

# **Preclinical Speech Science Workbook**



# Preclinical Speech Science Workbook

THIRD EDITION

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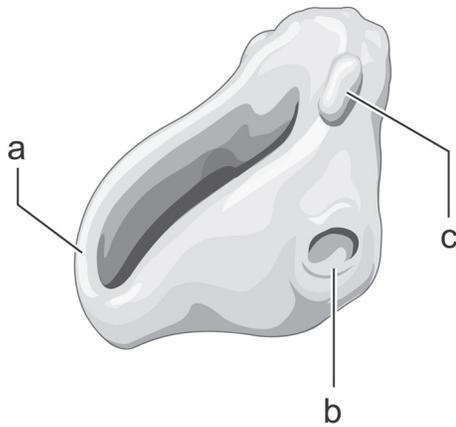
# Preface

The *Preclinical Speech Science Workbook, Third Edition* is a natural companion to the *Preclinical Speech Science, Third Edition* textbook. It has been carefully designed to help students reinforce, integrate, apply, and go beyond the material presented in the textbook.

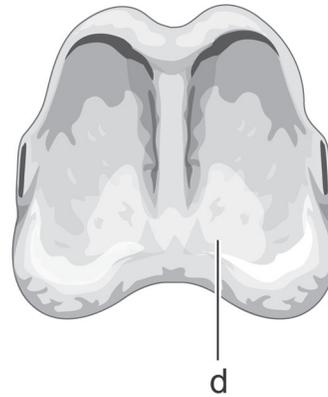
The workbook contains a wide variety of activities. These include anatomic labeling, measuring physiologic and acoustic data, interpreting graphs, calculating quantitative problems, answering thought questions about material presented in the textbook, and conducting simple experiments (without the use of special equipment). The solutions to all these activities are provided at the back of the workbook; however, we strongly encourage students to work through each activity independently and refer to the solutions only when completely satisfied with their answers. This will provide the best learning experience and will help students make the transition from passive learners to active participants in their development toward becoming speech-language pathologists, audiologists, and clinical scientists.

**3-3.** Label the parts of the cricoid cartilage indicated in the figures.

Side oblique view



Back view



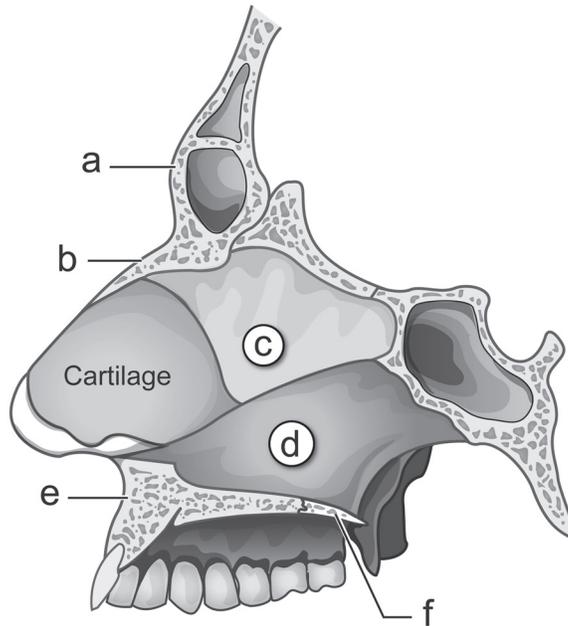
a \_\_\_\_\_

c \_\_\_\_\_

b \_\_\_\_\_

d \_\_\_\_\_

**4-6.** Label the bones indicated in the figure.



a \_\_\_\_\_ d \_\_\_\_\_  
 b \_\_\_\_\_ e \_\_\_\_\_  
 c \_\_\_\_\_ f \_\_\_\_\_

(a) The two nasal cavities are separated from one another by the nasal \_\_\_\_\_, which is made up of [Check one]

\_\_\_\_\_ tendons and ligaments.

\_\_\_\_\_ a matrix of soft tissue.

\_\_\_\_\_ muscle.

\_\_\_\_\_ cartilage and bone.

(b) The hard palate is made up of the \_\_\_\_\_ bone and the \_\_\_\_\_ bone.

**6-21.** The velopharyngeal orifice area can be estimated by a method developed by Warren and DuBois (1964; see Figure 6-15 in your textbook). Estimate the velopharyngeal orifice area using the formula and the values given below for oral pressure ( $P_1$ , in dynes/cm<sup>2</sup>), nasal pressure ( $P_2$ , in dynes/cm<sup>2</sup>), and nasal flow (in cubic centimeters per second, cc/s). The formula is:

$$\text{Velopharyngeal port area} = \frac{k \sqrt{\frac{2 (\text{Air pressure differential})}{\text{Density of air}} \times \text{Nasal airflow}}}{k}$$

Note that dynes/cm<sup>2</sup> is a unit of measure for pressure that is much smaller than cmH<sub>2</sub>O (specifically, 1 cmH<sub>2</sub>O  $\approx$  980 dynes/cm<sup>2</sup>, so 1 dyne/cm<sup>2</sup>  $\approx$  0.001 cmH<sub>2</sub>O). Also, note that  $k$  is a constant that adjusts for the fact that airflow is often turbulent during speech production, rather than laminar (smooth). The suggested value for  $k$  is 0.65, density of air  $\approx$  .001 (g/cm<sup>3</sup>), and the air pressure differential =  $P_1 - P_2$ .

Velopharyngeal orifice area is expressed in square centimeters (cm<sup>2</sup>). Calculate the velopharyngeal orifice area from the oral pressure, nasal pressure, and nasal flow values given below.

Oral Pressure ( $P_1$ ; dynes/cm <sup>2</sup> )	Nasal pressure ( $P_2$ ; dynes/cm <sup>2</sup> )	Nasal Flow (cc/s)	Velopharyngeal Orifice Area (cm <sup>2</sup> )
100	80	200	_____
100	0	0	_____
100	20	30	_____

Indicate which of the calculated values above best describes the velopharyngeal orifice area for:

Sustained vowel with normal voice quality \_\_\_\_\_

Sustained vowel with hypernasal voice quality \_\_\_\_\_

Sustained /m/ \_\_\_\_\_

**13-30.** When is the electrical potential of the hair cells of the organ of Corti and of the crista ampullaris changed?

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**13-31.** The parts of the vestibular system that sense position of the head in the front-to-back and side-to-side dimensions are the \_\_\_\_\_ and \_\_\_\_\_, respectively. These two structures are part of the organ called the \_\_\_\_\_.

**13-32.** The core of the cochlea is called the \_\_\_\_\_, which contains \_\_\_\_\_ originating at the base of the hair cells as well as the group of cell bodies called the \_\_\_\_\_.

**13-33.** The membranes that separate the three cochlear ducts are \_\_\_\_\_ and \_\_\_\_\_.

**13-34.** In three sentences or less, describe the organ of Corti.

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