



# ANATOMY & PHYSIOLOGY

See General Rules, Eye Protection & other Policies on [www.soinc.org](http://www.soinc.org) as they apply to every event.

1. **DESCRIPTION:** Understand the anatomy and physiology of the **human body** systems below.

**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 2 non-programmable, non-graphing calculators.

3. **THE COMPETITION:** The test is limited to the following topics:

a. **NERVOUS SYSTEM - All levels should know:**

- i. The Brain - major regions and their functions
- ii. Identification of simple encephalographic wave forms
- iii. Neural Impulses - cellular anatomy and physiology of glial and supporting cells, synapses and neurotransmitters, action potential generation and propagation, ionic basis of the cellular membrane potential, cellular anatomy and physiology of neurons
- iv. Central Nervous System - organization of the spinal cord, purpose/functions of sleep
- v. Peripheral Nervous System - neuroganglia, action of sensory and motor neurons, understand differences in and purposes of parasympathetic, sympathetic, somatic, and sensory systems
- vi. Disorders: Epilepsy, Alzheimer's Disease, Multiple Sclerosis, Parkinson's Disease, Cerebral Palsy, Shingles (herpes zoster), Glaucoma, Pink Eye (conjunctivitis)
- vii. Effects of the drugs: alcohol, caffeine, nicotine, and marijuana on the nervous system

**National Level Only:**

- viii. The Brain - anatomy and physiology of brain function including function and role of specific nuclei clusters and tracts, theories of dreaming, neural impulses - retrograde signaling, purpose and principles of MRIs and EEGs
- ix. Treatments and/or prevention for all conditions listed above (drugs, surgery, etc.)

b. **SENSE ORGANS - All levels should know:**

- i. Types of sensory receptors, General Senses vs. Special Senses
- ii. Mechanisms for the General Senses of touch, pressure, pain, temperature, itch, and proprioception
- iii. Sense Organs - regions of each of the Special Sense Organs and their functions
- iv. Physiology of sight, hearing, balance, smell, and taste
- v. Disorders: myopia, hyperopia, presbyopia, nyctalopia, astigmatism, conjunctivitis, color blindness, otitis media

**National Level Only:**

- vi. Neural pathways for vision, depth perception, and hearing
- vii. Additional Disorders: Diabetic Retinopathy, Macular Degeneration, Glaucoma, Otosclerosis, Presbycusis, Meniere's Disease plus treatments and/or prevention of all conditions listed above

c. **ENDOCRINE SYSTEM - All levels should know:**

- i. The three classes of hormones - steroids, peptides, and amines
- ii. Mechanisms of hormone action - water soluble vs. fat soluble
- iii. Endocrine related problems - hypersecretion, hyposecretion
- iv. Hormone producing glands, their hormones and the functions of each
- v. Disorders: diabetes mellitus, hypoglycemia, Graves' disease, goiter

**National Level Only:**

- vi. Endocrine cycles and negative feedback, Autonomic nervous system control of endocrine function
- vii. Additional Disorders: Cushing's Syndrome, Addison's Disease, and Myxedema, Treatments and/or prevention for all conditions listed above (drugs, surgery, etc.)

4. **SCORING:** High score wins. Selected questions will be used to break ties.

**Recommended Resources:** All reference and training resources including the in-depth **Anatomy and Physiology CD (APCD)** and the introductory **Bio/Earth CD (BECD)** are available on the Official Science Olympiad Store or Website at <http://www.soinc.org>

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