

**Question 23**  
**Benchmark A**  
**Spring 2009**

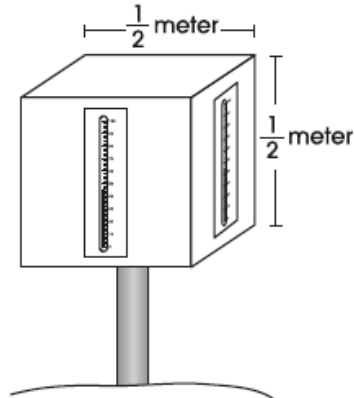
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Use the information and illustration to answer questions 23 and 24.

**Solar Warming**

A group of students in Ohio conducted an investigation during the month of January to study the effects of solar warming. The students used a wooden box painted white. The box was mounted on a post in an open area and a thermometer was fastened on each of the four sides. The box was oriented so that each thermometer faced squarely in a different direction: north, south, east or west. The temperature on each thermometer was recorded in degrees Fahrenheit at 12:00 noon during five consecutive days of clear skies.

The picture shows the apparatus used by the students.



The table shows the data collected by the students.

**Effects of Solar Warming**  
**(Temperature in °F)**

	North	South	East	West
Day 1	29	36	32	32
Day 2	29	36	32	31
Day 3	30	37	34	33
Day 4	27	34	32	30
Day 5	30	37	35	33

10<sup>th</sup> Grade Science Ohio Graduation Test  
Scientific Inquiry

23. Based on the data, which statement best summarizes the effects of solar warming in January?
- A. Solar warming at noon is greatest on south-facing surfaces.
  - B. Solar warming is greatest in January when the weather is clear.
  - C. Solar warming in Ohio is greatest in the northern part of the state.
  - D. Solar warming increases from the west side of Ohio to the east side of Ohio.

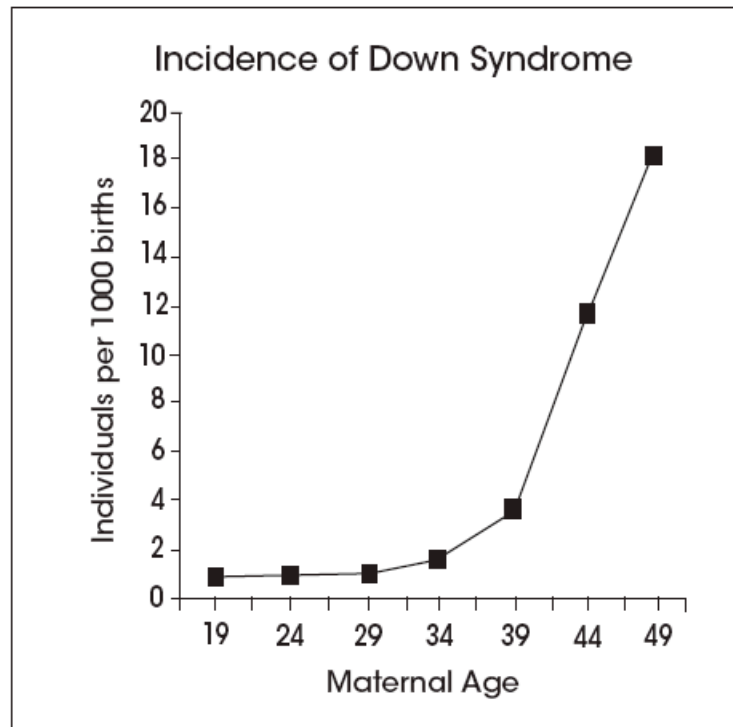
**Question 35**  
**Benchmark A**  
**Spring 2009**

A teacher gives a student a non-toxic, odorless, white powder to identify. Generate four questions, each regarding a different property of the unknown powder, that could be safely tested and answered in the laboratory.

Respond in the space provided in your **Answer Document**. (4 points)

**Question 19**  
**Benchmark A**  
**March 2008**

19. The graph below shows the relationship between maternal age and the incidence of children born with Down syndrome (a condition that results in an individual having an extra chromosome 21).

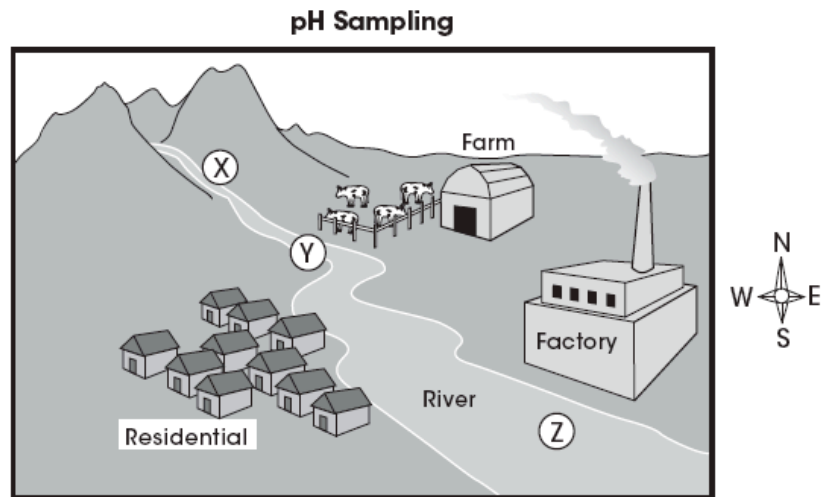


What conclusion is best supported by the data?

- A. There is no risk of Down syndrome in children born to mothers under age 34.
- B. The risk of Down syndrome increases dramatically in children born to mothers after age 34.
- C. The risk of Down syndrome doubles in children born to mothers for each year over the age of 34.
- D. There is no correlation between the number of Down syndrome births and age.

**Question 35**  
**Benchmark A**  
**March 2008**

35. Environmental monitoring of a lake located to the southeast of a factory has shown a consistent decrease in pH over the period of a year. A researcher investigating the pH change hypothesizes that either a factory or a farm along the river is responsible for the pH change. The river flows into the lake.



The researcher collects a water sample from locations Y and Z in the diagram and runs pH analyses on each sample. He finds that the pH in sample Z is lower than the pH in sample Y and concludes that the factory is responsible for the low pH values in the lake.

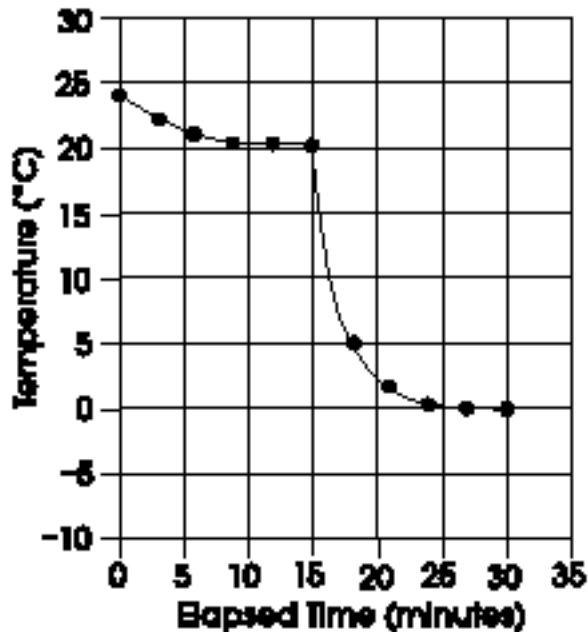
Based on the diagram and the researcher's investigation, provide two reasons why this may not be a valid conclusion. Describe how each reason could invalidate the conclusion.

Respond in the space provided in your **Answer Document**. (4 points)

**Question 6**  
**Benchmark A**  
**9<sup>th</sup> Practice Test**

6. In a proposed experiment using twice as much ice and half as much water as in Experiment 1, a student predicts the values shown in the graph below.

**Predicted Values for Proposed Experiment**

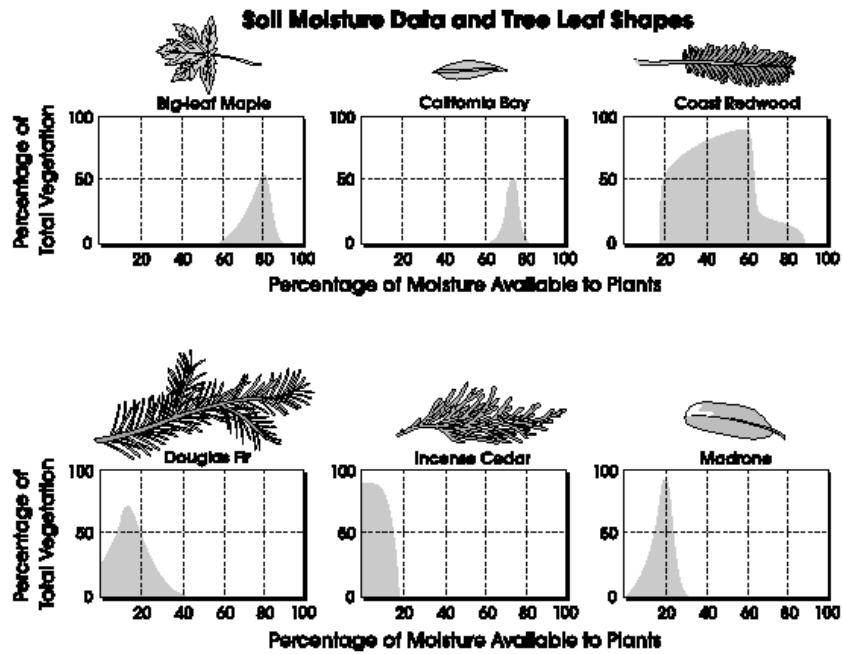


Compare the shapes of the graphed lines from Experiment 1 and the proposed experiment and explain why the predicted values are probable. Respond in the space provided in your **Answer Document**. (2 points)

**Question 8**  
**Benchmark A**  
**9<sup>th</sup> Practice Test**

**Plant Distribution**

The distribution of plant species depends on many factors, including climate, topography, soil conditions and biological interactions. Data on moisture availability were collected along the coast of Northern California. In this area, each plant community has a dominant tree. The graphs below illustrate a dominant tree's percentage of the total vegetation compared to the percentage of soil moisture available. Each tree species studied has a distinct preference for a certain kind of habitat.



10<sup>th</sup> Grade Science Ohio Graduation Test  
Scientific Inquiry

An ecologist observes that an area in California has experienced an increase in average soil moisture content. The area was once dominated by incense cedar but is now home to a greater variety of trees. Which types of trees would the ecologist most likely observe in this area if the soil moisture content has risen to 30%?

- A. madrone and California bay
- B. Douglas fir and madrone
- C. incense cedar and big-leaf maple
- D. coast redwood and big-leaf maple

**Question 11**  
**Benchmark A**  
**9<sup>th</sup> Practice Test**

11. A survey of a small coastal valley in California finds only Douglas fir, madrone, and coast redwood. The soil moisture availability in this valley is most likely to be
- A. 0 – 20%.
  - B. 20 – 40%.
  - C. 40 – 80%.
  - D. 60 – 80%.

**Question 42**  
**Benchmark A**  
**Spring 2005**

42. An agricultural scientist wants to determine the effect of fertilizers on corn plant growth. She selects a fertilizer to treat a soil plot where corn seeds have just sprouted. Describe an appropriate control she could use to determine whether the fertilizer affects growth of the corn plants. Explain why it is important to include this control. Respond in the space provided in your **Answer Document**. (2 points)

**Question 44**  
**Benchmark A**  
**Spring 2005**

The water level in a graduated cylinder rises from 10 cm<sup>3</sup> to 35 cm<sup>3</sup> when a solid lead ball is added. What is the approximate volume of the lead ball?

- A. 3.5 cm<sup>3</sup>
- B. 25 cm<sup>3</sup>
- C. 35 cm<sup>3</sup>
- D. 45 cm<sup>3</sup>

**Question 11**  
**Benchmark A**  
**Spring 2006**

Use the information to answer questions 11 – 14.

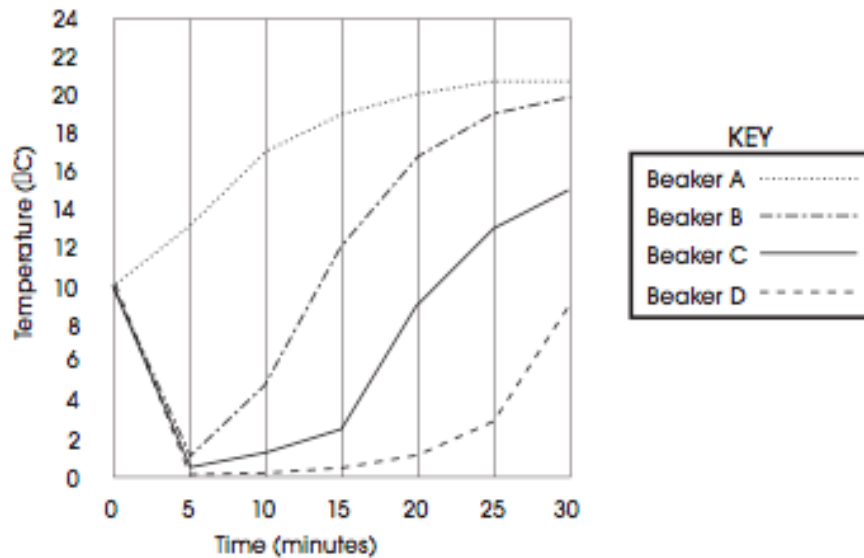
**Water Temperature Experiment**

Students studied the effect of ice on the temperature of a sample of water. First, they put 500 mL of cold water (at 10°C) into each of four beakers. Next, they measured and recorded the initial temperature of the water in each beaker. Then, they added various amounts of ice as shown in the table below. They continued to measure the temperature over a period of 30 minutes. Their results are shown in the graph below. The temperature of the room during the experiment was 22°C.

**Data Table**

Beaker	Amount of Ice (in scoops)	Volume of Water (in milliliters)
A	0	500
B	1	500
C	2	500
D	3	500

**Results of Experiment**



10<sup>th</sup> Grade Science Ohio Graduation Test  
Scientific Inquiry

11. Which was the dependent (responding) variable in this experiment?
- A. the temperature of the water
  - B. the amount of ice added to each beaker
  - C. the initial amount of water in each beaker
  - D. the amount of time during which observations took place

**Question 13**  
**Benchmark A**  
**Spring 2006**

13. After reviewing these results, Archie suggested, "The more ice you add to a drink, the colder the drink will become." Using data collected in the experiment, write an explanation to Archie for why his conclusion is incorrect and what effect additional ice will have on the temperature of his drink. Respond in the space provided in your **Answer Document**. (2 points)

**Question 14**  
**Benchmark A**  
**Spring 2006**

14. Which was the independent (manipulated) variable in this experiment?
- A. the amount of water in each beaker
  - B. the amount of ice added to each beaker
  - C. the initial temperature of the water in each beaker
  - D. the amount of time during which observations took place

**Question 37**  
**Benchmark A**  
**March 2007**

Some strains of laboratory mice have been inbred for many generations, resulting in large numbers of mice with nearly identical genetic makeup. Explain an advantage of using these mice in designing an experiment to test the effects of a new drug. Compare this to a test using mice with varied genetic makeup. Respond in the space provided in your **Answer Document**. (2 points)

**Question 39**  
**Benchmark A**  
**March 2007**

**Himalayan Rabbits**

Himalayan rabbits are native to the Himalayan Mountains, where a great deal of snow falls annually. These rabbits have white fur over most of their bodies, with black fur on the ears, noses, feet and tails. This color pattern results from temperature differences in different parts of the rabbits' bodies. Areas where the body temperature is below 33°C the fur grows in black.

To demonstrate this color change, a scientist shaved a small area of fur on the backs of adult Himalayan rabbits. Ice packs were kept on the shaved areas long enough for the rabbits' fur to begin growing back. When the ice packs were removed, the fur growing beneath them was black.

Before Experiment



After Experiment

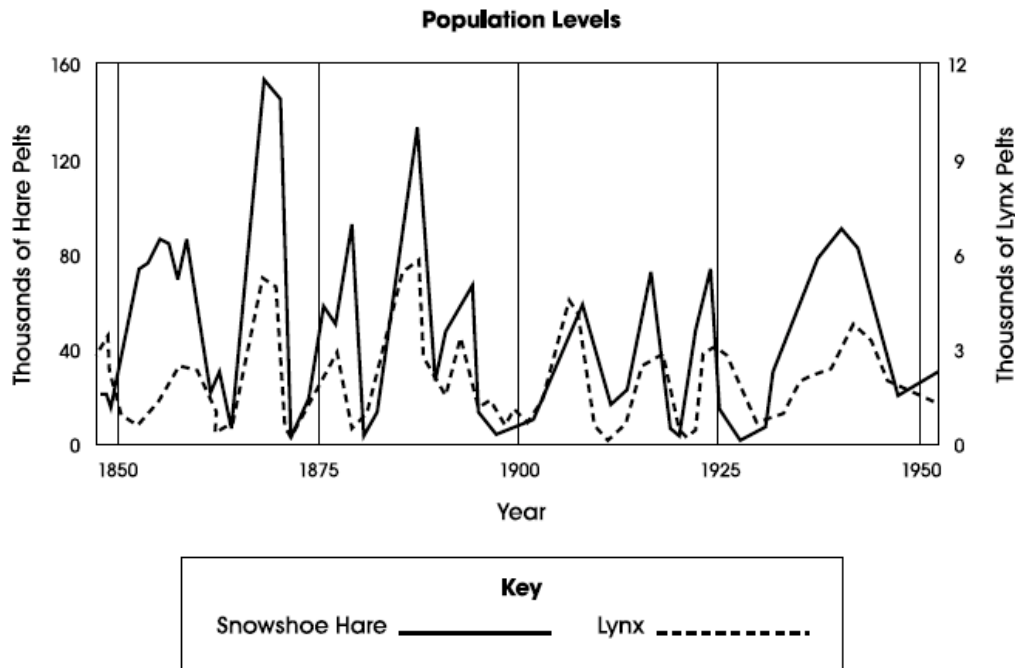


39. Suppose the same scientist wanted a Himalayan rabbit with white feet. Which procedure would most likely generate these results?
- A. place ice packs on the rabbit's feet
  - B. place the rabbit outside on a sunny day
  - C. place the rabbit outside when it is snowing
  - D. place the rabbit in a cage with a heated floor

**Question 43**  
**Benchmark A**  
**March 2007**

**Hare and Lynx Populations**

In a classic study of predator-prey interactions, the numbers of snowshoe hare pelts and lynx pelts sold to a trading company by trappers were recorded over a period of 100 years. Both lynx and hare populations appear to oscillate in a regular pattern over a period of about ten years. One explanation for this pattern is that heavy predation reduces the snowshoe hare population, which in turn reduces the lynx population. More recently, scientists have proposed that the hare population oscillates due to diseases caused by overcrowding or by the effects of its own feeding activities on vegetation.



43. One assumption about the data used in this study is that
- A. oscillations in population size occur every ten years.
  - B. the number of pelts reflects the size of the populations.
  - C. snowshoe hares have an impact on their food supply.
  - D. hares and lynx were trapped over a period of 100 years.