CELL BIOLOGY

See General Rules, Eye Protection & other Policies on www.soinc.org as they apply to every event.

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**: **C** **APPROXIMATE TIME:** 50 minutes

2. **EVENT PARAMETERS:**

   Students will bring and wear goggles where needed. Each team may bring one 8.5" x 11" sheet of paper, which may be in a sheet protector sealed by tape or laminated, that may contain information on both sides in any form and from any source without any annotations or labels affixed along with two stand-alone non-programmable, non-graphing calculators.

3. **THE COMPETITION:**

   a. The competition may be administered as 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:

Regional and State Tournament Topics		
Biological monomers and polymers	Cellular homeostasis (pH, osmolarity etc.)	Enzymes and inhibition
Bioenergetics, **metabolic networks, fermentation products and uses**	Cell organelles / structures and their functions **in eukaryotes and prokaryotes**	**Cell wall structure and diversity in all domains of life**
Membrane structure and function including lipid rafts, transport	Vesicle formation, fusion	Cell cycle and mitosis, role of cyclins and kinases
Apoptosis and cancer	**C3 vs. C4 vs. CAM plants**	**Cell communication, membrane receptors, and signal transduction**
National Tournament Topics (Regional & State topics + the following)		
Traditional fluorescence microscopy and TIRF microscopy	**Carcinogens, the hallmarks of cancer**	Cell cytoskeleton and intracellular trafficking
Induced pluripotent stem cells	Host/virus interactions	Protein folding and related diseases
Cellular basis of common medicines (antibiotics, chemotherapy, insulin, etc.)	Genomics and medicine/human health	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 as 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. **Analyze a graph showing cyclin levels and describe cell cycle effects of these cyclins.**
d. Contrast healthy cells to cells infected with viruses, cancerous cells using images and/or descriptions of cellular processes.
e. Label structures present in eukaryotic and prokaryotic cell membranes.
f. Identify substances such as protein, carbohydrates, lipids and vitamin C using reagent tests or data provided.

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

Recommended Resources: The Science Olympiad Store (store.soinc.org) carries a variety of resources to purchase for this event; other resources are on the Event Pages at soinc.org