SmartKalike

CBSE Class 10 · English

The Making of a Scientist

10 most probable questions for Boards 2027

Q1. 1 mark · Very short answer

According to the account of Ebright's success, name one quality, besides a first-rate mind, that helps make a scientist.

Answer

Curiosity helped make Ebright a scientist; his questions about monarchs led to experiments and important discoveries.

Q2. 2 marks · Short answer

Does becoming a scientist involve only reading books? Briefly state what else the process requires.

Answer

Becoming a scientist requires more than reading books; it involves curiosity, observation, thinking and experiments. Ebright tested ideas through research, learned from failure and investigated questions about monarch butterflies.

Q3. 5 marks · Long answer

Describe Ebright's investigations into the monarch caterpillar disease and the birds' response to monarchs. What results did he obtain, and how was his viceroy project placed at the county science fair?

Answer

Ebright's early monarch projects taught him to test scientific questions through experiments.

1. In eighth grade, he investigated the cause of a viral disease that kills nearly all monarch caterpillars every few years. He suspected that beetles might carry the disease and raised caterpillars in their presence, but obtained no real results.
2. Although the beetle experiment was unsuccessful, Ebright presented it at the science fair and won. He had demonstrated that he had genuinely tried the experiment.
3. The following year, he tested the theory that viceroy butterflies copy monarchs. The theory suggested that birds would eat all the monarchs they could get; later research by other people showed that viceroys probably do copy monarchs.
4. Ebright's viceroy project placed first in the zoology division and third overall at the county science fair.

These investigations helped Ebright move from unsuccessful trials to increasingly successful scientific projects.

Q4. 6 marks · Very long answer

Explain what DNA does in a cell and describe how Ebright and James R. Wong developed a theory about how a cell reads DNA's blueprint.

Answer

DNA is the substance in a cell's nucleus that controls heredity and provides the blueprint for life.

1. DNA determines the form and function of a cell, carrying the instructions that guide its development and activities.
2. Ebright's interest in how a cell reads DNA's blueprint grew from his research on insect hormones. While looking at X-ray photos of a hormone's chemical structure, he believed they helped answer this biological puzzle.
3. Ebright and his college roommate, James R. Wong, worked together throughout the night to explore how a cell might read the blueprint. They drew pictures and constructed plastic models of molecules to demonstrate how the process could happen.
4. Ebright and Wong later wrote a paper explaining their theory. Ebright then began experiments at Harvard Medical School to test the theory.

Their work connected Ebright's studies of monarch hormones with a new theory about cell life, which could advance understanding of life's processes if proved correct.

Q5. 12 marks · Essay answer

Write a detailed account of Ebright's research on the gold spots of monarch pupae. Explain what his cell-culture experiment established and how he identified the hormone's chemical structure.

Answer

In his second year of high school, Richard Ebright began research on the twelve tiny gold spots on a monarch pupa. The spots had long been assumed to be ornamental, but Dr Frederick A. Urquhart did not accept that assumption. Ebright wanted to discover what purpose the spots served. The investigation grew from a question about butterfly development into a research programme that contributed to his later theory about cell life.

Ebright and another excellent science student first had to build a device to investigate the spots. Their device showed that the spots produced a hormone necessary for the butterfly's full development. The finding established that the gold spots had a biological function rather than merely adding decoration to the pupa. The project won first place in the county fair and qualified Ebright for the International Science and Engineering Fair, where he won third place for zoology. The success also earned him an opportunity to work during the summer at the entomology laboratory of the Walter Reed Army Institute of Research.

As a high school junior, Ebright continued advanced experiments on the monarch pupa. His project won first place at the International Science Fair and brought another opportunity to work in the army laboratory during the summer. Ebright kept investigating the hormone produced by the gold spots, rather than treating the first finding as the end of the research. The continuing work helped him build on his evidence about the hormone and its role in development.

In his senior year, Ebright investigated the hormone's effect on cells from a monarch's wing. He grew the cells in a culture and found that the cells divided and developed into normal butterfly

wing scales only when fed the hormone from the gold spots. The experiment established that the hormone was needed for the cells' division and normal development. Without the hormone, the cultured cells did not form normal wing scales. The project won first place for zoology at the International Fair. After graduation, Ebright spent the summer doing further work at the army laboratory and at the laboratory of the U.S. Department of Agriculture.

After his freshman year at Harvard University, Ebright returned to the Department of Agriculture laboratory the following summer. He continued working on the hormone from the gold spots. The laboratory's sophisticated instruments enabled him to identify the hormone's chemical structure. The account does not specify the instruments or the particular procedure used for the identification; it establishes that the laboratory instruments made the identification possible.

A year-and-a-half later, during his junior year at Harvard, Ebright was looking at X-ray photographs of the hormone's chemical structure when he developed his theory about cell life. His earlier investigation of the gold spots had led him to study the hormone, and the structural photographs helped him consider how a cell could read the blueprint of its DNA. Ebright and his college roommate, James R. Wong, worked through the night drawing pictures and constructing plastic models of molecules. They later wrote a paper explaining their theory. The gold-spot research therefore progressed from discovering a hormone's role in butterfly development to identifying its chemical structure and contributing to a theory about how cells read DNA.

Q6. 20 marks · Essay answer

Prepare a substantial class presentation on the question, "Why does rain fall in drops?" Explain how you would investigate it, what scientific ideas you would explore, and how asking and testing such questions contributes to scientific inquiry.

Full answer on SmartKalike: https://smartkalike.com/cbse/class-10/english/the-making-of-a-scientist

Q7. 1 mark · Very short answer

What did Ebright show that the hormone produced by the gold spots on a monarch pupa was needed for?

Full answer on SmartKalike: https://smartkalike.com/cbse/class-10/english/the-making-of-a-scientist

Q8. 2 marks · Short answer

Name any two books recommended in this section.

Full answer on SmartKalike: https://smartkalike.com/cbse/class-10/english/the-making-of-a-scientist

Q9. 5 marks · Long answer

The recommended list includes *Children Who Made It Big* and *School Days*. Compare what their titles suggest a reader might explore in these books.

Full answer on SmartKalike: https://smartkalike.com/cbse/class-10/english/the-making-of-a-scientist

Q10. 6 marks · Very long answer

Describe Ebright’s cell-culture experiment and explain what it showed about the hormone from monarch gold spots. How did he later identify the hormone’s chemical structure?

Full answer on SmartKalike: https://smartkalike.com/cbse/class-10/english/the-making-of-a-scientist

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