the scientific question blank.

- A. TELEOLOGICAL.
- B. SCIENTIFIC
- C. ETHICAL
- D. TELEOLOGICAL.
- E. ETHICAL
- F. SOCIAL
- G. SOCIAL
- H. SCIENTIFIC

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Do female birds that are more physically fit have better offspring survival rates?

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DOES NI ACCUMULATION IN PLANTS PROTECT THEM FROM HERBIVORES?

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DOES UV RADIATION CAUSE DEFORMITIES OR DECREASED SURVIVAL AMONG AMPHIBIANS?

6. Evaluate the questions below and rank them in order from the weakest (worst) scientific question to the strongest (best). Include a brief explanation why you ranked them in that order.

WORST A. Why have cancer rates increased in the United States? Tereo

BETTER B. Do certain genes cause cancer? Brown

BEST C. Does the *brca1* gene alone cause breast cancer? Specific

7. Think of an observation that you made in the past and create your own valid scientific question.

Answers will vary