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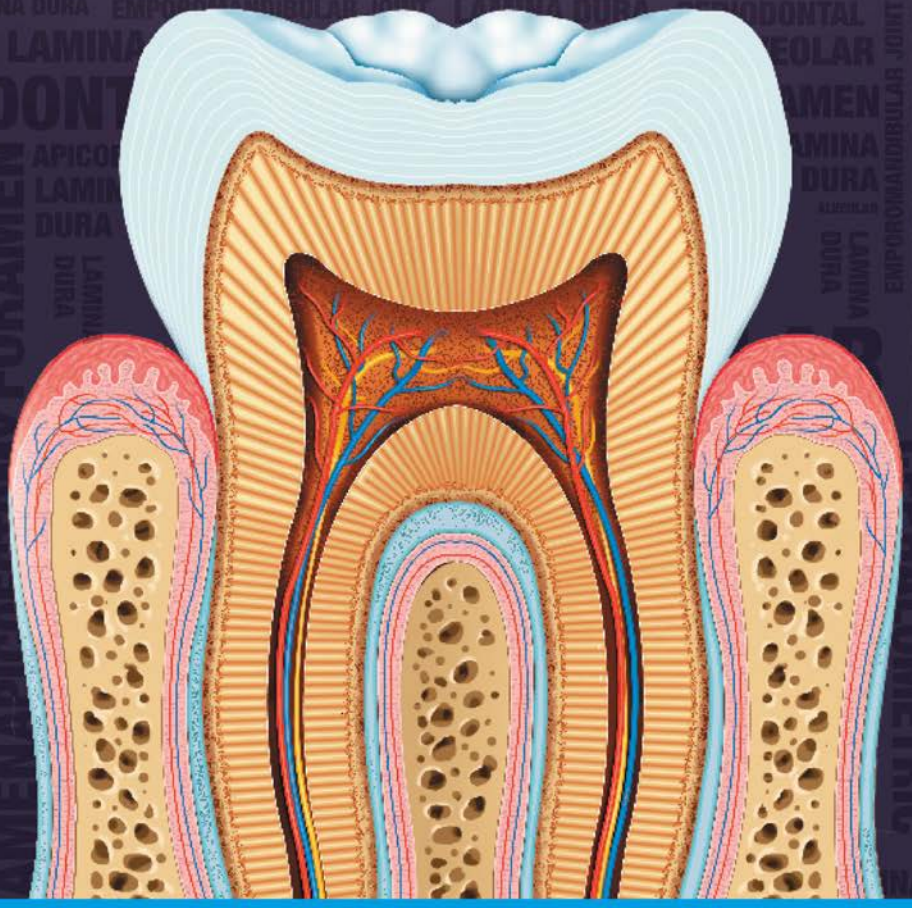
DENTAL TERMINOLOGY

Calista Kindle | 4th Edition
Charline Dofka



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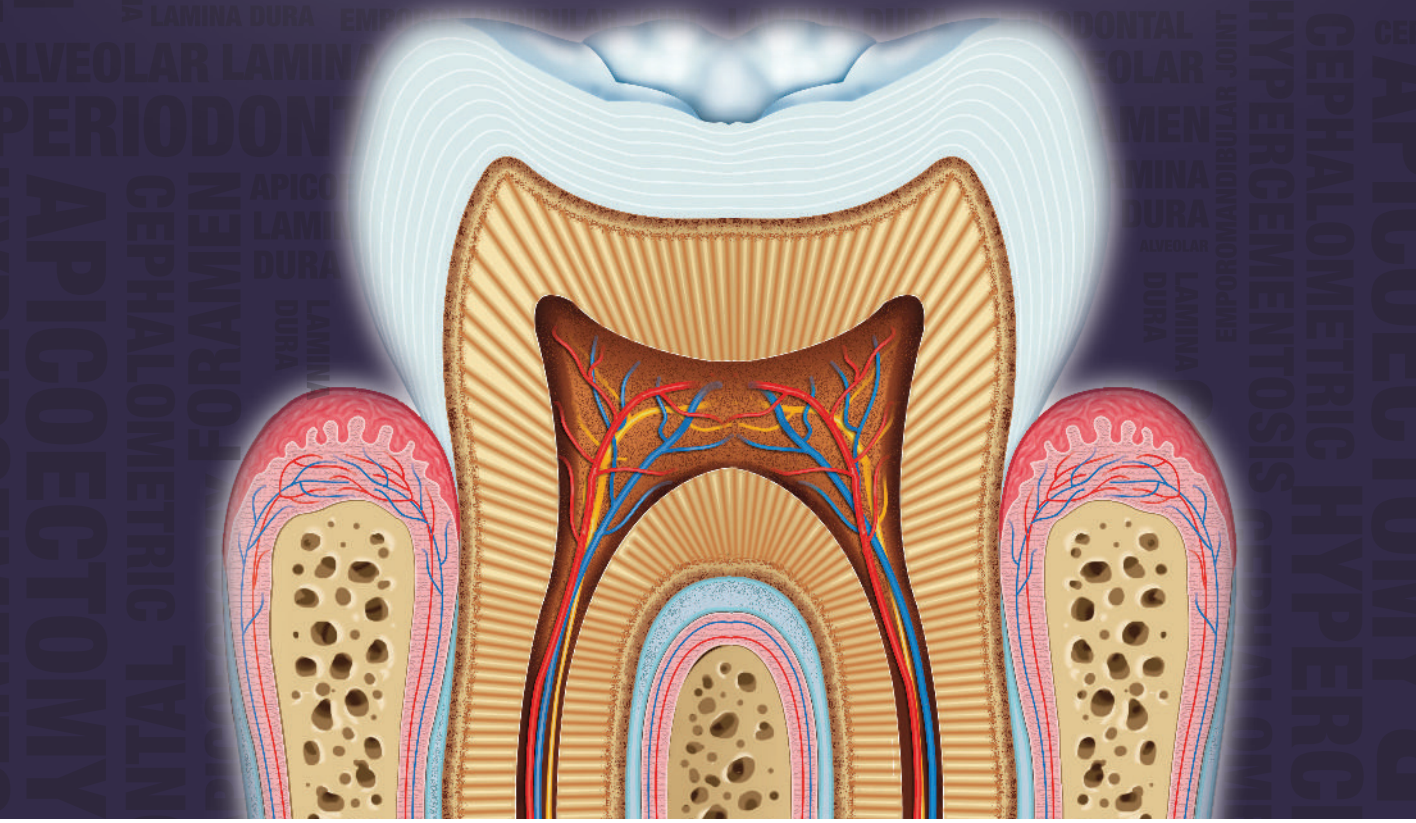

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***Dental Terminology,* Fourth Edition**
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PREFACE

DENTAL TERMINOLOGY, Fourth Edition, is a valuable tool to introduce the dental field to an individual interested in starting their dental career. This text is meant to lay the foundation needed to advance in dental assistant studies. As an instructor, you will be delighted to use this text as a tool to teach your students how to break down, use, and pronounce dental terminology. This edition takes a word-building approach to help dental assistants understand and remember dental terminology better than ever before. DENTAL TERMINOLOGY is not a strict dictionary of dental terms, but rather a word bank with pronunciation guides and definitions applied to practice areas. It's the resource that dental professionals can use for years to come. The chapters are organized by specialty area, so readers can always find the information quickly. Whether learning in the classroom or on the job, DENTAL TERMINOLOGY, Fourth Edition, is the easy-to-use reference that comes in handy again and again.

The book language is plain, common, and easy to understand. When large words are introduced, they are broken down into syllables and shown in a "sounds like" manner to help the student learn how to speak the term. Further, this edition includes a Spanish translation to many of the words listed in the glossary to assist the student or to transfer information in working with patients with a limited knowledge of English terms.

Although the mission and practice of dentistry with its healing arts do not change, technology does. DENTAL TERMINOLOGY, Fourth Edition, has updated information, including new equipment, materials, and techniques. More graphic and enhanced visual aids with color have been added to make the book more attractive and more informative, as well as to serve as an aid to the learning process.

The direct, clear, and useful word-building approach will instruct students about the origins and proper use of dental terminology. This text leaves students with a clear understanding of how to use dental words and gives them a cut above the rest when going forward with their dental studies throughout each course. When students begin with DENTAL TERMINOLOGY, they will have the tools to be successful in all their dental courses, having the capabilities to grasp and understand complex procedures and dental scenarios because of their solid background using DENTAL TERMINOLOGY, Fourth Edition.

NEW TO THIS EDITION

Chapter 1

- New tests and examples have been added throughout the chapter for more enforcement and understanding of the lesson.

Chapter 2

- More information has been introduced on palate structure, palatine areas, and sensory divisions and branches of the trigeminal nerve.

Chapter 3

- Tooth eruption and exfoliation information is given, along with added timetables for deciduous and permanent teeth.

Chapter 4

- Updating of duties, services, and employment concerns are discussed.
- New instrument information is included.

Chapter 5

- Concern and care for disease prevention has been expanded.
- New CDC classifications of risk categories for instruments and equipment have been added.

Chapter 6

- New guidelines for cardiopulmonary resuscitation and the use of automated external defibrillation are included.

Chapter 7

- The importance of proper and thorough patient health information data is discussed.
- More information is included about additional oral examination concerns and diagnostic testing.

Chapter 8

- Additional descriptions of anxiety abatement controls as a method of pain reduction are introduced.

Chapter 9

- Digital radiography with recovery and enhancement has been added.
- Cone beam 3D radiography and tomography information is given.
- Revised discussions concerning measurement of radiation energy, biological effects, and safety are included.

Chapter 10

- Information regarding new isolation of restorative sites methods with new matrix placement and dry field illuminators is introduced.

Chapter 11

- Smile makeover with tooth reconstruction, gingival reductions and augmentation, implant placement, and other cosmetic procedures are explained.

Chapter 12

- Material combinations, makeup, and uses are reviewed as well as a look at the requirements for practice in this specialty.

Chapter 13

- Charting and diagnosis of pulpal conditions have been added.
- New instruments, such as flowmeters, loupes, microscopic surgical instruments, and methods, are discussed.

Chapter 14

- Various surgical procedures for maxillofacial treatment of TMJ, bone reconstruction, implant placement, and other disorders are given. There is a discussion regarding the surgical participation in aesthetic dentistry.

Chapter 15

- Expanded review is included of corrective orthodontic procedures involving direct or indirect banding or brackets, lingual or Invisalign braces, and Class II corrective and anchor devices.
- Involvement of orthodontic practices in orthognathic procedures is introduced.

Chapter 16

- Expanded information related to the measurement and recording of periodontal conditions is given.
- A new section describing periodontic treatment in cosmetic dentistry is included.

Chapter 17

- Development and growth concerns of the child patient are described, as well as control and sedation of the child.

Chapter 18

- Digital impression methods and the uses in prosthetic procedures are explained. Use of dental materials and metal information is enlarged.

Chapter 19

- Additional discussion of computer-assisted systems in the CAD/CAM area of dental restoration and appliances is included.

Chapter 20

- HIPAA regulations are discussed. Expansion of the dental insurance, legal, and ethical terms is provided.

End-of-chapter exercises have been revised for each chapter. A new glossary approach is prepared with the addition of legal, insurance, and ethical words. Spanish translations of many words are given at the end of the word listing.

ACCOMPANYING TEACHING AND LEARNING RESOURCES

Spend less time planning and more time teaching with Delmar Cengage Learning's Instructor Resources to Accompany DENTAL TERMINOLOGY, Fourth Edition. All Instructor Resources can be accessed by going to www.cengagebrain.com and creating a unique user log-in. The password-protected Instructor Resources include the following.

Online Instructor's Manual

An Instructor Manual accompanies this book. It includes answers to the core textbook assessments for access at any time.

PowerPoint® Lecture Slides

These vibrant, customizable Microsoft® PowerPoint lecture slides for each chapter assist you with your lecture by providing concept coverage using images, figures, and tables directly from the textbook!

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Audio Library

The Audio Library is a reference that includes audio pronunciations and definitions for many dental terms! Use the audio library to practice pronunciation and review definitions for dental terms.

ABOUT THE AUTHORS

Calista Kindle, EFDA, CDA, was a staff writer at a local newspaper in Ashtabula, Ohio, for five years. She has been in the dental field for over 15 years. She was employed as a dental assistant and oral surgical assistant before she became a dental assistant instructor for Great Lakes Institute of Technology, in Erie, Pennsylvania. Soon after employment as an instructor, she was promoted as the program director of the Dental Assistant program. She devotes her time and effort to each individual student, making sure they are the best in the field. Her students maintain high DANB Certificate pass rates, along with high successful job placement immediately after graduating the dental program. While being the program director, she attended Westmoreland Community College to become an expanded function dental assistant. She has a current license in the state of Pennsylvania as an expanded function assistant and works part time at a local dental office, while performing her duties as a program director/instructor for the dental program at Great Lakes Institute of Technology. She continues her education at Clarion University to elevate the dental program at Great Lakes and to expand her career.

Charline M. Dofka received an MS from the University of Dayton. She has taken postgraduate studies at Ohio State, West Virginia University, Kent State, and Ohio University. She was employed as a dental assistant/hygienist in oral surgery, orthodontics, and general practices before she became a dental assisting instructor and Diversified Cooperative Health Occupations coordinator at Belmont Career Center in St. Clairsville, Ohio. Along with teaching duties, she chartered the National Honor Society participation of the vocational school and was advisor for the VICA opening and closing ceremony team to national competition representing the state of Ohio. Mrs. Dofka has retired from active teaching but maintains life membership in the Iota Lambda Sigma, professional vocational teaching fraternity, DANB dental assisting certification, and maintains retired status as a dental hygienist in West Virginia.

FEEDBACK

The authors hope that *Dental Terminology* will aid in understanding and using dental terms. Comments, viewpoints, or input regarding this book will be appreciated.

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CHAPTER 1 INTRODUCTION TO DENTAL TERMINOLOGY

✓ Learning Objectives

On completion of this chapter, you should be able to:

1. Identify the roles of the four types of word parts used in forming dental terms.
2. Use your knowledge of word parts to analyze unfamiliar dental terms.
3. Define the commonly used word roots, combining forms, suffixes, and prefixes introduced in this chapter.
4. Use the "sounds-like" pronunciation system and audio files to correctly pronounce the primary terms introduced in this chapter.
5. Recognize the importance of spelling dental terms correctly.
6. State why caution is important when using abbreviations.
7. Recognize, define, spell, pronounce, and correctly use the dental words introduced in this chapter.

LOCATE THE DENTAL WORD

Learning dental terminology is easy once you understand what word parts are and how they work together to form a dental word. This text will assist you on your path to expert word-building skills.

Dental words are arranged and listed alphabetically in dictionaries, reference works, or glossary listings. A few terms, such as AIDS (acquired immune deficiency syndrome) and HVE (high volume evacuator), are commonly listed in an abbreviated form made up of the first letters of several words. These **acronyms** (**ACK**-roh-nims) are listed along with other abbreviations representing a combination of word pieces or initials that can indicate an occupation, specialty, procedure, condition, or chemical. In filling prescriptions and writing labels, the science of pharmacology uses many abbreviations, such as *b.i.d.* (twice a day). Radiology and dental

Vocabulary Related to the Introduction to Dental Terminology

This list contains essential word parts and dental terms for this chapter. These and the other important **primary terms** are shown in boldface, and *secondary terms* appear in italics throughout the chapter. You may use the list to review these terms and to practice pronouncing them correctly. When you work with the audio for this chapter, listen to the word, repeat it, and then place a checkmark in the box. Proceed to the next boxed word, and repeat the process.

(hyphen before word means it's a suffix, hyphen after word means prefix, no hyphen means root word.)

Word Part	Meaning	Word Part	Meaning
furca	branch	occlus	shut, close-up
-tion	condition of	-ion	action, condition
trans-	through, across	sub-	below
illumina	give light	mandibul	mandible jaw
vas/o	vessel	-ar	pertaining to
constrict	bind or tie tightly	bio-	life
-or	agent	degrad	break down
inter-	between, among	-able	capable of
dent	tooth	myo	muscle
-al	pertaining to	card	heart
peri-	around	-ium	small, tissue
o/dont	tooth	ortho-	straight
mal-	bad	-ist	specialist

charting procedures also use many acronyms and abbreviations.

Care must be taken when looking for or using acronyms or abbreviations to shorten words because many abbreviations are not universal. For example, the abbreviation *imp* in general dentistry charting may indicate an impression, but an oral surgeon's office may use *imp* to designate an impaction. Some dental facilities develop a specific code or method of designating conditions and procedures. When in doubt about the spelling or meaning of an abbreviation or an acronym, it is best to spell out the word or look it up in a dictionary, glossary, or office manual.

Here are some examples of abbreviations or acronyms that may be found in reference works:

- **ALARA:** as low as reasonably achievable
- **ANUG:** acute necrotic ulcerative gingivitis
- **CDA:** Certified Dental Assistant
- **CCD:** charge coupled device
- **CAT:** computer assisted tomography
- **CEREC:** ceramic reconstruction
- **DDS/DMD:** Doctor of Dental Surgery or Doctor of Dental Medicine
- **FFD:** film focus distance or focal film distance
- **HIPAA:** Health Insurance Portability and Accountability Act
- **HIV:** human immunodeficiency virus
- **HVE:** high volume evacuation
- **MPD:** maximum permissible dose
- **MRSA:** methicillin-resistant *Staphylococcus aureus*

CAUTION!

Homonyms are similar in sound and spelling, but they have different meanings. Common homonyms used in dentistry are:

Die: tooth or bridge pattern used in prosthodontic dentistry
Dye: coloring material; may be used to indicate plaque

Auxiliary: dental assistant
Axillary: armpit site for taking body temperature

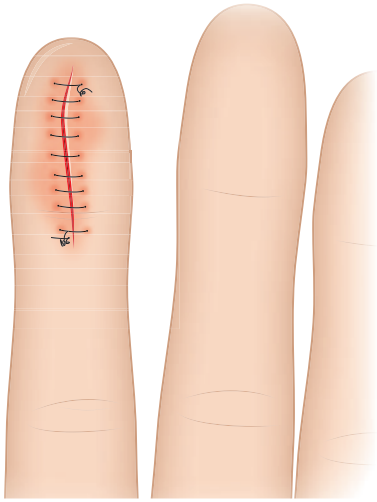
Palpation: examination method using fingers
Palpitation: increased heartbeat

Suture: area where two bones join together
Suture: stitches for wound closure

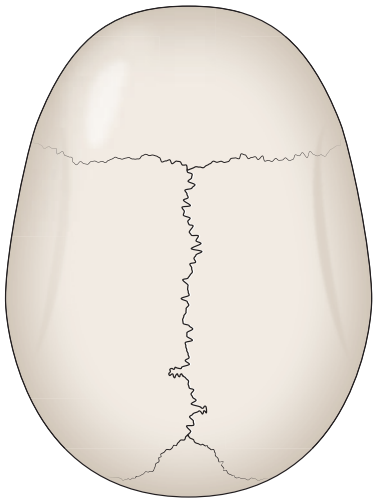
Vocabulary Related to the Introduction to Dental Terminology *continued*

Key Terms

- ❑ **-algia** (**AL**-jee-ah)
- ❑ **ante-** (**AN**-tea)
- ❑ **anti-** (**AN**-tie)
- ❑ **Bi- (BYE)**
- ❑ **dys- (DIS)**
- ❑ **-ectomy** (**ECK**-toh-me)
- ❑ **endo-** (**EN**-doe)
- ❑ **hyper-** (**HIGH**-per)
- ❑ **hypo-** (**HIGH**-poh)
- ❑ **infra-** (**INN**-frah)
- ❑ **intra-** (**INN**-trah)
- ❑ **-itis** (**EYE**-tiss)
- ❑ **-oid (OYD)**
- ❑ **-ologist** (**AH**-logh-jist)
- ❑ **-otomy** (**AH**-toh-mee)
- ❑ **peri-** (**PEAR**-ee)
- ❑ **-plasty** (**PLAS**-tee)
- ❑ **poly-** (**PAHL**-ee)
- ❑ **retro-** (**REH**-troh)
- ❑ **supra** (**SOO**-prah)
- ❑ **-trophy** (**TROH**-fee)
- ❑ **Acronyms**
- ❑ **Homonyms**
- ❑ **Eponyms**
- ❑ **Prefix**
- ❑ **combining form**
- ❑ **suffix**
- ❑ **root word**
- ❑ **syncope**
- ❑ **xerostomia**



Wound Sutures



Skull Sutures

- **MSDS:** Material Safety Data Sheet
- **PID:** Position Indicating Device
- **PDR:** *Physician's Desk Reference*
- **PPE:** personal protection equipment
- **RDH:** Registered Dental Hygienist
- **ZOE:** zinc-oxide eugenol

Sometimes dental terminology denotes the person who developed the procedure, discovered the anatomical area, designed the instrument, named the disease, and the like. Examples are *Nasmyth membrane, Sharpey's fibers,* or *Bass Technique*. These terms are called **eponyms** (**EP**-oh-nims).

PRONOUNCE THE DENTAL WORD

After locating the word, it has to be pronounced. In this book, each dental term is broken into "sounds-like" syllables or elements that appear in parentheses. **BOLD** uppercase letters are used to indicate the syllables that are to receive the most emphasis when pronouncing the word. If the word has a secondary syllable or element of stress, it is printed in **bold** lowercase letters. All other elements are printed in the phonetic "sounds-like" manner.

To pronounce a word, say it just as it is spelled out within the parentheses. For example, in *periodontitis* (**pear**-ee-oh-don-**TIE**-tis), the syllable **TIE** receives the most emphasis, and secondary, or lesser, stress is also placed on the first syllable, **pear**. In gingivitis (**jin**-jih-**VIE**-tis), the main emphasis is placed on **VIE**, with secondary stress on the first syllable, **jin**.

Pronunciation rules are standard. Some vocal accents, however, show regional/geographic differences or differences related to the school where the words are learned.

ANALYZE THE STRUCTURE OF THE DENTAL WORD

Dental terminology involves the study of words and terms related specifically to the dental sciences. Every science has its own unique terminology. Rules and conventions are standardized for formation, pronunciation, pluralization, and meaning of terms.

In medical terminology, many words refer to the proximity or nearness to anatomical structures. Many dental terms originate from the names of bones or structures, but more often, from the names of dental procedures or practical approaches.

Dental terms are usually formed by a combination of small words or syllables linked in a "building block" or word chain. Knowing the basic small divisions and the combining methods can assist in the understanding of word meanings. When broken into smaller parts, most longer terms reveal a prefix that modifies the term, a single- or double-root structure that provides the foundation to the term, and a suffix that qualifies the word meaning.

The Four Types of Word Parts:

1. A **prefix** usually, but not always, indicates location, time, number, or status, color, or size.
   - A prefix is always at the beginning of a word.
   - You'll know a word part is a prefix when it is shown followed by a hyphen (-). For example, **anti-** means against.
   - A word may or may not have a prefix.
2. A **root word** provides the basic meaning for the word. In medical and dental terminology, this word part usually, but not always, indicates the involved body part. For example, the root word meaning tooth is **dent** or **o/dont**.
3. A **combining form** is a root word with a combining vowel added. A dental term may have more than one root. When two roots are combined, a *combining vowel* (usually o) is used to connect them. When a combining form appears alone, it is shown with a backslash (/) between the root word and the combining vowel. For example, the combining form of root word dont is o/dont.
4. A **suffix** usually, but not always, indicates the procedure, condition, disorder, or disease.
   - A suffix is always at the end of the word.
   - You'll know a word part is a suffix when it is shown with a hyphen (-) preceding it. For example, the suffix -itis means inflammation.

A word may be easier to analyze by beginning with the suffix and working toward the beginning of the word. Many word structures have multiple meanings, either from the Greek, Latin, or French languages. The exercises in this book will use the more common substitution, but others may be found in the appendix at the rear of the book.

Prefix

A **prefix** (**PRE**-fix) is sometimes added to the beginning of a word to influence the meaning of that term. A prefix alters the word's meaning by indicating number, color, size, location, or condition. Some common prefixes used in dental terminology are listed in Tables 1-1 to 1-5. Table 1-1 gives examples of prefixes denoting quantity or number.

Prefixes Denoting Color

Occasionally, a root word has more than one prefix with the same meaning. One meaning may stem from Latin and another may be a Greek or French version. For example, *alba*, from the Latin word *albus,* refers to white, such as in *albumen* and *albino*. *Leuko* is a Greek prefix meaning white and is used in *leukoplakia* (a white, precancerous patch found inside the cheek). Although *leuko* may be more popular, both prefixes are correct. Table 1-2 includes other prefixes denoting color.

Prefixes Denoting Size or Degree

Some prefixes are used to qualify the size or degree of development of the root term. Table 1-3 gives examples.

Prefixes Denoting Location or Direction

Some prefixes are used to specify the location or the position of the root term and the involvement occurring, such as treatment occurring inside (*endo*) the tooth or treatment around (*peri*) the gingiva. Table 1-4 contains some examples of prefixes referring to location and/or position.

Prefixes Denoting Condition

Some prefixes are used to denote the condition of the root element. These prefixes may indicate that the condition is new (*neo*) or that the root term is not in effect, as in the word *infertile* (not fertile). Some examples denoting the condition of the root are presented in Table 1-5.

Table 1-1 Examples of Prefixes Denoting Quantity or Number

Prefix	Meaning	Example	Sounds Like
a- an-	without	*an*emia	(ah-**NEE**-me-ah)
bi-	two, double	*bi*furcation	(bye-fur-**KAY**-shun)
hemi-	half	*hemi*section	(**HEM**-ih-seck-shun)
cent-	hundred	*centi*meter	(**SEN**-tah-mee-ter)
deca(i)-	ten	*deci*bel	(**DESS**-ih-bull)
holo-	all	*hol*istic	(ho-**LIS**-tick)
mon/o-	one	*mon*omer	(**MON**-oh-mer)
poly-	many	*poly*merization	(pol-ah-mer-ah-**ZAY**-shun)
prim-/i-	first	*pri*mary	(**PRY**-mary)
quad-/quat-	four	*quad*rant	(**KWAH**-drant)
semi-	half	*semi*luminal	(sem-**EE**-lum-in-al)
tri-	three	*tri*geminal	(try-**JEM**-in-al)
uni-	one	*uni*lateral	(you-nah-**LAT**-er-ol)

Table 1-2 Examples of Prefixes Denoting Color

Prefix	Color	Example	Sounds Like
albus-	white	*albu*men	(al-**BU**-men)
chlor-/o-	green	*chlor*ophyll	(**CHLOR**-oh-fill)
cyan-/o-	blue	*cyan*osis	(sigh-ah-**NO**-sis)
erythr-/o-	red	*erythr*ocyte	(eh-**RITH**-row-site)
leuk-/o-	white	*leuk*oplakia	(loo-koh-**PLAY**-key-ah)
melan-/o-	black	*melan*oma	(mel-ah-**NO**-ma)
xanth-/o-	yellow	*xanth*oma	(zan-**THO**-ma)

Root Word

The main section or division of a term that provides the foundation or basic meaning is a root word. A word may have one or more root sections. When a root section is combined or connected with other word elements, it may take on a combining vowel and become a **combining form**. The most common combining vowel is *o*. For example, the word *temporal* relates to the temporal bone in the skull, and the word *mandible* is the lower jaw bone. Independently, these are two separate words, but they can be combined to form the word *temporomandibular,* as in temporomandibular

Table 1-3 Examples of Prefixes Denoting Size or Degree

Prefix	Meaning	Example	Sounds Like
hyper-	over/excess	*hyper*trophy	(high-**PER**-troh-fee)
hypo-	under/below	*hypo*plasia	(high-poh-**PLAY**-zee-ah)
iso-	equal	*iso*graft	(**I**-so-graft)
macro-	large	*macro*dontia	(mack-row-**DON**-she-ah)
micro-	small/minute	*micro*be	(**MY**-crobe)
pan-	all around	*pan*oramic	(**PAN**-oh-ram-ic)
ultra-	extreme/beyond	*ultra*sonic	(**UL**-trah-son-ic)

Table 1-4 Examples of Prefixes Denoting Location or Direction

Prefix	Meaning	Example	Sounds Like
ab-	away from	*ab*sent	(**AB**-sent)
ad-	toward/near	*ad*jacent	(ad-**JAY**-cent)
ambi-	both sides	*ambi*dextrous	(am-bah-**DECK**-strous)
ana-	apart	*ana*lysis	(ah-**NAL**-ah-sis)
ante-	in front	*anter*ior	(an-**TIER**-ee-or)
de-	down from	*de*hydration	(de-high-**DRAY**-shun)
dexi-	right side	*dex*ter	(**DECKS**-ter)
dia-	complete	*di*alysis	(die-**AL**-ah-sis)
ecto-	outside	*ecto*pic	(eck-**TOP**-ic)
endo-	within	*endo*dontic	(en-dough-**DON**-tic)
epi-	upon/over	*epi*dermis	(ep-ah-**DER**-mis)
ex/o-	out from	*ex*cretion	(eeks-**KREE**-shun)
in-	into/in	*in*cision	(in-**SIZH**-shun)
infra-	below	*infra*orbital	(in-frah-**OR**-bih-tal)
inter-	in midst of	*inter*dental	(in-ter-**DEN**-tal)
im-	into/position	*im*plant	(**IM**-plant)
mes-/o-	mid, among	*mesio*clusion	(me-zee-oh-**CLUE**-shun)
para-	near/beside	*par*enteral	(**PARE**-en-ter-al)
peri-/o-	around	*perio*dontal	(pear-ee-oh-**DON**-tal)

(*Continues*)

Table 1-4 (*Continued*)

Prefix	Meaning	Example	Sounds Like
post-	after/later	*post*erior	(pahs-**TEE**-ree-or)
pre-/ante-	before	*pre*molar	(pree-**MOL**-ar)
retro-	behind/back	*retro*molar	(rhet-tro-**MOLE**-ar)
sub-	under, lesser	*sub*dermal	(sub-**DER**-mal)
supra-	above/over	*supra*orbital	(sue-pra-**OR**-bih-tal)
syn-	together	*syn*ergism	(**SIN**-er-jizm)
trans-	through	*trans*plant	(**TRANS**-plant)

Table 1-5 Examples of Prefixes Denoting Condition

Prefix	Meaning	Example	Sounds Like
a-, an-	without	anodontia	(an-oh-**DON**-she-ah)
anti-	opposite to	antiseptic	(an-tih-**SEP**-tick)
brady-	slow	bradycardia	(bray-dee-**KAR**-dee-ah)
con-	with	connective	(con-**NECK**-tive)
contra-	against	contrangle	(**CON**-tra-ang-el)
dis-	take away	disinfectant	(dis-inn-**FECK**-tant)
in-	not	insoluble	(in-**SOL**-you-bull)
mal-	bad	malocclusion	(mal-oh-**CLUE**-zhun)
malaco-	soft	malacosis	(mal-ah-**KO**-sis)
neo-	new	neoplasm	(**NEE**-oh-plazm)
pachy-	thick	pachyderma	(pack-ah-**DERM**-ah)
sclero-	hard	scleroma	(sklay-**ROW**-ma)
tachy-	fast	tachycardia	(tack-ee-**KAR**-dee-ah)
un-	non/not	unerupted	(un-ee-**RUPT**-ed)

joint (TMJ). Note that the combining vowel *o* is inserted in place of the *al* in *temporal.*

As another example, two roots are combined to designate specific areas of teeth. In referring to the back chewing surface of a tooth, the root term for back or distant is *distal* and the term *occlusal* refers to chewing or occluding area. When combining these two roots with the combining vowel *o,* we have *distocclusal,* the back chewing surface.

Table 1-6 Common Dental Root/Combining Forms

Root Word	Sounds Like	Combo Form	Pertains To
alveolar	(al-**VEE**-oh-lar)	alveo	alveolus
apical	(**AY**-pih-kahl)	apic-/o-	apex of a root
axis	(**ACK**-sis)	ax-/o-	axis/midline
buccal	(**BUCK**-ahl)	bucc-/o-	cheek
cheilo	(key-**LOH**)	cheil-/o-	lip
coronal	(kor-**OH**-nal)	coron-/o-	crown
dens	(denz)	dent-/o-	tooth
distal	(**DIS**-tal)	dist-/o-	farthest from center
enamel	(ee-**NAM**-el)	ename-/o- or amel-/o-	tooth, enamel tissue
fluoride	(**FLOOR**-eyed)	fluor-/o-	chemical, fluoride
frenum	(**FREE**-num)	frene-	frenum
front	(front)	front-/o-	forehead
gingiva	(**JIN**-jih-vah)	gingiv-/o-	gingiva, gum tissue
glossa	(**GLOSS**-ah)	gloss-/o- or gloss/a	tongue
gnatho	(nah-**TH**-oh)	gnath-/o-	jaw, cheek
incisor	(in-**SIGH**-zore)	incis-/o-	incisor tooth
labia	(**LAY**-bee-ah)	labi-/o-	lip area
lingua	(**LING**-wa)	lingu-/o-	tongue
mandible	(**MAN**-dih-bull)	mandibu-/a-	lower jaw
maxilla	(**MACK**-sih-lah)	maxilla-/o-	upper jaw
mesial	(**ME**-zee-al)	mesi-/o-	middle, midplane
mucosa	(myou-**KOH**-sah)	muc-/o-	tissue lining an orifice
occlude	(oh-**KLUDE**)	occlus-/o-	occluding, jaw close
odont	(oh-**DONT**)	odont-/o-	tooth
orthos	(**OR**-thohs)	orth-/o-	straight, proper order
stoma	(**STOW**-mah)	stoma-	mouth
temporal	(**TEM**-pore-al)	tempor-/o-	temporal bone

Other examples of terms with two roots are thermometer, cementoenamel junction, and radiograph. Table 1-6 gives examples of common root words and combining forms used in dental terminology. More examples of root words are provided in the appendix.

Suffix

An element added to the end of a root word or combining form to describe or qualify the word meaning is a **suffix** (**SUF**-icks). A suffix cannot stand alone and is usually united with a root element by inserting a combining vowel (*o*) unless the suffix begins with a vowel. In that case, the combining form or vowel is dropped. For example, the surgical removal of gum tissue is the meaning of *gingivectomy* from the root word *gingivo* (gum) and suffix *ectomy* (surgical excision). Dropping the ending vowel in *gingivo* and adding *ectomy* to make *gingivectomy* unite these two word elements. Suffixes have the ability to transform a noun or verb into an adjective, or verbs into nouns, by the addition of a word ending. Suffixes can also indicate time and size, condition, agents, or specialists. Some examples of common suffixes used in dental terminology are given in Tables 1-7 to 1-10. A more complete listing of common suffixes is contained in the appendix.

Suffixes Meaning "Pertaining to"

An adjective is a word that defines or describes. In dental terminology, many suffixes meaning "pertaining to" are used to change the meaning of a root word into an adjective. For example, the root word **gingiv** means tissue surrounding the teeth (gums), and the suffix -al means pertaining to. When these word elements are combined, they form the term *gingival,* an adjective that means pertaining to the gingiva tissue. Commonly used suffixes that mean *pertaining to* are show in Table 1-7.

Suffixes Meaning "Abnormal Condition or Disease"

A suffix added to a root may indicate the condition of the root word. It may denote that disease (*pathy*) or inflammation (*itis*) is occurring, or it may indicate that the condition exists (*tion*). Table 1-8 gives examples of suffixes that mean *condition.*

Suffixes Denoting Agent or Specialist

Some suffixes are added to the root element to indicate an agent involving an action, or a person concerned with or trained in that specialty. The suffixes in Table 1-9 are some of the more familiar ones, and many more are used to indicate specialization.

Table 1-7 Suffixes Meaning "Pertaining to"

• -a	• -al	• -ary
• -ial	• -ical	• -ior
• -tic	• -an	• -eal
• -ac	• -ic	• -ory
• -ile	• -ar	• -ia
• -um	• -ine	• -ous

Table 1-8 Suffixes Indicating Condition

• -ant	• -ion	• -oma
• -cle	• -ism	• -pathy
• -ule	• -itis	• -sion
• -ia	• -ity	• -tic
• -ible, ile	• -ium	• -tion
• -id	• -olus	• -y

Table 1-9 Suffixes Denoting Agent or Person Concerned

Suffix	Agent or Person
-ee	train*ee*, employ*ee*, leas*ee*
-ent	pati*ent*, recipi*ent*, resid*ent*
-eon	surg*eon*
-er	subscrib*er*, examin*er*, practition*er*
-ician	phys*ician*
-ist	dent*ist*, orthodont*ist*
-or	doct*or*, don*or*

Suffixes Related to Pathology and Procedures

Some suffixes are added to root elements to show processes, uses, or healing. When analyzing a long dental word, starting at the suffix may indicate something happening to the root word element, such as *ectomy* (surgical removal) or *trophy* (development). Other suffixes are added to indicate pain (*algia*) or bleeding (*rrhage*) and so on. Table 1-10 gives some examples.

DEFINE THE MEANING OF THE DENTAL WORD

After providing the word and its pronunciation, this text gives the meaning of the word, including

Table 1-10 Suffixes Expressing Medical Terms, Processes, Uses

Suffix	Meaning	Sample Words
-algia	pain	odont*algia*, neurol*agia*, my*algia*
-ate, -ize	use/action	vaccin*ate*, lux*ate*, palp*ate*, visual*ize*
-cide	kill	germi*cide*, homi*cide*
-cyte	cell	leuko*cyte*, osteo*cyte*
-ectomy	surgical removal	apico*ectomy*, append*ectomy*
-gnosis	knowledge	pro*gnosis*, dia*gnosis*
-ology	study of	hist*ology*, bi*ology*
-oma	tumor	carcin*oma*
-opsy	view	bi*opsy*, aut*opsy*
-phobia	dread fear	claustro*phobia*
-plasty	surgical repair	gingivoplasty
-plegia	paralysis	para*plegia*
-rrhea	discharge	hemmo*rrhea*, sialo*rrhea*
-scope	instrument	micro*scope* (micro), laryngo*scope* (larynx)
-tomy	incision	myo*tomy* (muscle)
-trophy	development	osteo*trophy* (bone development)

the definition and any relevant feature that occurs within or about the word. For example:

syncope (**SIN**-koh-pee): a temporary loss of consciousness resulting from an inadequate supply of blood to the brain; also known as swooning or fainting.

xerostomia (**zeer**-oh-**STOH**-me-ah; xeros = *dry*, stoma = *mouth*): dryness of the mouth caused by the lack of normal saliva secretion.

In the first example, synonyms (e.g., fainting) are provided for *syncope*. The second example contains information about the derivation of the word *xerostomia; xeros* is Greek for dry, and *stoma* is the word for mouth.

PLURALIZE THE DENTAL WORD

As the majority of dental terminology originates from Latin and Greek, the rules for changing terms from singular to plural are predetermined by the conventions of those languages. The first step is to learn the basic rules for changing word endings, bearing in mind that a few terms will not conform to the rules given in Table 1-11. Look up terms in a dictionary or reference book to verify spelling on any terms in question.

USE THE DENTAL WORD

Read, pronounce, and determine the structure of the term. Breaking down the word parts and learning the meaning of the word parts will help determine if your structure analysis was correct and will reinforce word meanings. Strengthen your knowledge of the dental term when incorporating the dental term into a sentence or statement.

Table 1-11 Guideline for Plural Forms

Word Endings	Change To	Singular	Plural
a	*ae* (add *e* to end)	gingiva	gingivae
ex, ix	*ices* (drop *x*, add *ices*)	apex	apices
itis	*ides* (drop *s*, add *des*)	pulpitis	pulpitides
sis	*sis* (change *is* to *ses*)	cementosis	cementoses
nx	*nges* (change *nx* to *nges*)	larynx	larynges
on	*a* (change *on* to *a*)	ganglion	ganglia
oma	*omas* (add *s* to the end)	dentinoma	dentinomas
um	*a* (change *um* to *a*)	frenum	frena
us	*i* (change *us* to *i*)	sulcus	sulci
y	*ies* (drop *y*, add *ies*)	biopsy	biopsies

Test Your Knowledge

Complete the following practices to enforce your understanding of Chapter 1. The answers to the practice challenges can be found in the back of this textbook.

Practice 1

Underline the prefixes used in the following words and specify what number or amount each represents:

1. **anaerobic** _____oxygen/s
2. **hemisphere** _____sphere/s
3. **quaternary** _____element/s
4. **primordal** _____form/s
5. **anesthesia** _____feeling/s
6. **monocular** _____eyepiece/s
7. **anemia** _____hemoglobin/s
8. **bicuspid** _____cusp/s
9. **tripod** _____foot/feet
10. **polypnea** _____breath/s
11. **unilateral** _____side/s
12. **trifurcation** _____division/s
13. **semicoma** _____coma/s
14. **decimeter** _____meter/s
15. **monocell** _____cell/s

Practice 2

Match each prefix in Column A with the color it represents in Column B. (An answer in Column B may be used more than once.)

Column A	Column B
1. _____melan-/o-	**A**. white
2. _____cyan-/o-	**B**. yellow
3. _____chlor-/o-	**C**. violet
4. _____erythr-/o-	**D**. blue
5. _____leuk-/o-	**E**. black
6. _____alba-	**F**. red
7. _____xanth-/o-	**G**. green

Practice 3

Give the meaning of the prefix underlined in the following words:

1. **macroglossia** = _____tongue
2. **isocoria** = _____pupil size
3. **hyperglycemia** = _____blood sugar
4. **hypocementosis** = _____cementum
5. **micrognathia** = _____jaw
6. **panoramic** = _____view
7. **ultrasonic** = _____sounds

Practice 4

Using the prefix list given, choose the prefix that best describes the meaning of the term:

ab-, ad-, ambi-, ana-, de-, dexi-, dia-, ecto-, endo-, ex-, in-, mes-, peri-, post-, pre-, retro-, sub-, supra-, syn-, trans-

1. **around** = _____
2. **outside** = _____
3. **behind** = _____
4. **under** = _____
5. **toward** = _____
6. **mid/among** = _____
7. **apart** = _____
8. **through** = _____
9. **together** = _____
10. **down** from = _____
11. **right** = _____
12. **after** = _____
13. **before** = _____
14. **both** sides = _____
15. **into** = _____
16. **away** from = _____
17. **out** from = _____
18. **within** = _____
19. **above** = _____
20. **complete** = _____

Practice 5

Match the prefix in Column A to the term it best describes in Column B:

Column A	Column B
1. neo-_____	**A.** soft
2. pachy-_____	**B.** bad
3. con-_____	**C.** without
4. sclero-_____	**D.** against
5. dis-_____	**E.** hard
6. a- or an-_____	**F.** fast
7. mal-_____	**G.** opposite to
8. anti-_____	**H.** not/non
9. un- or in-_____	**I.** new
10. tacky-_____	**J.** removal
11. contra-_____	**K.** with
12. malaco-_____	**L.** slow
13. brady-_____	**M.** thick

Practice 6

Place a root element for the given words in the blanks provided.

1. **gum tissue** _____
2. **lip area** _____
3. **root apex** _____
4. **tongue** _____
5. **upper jaw** _____
6. **mouth opening** _____
7. **middle** _____
8. **orifice tissue lining** _____
9. **far from center** _____
10. **crown area** _____

Practice 7

Underline the suffix indicating relationship in each given word, and write it in the blank next to the word.

1. **filliform** _____
2. **chronic** _____
3. **kilogram** _____
4. **condyloid** _____
5. **endosteal** _____
6. **posterior** _____
7. **vascular** _____
8. **squamous** _____
9. **apical** _____
10. **cardiac** _____
11. **xenograph** _____
12. **intraligamentary** _____

Practice 8

Insert the correct suffix to complete the root element.

1. **condition of being acid** = acid_____
2. **surgical cut** = inci_____
3. **term for a germ** = bacter_____
4. **fatty tumor** = lip_____
5. **act of chewing** = mastica_____
6. **dead tissue** = necro_____
7. **muscle damage disease** = myo_____
8. **small bit of matter** = a mole_____
9. **tooth grinding** = brux_____
10. **air sac** = alve_____

Practice 9

List six agents and/or persons concerned with a specialty area, and underline the suffix denoting their position.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

Practice 10

Examine the boldfaced words in each sentence, and circle the suffix denoting a medical procedure, use, or condition of the root element. Then write the meaning of the word in the space below.

1. A **gingivoplasty** may be the correct treatment for an infected third molar area.

   _____

2. The patient's health history included drugs for her **fibromyalgia** condition.

   _____

3. The assistant prepares the **germicide** according to the manufacturer's instructions.

   _____

4. A **stethoscope** is used to determine blood flow sounds in a blood pressure examination.

   _____

5. Tissue **hemorrhea** may be an indicator of a serious blood disease.

   _____

6. The dentist will **cauterize** the patient's gingiva during the surgical procedure.

   _____

7. Jimmy will need a **frenectomy** before the central incisors can be moved into the area.

   _____

8. The patient was referred to an oral surgeon for the **apicoectomy**.

   _____

9. To avoid bone and tooth damage, the dentist will **rotate** the tooth before removal.

   _____

10. Some patients claim to suffer **claustrophobia** when visiting the dental office.

    _____

11. A complete dental exam includes inspection for oral **carcinoma** symptoms.

    _____

12. The patient was anxious to hear a good **prognosis** from the dentist.

    _____

13. The assistant prepared the **biopsy** slide for shipment to the laboratory.

    _____

14. An infection could be the cause of an elevated **leukocyte** count.

    _____

15. **Histology** is the study of microscopic structure of tissue.

    _____

Practice 11

Provide the plural form for each singular word listed here:

Singular	Plural
1. matrix	_____
2. mamelon	_____
3. frenum	_____
4. radius	_____
5. sulcus	_____
6. iris	_____
7. axillary	_____
8. diagnosis	_____
9. gingiva	_____
10. stoma	_____

Review Exercises

Complete the following Review Exercises to strengthen your knowledge of the dental terms introduced in this chapter.

Matching

Match the following word elements with their meanings:

1. _____poly-		**A.**	tongue
2. _____supra-		**B.**	from, away from
3. _____peri-		**C.**	many
4. _____-trophy		**D.**	mouth
5. _____mesial		**E.**	black
6. _____ab-		**F.**	tumor
7. _____-oma		**G.**	gum tissue
8. _____melano-		**H.**	middle, midplane
9. _____retro-		**I.**	around or about
10. _____mini-		**J.**	inflammation
11. _____mal-		**K.**	development, growth
12. _____-itis		**L.**	evil, sickness, disorder, poor
13. _____pathy-		**M.**	cutting into, incision into
14. _____dens		**N.**	backward
15. _____-otomy		**O.**	fear
16. _____glossa		**P.**	above
17. _____stoma		**Q.**	small
18. _____neo-		**R.**	disease
19. _____gingiva		**S.**	tooth
20. _____phobia		**T.**	new

Multiple Choice

Using the selection given for each sentence, choose the best term to complete the definition.

1. The root/combining word for lip is _____.
   a. labia
   b. glossa
   c. frenum
   d. buccal
2. Which suffix means pain or ache?
   a. -soma
   b. -oma
   c. -ous
   d. -algia
3. Which prefix means toward or increase?
   a. an-
   b. ad-
   c. ab-
   d. in-
4. The abbreviated form for high volume evacuation is:
   a. HIV
   b. HVE
   c. HEE
   d. HCC
5. Which prefix means together?
   a. con-
   b. bi-
   c. syn-
   d. retro-
6. The root or combining word for lower jaw is:
   a. maxilla
   b. mesial
   c. mandible
   d. megial

7. Which suffix means tissue death, decay?
   a. -plasty
   b. -pathogy
   c. -ectomy
   d. -necrosis

8. The combining form for straight or for proper order is:
   a. occlus/o
   b. anti/e
   c. oppos/o
   d. orth/o

9. Which suffix means graph or picture (especially in radiology)?
   a. -grate
   b. -photo
   c. -gram
   d. -trophy

10. Which prefixes determine the number to be two?
    a. bi- and semi-
    b. bi- and uni-
    c. tri- and bi-
    d. bi- and pan-

11. Which combining form means apex of the root?
    a. apix/o
    b. apic/o
    c. axi/o
    d. axium

12. A pattern used in prosthodontic dentistry is:
    a. dia-
    b. dye
    c. dys-
    d. die

13. What is the plural form of frenum?
    a. frenix
    b. freni
    c. frena
    d. frenia

14. Which prefix means less than, below, or under?
    a. hypo-
    b. hyper-
    c. trans-
    d. hydro-

15. Which suffix designates a specialist in a particular study?
    a. -ology
    b. -ier
    c. -ologist
    d. -teur

Building Skills

Locate and define the prefix, root/combining form, and suffix (if present) in the following words.

1. **bifurcation** (**bye**-fer-**KAY**-shun): branching into two parts.
   prefix _____ means:
   root or combining form _____ means:
   suffix _____ means:

2. **transillumination** (trans-ill-**lum**-mih-**NAY**-shun): passage of light through an object.
   prefix _____ means:
   root or combining form _____ means:
   suffix _____ means:

3. **vasoconstrictor** (vas-oh-kahn-**STRIK**-tore): chemical used to constrict blood vessels.
   prefix _____ means:
   root or combining form _____ means:
   suffix _____ means:

4. **interdental** (in-ter-**DENT**-al): between two teeth.
   prefix _____ means:
   root or combining form _____ means:
   suffix _____ means:

5. **periodontitis** (**pear**-ee-oh-don-**TIE**-tis): inflammation/degeneration of dental periosteum.
   prefix _____ means:
   root or combining form _____ means:
   suffix _____ means:

6. **malocclusion** (**mal**-oh-**KLOO**-shun): imperfect occlusion of the teeth, improper closure.
   prefix _____ means:
   root or combining form _____ means:
   suffix _____ means:

7. **submandibular** (sub-man-**DIB**-you-lar): beneath the lower jaw or mandible.
   prefix _____ means:
   root or combining form _____ means:
   suffix _____ means:

8. **biodegradable** (**bye**-oh-dee-**GRADE**-ah-bull): metabolic breakdown of protein matter.
   prefix _____ means:
   root or combining form _____ means:
   suffix _____ means:
9. **myocardium** (my-oh-**KAR**-dee-um): middle cardiac muscular layer.
   prefix _____ means:
   root or combining form _____ means:
   suffix _____ means:
10. **orthodontist** (**or**-thoh-**DON**-tist): a specialist dealing with tooth arrangement.
    prefix _____ means:
    root or combining form _____ means:
    suffix _____ means:

Plurals

Use the blank space to write in the plural form of each given word.

1. **ala** _____
2. **apex** _____
3. **calculus** _____
4. **diagnosis** _____
5. **larynx** _____
6. **dens** _____
7. **bacterium** _____
8. **carcinoma** _____
9. **bacillus** _____
10. **labium** _____
11. **therapy** _____
12. **focus** _____
13. **fossa** _____
14. **enema** _____
15. **appendix** _____

Word Use

Read the following sentences and define the word written in boldfaced letters.

1. The dentist suggested topical **anesthesia** for the treatment.

   _____

   _____

2. The hygienist explained that a **gingivectomy** is a common treatment for necrotic gingival tissue.

   _____

   _____

3. The dentist wrote a prescription for therapeutic vitamin B complex medicine for the patient suffering from **cheilosis**.

   _____

   _____

4. A calcium deposit in the **sublingual** salivary duct caused a large and uncomfortable swelling in the mouth.

   _____

   _____

5. An incorrect bite can be one of the causes of a **temporomandibular** joint disorder.

   _____

   _____

6. The assistant attached the **biopsy** report to the patient's records.

   _____

   _____

7. The dentist pointed out the patient's abscess on the enlarged digital **radiograph**.

   _____

   _____

8. During the dental examination, the patient is screened for the presence of an oral **carcinoma**.

   _____

   _____

9. Sometimes a **posterior** dental X-ray may be difficult to place in a small mouth.

   _____

   _____

10. All maxillary molars exhibited a **trifurcation** of the root, while mandibular molars showed a bifurcation.

    _____

    _____

Please note that the answers to this chapter's exercise may be found in Appendix B.

CHAPTER 2 ANATOMY AND ORAL STRUCTURES

✓ Learning Objectives

On completion of this chapter, you should be able to:

1. Name and identify the major bones of the face and skull.
2. Locate the sinus cavities, sutures, processes, and foramina of the skull.
3. Locate the major structural points of the mandible, and explain their functions or purposes.
4. Identify the names and locations of the major muscles of mastication, and explain the function of each.
5. Describe the principal branches of the trigeminal nerve, and explain the functions of each division.
6. Locate and identify the major blood vessels to and from the cranium.
7. Describe the placement and functions of the major salivary glands.
8. Discuss the tissue bodies present in the cranium and their function in fighting infection and assisting with immunity.
9. Locate and explain features in the oral cavity, such as the labia, frena, tongue, and palate structures and miscellaneous tissues.

Vocabulary Related to Anatomy and Oral Structures

This list contains selected new and important word parts and terms from this chapter. Take the time to learn these word parts and their meanings. You may use the list to review these terms and practice pronouncing them correctly. When you work with the audio for this chapter, listen to the word, repeat it, and then place a checkmark in the box. Proceed to the next boxed word, and repeat the process.

(hyphen before word means it's a suffix, hyphen after word means prefix, no hyphen means root word.)

Word Parts	Meaning	Word Parts	Meaning
infra-	under, below	palat	hard palate in mouth
orbit	eye area	-ine	pertaining to
-al	pertaining to	sub-	under
peri-	around	mandibul	mandible jaw
oste	bone	-ar	pertaining to
-um	pertaining to	tempor/o	temporal bone
gloss/o	tongue	pariet	parietal bone

Key Terms

- ❑ **abducens** (**UHB**-doo-snz)
- ❑ **adenoid** (**A**-duh-noyd)
- ❑ **alveolar** (al-**VEE**-oh-lar)
- ❑ **alveolus** (al-**VEE**-oh-lus)
- ❑ **ankyloglossia** (**ang**-key-loh-**GLOSS**-ee-ah)
- ❑ **anopia** (an-**OH**-pee-ah)
- ❑ **anosmia** (an-**OZ**-mee-ah)
- ❑ **antibody** (**AN**-tie-bah-dee)
- ❑ **antigens** (**AN**-tih-jens)
- ❑ **articular eminence** (ar-**TICK**-you-lar **EM**-ih-nense)
- ❑ **Bell's palsy** (**PAUL**-zee)
- ❑ **buccinator** (**BUCK**-sin-ay-tor)
- ❑ **capillaries** (**KAP**-ih-lair-eez)
- ❑ **carotid** (care-**OT**-id)
- ❑ **cervical** (**SIR**-vih-kul)
- ❑ **circumvallate** (sir-kum-**VAL**-ate)
- ❑ **commissure** (**KOM**-ih-shur)
- ❑ **conchae** (**KONG**-kee) (pl. of concha)
- ❑ **condyle** (**KON**-dial)
- ❑ **condyloid** (**KON**-dih-loyd)

Vocabulary Related to The Introduction to Dental Terminology *continued*

Key Terms *continued*

- ❑ **coronal** (kor-**OH**-nal)
- ❑ **coronoid** (**KOR**-oh-noid)
- ❑ **cranium** (**KRAY**-nee-um)
- ❑ **deglutition** (**dee**-glue-**TISH**-un)
- ❑ **diplopia** (die-**PLOH**-pee-ah)
- ❑ **ethmoid** (**ETH**-moyd)
- ❑ **expectorate** (ex-**PECK**-tuh-rate)
- ❑ **fauces** (**FOH**-sez)
- ❑ **filiform** (**FIL**-ih-form)
- ❑ **foliate** (**FOH**-lee-ate)
- ❑ **foramen** (foh-**RAY**-men)
- ❑ **frenum** (**FREE**-num)
- ❑ **frontal** (**FRON**-tal)
- ❑ **fungiform** (**FUN**-jih-form)
- ❑ **ganglion** (**GANG**-lee-un)
- ❑ **glenoid fossa** (**GLEE**-noyd **FAH**-sah)
- ❑ **glossa** (**GLOSS**-ah)
- ❑ **glossopalatine** (gloss-oh-**PAL**-ah-tine)
- ❑ **glossopharyngeal** (gloss-oh-fair-an-**JEE**-al)
- ❑ **hyoid** (**HIGH**-oyd)
- ❑ **hypoglossal** (high-poh-**GLOSS**-al)
- ❑ **immunoglobulin** (im-you-no-**GLOB**-you-lin)
- ❑ **incisive** (in-**SIGH**-siv)
- ❑ **incus** (**IN**-kus)
- ❑ **infraorbital** (**IN**-frah-**OR**-bih-tal)
- ❑ **interferon** (in-ter-**FEAR**-on)
- ❑ **jugular** (**JUG**-you-lar)
- ❑ **lacrimal** (**LACK**-rih-mal)
- ❑ **lambdoid** (**LAM**-doyd)
- ❑ **lymph** (**LIMF**)
- ❑ **lymphocytes** (**LIM**-foe-sites)
- ❑ **malleus** (**MAL**-ee-us)
- ❑ **mandible** (**MAN**-dih-bull)
- ❑ **masseter** (mass-**EE**-ter)
- ❑ **mastoid** (**MASS**-toyd)
- ❑ **maxillary** (**MACK**-sih-lair-e)
- ❑ **meatus** (mee-**AY**-tus)
- ❑ **meniscus** (men-**IS**-kus)
- ❑ **mentalis** (men-**TAL**-is)
- ❑ **mucin** (**MYOU**-sin)
- ❑ **mucoperiosteum** (**myou**-koh-pear-ee-**AHS**-tee-um)
- ❑ **mucosa** (**MU**-co-sah)
- ❑ **mylohyoid** (my-loh-**HIGH**-oyd)
- ❑ **nasal** (**NAY**-zel)
- ❑ **nasion** (**NAY**-zhun)
- ❑ **nasociallary** (**nay**-zoh-**SIL**-ee-air-e)
- ❑ **nasopalatine** (**nay**-zoh-**PAL**-ah-tine)
- ❑ **occipital** (ock-**SIP**-ih-tal)
- ❑ **oculomotor** (ock-you-low-**MOE**-tor)
- ❑ **olfactory** (ol-**FACK**-toh-ree)
- ❑ **ophthalmic** (off-**THAL**-mick)
- ❑ **orbicularis oris** (or-**bick**-you-**LAIR**-iss **OR**-iss)
- ❑ **palatine** (**PAL**-ah-tine)
- ❑ **papillae** (pah-**PIH**-lie) (pl. of papilla)
- ❑ **parietal** (pah-**RYE**-eh-tal)
- ❑ **parotid** (pah-**ROT**-id)
- ❑ **periosteum** (pdh-ree-**OW**-stee-uhm)
- ❑ **phagocytes** (**FAG**-oh-sites)
- ❑ **pharyngopalatine** (fare-in-goh-**PAL**-ah-tine)
- ❑ **philtrum** (**FIL**-trum)
- ❑ **posterior** (pahs-**TEE**-ree-or)
- ❑ **protuberance** (proh-**TOO**-ber-an)
- ❑ **pterygoid** (**TER**-eh-goyd)
- ❑ **ptosis** (**TOE**-sis)
- ❑ **ramus** (**RAY**-mus)
- ❑ **raphe** (**RAH**-fay)
- ❑ **retromolar** (ret-trow-**MOLE**-a)
- ❑ **rugae** (**RUE**-guy)
- ❑ **sagittal** (**SAJ**-ih-tal)
- ❑ **sigmoid** (**SIG**-moyd)
- ❑ **sphenoid** (**SFEE**-noyd)
- ❑ **sphenopalatine** (sfee-no-**PAL**-ah-tine)
- ❑ **squamous** (**SKWAY**-mus)
- ❑ **stapes** (**STAY**-peez)
- ❑ **strabismus** (strah-**BIZ**-muss)
- ❑ **styloid** (**STY**-loyd)
- ❑ **sulcus** (**SULL**-kus)
- ❑ **symphysis** (**SIM**-fih-sis)
- ❑ **synovial** (sin-**OH**-vee-al)
- ❑ **temporal** (**TEM**-pore-al)
- ❑ **temporomandibur** (**tem**-poe-roe-man-**DIB**-you-lar)
- ❑ **temporoparietal** (**tem**-poe-roe-pah-**RYE**-eh-tal)
- ❑ **tinnitus** (tin-**EYE**-tuss)
- ❑ **tonsil** (**TAHN**-sill)
- ❑ **trachlear** (**TRAH**-klee-ur)
- ❑ **trigeminal** (try-**JEM**-in-al)
- ❑ **umami** (oo-**MAH**-me)
- ❑ **uvula** (**YOU**-view-lah)
- ❑ **vagus** (**VAY**-gus)
- ❑ **vermillion** border (ver-**MILL**-yon **BORE**-der)
- ❑ **vertigo** (**VER**-tih-go)
- ❑ **vestibule** (**VES**-tih-byul)
- ❑ **vestibulocochlear** (ves-**tib**-you-low-**COCK**-lee-ar)
- ❑ **vomer** (**VOH**-mer)
- ❑ **zygomatic** (zye-goh-**MAT**-ic)
- ❑ **zygomaticofacial** (zye-goh-**MAT**-ee-coe-fay-shal)

ANATOMY OF THE SKULL

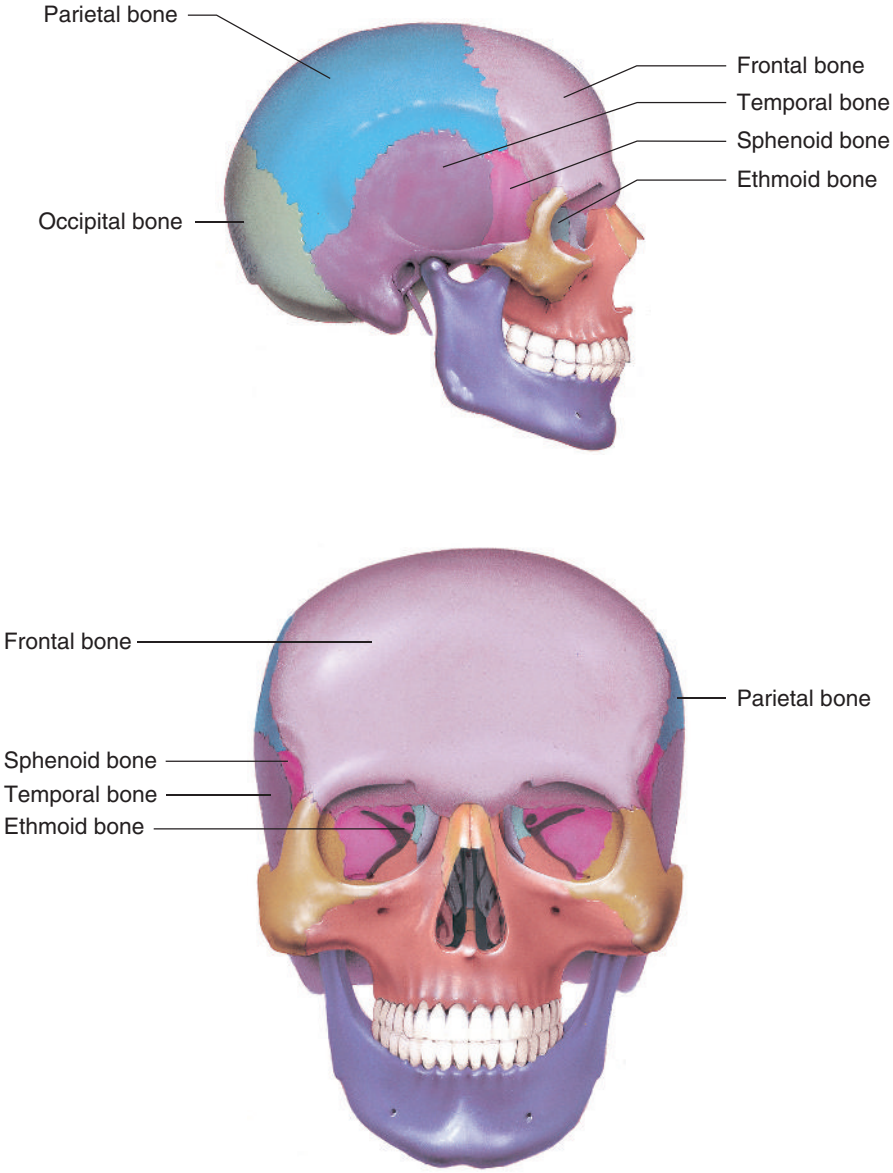
Medical terminology deals with the entire body and all its systems. The terminology of dentistry is related mostly to the head region. The skull area is composed of two main bone divisions: the cranium and the facial section.

Cranium

The **cranium** (**KRAY**-nee-um) is the portion of the skull that encloses the brain. Eight bones make up this section of the skull (Figure 2-1):

- **temporal** (**TEM**-pore-al): two fan-shaped bones, one on each side of the skull, in the temporal area above each ear.

Figure 2-1 Cranial bones



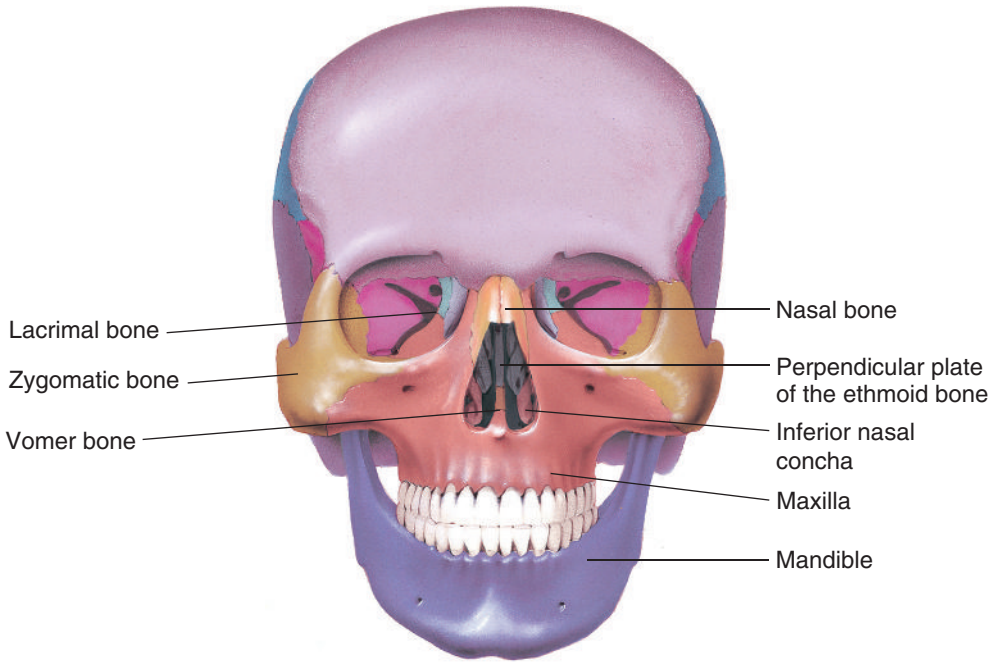
- **parietal** (pah-**RYE**-eh-tal): two bones, one on each side, that make up the roof and side walls covering the brain.
- **frontal** (**FRON**-tal): a single bone in the frontal or anterior region that makes up the forehead.
- **occipital** (ock-**SIP**-ih-tahl): one large, thick bone in the lower back of the head that forms the base of the skull and contains a large opening for the spinal cord passage to the brain.
- **ethmoid** (**ETH**-moyd): a spongy bone located between the eye orbits that helps form the roof and part of the anterior nasal fossa of the skull.
- **sphenoid** (**SFEE**-noyd): a large bat-shaped bone at the base of the skull between the occipital and ethmoid in front, and the parietal and temporal bones at each side.

Facial Bones

Fourteen bones make up the facial division of the cranium (see Figure 2-2). All are paired with one on each side, except there is only one vomer in the nose and one mandible extending from right to left. The facial bones are:

- **zygomatic** (**zye**-goh-**MAT**-ick): two facial bones, one under each eye, that form the cheekbone and give character to the face. The zygomatic bones are also called the **malar** (**MAY**-lar) bones.
- **maxilla** (**MACK**-sih-lah): two large facial bones, one under each eye, that unite in the center in the *median suture* to form the upper jaw that supports the maxillary teeth in the *alveolar process*. Also present in this bone is the *maxillary sinus* (Atrium of Highmore) and the *infraorbital frenum* under each eye that permits the passage of nerves.
- **palatine** (**PAL**-ah-tine): two bones, one left and one right, that unite at the *median palatine suture* to form the hard palate of the mouth and the nasal floor. Present in this bone are multiple foramina, the largest, the *incisive foramen,* is directly behind the central incisors.

Figure 2-2 Facial bones



- **nasal** (**NAY**-zal): two bones, one left and one right, that join side by side to form the arch or bridge of the nose.
- **lacrimal** (**LACK**-rih-mal): two small bones, one each on the inner side or nose site of the orbital cavity, that make up the corner of the eye where the *tear ducts* are located.
- **inferior concha** (**KONG**-kah in singular use or (conchae) **KONG**-kee in plural use): two thin scroll-like bones that form the lower part of the interior of the nasal cavity.
- **mandible** (**MAN**-dih-bull): the strong, horseshoe-shaped bone that forms the lower jaw (described in further detail later in this chapter).
- **vomer** (**VOH**-mer): a single bone that forms the lower posterior part of the nasal septum and separates the nose into two chambers.

Miscellaneous Bones of the Skull

There are several bones that are not considered bones of the face or cranium, but they are present in the head or skull. These bones include:

- **hyoid** (**HIGH**-oyd): a horseshoe-shaped bone lying at the base of the tongue. It does not articulate with any other bone.
- **auditory ossicles** (AHS-ih-kuls): small bones in the ear. The three auditory ossicles are:
  - **malleus** (**MAL**-ee-us): the largest of three ossicles in the middle ear; commonly called the ear mallet.
  - **incus** (**IN**-kus): one of the three ossicles of the middle ear; commonly called the anvil.
  - **stapes** (**STAY**-peez): one of the three ossicles in the middle ear; commonly called the stirrup.

ANATOMICAL FEATURES OF THE SKULL

It is important for dental professionals to be able to identify the anatomical features in the cranial and facial bones, including the sinuses, bone sutures, processes of the skull bones, and major foramina. Each feature has a specific location and purpose.

Sinus

A **sinus** (**SIGH**-nus) is an air pocket or cavity in a bone that lightens the bone, warms the air intake, and helps form sounds. These sinus cavities are named after the bone they are occupying (Figure 2-3). The **accessory paranasal sinuses** that empty into the nasal cavity are:

- **frontal:** larger accessory sinus, located in the frontal bone or the forehead above each eye.
- **ethmoid:** multiple, smaller sinuses located in the ethmoid bone, at the side of each eye.
- **sphenoid:** multiple, small sinuses located in the sphenoid bone situated behind the eyes.
- **maxillary:** located in the maxilla; the maxillary sinus is the largest and is called the **Atrium** (**A**-tree-um) **of Highmore**; this cavity is easily seen and is used as a landmark for identifying radiographs in the mounting of films.

Sutures of the Skull

A **suture** (**SOO**-chur) is a line where two or more bones unite in an immovable joint. Several main sutures are located in the cranium (Figure 2-4):

Figure 2-3 Sinuses

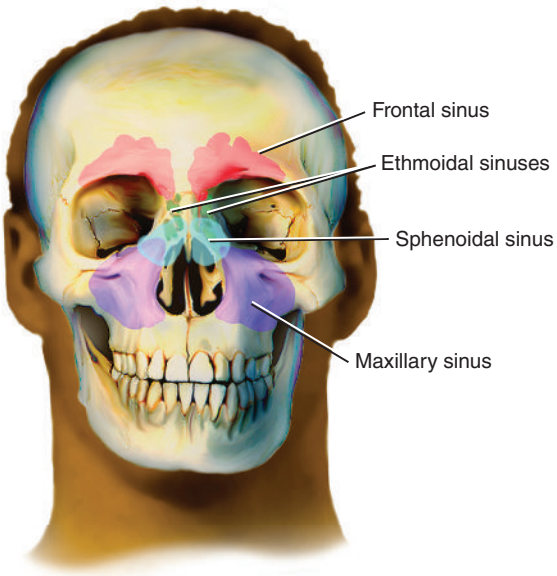
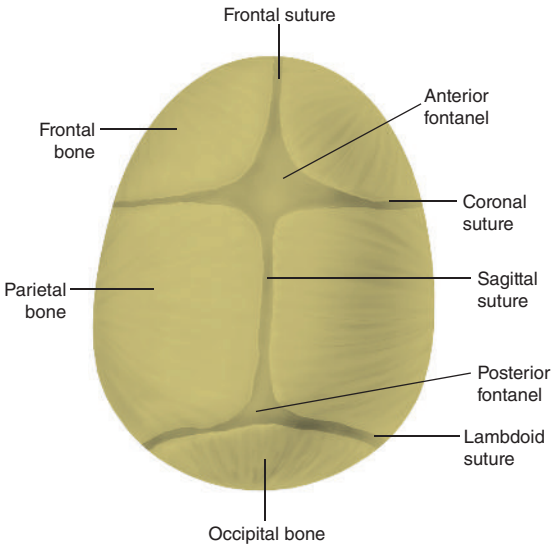


Figure 2-4 Sutures of the skull



- **coronal** (kor-**OH**-nal): junction of the frontal and the parietal bones; this area is soft at birth and shortly afterward, and it has been called the baby's "soft spot" or **fontanel** (**fon**-tah-**NELL** = *little fountain*), sometimes spelled *fontanelle*.
- **sagittal** (**SAJ**-ih-tahl): the union line between the two parietal bones on the top of the skull.
- **lambdoid** (**LAM**-doyd): located between the parietal bone and the upper border of the occipital bone.
- **temporoparietal** (**tem**-poe-roe-pah-**RYE**-eh-tal): located between the temporal and parietal bones; also known as the **squamous** (**SKWAY**-mus) suture (not visible in Figure 2-4).

Bone Structures of the Hard Palate

Oral cavity sutures indicate an area where bones are joined together. The hard palate is composed of four main processes united by two palatine sutures, the *median* and the *transverse palatine sutures*. The left and right palatine processes and the left and right processes of the maxilla meet at the median palatine suture. All four edges of the processes combine at the transverse palatine suture, completing the hard palate. Five foramina are present in this hard palate bone. The largest, the *incisive foramen*, is situated behind the incisors; a *greater* and a *lesser palatine foramina* are present on each side in the rear (Figure 2-5).

Processes of the Cranium

A **process** (**PROS**-es) is a projection or outgrowth of bone or tissue. This bone projection is not to be confused with the fusion line where two bones develop into one, such as the mandible. The **symphysis** (**SIM**-fih-sis) is in the center of the mandible, forms the chin, and is called the **mental** or chin **protuberance** (pro-**TOO**-ber-ans = *projection*). The skull has eight main processes or bony growths related to dentistry:

- **alveolar** (al-**VEE**-oh-lar): bone growth or border of the maxilla and the mandible; makes up and forms the tooth sockets.
- **condyloid** (**KON**-dih-loyd): posterior growth on the **ramus** (**RAY**-mus) of the mandible;

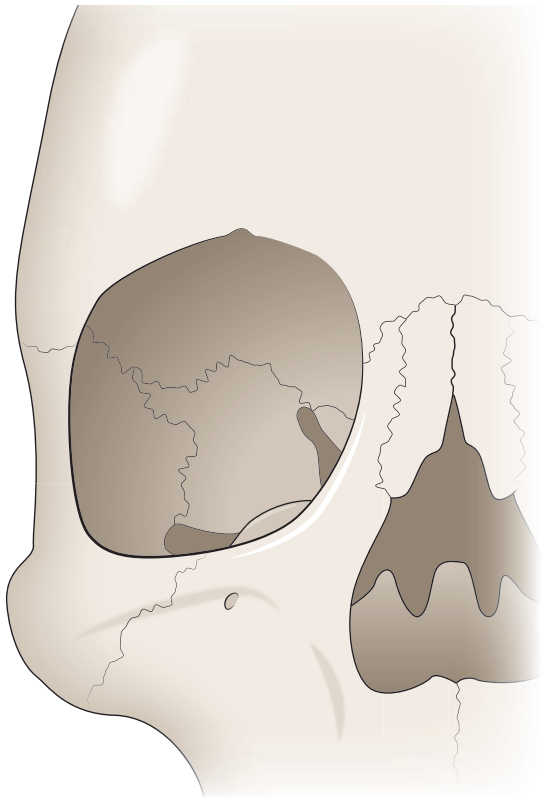
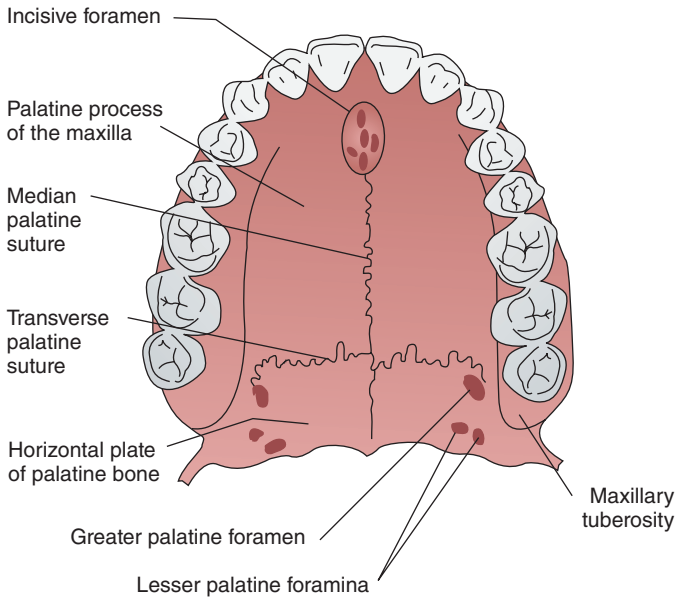


Figure 2-5 Anatomy of the palate



articulates with the temporal bone in the **temporomandibular** (**tem**-poe-roe-man-**DIB**-you-lar) joint (TMJ).

- **coronoid** (**KOR**-oh-noyd): anterior growth on the ramus of the mandible that serves as the attachment position for the temporalis muscle.
- **frontal:** the projection of maxilla meeting with the frontal bone to form the eye orbit.
- **infraorbital** (**in**-frah-**OR**-bih-tahl): growth process from the zygomatic bone that articulates with the maxilla to form the lower side of the eye orbit.
- **mastoid** (**MASS**-toyd): growth on the temporal bone behind the ear that is used for muscle attachment.
- **pterygoid** (**TER**-eh-goyd = *wing shaped*): growth of the sphenoid bone extending downward from the bone; the most inferior end of the process is known as the **pterygoid hamulus** (**HAM**-you-luss), a hook-like end that serves as a site for muscle attachment.
- **styloid** (**STY**-loyd): small, pointed growth from the lower border of the temporal bone; serves as a bone position for attachment of some tongue muscles.

Foramina of the Cranium

A **foramen** (for-**RAY**-men) is an opening or hole in the bone for nerve and vessel passage. A foramen is not to be confused with the **external auditory meatus** (mee-**AY**-tus), a large opening in the temporal bone used for the passage of auditory nerves and vessels. Knowing the location of the foramina is important because many injections for anesthesia are placed in these areas. There are nine main **foramina** (foh-**RAY**-men-ah = *plural of foramen*) of the head related to dentistry:

- **magnum** (**MAG**-num): opening in the occipital bone for spinal cord passage; largest of all foramina.
- **mandibular:** located on the lingual side of the ramus of the mandible; permits nerve and vessels passage to teeth and mouth tissues.
- **mental** (**MEN**-tal = *Latin for chin*): opening situated on left and the right anterior areas of the mandible; used for passage of nerve and vessels.
- **lingual** (**LIN**-gwal): small opening in the center of the mental spine for nerve passage to the incisor area.
- **incisive** (in-**SIGH**-siv): opening in the maxilla behind the central incisors on the midline.

- **supraorbital** (**soo**-prah-**OR**-bih-tal): an opening in the frontal bone above the eye orbit.
- **infraorbital:** an opening in the maxilla under the eye orbit.
- **palatine:** anterior and posterior openings in the hard palate.
- **zygomaticofacial** (**zye**-go-**MAT**-ee-coe-**fay**-shal): an opening in the zygomatic bone.

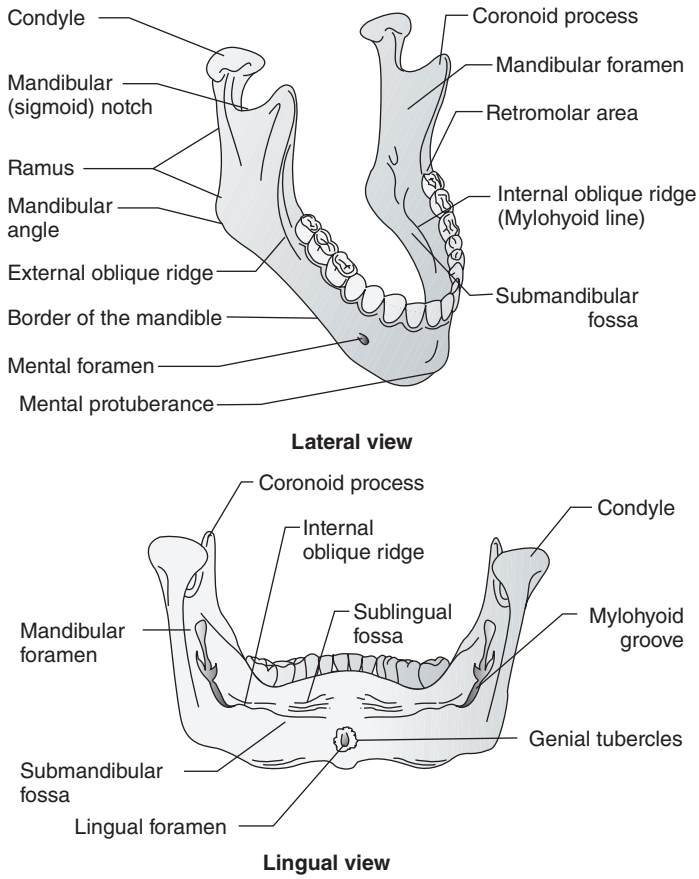
All bones are covered by a fibrous membrane called the **periosteum** (pear-ee-**AHS**-tee-um) that forms a lining on all surfaces, except for the areas in the oral cavity. The tissues inside the oral cavity have a mucous surface layer, called the mucoperiosteum (**MYOU**-koh-**pear**-ee-**AHS**-tee-um). The oral cavity has three types of oral **mucosa** (**MU**-ko-sa):

- **lining mucosa:** mucous membrane that lines the inner surfaces of the lips (*labial mucosa*) and the cheeks (*buccal mucosa*).
- **masticatory** (mass-**TIH**-kah-toe-ree) **mucosa:** elastic type of mucous membrane that undergoes stress and pull; located around the alveolar area of the teeth and lines the hard palate.
- **specialized mucosa:** smoother mucous tissue found on the dorsal side of the tongue.

LANDMARKS AND FEATURES OF THE MANDIBLE

The mandible is the only movable bone in the skull. It is the strongest bone in the face and supports many features (see Figure 2-6). The mandible has seven major anatomical parts:

Figure 2-6 Lateral and lingual view of the mandible



- **ramus:** ascending part of the mandible that arises from the curved, lower arch.
- **angle of the mandible:** area along the lower edge of the mandible where the upward curve of the mandible forms.
- **sigmoid notch:** S-shaped curvature between the condyle and coronoid processes; upper border of the mandible; also called the mandibular notch.
- **mylohyoid ridge** (my-loh-**HIGH**-oyd): bony ridge on the lingual surface of the mandible.
- **oblique** (oh-**BLEEK**) **line:** slanted, bony growth ridge on the facial side of the mandible.
- **retromolar** (ret-row-**MOLE**-ar) **area:** space located to the rear of the mandibular molars.
- **symphysis:** center of mandible (chin); also known as *mental protuberance* (projection).

The mandible **articulates** (are-**TICK**-you-lates) or comes together as a joint with the temporal bone of the cranium. This temporomandibular joint is commonly abbreviated as TMJ. The **condyle** (**KON**-dial) of the mandible rests in a depression in the temporal bone called the **glenoid** (**GLEE**-noyd) or **mandibular fossa** (**FAH**-sah). The **articular eminence** (ar-**TICK**-you-lar **EM**-in-ence) of the temporal bone forms the anterior boundary of the fossa and helps maintain the mandible in position. Between the contact area of these two bones is the articular disc, a **meniscus** (men-**IS**-kus) and **synovial** (sin-**OH**-vee-al) **fluid** that cushions and lubricates the joint that works in a hinge-action movement.

MUSCLES OF MASTICATION

Mastication (mass-tih-**KAY**-shun = *chewing*) is controlled by paired (left-right) muscles, named for their placement area. Each performs a specific function. The four major muscles of mastication (Figure 2-7) are:

- **temporal:** a fan-shaped muscle on each side of the skull; elevates and lowers the jaw and can draw the mandible backward.
- **masseter** (mass-**SEE**-ter): the muscle that closes the mouth; the principal mastication muscle.
- **internal pterygoid** (*wing shaped*): muscle that raises the mandible to close the jaw.
- **external pterygoid:** muscle that opens the jaw and thrusts the mandible forward; assists with lateral movement.

Figure 2-7 Muscles of mastication

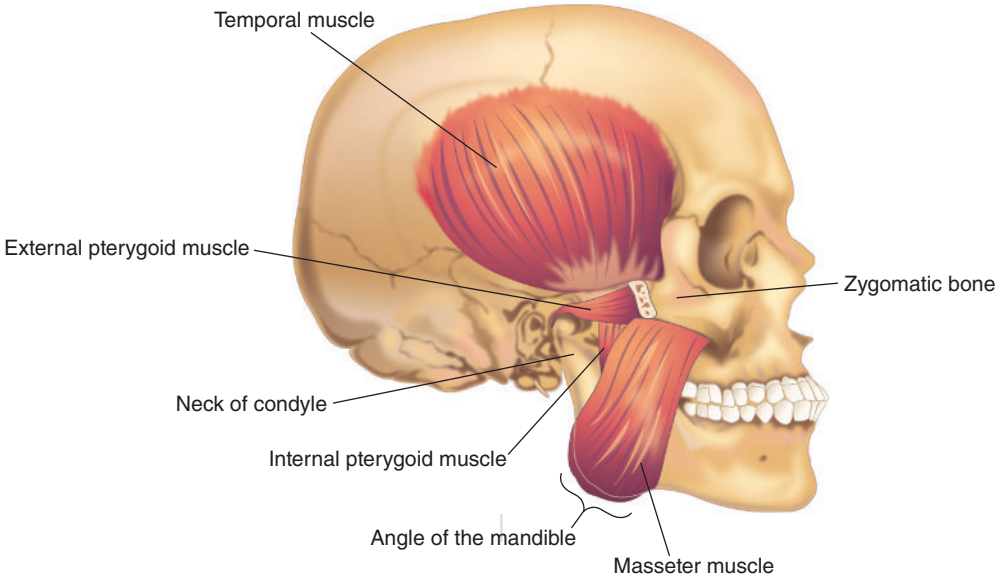
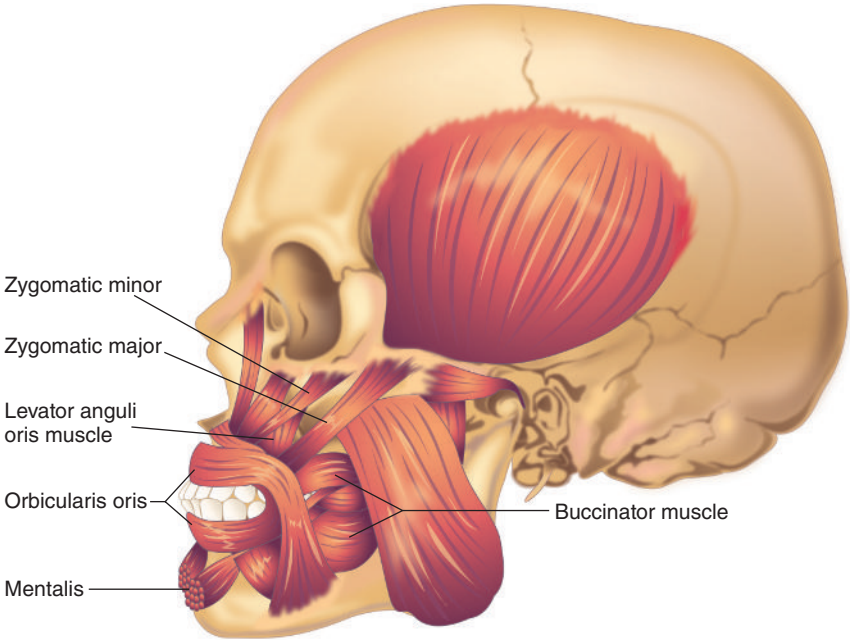
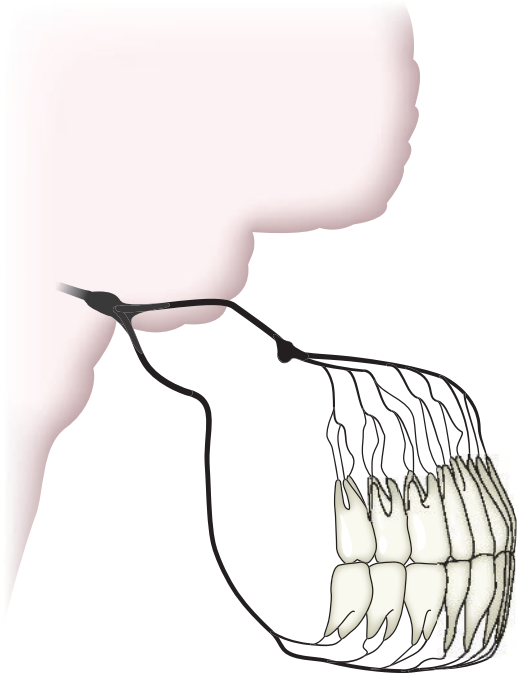


Figure 2-8 Muscles of facial expression



Several other muscles of the head are important to dentistry. These essential muscles relate to or control some of the anatomy concerned with dental care (Figure 2-8):

- **orbicularis oris** (or-bick-you-**LAIR**-iss **OR**-is): Also known as the "kissing muscle," a circular muscle surrounding the mouth that compacts, compresses, and protrudes the lips.
- **buccinator** (**BUCK**-sin-ay-tore): principal cheek muscle; compresses the cheek, expels air through the lips, and aids in food mastication.
- **mentalis** (men-**TAL**-iss): muscle of the chin (mental) that moves the chin tissue and raises or lowers the lower lip.



TRIGEMINAL NERVE LOCATION AND FUNCTIONS

Muscle movement and the registration of sensations are accomplished by nerves, the communication lines to the brain. The head contains 12 pairs of cranial nerves. Each pair is numbered; one of each pair is on the left and one on the right. Table 2-1 lists the cranial

Table 2-1 The Cranial Nerves and Their Function

Nerve		Type	Meaning	Function	Example Malfunction(s)
I	Olfactory (ol-**FACK**-toh-ree)	S	olfact – *smell*	smell	**anosmia** (an-**OZ**-me-ah) loss of sense of smell
II	Optic	S	optic – *eye*	vision	**anopia** (an-**OH**-pee-ah) blindness
III	Oculomotor (auk-you-loh-**MOE**-tor)	M	oculo – *eye*, motor – *movement*	upper-eyelid and eyeball movement	**strabismus** (stra-**BIZ-**mus) eyes do not fix at same point **ptosis** (**TOE**-sis) eyelid droop **diplopia (**dip-**LOW**-pee-ah) double vision
IV	Trochlear (**TRAH**-klee-ur)	M	trochle – *small pulley*	eye movement and sensation	vertical droop of eye
V	Trigeminal (try-**JEM**-in-al)	B	tri – *three*, geminal – *branches*	dental and face nerve	teeth and face sensation, tongue movement
VI	Abducens (**AB**-due-sense)	M	ab – *away*, ducens – *to lead*	lateral eye sense and movement	eyeball cannot move laterally—stays medial
VII	Facial (**FAY**-shal)	M	facial – *pertaining to the face*	taste sense and facial expression	**Bell's palsy** – face contraction, taste loss, decreased saliva
VIII	Vestibulocochlear (ves-**tib**-you-loh-**COCK**-lee-ar) also termed acoustic nerve	M	vestibulo – *small opening or cavity,* cochlear – *snail-like*	equilibrium, hearing, sensation	acoustic loss **vertigo** (**VER**-tee-go) dizziness **tinnitus** (tin-**EYE**-tis) ear ringing **ataxia** (ah-**TACKS-**ee-ah) muscle incoordination
IX	Glossopharyngeal (**gloss-**oh-fair-en-**JEE**-al)	M	glosso – *tongue,* pharyngeal – *throat area*	taste sensation, swallowing, regulation of O_2 and CO_2 breaths	loss of taste sensation, swallowing difficulty, reduced saliva flow of parotid gland
X	Vagus (**VAY**-gus)	M	vaga – *vagrant, wander*	taste sensation of epiglottis, pharynx, blood pressure, smooth muscle of gastrointestinal system, heart rate, digestion	paralyze vocal cords, heart rate increase, sensation interference of swallowing, GI organs
XI	Accessory (ack-**SESS**-ore-ee)	M	access – *assist, help out*	body sensation, muscles of shoulders	difficulty in raising shoulders and moving head
XII	Hypoglossal (**high**-poe-**GLOSS**-al)	M	hypo – *under*, glosso – *tongue*	body sensation, tongue movement in speech and swallowing	difficulty in chewing, speaking, and swallowing

Note: S = sensory; M = motor; B = mixed

nerves, type (S for sensory, M for motor, or B for mixed), meaning, function, and example malfunctions.

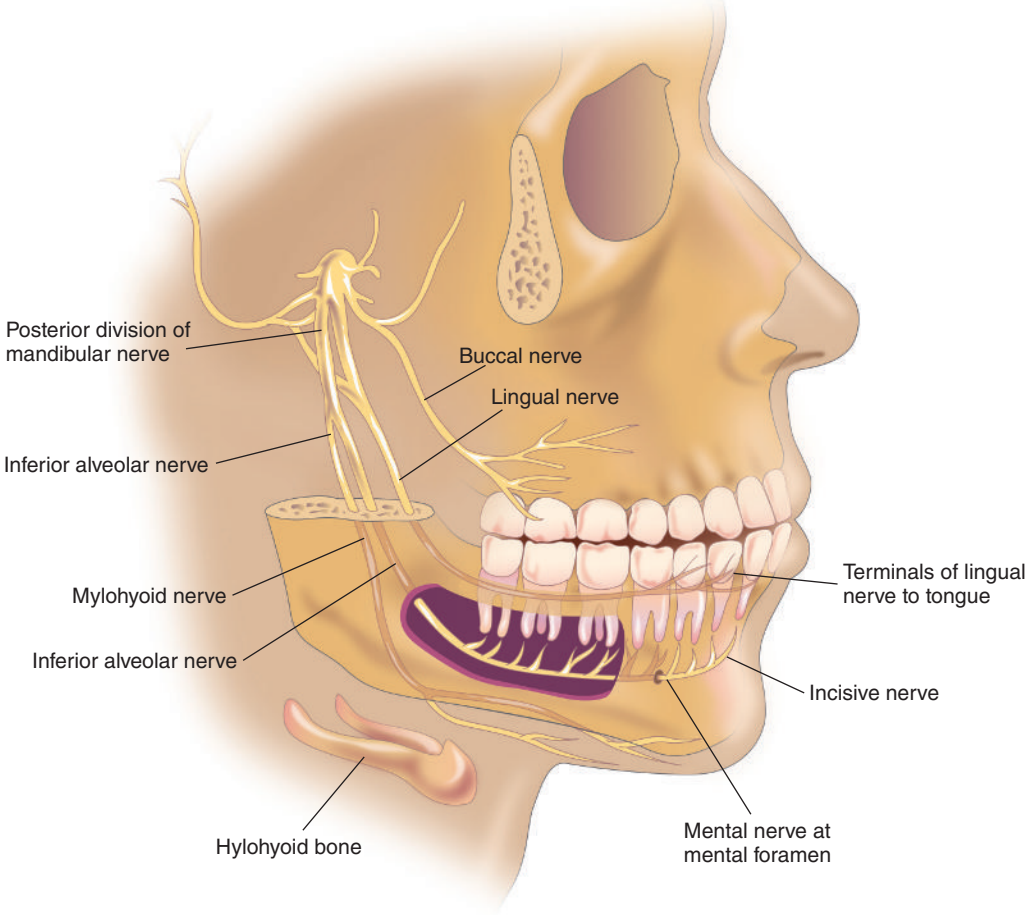
The most important nerve connected with dentistry is the fifth cranial nerve, the **trigeminal**. This combination motor and sensory nerve emerges from the brain and branches at the **Gasserian** (**GAS**-er-in) or semilunar, **ganglion** (**GANG**-glee-on = *mass of nerves*). The trigeminal nerves are classified as *ophthalmic, maxillary*, or *mandibular*:

- **ophthalmic** (off-**THAL**-mick): The smallest sensory nerve of the three main divisions, also has three branches:
  - **lacrimal:** carries sensation from the lacrimal gland and eye conjunctiva.
  - **frontal:** carries sensation from the forehead, scalp, upper eyelid, and nasal root.
  - **nasociliary** (**nay**-zoh-**SIL**-ee-air-ee): carries sensation from the nose, eye, and eyebrow.
- **maxillary:** a sensory division of the trigeminal nerve that has several branches:
  - **anterior palatine:** carries sensation from the hard palate, periosteum (pear-ee-**AH**-stee-um), and mucous membrane of the molars and premolar teeth; sometimes considered the greater palatine nerve.
  - **middle palatine:** carries sensation from the soft palate, the **uvula** (**YOU**-view-lah), and upper or soft part of the palate, along with the posterior palatine nerve; may be grouped as lesser palatine nerves.
- **posterior palatine:** carries sensation from the tonsils and the soft palate.
- **nasopalatine** (**nay**-zoh-**PAL**-ah-tine): carries sensation from the nose and the anterior area of the palate.
- **infraorbital:** subdivides into three parts:
  - **anterior superior alveolar branch:** carries sensation from the maxillary centrals, laterals, and canines.
  - **middle superior alveolar branch:** carries sensation from the maxillary premolars and the mesiobuccal root of the maxillary first molar.
  - **posterior superior alveolar branch:** carries sensation from the maxillary second and third molar, and the remaining roots of the maxillary first molar.
- **zygomatic:** carries sensation from the lacrimal and upper cheek.
- **sphenopalatine** (**sfee**-no-**PAL**-ah-tine): sensory nerve ending for the maxillary anterior mucosal and palatine tissues.
- **mandibular:** *mixed* nerve division that registers sensation and causes movement (see Figure 2-9). It has several branches:
  - **inferior alveolar:** carries sensation from the mandibular teeth and mucosa of the mouth floor and some tongue areas.
  - **mental:** carries sensation from the skin of chin and the lower lip.
  - **incisive:** carries sensation from the anterior teeth and alveoli, chin, and lip areas.
  - **buccal:** carries sensation from the buccal gingiva and mucosa of the molar region.
  - **lingual:** carries some sensation from the tongue and causes some movement of the tongue and mastication muscles; thereby the classification of the trigeminal nerve is mixed.

BLOOD SUPPLY OF THE CRANIUM

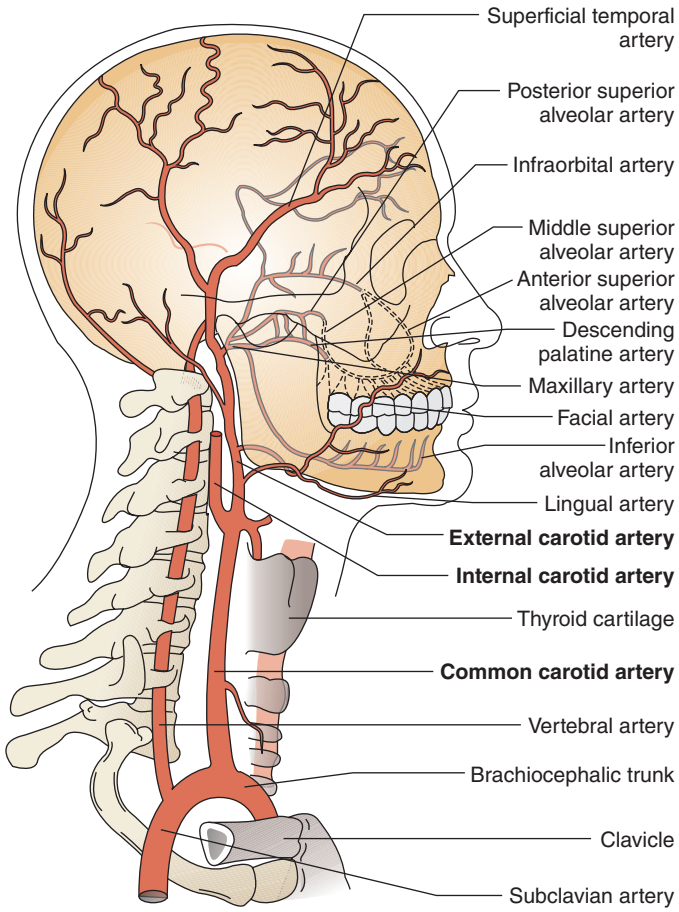
Blood is supplied to the head by a vascular (**VAS**-kyou-lar = *small vessels*) system of arteries and veins. An artery (**ARE**-ter-ee) carries blood away from the heart, and a vein (**VAYN**) takes blood to the heart. Knowledge of the vascular system is important for controlling bleeding and also for administering local anesthesia. In dentistry there are three major areas of concern: capillaries, carotid arteries, and jugular veins:

Figure 2-9 Mandibular branch of the trigeminal nerve



- **capillaries** (**KAP**-ih-lair-eez): tiny blood vessels that help to transport blood from the veins to the arteries.
- **carotid** (kr-**AA**-tuhd) **artery:** rises from the aorta right and left, and divides in the neck to form two arteries (Figure 2-10):
  - **internal carotid artery:** provides the blood supply to the brain and eyes.
    - **external carotid artery:** provides blood to the throat, face, mouth, tongue, and ears through these branches:
      - **infraorbital (under eye orbit):** provides blood to the maxillary anterior teeth and surrounding tissues.
      - **inferior alveolar (lower alveolar process):** provides blood to the mandibular teeth, periodontal ligaments, and surrounding tissues.
      - **facial (pertaining to face):** provides blood to the face, tonsils, palate, and submandibular gland.

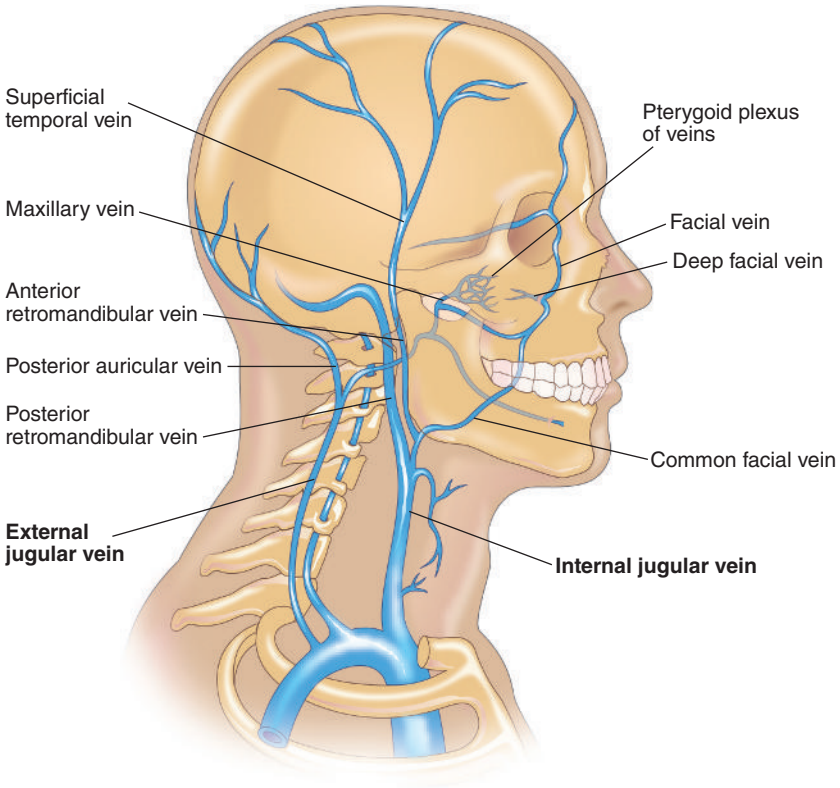
Figure 2-10 Carotid arteries



- **lingual (tongue):** divides into branches to serve the tongue, tonsil, soft palate, throat, and floor of the mouth.
- **maxillary:** largest of the branches the external carotid; provides blood to the maxillary teeth, periodontal ligaments, muscles, sinus, and palate.

- **jugular** (**JUG**-you-lar) **vein:** carries blood from the head to the heart through two divisions (Figure 2-11):
  - **internal jugular vein:** collects and drains blood from the brain, cranium, face, and neck.
  - **external jugular vein:** collects and drains blood through assorted branches. The major branches are:
    - **facial division:** carries blood from the face structures and mouth area.
    - **maxillary division:** carries blood from the maxillary region.
    - **pterygoid venus plexus** (**PLECK**-sus = *network*): collects the blood supply from the head, nasal cavity, palate, teeth, and muscles.

Figure 2-11 Jugular veins



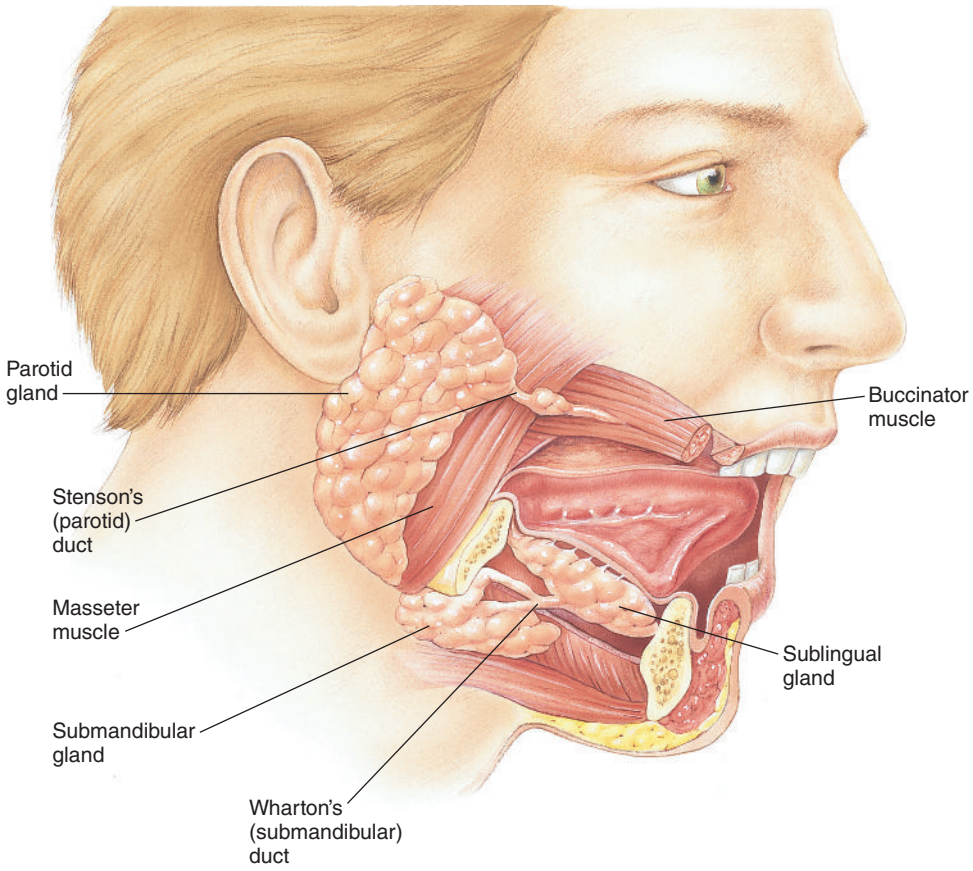
LOCATIONS AND PURPOSES OF THE SALIVARY GLANDS

Salivary glands supply secretions to the oral cavity that protect the lining of the mouth, help moisten food, assist in speech, and make saliva to **expectorate** (ex-**PECK**-toe-rate = *spit*). The major salivary glands produce large amounts of secretions, and the minor salivary glands maintain moist oral tissue.

Secretions may produce **serum** (**SEAR**-um = *watery fluid*) or **mucin** (**MYOU**-sin = *sticky, slime, secretion*) that forms mucus. Some glands produce both with **enzymes** (**EN**-zimes = *body-produced chemicals*) to digest food. In dentistry, the three major pairs of salivary glands are (Figure 2-12):

- **parotid** (pah-**ROT**-id): the largest salivary gland, located near the ear, produces serus saliva that empties into the mouth near the maxillary second molar through the Stenson's **duct** (**DUCKT** = *to lead*). This gland becomes swollen when infected by mumps.
- **submandibular:** a smaller gland located on the lower side of the face that secretes mucin and serus fluids with enzymes; empties through the submandibular duct (Wharton duct) openings in the small fleshy growths, called **caruncles** (**CAR**-un-kuhls). These growths may be seen under the tongue on each side of the lingual frenum.
- **sublingual:** smallest major salivary gland, situated in the floor of the mouth; secretes mucin through multiple ducts; many other small glands are nearby, and they function to keep the mouth tissues moist.

Figure 2-12 Salivary glands, lateral view



AGENTS AND FUNCTIONS OF THE LYMPHATIC SYSTEM

The lymphatic system's presence throughout the body helps protect the body from disease and assists with immunity. The lymphatic system is composed of a variety of structures:

- **lymph** (LIMF): vessels that transport lymph fluid of plasma and water and waste products.
- **lymph capillaries:** tiny vessels or tubes that carry lymph fluid.
- **lymph node:** a mass of lymph cells forming a unit of lymphatic tissue that is named after the formation site, for example:
  - **axillary** (**ACK**-sih-lair-ree = *pertaining to the armpit*): lymph nodes located under the armpit.
  - **cervical** (**SIR**-vih-kul = *pertaining to the neck*): lymph nodes located in the neck.
  - **inguinal** (**IN**-gwee-nal = *pertaining to the groin*): lymph nodes found in the groin area near the abdomen.
- **tonsil** (**TAHN**-sill): lymphatic tissue masses found in the posterior of the throat between the anterior and posterior fauces (*palatine tonsil*) and on the back of the tongue (*lingual tonsil*). Tonsils act as filters, aid in the production of disease-fighting immune responses, and may help immunity.
- **adenoid** (**ADD**-eh-noyd): lymphatic tissue found in the nasopharynx area; sometimes called the *pharyngeal tonsil.*

More specific information on this system is found in Chapter 5, Infection Control.

IMPORTANT STRUCTURES IN THE ORAL CAVITY

The composition of the oral cavity involves many different tissues and forms. Each structure is designed for a specific purpose and function. The more important landmarks of note in the dental field are described next.

Labia

- **Labia** (**LAY**-bee-ah = *lips*), meaning lips, have several sections or divisions:
  - **superior oris** (**OR**-is): the upper lip.
  - **inferium oris:** the lower lip.
  - **labial commissure** (**KOM**-ih-shur): area at the corners of the mouth where the lips meet.
  - **vermillion** (ver-**MILL**-yon) **border**: area where the pink-red lip tissue meets facial skin.
  - **philtrum** (**FIL**-trum): median groove in the center external surface of the upper lip.

FRENUM

The tongue and each lip and cheek attach to the oral membrane with a triangular piece of tissue called a **frenum** (**FREE**-num). The oral cavity has five major **frena** (**FREE**-nah = *plural of frenum*):

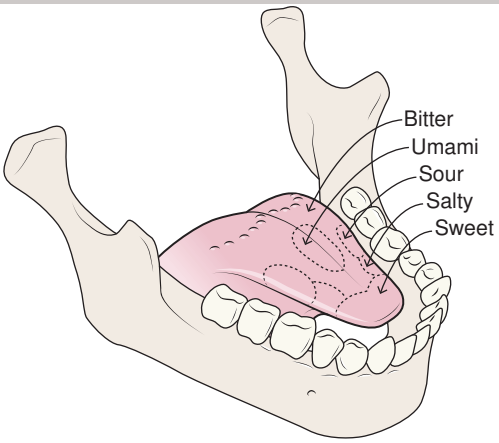
- **labial frenum** (two tissues): tissue that attaches the inside of the lip to the mucous membrane in the anterior of the oral cavity. The labial frena occur in both the maxillary and the mandibular arches. The maxillary labial frenum is a common site for a surgical frenectomy to permit closure of the two central incisors' gap caused by a labial frenum that is too large or thick.
- **lingual frenum** (one tissue): attaches the lower side of the tongue to the floor membrane. Openings for the Wharton's duct are found on each side of this frenum in the fleshy tissue elevations called caruncles. If the lingual frenum is too short, **ankyloglossia** (**ang**-key-loh-**GLOSS**-see-ah), a "tongue-tied" condition, can result.
- **buccal frenum** (two tissues): attaches the inside of the cheek to the oral cavity in the maxillary first molar area. This frenum occurs one each on the left and the right sides.

Tongue Structures

The tongue is an important organ in the oral cavity that performs many necessary functions. The tongue, or **glossa** (**GLOSS**-ah = *Latin for tongue*), is a strong muscular organ that aids in chewing, talking, and **deglutition** (**dee**-glue-**TISH**-un = *swallowing*). A **median sulcus** (**SULL**-kus = *groove, depression*) divides the tongue's top surface into two parts. The tongue also has many **papillae** (pah-**PILL**-lie = *tissue growths*) or taste buds situated on the **dorsal** (**DOOR**-sal = *back*) surface of the tongue. The locations of the taste buds on the tongue are illustrated in Figure 2-13. The major papillae are:

- **circumvallate** (sir-kum-**VAL**-ate): the largest, V-shaped papillae, situated on the dorsal aspect of the tongue; sense bitter tastes.
- **filiform** (**FIL**-ih-form): the smallest, hair-like papillae covering the entire dorsal aspect of the tongue; do not sense taste.
- **fungiform** (**FUN**-jih-form): small, dark red papillae on the middle and anterior dorsal surface and along the sides of the tongue; sense sweet, sour, and salty tastes.
- **foliate** (**FOE**-lee-ate): present on the posterior lateral borders of the tongue and can be seen if the tongue is grasped with gauze and extended; sense sour tastes.

Figure 2-13 View of tongue with taste buds (papillae) noted



There is a newly discovered fifth taste known as **umami**, which is the taste of monosodium, described as a meaty, savory taste.

Palate Structures

The **palate** (**PAL**-utt) or roof of the mouth is composed of assorted structures. Its two main divisions are the hard palate and soft palate:

- **hard palate:** composed of the palatine processes of the maxillae bones; covered with mucous membrane and has the following features:
  - **rugae** (**RUE**-guy): irregular folds or bumps on the surface.
  - **incisive papilla:** tissue growth that is situated at the anterior portion of the palate behind the maxillary centrals; the site for infiltration injection of local anesthesia.
  - **palatine raphe** (**RAH**-fay = *ridge between the union of two halves*): white streak in the middle of the palate.
- **soft palate:** flexible portion of the palate without bone; area where the gag reflex is present. The soft palate is movable and closes off the nasal passage during swallowing.

Miscellaneous Oral Cavity Structures

Additional oral cavity structures include the following:

- **uvula:** tissue structure hanging from the palate in the posterior of the oral cavity.
- **vestibule** (**VES**-tih-byul): open gum and tissue area between the teeth and the cheek.
- **fauces** (**FOE**-seez): constricted opening or passage leading from the mouth to the oral pharynx, bound by the soft palate, the base of tongue, and the palatine arches. The fauces are considered two pillars of mucous membranes:
  - **glossopalatine arch** (gloss-oh-**PAL**-ah-tine = *glossa* and *palate* area): anterior pillars.
  - **pharyngopalatine** (fare-in-goh-**PAL**-ah-tine = *pharynx* and *palate* area): posterior pillars. The palatine tonsils lay between these pillars.

Review Exercises

Matching

Match the following word elements with their meaning:

1.	_____ rugae	**A.**	foramen in occipital bone for spinal cord passage
2.	_____ fauces	**B.**	tissue structure hanging from the posterior of the palate
3.	_____ philtrum	**C.**	another word for tongue
4.	_____ superior oris	**D.**	irregular folds on palate surface
5.	_____ glossa	**E.**	mass of lymph cells forming body named for area site
6.	_____ parotid	**F.**	constricted opening leading from the mouth
7.	_____ buccinator	**G.**	upper lip
8.	_____ magna foramen	**H.**	border of lip and facial tissue
9.	_____ suture	**I.**	groove on external middle surface of upper lip
10.	_____ vermillion border	**J.**	principal cheek muscle
11.	_____ mental	**K.**	forehead bone
12.	_____ incus	**L.**	bone of middle ear
13.	_____ uvula	**M.**	another word for chin
14.	_____ frontal	**N.**	immovable junction of two bones
15.	_____ node	**O.**	largest salivary gland

Definition

Using the selection given for each sentence, choose the best term to complete the definition.

1. The border area where the pink tissue of the lips meets the facial tissue is called:
   a. circumvallate
   b. vermillion
   c. commissure
   d. frenum
2. Which vessel transports blood from the brain to the heart?
   a. internal jugular
   b. internal carotid
   c. external jugular
   d. external carotid
3. A body-produced chemical helping to break down food for digestion is called:
   a. infragen
   b. enzyme
   c. expectorant
   d. antigen
4. Which artery carries the blood supply to the head and brain?
   a. jugular
   b. carotid
   c. capillary
   d. radial artery
5. The branch of the ophthalmic nerves that provides sensation for the tear gland is the:
   a. lacrimal
   b. nasociliary
   c. maxillary
   d. plexus
6. The principal muscle of mastication that closes the mouth is the:
   a. internal pterygoid
   b. external pterygoid
   c. masseter
   d. common pterygoid
7. Which of the following is not an auditory ossicle?
   a. stapes
   b. malleus
   c. tympanic
   d. anvil
8. The protective mucous layer covering the bone surface is:
   a. periosteum
   b. mucoperiosteum
   c. calcisopenum
   d. osteoplasta
9. The fusion line in the center/middle of the mandible is the:
   a. symphysis
   b. condyle
   c. ramus
   d. orbit
10. The squamous suture between the two bones in the head is called the:
    a. sagittal
    b. coronal
    c. temporoparietal
    d. symphysis
11. The Atrium of Highmore is another name for:
    a. opening in the occipital bone
    b. oral cavity free space between the cheek/lips
    c. maxillary sinus cavity
    d. opening in the frontal bone
12. Which of the following is not considered a facial bone?
    a. lacrimal
    b. maxilla
    c. zygomatic
    d. occipital
13. The bone that lies in suspension between the larynx and the mandible is:
    a. lambdoid
    b. hyoid
    c. sigmoid
    d. frontal

14. The large bone growth behind the ears on the temporal bone is:
    a. coronoid
    b. sublingual
    c. mastoid
    d. occipital
15. An opening or passage through a bone that is used for nerve or vessel passage is called a/an:
    a. foramen
    b. frenum
    c. alveolar crest
    d. sinus
16. An inferior end of a process that has a hooked end is called a/an:
    a. plexus
    b. hamulus
    c. protuberance
    d. forama
17. The S-shaped curvature between the condyle and coronoid process is the:
    a. ramus
    b. angle of mandible
    c. mandibular notch
    d. coronoid
18. The largest V-shaped papillae present on the dorsal side of the tongue are:
    a. fungiform
    b. foliate
    c. circumvallate
    d. filiform
19. The area located to the rear of the mandibular molars is:
    a. retromolar area
    b. suborbital area
    c. supramandibular area
    d. hyoid area
20. The median sulcus divides the tongue into how many sections?
    a. none
    b. one
    c. two
    d. three

Building Skills

Locate and define the prefix, root/combining form, and suffix (if present) in the following words:

1. **infraorbital**
   prefix _____
   root/combining form _____
   suffix _____
2. **periosteum**
   prefix _____
   root/combining form _____
   suffix _____
3. **glossopalatine**
   prefix _____
   root/combining form _____
   suffix _____
4. **submandibular**
   prefix _____
   root/combining form _____
   suffix _____
5. **temporoparietal**
   prefix _____
   root/combining form _____
   suffix _____

Fill-Ins

Write the correct word in the blank space to complete each statement.

1. The skull is composed of two main bone divisions, the _____ and the cranium.
2. The part of the mandible that rises upward and contains the condyle is the _____.
3. The _____ gland is the largest of the major salivary glands.
4. The mandibular _____ foramen is located in the anterior region of the mandible.
5. The fibrous membrane covering of most bones is called the _____.

6. Another name for the sigmoid notch is the _____ _____.
7. The junction of the frontal and parietal bones at birth is soft and sometimes called the baby's "soft spot" or the _____.
8. Another name for the circular "kissing muscle" surrounding the mouth is the _____ _____.
9. The trigeminal nerve emerges from the brain and branches at the semilunar mass of nerves called the _____.
10. The division of the trigeminal nerve that registers sensation to the maxillary second molar is the _____ division.
11. The internal carotid artery supplies blood to the cranium and the _____.
12. Wharton's duct is the drain opening for the _____ salivary gland.
13. The lymphatic system assists with immunity and protects the body from _____.
14. The vascular vessel that carries blood to the heart is called a/an _____.
15. Small fleshy tissue elevations under the tongue are called _____.
16. In the TMJ, the mandibular condyle rests in the _____ fossa of the temporal bone.
17. The small, dark-red papillae on the middle and anterior dorsal surface and along the sides of the tongue are called the _____ papillae.
18. The _____ is the muscular tissue structure that hangs down from the palate in the rear of the oral cavity.
19. The branch of the mandibular division of the trigeminal nerve that causes movement of the tongue is the _____ branch.
20. The tissue body that is situated between the glossopalatine and pharyngopalatine pillars is the _____.

Word Use

Read the following sentences and define the word written in boldface letters.

1. Many people complain of **sinus** problems when the temperature or humidity is high.

   _____

2. Touching the **uvula** or soft palate area will cause a gag-reflex action.

   _____

3. X-ray examination revealed a fracture of the left **coronoid** process and the presence of an unerupted maxillary tooth.

   _____

4. The patient was given a prescription for treatment of enlarged tonsils and an acute infection in the **mastoid** area.

   _____

5. The orthodontist recommended a labial **frenectomy** before the orthodontic treatment would be started.

   _____

CHAPTER 3 TOOTH ORIGIN AND FORMATION

✓ Learning Objectives

On completion of this chapter, you should be able to:

1. Discuss the primary and secondary dentitions and terms related to them.
2. Identify each developmental stage of tooth formation from initiation to attrition; list the eruption dates for the primary and secondary teeth.
3. Identify and determine the makeup of each of the tooth tissues and conditions related to their development.
4. Name and discuss the various tissues and membranes that make up the periodontium.
5. Discuss the attributes and characteristic terms that are common to teeth.
6. Name and identify the tooth surfaces and characteristic landmarks.

CLASSIFICATION OF THE HUMAN DENTITION

Each human receives two sets of teeth. The first set or **deciduous** (deh-**SID**-you-us = *falling off*) teeth are followed by the permanent **dentition** (den-**TISH**-un = *tooth arrangement*). The 20 deciduous teeth erupting first are commonly called "baby teeth" or primary teeth. The 32 permanent teeth that erupt and replace the deciduous teeth are commonly called secondary teeth. The permanent teeth are also termed **succedaneous** (suck-seh-**DAY**-nee-us) because these teeth, with the exception of the molars, replace the deciduous teeth when the latter **exfoliate** (ecks-**FOH**-lee-ate = *scale off*).

Mixed dentition occurs from age 6 to 16, when the dentition contains both deciduous and secondary teeth. Figure 3-1 illustrates mixed dentition. Although human teeth are considered **heterodont**

Vocabulary Related to Tooth Origin and Formation

This list contains selected new and important word parts and terms from this chapter. Take the time to learn these word parts and their meanings. You may use the list to review these terms and practice pronouncing them correctly. When you work with the audio for this chapter, listen to the word, repeat it, and then place a checkmark in the box. Proceed to the next boxed word, and repeat the process.

(hyphen before word means it's a suffix, hyphen after word means prefix, no hyphen means root word.)

Word Parts	Meaning	Word Parts	Meaning
hyper-	over, above	bi-	two
cement/o	cementum	furca	branch
-osis	condition of	-tion	condition or state of
muc/o	mucus	peri-	around
gingiv	gingiva, gums	odont	tooth
-al	relating to	-itis	inflammation
-ology	study of		

Key Terms

- ❑ **acellular** (ay-**SELL**-you-lar)
- ❑ **alveolar** (al-**VEE**-oh-lar)
- ❑ **ameloblast** (ah-**MEAL**-oh-blast)
- ❑ **anodontia** (an-oh-**DON**-she-ah)
- ❑ **antagonist** (an-**TAG**-oh-nist)
- ❑ **apical** (**AY**-pih-kahl)
- ❑ **apposition** (ap-oh-**ZIH**-shun)
- ❑ **attrition** (ah-**TRISH**-un)
- ❑ **bifurcation** (**bye**-fer-**KAY**-shun)
- ❑ **buccal** (**BUCK**-al)
- ❑ **calcification** (kal-sih-fih-**KAY**-shun)

(*Continued*)