**Special Senses homework questions (Ch. 17)**

Name and date submitted (3 pts):

Instructions: Create space in the document below and respond to all questions. Turn in your completed work by the due date.

(50 questions, 100 points, average 2 points per question)

Olfaction: Sense of Smell

1. You have 10-100 million smell receptors contained in your olfactory epithelium. *Olfact* = \_\_\_\_\_
2. The olfactory epithelium is located
   1. Along the sides of your nasal cavity
   2. Along the back of your nasal cavity
   3. Along the front of your nasal cavity
   4. Along the top of your nasal cavity
3. The olfactory epithelium consists of olfactory receptors, supporting cells, and basal cells. Explain the structure AND function of each
   1. Olfactory receptors
   2. Supporting cells
   3. Basal cells
4. We can recognize approximately \_\_\_\_\_\_\_\_\_ different odors
5. What is the mechanism (physiology) of smell? (choose the best one)
   1. Odorant molecule binds to a Na+ pump in an olfactory receptor, opening the Na+ channels, generating a nerve impulse which travels to the brain.
   2. Odorant molecule binds to a receptor protein in the plasma membrane of an olfactory receptor ‘hair’, triggering a chain of chemical events which open various ion channels, generating a nerve impulse which travels to the brain.
   3. Odorant molecule binds to a G protein, producing adenosine triphosphate (ATP) which powers the Na+ pumps in the olfactory nerve cell, generating a nerve impulse which travels to the brain.
   4. Odorant molecule enters the nasal cavity, binds to a G protein on the olfactory epithelium, causing a signal cascade which results in more cAMP, inflow of Na+ ions, and generation of a nerve impulse which travels to the brain.
6. What is the chemical called which is added to natural gas to make it smell in order to warn of gas leaks?
7. Explain “adaptation” in the context of smell
8. Clinical Connection: What is hyposmia?

Gustation: Sense of Taste

1. *Gust* = \_\_\_\_\_\_\_\_\_\_\_
2. List the five primary tastes
3. Each of your 10,000 taste buds consists of supporting cells, gustatory receptor cells, and basal cells. Explain the structure AND function of each
   1. Supporting cell
   2. Gustatory receptor cell
   3. Basal cell
4. State the location and appearance of
   1. Vallate papillae
   2. Fungiform papillae
   3. Foliate papillae
   4. Filiform papillae
5. What is the mechanism (physiology) of taste
   1. Tastant molecule dissolves in saliva, makes contact with plasma membrane of gustatory cells, triggering various channels to open depending on the food-type, creating a nerve signal that travels to the brain
   2. Tastant molecule dissolves in saliva, enters gustatory cells through the plasma membrane, triggers production of adenosine triphosphate (ATP), creating a nerve signal that travels to the brain
   3. Tastant molecule dissolves in saliva, crosses epithelium of nearby blood capillaries, thereby entering circulatory system and triggering signals in the brain
   4. Tastant molecule dissolves in saliva, is broken down by special enzymes called G proteins, triggers opening of Na+ and H+ channels in the plasma membrane, creating a nerve potential which travels to the brain.
6. Rank the following by “taste threshold”, from lowest to highest: Sour, Bitter, Salty, Sweet
7. Clinical Connection: Sweet foods evoke \_\_\_\_\_\_\_\_\_ in newborn babies, while bitter ones cause \_\_\_\_\_\_\_\_\_. This phenomenon is known as \_\_\_\_\_\_\_\_\_\_\_.

Vision

1. More than \_\_\_\_\_\_\_\_\_\_ of your sensory receptors are located in the eyes.
2. In the electromagnetic spectrum, *visible light* ranges from about \_\_\_\_\_\_\_\_ nm to \_\_\_\_\_\_\_\_\_\_ nm in wavelength.
3. Violet is \_\_\_\_\_\_\_\_\_ nm wavelength
4. Red is \_\_\_\_\_\_\_\_\_\_ nm wavelength
5. Choose: An object will appear the color of the wavelength that it reflects/absorbs
6. Choose: A white object reflects/absorbs all wavelengths
7. Choose: A black object reflects/absorbs all wavelengths
8. Functions of the eyelids
   1. Sha….
   2. Pro….
   3. Spr….
9. That annoying twitch in the eyelid is harmless, and is associated with s\_\_\_\_\_\_\_ and f\_\_\_\_\_\_\_\_.
10. State their function using correct terms
    1. Eyelashes and eyebrows
    2. Sebaceous glands
11. What is a “sty”?
12. Lacrimal Apparatus: *Lacrim* = \_\_\_\_\_\_\_\_\_\_\_\_
13. What usually causes *dacryocystitis*?
14. Explain, using correct anatomical terms, how crying produces a runny nose
15. Choose: The adult eyeball measures ½”, 1”, 2”, 3” in diameter
16. Give the structure AND function of the cornea
17. Give the structure AND function of the sclera
18. Give the structure AND function of the iris
19. Give the structure AND function of the pupil
20. Give the structure AND function of the retina
21. Compare the function of rods and cones
22. Clinical Connection: 4-part question: State three ways you can get a detached retina

How can you tell if that’s happened?

1. Clinical Connection: What is age-related macular disease (AMD)?
2. Give the structure AND function of the lens
3. Image formation (choose the best one)
   1. Light enters the eye, passes through the pupil, is completely refracted by the lens, and focused on the retina where it is turned into nerve signals.
   2. Light enters the eye, passes through the pupil, is refracted by the iris and the lens, and focused on the retina where it is turned into nerve signals.
   3. Light enters the eye, passes through the cornea and lens, is refracted partly by the vitreous humor and partly by the lens, and focused on the retina where it is turned into nerve signals.
   4. Light enters the eye, is 75% refracted by the cornea, passes through the pupil, is 25% refracted by the lens, and focused on the retina where it is turned into nerve signals.
4. Clinical Connection: What causes farsightedness (presbyopia)?
5. What causes nearsightedness (myopia)?
6. What is astigmatism, and what causes it?
7. Clinical Connection: describe what goes on during LASIK surgery

Hearing and Equilibrium

1. Give the structure AND function of the auricle
2. Give the structure AND function of the tympanic membrane (eardrum)
3. Give three possible causes of a perforated eardrum
4. Give the decibels (dB) of
   1. Rustling leaves \_\_\_\_\_
   2. Whispered speech \_\_\_\_\_\_
   3. Normal conversation \_\_\_\_\_\_
   4. Vacuum cleaner \_\_\_\_\_\_\_\_\_
   5. Shouting \_\_\_\_\_\_\_\_
   6. Nearby motorcycle or jackhammer \_\_\_\_\_\_\_\_
   7. Uncomfortable threshold \_\_\_\_\_\_\_
   8. Painful threshold \_\_\_\_\_\_\_\_
5. Clinical Connection: Your employers must provide you with hearing protection at noise levels above \_\_\_\_\_\_\_\_\_ dB
6. Clinical Connection: Explain how a cochlear implant works