

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:**

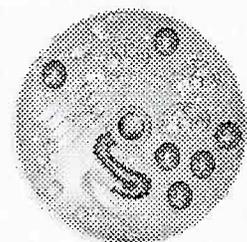
- a. The competition may be administered at a series of lab-practical stations **such as** demonstrations, experiments, scientific apparatus, models, illustrations, specimens, data collection and analysis, and problems for students to solve. Content topics will include:

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

- 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.