

# MY SO STEM SHOWDOWN

## CONTENT, RECOMMENDED MATERIALS & SCORING

### STEM SHOWDOWN CONTENT

The STEM Showdown will consist of a series of online multiple-choice questions. Participants at both levels will be expected to demonstrate their understanding of the anatomy and physiology for the human Integumentary, Skeletal, and Muscular systems. A Showdown participant will have 50-minutes to login and answer as many questions as possible.

***The Anatomy & Physiology content and skills covered by the Showdown this month are as follows:***

#### **Nervous System:**

1. The Brain
  - a. major regions and their functions
  - b. anatomy and physiology of brain function including function and role of specific nuclei clusters and tracts
  - c. theories of dreaming
  - d. neural impulses - retrograde signaling
  - e. purpose and principles of MRIs and EEGs
2. Identification of simple encephalographic wave forms and why they occur
3. Neural Impulses - cellular anatomy and physiology of neurons and supporting cells, synapses and neurotransmitters, action potential generation and propagation, ionic basis of the cellular membrane potential, types of neural synapses
4. Central Nervous System - organization of the spinal cord, brainstem and cranial nerves, purpose/functions of sleep
5. Peripheral Nervous System – neural ganglia, action and physiology of sensory and motor neurons, action and physiology of sympathetic and parasympathetic neurons, understand differences in and purposes of parasympathetic, sympathetic, somatic, and sensory systems, reflex arcs and proprioception, nerve structure
6. Disorders: Epilepsy, Alzheimer’s Disease, Multiple Sclerosis, Parkinson’s Disease, Cerebral Palsy, Shingles (herpes zoster), Stroke, Amyotrophic Lateral Sclerosis (ALS)
7. Effects of the drugs: alcohol, caffeine, nicotine, and marijuana on the nervous system
8. Treatments and/or prevention (e.g.; drugs, surgery) for all conditions listed above

#### **Sense Organs:**

1. Types of sensory receptors, General Senses vs. Special Senses
2. Mechanisms for the General Senses of touch, pressure, pain, temperature, itch, and proprioception
3. Sense Organs – regions of each of the Special Sense Organs and their functions
4. Physiology of sight, hearing, balance, smell, and taste
5. Neural pathways for vision, depth perception, and hearing
6. Disorders: myopia, hyperopia, presbyopia, nyctalopia, astigmatism, conjunctivitis, color blindness, otitis media, types of deafness, Anosmia/dysosmia, dysgeusia
7. Additional Disorders: Diabetic Retinopathy, Macular Degeneration, Glaucoma, Otosclerosis, Presbycusis, Meniere’s Disease, Pink Eye (conjunctivitis) plus treatments and/or prevention of all conditions listed above



## **Endocrine System:**

1. The three classes of hormones – steroids, peptides, and amines
2. Mechanisms of hormone action – nuclear vs. cytoplasmic
3. Endocrine related problems – hypersecretion, hyposecretion
4. Hormone producing glands, their hormones and the function of each
5. Endocrine cycles and negative feedback
6. Autonomic nervous system control of endocrine function
7. Disorders: diabetes mellitus, hypoglycemia, Graves' disease, Hashimoto's disease, goiter, cretinism
8. Additional Disorders: Cushing's Syndrome, Addison's Disease, and Myxedema, acromegaly
9. Treatments and/or prevention for all conditions listed above (drugs, surgery, etc.)

## **Recommended Materials**

- Each Showdown participant will need a computer with internet access, scratch paper, something to write with, and a stand-alone calculator of any type
- Showdown participants may use resources available to help them answer the questions asked during the Showdown. These resources could be a collection of notes on the topics listed below, copies of magazine or journal articles, a textbook, or any combination of these items.

## **Scoring**

- High score wins.
- Ties will be broken using:
  - a. The time it takes to complete the test; and
  - b. The results to the questions indicated as tiebreakers.

## **Additional Resources**

- The Science Olympiad Store ([store.soinc.org](http://store.soinc.org)) carries the Anatomy & Physiology Starter Pack and additional resources.
- Other resources can be found on the Anatomy & Physiology Event Pages at <http://soinc.org/>.