

1. **DESCRIPTION:** Students will solve problems and analyze data or diagrams using their knowledge of the basic principles of genetics, molecular genetics and biotechnology.

A TEAM OF UP TO: 2

APPROXIMATE TIME: 50 min.

2. **EVENT PARAMETERS:** Each team may bring only one 8.5" x 11" two-sided page of notes that contain information in any form from any source and up to 2 non-programmable, non-graphing calculators
3. **THE COMPETITION:** This event may be run at stations and may include observations, inferences, predictions, data analysis, and calculations. Every attempt should be made to avoid over-emphasis on a particular area. At the various levels, possible areas to be tested are limited to the basic principles of genetics (see Heredity-B event training on SO website) plus the following topics:

Regional and State	Regional and State	National (all topics-Regional, State, and National)
DNA structure & function	Sanger DNA Sequencing	Restriction mapping
DNA Replication including roles of enzymes	DNA fingerprinting	Phylogenetics
Gene expression including roles of enzymes	RFLP	RNA processing
Promoters	PCR	RNA-Seq
Mutations	DNA microarrays	DNA Repair
Organelle DNA	Molecular cloning	Epigenetics
Plasmid selection and isolation	Gene Therapy	Next Gen Sequencing Platforms (comparison)

4. **EXAMPLES:**

- a. Gel electrophoresis set up and running. Photographs showing results of a gel with the lanes labeled: mother, child, male 1 and male 2.
 - i. Identify the apparatus or process (gel electrophoresis).
 - ii. According to the results, who is the possible father of the child?
 - iii. Why do the bands of DNA in the photograph end up at different locations within their lanes?
 - iv. What is the size of fragment 3 in Lane 3?
 - b. Given a sequence of coding strand DNA,
 - i. What is the sequence of the corresponding RNA?
 - ii. Using the genetic code, what would be the sequence of amino acids made from this RNA?
 - c. What would be the consequence of mutating the -10 region of a prokaryotic promoter?
5. **SCORING:** Highest number of correct solutions will determine the winner. Selected questions may be used as tiebreakers.

Recommended Resources: All reference and training resources including the **Bio/Earth CD** and the in-depth **Genetics CD** are available on the Official Science Olympiad Store or Website at www.soinc.org

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