

1. **DESCRIPTION:** This event integrates content knowledge and process skills in the areas of cell biology and **cellular** biochemistry.

A TEAM OF UP TO: 2

EYE PROTECTION: #4

APPROXIMATE TIME: 50 minutes

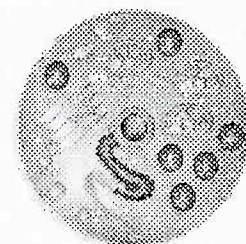
2. **EVENT PARAMETERS:** Students will bring and wear Z87 chemical splash goggles where needed and non-programmable calculators. **Each team may bring one 8.5" x 11" two-sided page of notes that contain information in any form from any source.**

3. **THE COMPETITION:**

- a. The competition may be administered at a series of lab-practical stations **such as** demonstrations, experiments, scientific apparatus, models, illustrations, specimens, data collection and analysis, and problems for students to solve. Content topics will include:

<i>At the regional and state level:</i>	<i>At the national level:</i>
<ol style="list-style-type: none"> 1) Biological monomers and polymers, including LDL and HDL 2) pH 3) Enzymes 4) Cell organelles/structures and their functions 5) Differences between eukaryotic and prokaryotic cells 6) Qualitative aspects of photosynthesis & respiration 7) Membrane structure and function 8) Movement across membranes 9) Importance of ATP 10) Structure of viruses 11) Cell cycle and mitosis 12) Chromosome structure 13) Fermentation products and uses 	<ol style="list-style-type: none"> 1) All topics from state and regional plus: 2) Cell communication and membrane receptors 3) Apoptosis 4) Enzyme inhibition 5) Stem cell concepts and uses 6) Viral replication 7) C₃ vs. C₄ vs. CAM plants 8) Consequences of changes in protein shape 9) Cancerous vs normal cells 10) Genomics 11) Bioethics relating to above topics

- b. Process skills may include writing hypotheses, determining independent and dependent variables, controlling variables, graphing, analyzing data, interpreting results as well as using and applying technologies.
 - c. Questions pertaining to the exact amount of ATP produced during cellular respiration must not be used (note: this is because the amount of ATP produced varies within a cell).
4. **SAMPLE QUESTIONS:**
 - a. Using models, photographs, or illustrations of structures such as organic molecules and cell organelles, identify the structure and describe its function or role in life processes.
 - b. Using a light microscope, estimate cell size and determine the 3-dimensional shape of cells. Relate the size and shape of a cell to its function.
 - c. Make measurements to calculate surface area to volume relationships. Relate surface area to volume relationships to cell structure and function.
 - d. Contrast viruses and cells.
 - e. Using the results of gel electrophoresis, identify and compare the different proteins.
 - f. Identify substances such as protein, carbohydrates, lipids and vitamin C using reagent tests or data provided.
 - g. Calculate the energy content of food from data either given or obtained from calorimeters.



5. **SCORING:** Each correct response will be assigned a point value. The highest score wins. Selected questions may be used as tiebreakers.