

## Component I: Core

### Module B: Terminology, Anatomy and Physiology

#### Topic 4: The Senses

##### Statement of Purpose

To prepare the learner with basic knowledge of the senses.

##### Student Learning Outcomes

Upon completion of this topic, the learner will be able to:

1. Spell and define key terms.
2. List the senses of the body.
3. Identify the corresponding organ or organs responsible for sensory perception.
4. Describe the anatomy and physiology of the eyes, ears, nose, tongue and skin.

##### Terminology

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|-----------------------|-----------------------------|
| 1. Accommodation      | 24. Mucus membranes         |
| 2. Amblyopia          | 25. Myopia                  |
| 3. Aqueous humor      | 26. Olfactory receptors     |
| 4. Astigmatism        | 27. Optic disc              |
| 5. Auditory           | 28. Optic nerve             |
| 6. Cataract           | 29. Optic chiasm            |
| 7. Cerumen            | 30. Otitis                  |
| 8. Choroid            | 31. Papillae                |
| 9. Cochlea            | 32. Pinna                   |
| 10. Conjunctiva       | 33. Polyps                  |
| 11. Cornea            | 34. Pupil                   |
| 12. Epistaxis         | 35. Receptor                |
| 13. Eustachian tubes  | 36. Retina                  |
| 14. External nares    | 37. Retinopathy             |
| 15. Eyelids           | 38. Rods                    |
| 16. Glaucoma          | 39. Sclera                  |
| 17. Hyperopia         | 40. Stapes                  |
| 18. Incus             | 41. Strabismus              |
| 19. Iris              | 42. Taste buds              |
| 20. Lacrimal gland    | 43. Tinnitus                |
| 21. Lens              | 44. Tympanic membrane       |
| 22. Malleus           | 45. Visual accessory organs |
| 23. Meniere's disease | 46. Vitreous humor          |

##### References

1. Davis, F.A. (2013). *Taber's Cyclopedic Medical Dictionary* (22<sup>nd</sup> Ed.). Philadelphia: F.A. Davis Company.
2. Dennerll, J.T., & Davis, P.E. (2010). *Medical Terminology: A Programmed Systems Approach* (10<sup>th</sup> Ed.). Clifton Park, NY: Delmar, Cengage Learning.
3. Kronenberger, J., Southard D. L., & Woodson, D. (2012). *Comprehensive Medical Assisting* (4<sup>th</sup> Ed.). Philadelphia, PA: Lippincott, Williams & Wilkins.

4. Blesi, M., Wise, B.A., & Kelley-Arney, C, (2012) *Medical Assisting Administrative and Clinical Competencies* (7<sup>th</sup> Ed.) Clifton Park, NY: Delmar, Cengage Learning.
5. Lindh, W., Pooler, M., Tamparo, C. & Dahl, B., (2013). *Comprehensive Medical Assisting Administrative and Clinical Competencies* (5<sup>th</sup> Ed.). Clifton Park, NY: Delmar, Cengage Learning.
6. French, L.L., & Fordney, M.T. (2013). *Administrative Medical Assistant* (7<sup>th</sup> Ed.) Clifton Park, NY: Delmar, Cengage Learning.
7. Booth, K.A., Whicker, L.G., Wyman, T.D., & Moaney-Wright, S. (2011). *Medical Assisting: Administrative & Clinical Competencies with Anatomy and Physiology*. (4<sup>th</sup> Ed.). New York, NY: McGraw-Hill Company, Inc.
8. Proctor, D. B., & Young-Adams, A. P. (2011). *Kinn's The Medical Assistant: An Applied Learning Approach* (11<sup>th</sup> Ed.). Philadelphia, PA: Saunders Elsevier.
9. Larsen, W. (2011). *Computerized Medical Office Procedures: A Worktext Using Medisoft v16* (3<sup>rd</sup> Ed.). Philadelphia, PA: Saunders Elsevier.

### Websites

1. [www.innerbody.com](http://www.innerbody.com)
2. [www.cdc.gov](http://www.cdc.gov)
3. [www.vivo.colostate.edu/hbooks/pathphys/digestion/](http://www.vivo.colostate.edu/hbooks/pathphys/digestion/)
4. [www.merckmanuals.com/professional/pulmonary\\_disorders.html](http://www.merckmanuals.com/professional/pulmonary_disorders.html)
5. [www.lung.org/associations/states/california/](http://www.lung.org/associations/states/california/)
6. [www.stedmanonline.com/index.aspx](http://www.stedmanonline.com/index.aspx)
7. [http://kidshealth.org/parent/general/body\\_basics/kidneys\\_urinary.html](http://kidshealth.org/parent/general/body_basics/kidneys_urinary.html)

Content Outline/Theory Objectives	Suggested Learning Activities
<p><b>Objective 1</b>  <b>Spell and define key terms.</b></p> <ul style="list-style-type: none"> <li>A. Review the terms listed in the terminology section.</li> <li>B. Spell the listed terms accurately.</li> <li>C. Pronounce the terms correctly.</li> <li>D. Use the terms in their proper context.</li> </ul>	<ul style="list-style-type: none"> <li>A. Games: word searches, crossword puzzles, Family Feud, Jeopardy, bingo, spelling bee, hangman and concentration.</li> <li>B. Administer vocabulary pre-test and post-test.</li> <li>C. Discuss learning gaps and plan for applying vocabulary.</li> </ul>
<p><b>Objective 2</b>  <b>List the senses of the body.</b></p> <ul style="list-style-type: none"> <li>A. Sensory receptors are found in the sensory organ located in the brain.</li> <li>B. Source of ability for human communication <ul style="list-style-type: none"> <li>1. Sight</li> <li>2. Hearing</li> <li>3. Smell</li> <li>4. Taste</li> <li>5. Touch</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>A. Lecture/Discussion</li> <li>B. Assigned Readings</li> <li>C. Use anatomical diagrams/posters/videos/computer assisted learning/workbook activities.</li> </ul>
<p><b>Objective 3</b>  <b>Identify the corresponding organ or organs responsible for sensory perception.</b></p> <ul style="list-style-type: none"> <li>A. Sight – eyes</li> <li>B. Hearing – ears</li> <li>C. Smell –nose</li> <li>D. Taste – tongue</li> <li>E. Touch – skin</li> </ul>	<ul style="list-style-type: none"> <li>A. Lecture/Discussion</li> <li>B. Assigned Readings</li> <li>C. Use anatomical diagrams/posters/videos/computer assisted learning/ workbook activities.</li> <li>D. Blindfold students; give different “scents” to identify.</li> </ul>
<p><b>Objective 4</b>  <b>Describe the anatomy and physiology of the eyes, ears, nose, tongue and skin</b></p> <ul style="list-style-type: none"> <li>A. Eye <ul style="list-style-type: none"> <li>1. Orbit is the bony depression of skull which protects and holds the eye.</li> <li>2. Chambers of the eye <ul style="list-style-type: none"> <li>a. The anterior chamber contains aqueous humor, providing nutrients to structures in the anterior cavity of the eyeball. Too much fluid produces a condition that is a major cause of blindness, Glaucoma.</li> <li>b. The posterior chamber behind the lens is filled with a thick liquid called vitreous humor. Vitreous humor keeps the lens flat</li> </ul> </li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>A. Lecture/Discussion</li> <li>B. Assigned Readings</li> <li>C. Use anatomical diagrams/posters/videos/computer assisted learning/workbook activities.</li> <li>D. Library research.</li> <li>E. Have small groups put models together.</li> <li>F. Perform various hearing tests.</li> <li>G. Label anatomical illustrations.</li> <li>H. Groups of two – create an eye safety teaching plan.</li> </ul>

<p>and helps maintain the shape of the eye.</p> <ol style="list-style-type: none"> <li>3. Outer layer       <ol style="list-style-type: none"> <li>a. Sclera, white of the eye.</li> <li>b. Cornea           <ol style="list-style-type: none"> <li>1) Clear layer of the sclera covering the pupil and iris.</li> <li>2) Contains no blood vessels but many sensory receptors that can detect even the smallest of particles on the surface of the eyeballs.</li> <li>3) Helps keep fluid in the eye.</li> <li>4) Functions in focusing light.</li> </ol> </li> </ol> </li> <li>4. Middle layer, vascular and pigmented       <ol style="list-style-type: none"> <li>a. Richly supplied with blood vessels and pigments.</li> <li>b. Consists of choroid, ciliary body and iris           <ol style="list-style-type: none"> <li>1) Choroid lines the eye.</li> <li>2) Ciliary body functions to hold and move the transparent lens               <ul style="list-style-type: none"> <li>• Cataract: cloudy lens that prevents light from reaching the visual receptors.</li> </ul> </li> <li>3) Iris, the colored portion of the eye, is the most anterior structure.</li> </ol> </li> <li>c. Pupil, hole in the iris           <ol style="list-style-type: none"> <li>1) Adjustable opening of the eye.</li> <li>2) Dilates in dark.</li> <li>3) Constricts in bright light.</li> </ol> </li> </ol> </li> <li>5. Conjunctiva       <ol style="list-style-type: none"> <li>a. Delicate, thin membrane.</li> <li>b. Covers the sclera, cornea and under surface of the eyelids.</li> </ol> </li> <li>6. Lens       <ol style="list-style-type: none"> <li>a. Located behind the pupil.</li> <li>b. Biconvex transparent body situated behind the iris in the eye; its role (along with the cornea) is to focus light on the retina.</li> <li>c. Filled with a clear, watery substance known as the aqueous humor.</li> <li>d. Accommodation is the automatic adjustment in the focal length of the lens of the eye to permit retinal focus of images of objects at varying distances.</li> </ol> </li> <li>7. Vitreous humor       <ol style="list-style-type: none"> <li>a. Transparent jelly-like substance.</li> <li>b. Important to maintaining shape of eye.</li> <li>c. Cannot be replaced.</li> <li>d. Body does not restore.</li> </ol> </li> <li>8. Retina       <ol style="list-style-type: none"> <li>a. Cells in the back of the eye.</li> <li>b. Converts light into electrical impulses.</li> </ol> </li> </ol>	<ol style="list-style-type: none"> <li>I. Show diagrams for major parts of the ear and olfactory area.</li> </ol>
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9. Optic nerve
  - a. Transports electrical impulses to brain for interpretation.
10. Visual pathway
  - a. Sends information to optic nerves that cross at a structure (optic chiasm).
11. Common diseases of the eye
  - a. Amblyopia, “lazy eye” developmental abnormality; occurs during childhood.
  - b. Astigmatism, a vision condition that causes blurred vision due to the irregular shape of the cornea.
  - c. Conjunctivitis, “pink eye” caused by bacteria, viruses or allergies.
  - d. Dry eye syndrome, common eye problem, resulting from decreased production of oil within tears; normally occurs with age.
  - e. Hyperopia, farsightedness.
  - f. Myopia, nearsightedness.
  - g. Presbyopia, condition in which the lens of the eye loses its ability to focus, making it difficult to see objects up close; occurs in older adults.
  - h. Retinopathy, pathological disorder of the retina, example: diabetic retinopathy.
  - i. Strabismus “crossed eyes” is when eyes do not focus on the same image.

#### B. Ear

1. Pinna is the cartilage shaped external ear.
2. External auditory canal is the opening that runs from external ear to the tympanic membrane.
3. Cerumen, earwax.
4. Tympanic membrane divides the external auditory canal and the internal auditory canal.
5. Middle ear
  - a. Contains three small bones
    - 1) Malleus (hammer).
    - 2) Incus (anvil).
    - 3) Stapes (stirrups).
  - b. Attached to the wall of the tympanic membrane.
  - c. Transmits vibrations that are turned into sounds.
6. Inner ear
  - a. Contains the cochlea and the semicircular canals.
  - b. Chambers transmit sound waves to the auditory nerve.
7. Conditions
  - a. Meniere’s disease, pathological condition of

the inner ear characterized by dizziness, ringing in the ears and progressive loss of hearing.

- b. Otitis, inflammation of the ear; otitis externa (external ear canal), otitis media (middle ear) or otitis interna (inner ear).
- c. Tinnitus, sound in one or both ears, such as buzzing, ringing or whistling. Occurs without an external stimulus and usually caused by a specific condition, such as an ear infection, the use of certain drugs, a blocked auditory tube or canal or a head injury.

#### C. Nose

- 1. External nares
- 2. Nasal cavity
  - a. Lined with a mucous membrane.
  - b. Olfactory receptors
    - 1) Chemoreceptors
      - Respond to changes in chemical concentrations.
      - Chemicals that activate smell receptors.
      - Dissolved in mucus of the nose.
      - Those with “dry noses” have difficulty smelling.
    - 2) Located in top of nasal cavity in olfactory organ.
    - 3) Connected by nerve fibers.
    - 4) Direct connection to the olfactory center of the brain.

#### D. Tongue

- 1. Muscle.
- 2. Considered part of the digestive system.
- 3. Rough surface caused by papillae.
- 4. Senses of taste
  - a. Sweet—taste buds concentrated on the tip of the tongue.
  - b. Sour—taste buds concentrated on the sides of the tongue.
  - c. Salty—taste buds concentrated at the front of the tongue.
  - d. Bitter—taste buds concentrated at the back of the tongue.
  - e. Umami—recently recognized as a unique taste, pleasantly savory, can be detected by taste buds all over the tongue

#### E. Skin

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| <ol style="list-style-type: none"><li>1. Senses touch through contact receptor<ol style="list-style-type: none"><li>a. Involves mechanical energy<ol style="list-style-type: none"><li>1) Traction</li><li>2) Pressure</li></ol></li><li>b. Involves radiant energy<ol style="list-style-type: none"><li>1) Heat</li><li>2) Cold</li></ol></li></ol></li><li>2. Sensations perceived<ol style="list-style-type: none"><li>a. Pain</li><li>b. Touch</li><li>c. Heat</li><li>d. Pressure</li><li>e. Traction</li><li>f. Cold</li><li>g. Tickle</li></ol></li></ol> |  |
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