Preclinical Speech Science Workbook

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THIRD EDITION

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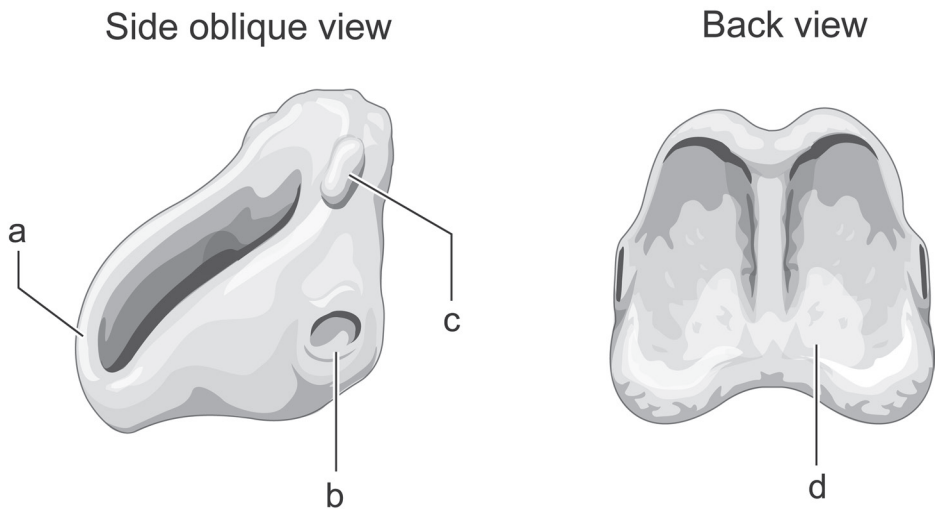
Contents

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.

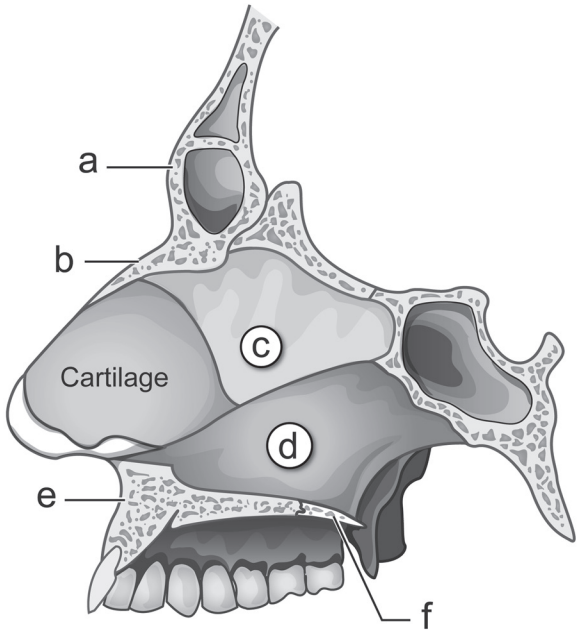
3–3. Label the parts of the cricoid cartilage indicated in the figures.



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^2), nasal pressure (P_2, in dynes/cm^2), and nasal flow (in cubic centimeters per second, cc/s). The formula is:

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

Note that dynes/cm^2 is a unit of measure for pressure that is much smaller than cmH_2O (specifically, 1 cm$H_2O \approx 980$ dynes/cm^2, so 1 dyne/cm$^2 \approx 0.001$ cmH_2O). 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 ≈ .001 (g/cm^3), and the air pressure differential = $P_1 - P_2$.

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

Oral Pressure (P_1; dynes/cm^2)	**Nasal pressure (P_2; dynes/cm^2)**	**Nasal Flow (cc/s)**	**Velopharyngeal Orifice Area (cm^2)**
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?

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.