

1. **DESCRIPTION:** This event encompasses the anatomy (structure and function) of the skeletal and muscular systems and the effects of aging and diseases on them.

A TEAM OF UP TO: 2

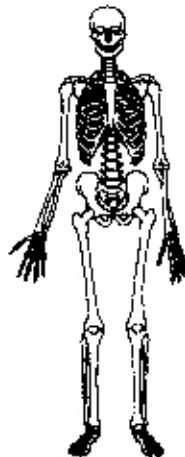
APPROXIMATE TIME: 50 Minutes

2. **EVENT PARAMETERS:** Each team member may bring a non-programmable calculator. **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:** Students should know the basic anatomy of the skeletal and muscular systems and how aging and specific diseases affect them. Process skills expected may include data collection, making observations, inferences, predictions, calculations, analyses and conclusions. The test may include various formats (e.g., timed stations, written test, slides, etc.) for the following topics:

a. **SKELETAL SYSTEM** - All competition levels should know:

- i. Bones of the axial and appendicular skeleton (excluding the skull bones); label the basic surface anatomy of a bone as shown on a diagram and/or normal X-ray.
- ii. Names, structures and functions of types of joints and human ranges of motion allowed by each type (e.g., ball and socket).
- iii. Structures of bones in cross-section.
- iv. Cellular composition, structure and function of bones, bone marrow and cartilage
- v. How to distinguish between types of vertebrae (e.g., cervical, thoracic and lumbar).
- vi. **Characteristics** and radiological features of bone diseases/disorders from the cell level to the whole person (osteoarthritis, osteoporosis, fractures, disc herniation and scoliosis).
- vii. The effects of exercise on the skeletal system and the diseases/disorders mentioned above.



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- viii. Additional diseases/disorders to know: spinal stenosis, rheumatoid arthritis, gout, and juvenile rheumatoid arthritis
- ix. Treatments and/or prevention for all conditions listed above (drugs, surgery, etc.)
- x. Label the bones of the skull.
- xi. Salter-Harris fracture classification system.

b. **MUSCULAR SYSTEM** See www.soinc.org for the 2010 List of the Major Skeletal Muscles. All levels should know:

- i. The interaction of the skeletal and muscular systems (i.e., bones, joints, tendons, and muscles) to allow movement.
- ii. **Muscle fibers** -the cellular and gross anatomy of skeletal muscle, cardiac muscle and smooth muscle
- iii. The function and characteristics of muscle tissue.
- iv. Location, identification, and function of the major skeletal muscles of the body.
- v. Effect of exercise on the muscular system.
- vi. Muscle and tendon injuries and their prevention (i.e., Strains and Sprains).
- vii. The diseases on each level from the cell to the whole person as listed: Poliomyelitis, Muscular Dystrophies, Myasthenia gravis.
- viii. The effects of exercise on the cellular and gross anatomical structure of the muscular system

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- ix. Location, origin, insertion and function of the muscles on the 2010 List of Skeletal Muscles.
- x. Understand the cellular components involved in muscle contraction and the neuromuscular junction.
- xi. Understand muscle sensory systems (e.g., spindles and Golgi tendon organs).
- xii. Understand the anatomy and function of cardiac and smooth muscle roles in the body.
- xiii. Additional diseases: Carpal Tunnel Syndrome, Fibromyalgia.
- xiv. Treatment and prevention of all described diseases.

4. **SCORING:** High score wins. Selected questions/quality of free-response answers will be used to break ties

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