



## Jerusalem Science Contest 5784

### Neuroscience

#### Test 4

#### Form – A

#### Answer Key

- 1) What is the first step in sensory processing?
  - a) Touch
  - b) Attention
  - c) Transduction**
  - d) Action potential
  
- 2) Sensory processing for a given modality (e.g., vision, hearing, etc.) occurs primarily in:
  - a) Spinal cord
  - b) Brainstem
  - c) Thalamus
  - d) Cerebral cortex**
  
- 3) How is processing of all sensory phenomena similar?
  - a) They go through the spinal cord.
  - b) They require cells sensitive to chemicals.
  - c) They are transduced to a mechanical signal.
  - d) They are initially transmitted as an electrical signal.**
  
- 4) The Pacinian corpuscle transduces which modality?
  - a) Pain
  - b) Pressure**
  - c) Color
  - d) Taste
  
- 5) What taste can the human tastebud detect?
  - a) Salty**
  - b) Meaty
  - c) Spicy
  - d) Hot

6) How many different odors can the olfactory system detect?

- a) 5
- b) 100
- c) 1000
- d) Thousands**

7) What feature does primary visual cortex represent?

- a) Color
- b) Texture
- c) Location**
- d) Saliency

8) What feature does higher level auditory cortex detect?

- a) Frequency
- b) Phase
- c) Intensity
- d) Harmony**

9) Which is an example of parallel cortical processing?

- a) Touch and cold are both represented in primary somatosensory cortex.
- b) Sound location is determined by the brainstem and thalamus.
- c) Color and texture are detected simultaneously, but each in a different part of higher visual cortex**
- d) Smell and taste are integrated to yield perception of flavor.

10) Which is a chemical sense?

- a) Pain
- b) Vision
- c) Hearing
- d) Taste**

11) What is the sensory homunculus?

- a) A map of the retina in primary visual cortex.
- b) The result of integration in higher somatosensory cortex to yield a perception of the body surface.
- c) A 1:1 receptor map of the skin surface in primary somatosensory cortex.**
- d) Provides larger cortical representations for body surfaces with fewer receptors.

12) How many times is the sound wave that enters the ear canal transduced before becoming an electrical signal in the auditory nerve?

- a) 1
- b) 2
- c) 3**
- d) 4

- 13) Where is frequency of sound encoded in the cerebral cortex?
- a) Frontal lobe
  - b) Parietal lobe
  - c) Temporal lobe**
  - d) Occipital lobe
- 14) Which visual percept is localized to a specific brain area?
- a) Video games
  - b) Print media
  - c) Hallucinations
  - d) Faces**
- 15) A patient is injured in an assault that damages their right occipital lobe. What will their visual problem be?
- a) Right eye blindness
  - b) Loss of vision on the right side
  - c) Loss of vision on the left side**
  - d) Left eye blindness
- 16) According to neuroscientists, at what age does the person's brain contain the most neurons?
- a) Age 50
  - b) Age 40
  - c) Age 20
  - d) Age 2**
- 17) What is the earliest source, among the following sources, for the impressionability of a child's mind?
- a) The Mishnah in Pirkei Avos regarding one who learns Torah when he is a child.
  - b) The Gemara in Bava Basra regarding stuffing a child with information.
  - c) The verse in Mishlei (Proverbs) directing us to "educate the youth according to his way."**
  - d) The passage in Alei Shur about "the impressions of what is happening around him are absorbed in him strongly."
- 18) Which teacher of children is better – a teacher who teaches a lot of material but is not precise, or one who is precise but does not teach a lot of material – and why?
- a) . The teacher who is precise is preferable, because an error that has been absorbed by the child's mind is very difficult to extract.
  - b) The reach who teaches more is better, and any errors will eventually be corrected by themselves.
  - c) It is a dispute between a & b in the Gemara, and the Halachah follows a.**
  - d) It is a dispute between a & b in the Gemara, and the Halachah follows b.

19) Neuroscience research supports the Torah's view that healthy neurological development depends greatly on the positive attention, interactions, stimulation, care, and warmth from parents and caregivers, from what age of the child?

**a) From birth.**

b) From age 2.

c) From age 6.

d) From age 10.

20) According to the Torah view, by the time a person reaches adulthood, the brain is fully developed like every other human organ, and the neurons and their connections cannot change, and thus the person cannot develop new habits or generate traits that he was not born with.

a) True.

**b) False.**

c) It is a dispute among the Sages.

d) There is no indication as to what the Torah view is.