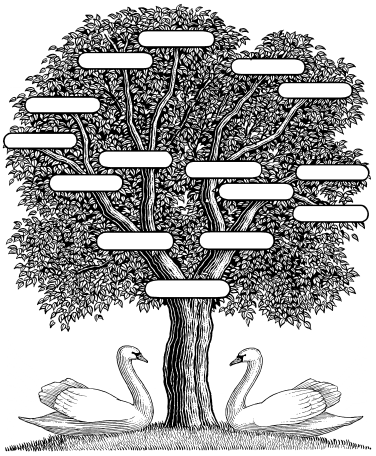
HEREDITY

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

   A TEAM OF UP TO: 2 **APPROXIMATE TIME:** 50 minutes



2. **EVENT PARAMETERS:** Each team may bring **only** one 8.5" x 11" two-sided page of information in any form from any source and up to two non-programmable, non-graphing calculators.

3. **THE COMPETITION:** This event may be run at stations and may include process skills such as data analysis, predictions, calculations, inferences, and observations. Contestants will be given a combination of genetic problems to solve, pedigrees, karyotypes, or diagrams to analyze. Every attempt should be made to avoid over-emphasis on a particular area. Common genetic disorders will apply to all levels. **At the various levels, possible areas to be tested are limited to the following topics:**

Regional and State	Regional and State	National (all topics)
Monohybrid cross	Dihybrid cross	Pedigree construction and analysis
Dominant and recessive alleles	Sex-linked traits	Production of gametes with Abnormal #'s of chromosomes
Genotype vs. phenotype	Pedigree analysis	Trihybrid cross (probability analysis)
Human sex determination	Multiple alleles	Analysis of karyotypes for deletion, addition, translocation
Gene: protein relationship	DNA structure & replication	Transcription and translation
Mitosis	Meiosis and gamete formation	Multifactorial traits
Human karyotypes analysis for nondisjunction disorders	Co-dominance & incomplete dominance	Epistasis

4. **SAMPLE QUESTIONS:**
   a. In guinea pigs, short hair (S) is dominant over long hair (s). Two heterozygous dominant guinea pigs are crossed (Ss X Ss). What will be the genotype ratio of their offspring? What will be the phenotype ratio of their hair length?
   b. In mice, the gene for color coat (C) is dominant to the gene for albino (c), and gene for straight whiskers (S) is dominant to the gene for bent whiskers (s). Two heterozygous dominant mice are crossed CcSs x CcSs. Show the Punnett Square of genotypes for this cross and determine the genotype and phenotype ratios for this cross.
   c. A man who is blood type AB marries a woman who is blood type O. What blood types might be present in their children?
   d. Examine a pedigree and answer the questions about sex of individuals, relationships, phenotype, and genotypes.
   e. Examine a karyotype and answer questions about sex of individual, number of chromosomes, monosomy, trisomy, and genetic disorders.
   f. Examine data and/or diagrams concerning mitosis, meiosis, or DNA structure/replication and answer questions about the processes.

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