Objectives for Section B-1

Types of Teeth/Abnormalities & Occlusion

Upon successful completion of this section the student will:

a) Name and identify the location of the various teeth
b) Identify parts of a tooth and differentiate between its six surfaces
c) Identify different tissues that make up a tooth
d) Identify different functions of the teeth
e) List and describe developmental tooth anomalies
f) List various types of anomalies that affect the colour, number, size and /or shape of the teeth
g) List and describe acquired tooth damage
h) Define centric occlusion and relation
i) Define overbite, over jet, cross bite, open bite
j) Discuss Angle's three types of malocclusion, and include the relationships involving molars and canines, and facial profiles
k) Discuss parafunctional habits and their effects

Objectives for Section B-2

Tooth Numbering System

Upon successful completion of this section the student will:

a) Describe the classification of arches, quadrants and sextants
b) Describe the Universal tooth numbering system for permanent and primary teeth
c) Describe the Federation Dentaire Internationale (FDI) system for permanent and primary teeth
d) Describe the Palmer notation system for permanent and primary teeth
e) Identify and code teeth within the mouth using any of the 3 systems

Objectives for Section B-3

Primary & Secondary Dentition

Upon successful completion of this section the student will:

a) Understand difference between primary, secondary, and mixed dentition
b) Describe and identify the types and number of teeth in each quadrant for permanent and secondary dentition
c) Discuss how many teeth are in primary and permanent dentition
d) Discuss eruption schedule of primary teeth
e) Discuss eruption schedule of permanent teeth
f) Discuss important clinical considerations for each dentition period
g) Discuss how a dental educator can integrate knowledge of dentition into preventive measures

Objectives for Section B-4

Soft Tissue Structures of the Oral Cavity

Upon successful completion of this section the student will:

a) Define the boundaries of the oral cavity
b) Define and identify lips, vestibule, hard palate, soft palate, gingiva, buccal mucosa, labial mucosa, alveolar mucosa, tongue, floor of mouth, torus, exostosis, frenum, uvula, tonsils
c) Identify and differentiate between normal and abnormal tissues in the oral cavity

Manual for Section B-1

Types of Teeth/Abnormalities & Occlusion

Ref: Brand & Isselhard Ch 2, 6, 7; Bath-Balogh Ch. 15, 16, 17, 20; Ibsen & Phelan Ch. 5; Darby & Walsh Ch. 13

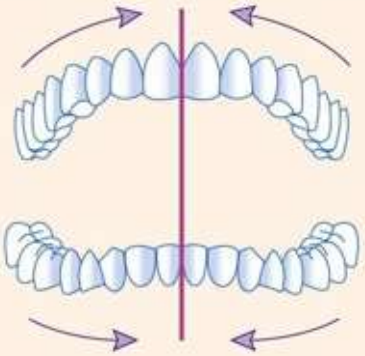
a) Name and identify the location of the various teeth

- Incisors – 4 maxillary, 4 mandibular: central and lateral
- Canines – 2 maxillary, 2 mandibular
- Premolars – 4 maxillary, 4 mandibular: 1st and 2nd
- Molars – 4-6 maxillary, 4 – mandibular: 1st, 2nd and 3rd

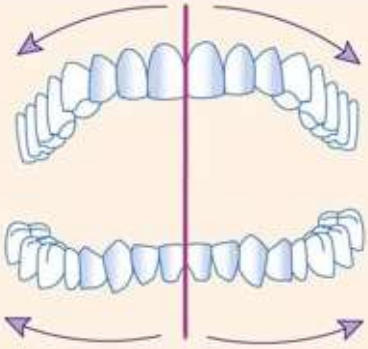
b) Identify parts of a tooth and differentiate between its six surfaces

- Facial – surface of the tooth that faces the cheek or lip, buccal in the posterior and labial in the anterior
- Lingual - surface of the tooth that faces the tongue
- Proximal – surface of the tooth that faces a neighboring tooth surface. Has two surfaces mesial and distal. Mesial is toward the midline and distal is away from the midline
- Occlusal – biting/ chewing surface of the tooth
- Incisal ridge- biting ridge of anterior teeth

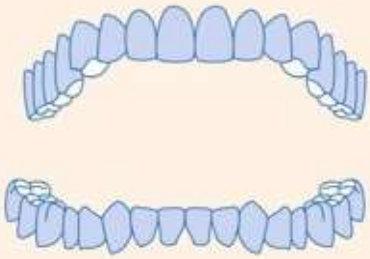
c) Identify different tissues that make up a tooth



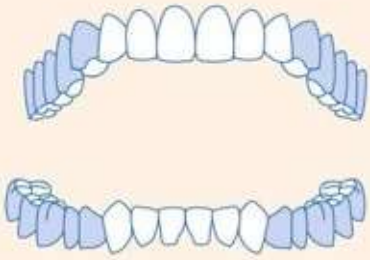
Mesial
All proximal surfaces that face the midline of dental arch



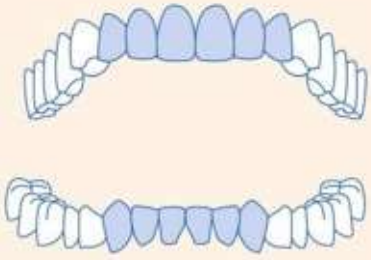
Distal
All proximal surfaces that face away from midline of dental arch



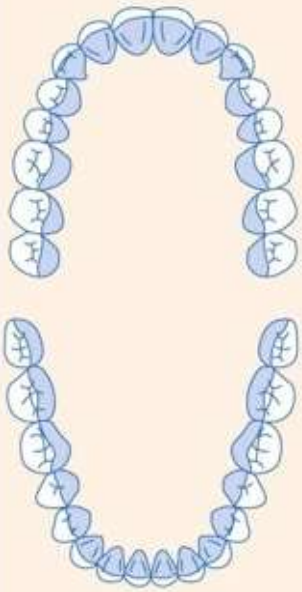
Facial
Surfaces toward the face. The term "facial" can be used in describing the tooth surface closest to the face for any tooth



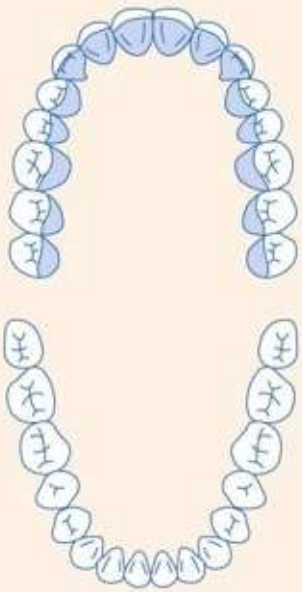
Buccal
Another term used to describe the facial surfaces of posterior teeth; refers specifically to surfaces nearest the buccal mucosa



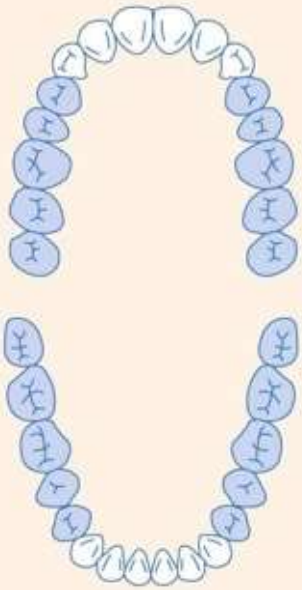
Labial
The term for facial surfaces of anterior teeth, those surfaces closest to the lips (labia)



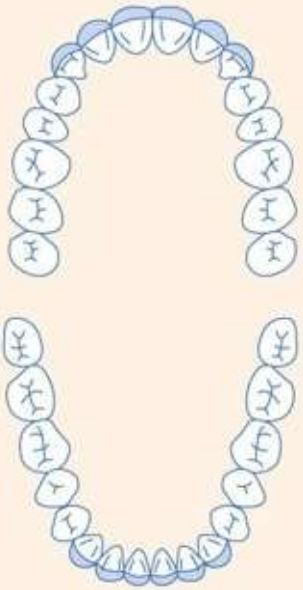
Lingual
Surface of the maxillary and mandibular teeth nearest the tongue. This term may be applied to both maxillary and mandibular teeth



Palatal
Another name for the lingual surface of the maxillary teeth—indicates the surface nearest the palate. The term "lingual" is more frequently used than "palatal"

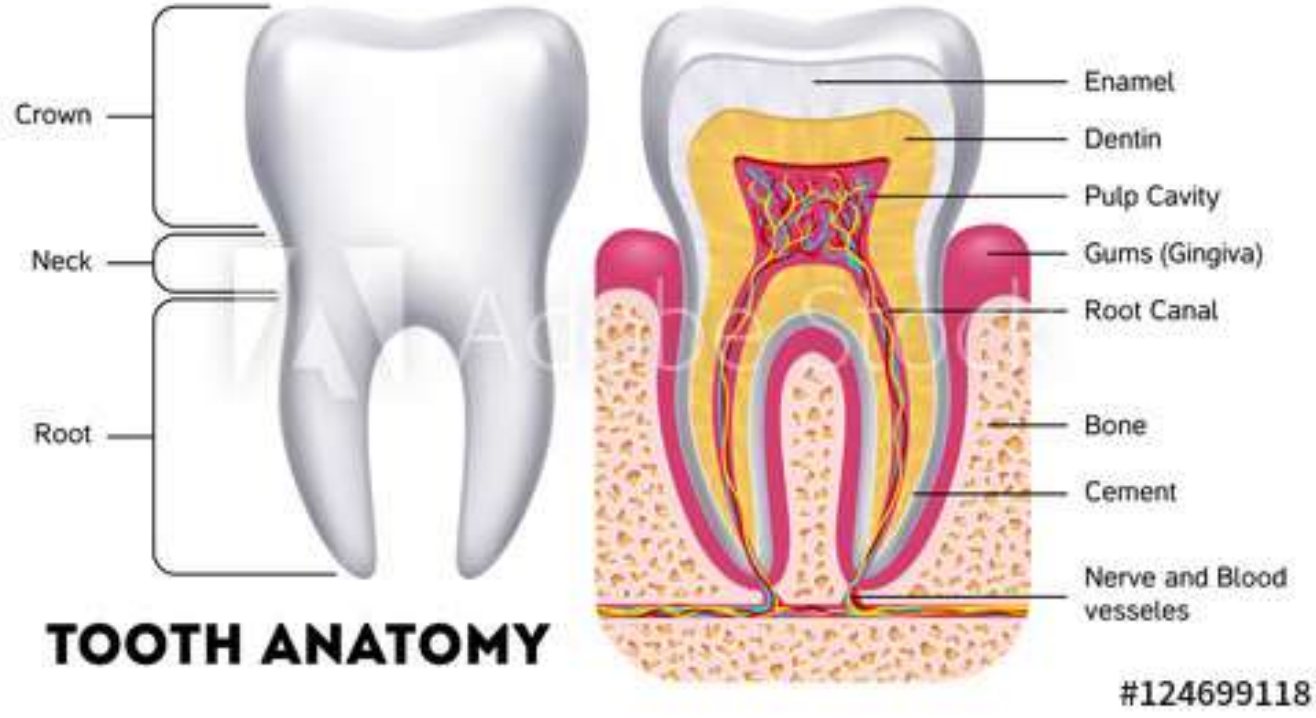


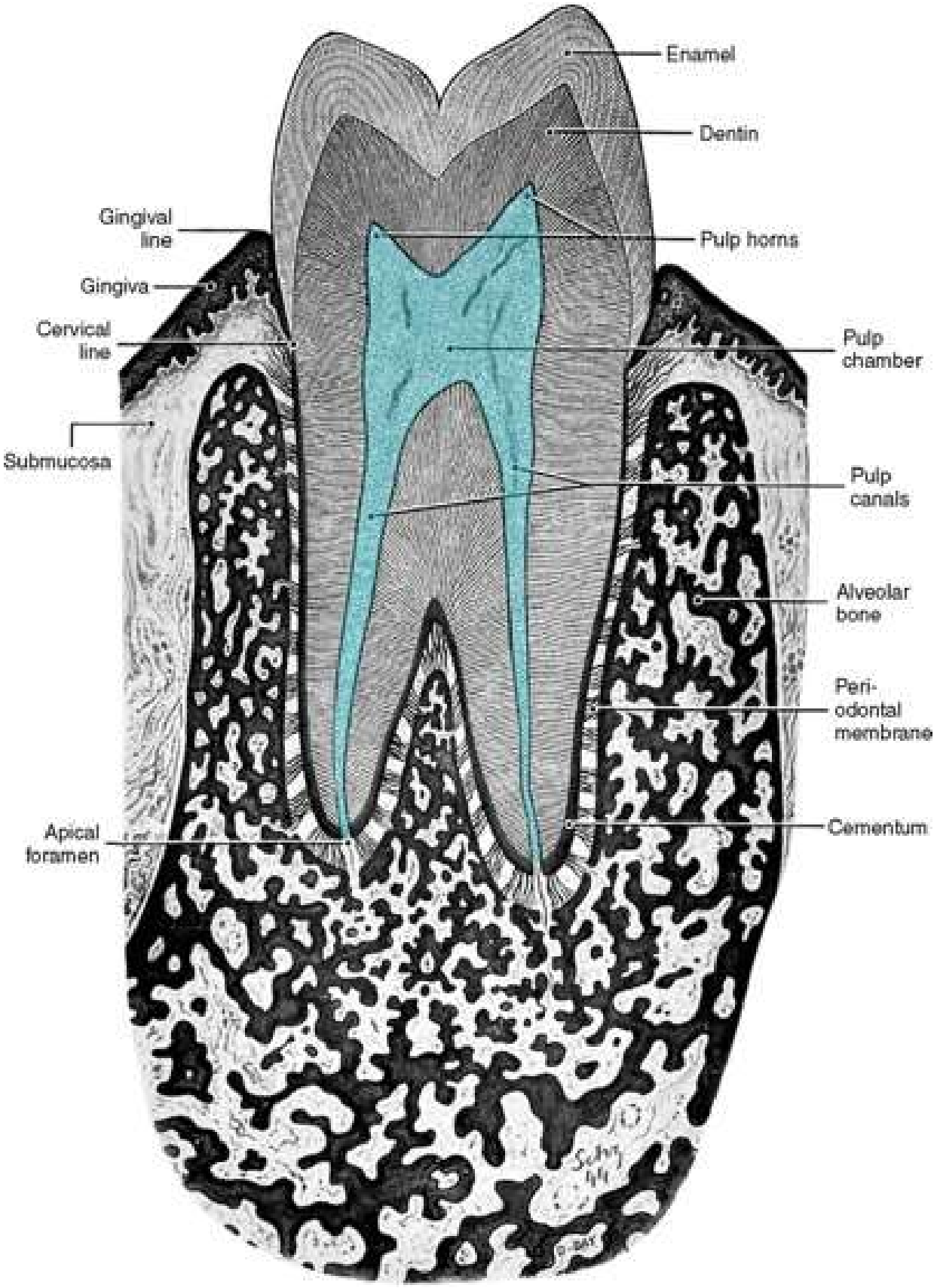
Occlusal
This term indicates the contacting, or biting, surfaces of all posterior teeth



Incisal (or Incisal Edge)
The edge of all anterior teeth. The incisal edge is not considered a full surface

- Root and crown portion
- Crown is covered with enamel
    - anatomical crown is the entire crown covered by enamel regardless if it is erupted or covered by gingiva
    - clinical crown is the crown that is visible in the mouth (above the gingiva)
- Root is covered with cementum
    - can have single or multiple roots and can be bifurcated/ trifurcated
    - has a apex or terminal end
    - anchored into the alveolar process of the jaw
    - roots held in place by ligaments joining the alveolus (tooth socket)
- Crown and root are joined by the cementoenamel junction (CEJ)
- Tooth tissues comprise of hard and soft tissues
    - Hard tissues
        - Enamel – outer covering of the crown, hardest tissue of the body, protects against bacteria, acids
        - Cementum- outer covering of thee root, attachment site for periodontal ligament, 2 types: acellular and cellular
        - Dentin- largest portion of tooth, capable of adding to itself
    - Soft tissues
        - Pulp – nourishment, sensation, dentin – repairing system to the tooth, made up of blood vessels lymph vessels, connective tissue, nerve tissue and odontoblasts
        - Made up of two sections – pulp chamber and pulp/root canals




Enamel
Dentin
Gingival line
Pulp horns
Gingiva
Cervical line
Pulp chamber
Submucosa
Pulp canals
Alveolar bone
Peri-odontal membrane
Cementum
Apical foramen

d) Identify different functions of the teeth

- Incisors
  - Incisal edge used for cutting
  - Lingual side shaped like a shovel to guide food into the mouth
  - Support the lips and face and maintain vertical dimension
  - Support facial muscles and contribute to overall normal arch formation
  - Aesthetics and speech
- Canine
  - holding and tearing and assists incisors and premolars
  - v shape at corner of mouth allows for dissipation of pressure that can force premolar to protrude out of the mouth or the incisors farther into the mouth
  - self cleaning and strong anchorage make them the strongest teeth
  - vertical dimension of the face intact
  - support incisors and premolars in their functions of speech and mastication
  - act as guideposts during occlusal movement
  - protective functional devise for lateral excursion
- Premolars
  - buccal cusps hold food and lingual cusps grind food
  - assist molars in grinding food
  - maintain height of lower third of vertical dimension of face to support facial muscles
  - aesthesis and speech
- Molars
  - Grind and crush food
  - Support the tissues of the cheek and facial muscles
  - Maintain height of lower third of the vertical dimension of face and arch continuity
  - Aesthetics and speech

e) List and describe developmental tooth anomalies

- Dental anomalies are deviations from normal dental tissue origin including enamel, dentin and cementum. They can result from intrinsic and extrinsic factors.
- Intrinsic factors include; hereditary, metabolic dysfunction, and mutations. Extrinsic factors include physical and chemical trauma, biologic agents, nutritional deficiencies, stress, habits, and environmental conditions.
- Variation in the size of teeth:
  - Macrodontia- teeth are too large
  - Microdontia- teeth are too small
- Variation in the number of teeth:
  - Hyperdontia- multiple or extra teeth (supernumeraries)
  - Anodontia- too few teeth
  - True anodontia is the congenital absence of teeth and may involve the primary, permanent, or both dentitions
- Hyperdontia
  - Supernumerary teeth most often occur in the midline (mesodens) and molar region of the maxillae. Distomolars are fourth molars located distal to the third molars. A paramolar is a supernumerary tooth located buccally or lingually to molar and appear as small rudimentary.
- Anomalies in shape:
- Odontoma- tumorous anomaly of calcified tissue. Two kinds:

    - Complex- a single mass of dentin, cementum and enamel in a unspecified shape
    - Compound- several small masses that resemble rudimentary teeth
- Dense in dente- thought to occur when the outer surface of the tooth invaginates or turns itself inward before mineralization takes place. “tooth within a tooth”. The permanent max lateral incisors are most common teeth
- Dilaceration – a tooth that has a sharp bend or curve in the root/crown
- Dwarfed roots- roots are extremely short
- Gemination- tooth attempts to divide itself by splitting its tooth germ and can result in a “twin” tooth. Can split into two crowns with one root
- Twinning- form of germination. One tooth germ splits and forms two identical teeth
- Fusion- Two adjacent tooth germs untie. Teeth are joined at the crowns or roots and occurs at the dentin
- Concrescence- occurs after the roots have formed. Two approximating roots contacting, and fusing by deposition of cementum.
- Hypercementosis – deposition of excessive amounts of secondary cementum and usually occurs at the apex of the root. Cementoma is a form of hypercementosis that is associated with localized destruction of bone.
- Enamel Pearls- small masses of excess enamel on the surface of teeth located apically to the CEJ. Found at the bifurcation/trifurcation areas. Formed by misplaced ameloblasts.
- Hutchinson’s incisors- notched incisors characteristic of prenatal syphilis
- Mulberry molars- irregular shaped molars with poorly forms cusps characterized by congenital syphilis.
- Enamel Dysplasia- two types: Enamel hypoplasia and hypocalcification
- Enamel hypoplasia is caused by a condition that inhibits enamel formation and can leave small pits or grooves
- Enamel hypocalcification is caused by a condition that inhibits the calcification of enamel.
- Enamel fluorosis- enamel hypocalcification, discoloration of enamel caused by excessive amounts of fluoride in the tooth structure. Can range from white flecks to large opaque, brown spots with pits. The discolored areas are mottled enamel.
- Amelogenesis Imperfecta- hereditary hypocalcification; enamel dysplasia and is the interferences with ameloblasts leading to the faulty development of enamel.
- Turners tooth- hypocalcification of a single tooth usually a max incisor.
- Dentogenis Imperfecta- hereditary dentin dysplasia. Dentin is gray, brown or yellow and has a opalescent sheen. Pulp chambers and root canals are completely filled with dentin.
- Tetracycline staining- Expecting mother takes antibiotic tetracycline and the teeth a the child develops as a yellow to brown, greyish hue.
- Abnormal crown shapes- max and mand third molars show the most variety of abnormalities in shape, size, and number. Can range from peg shaped to multicuspid to large/small variation of the first or second molar. The most common malformed anterior tooth is max lateral incisor which is peg shaped. The mand second premolars vary from two to three cusps. Accessory cusps or tubercles can occur on any tooth but most common on the max molars.
- Abnormal root formation – Max second premolars often have two bifurcated roots. Mand second premolars or canines may have accessory roots.

f) List various types of anomalies that affect the colour, number, size and /or shape of the teeth

- See above

g) List and describe acquired tooth damage

- Ref: Darby Ch. 13
- Attrition- tooth to tooth wear of the dentition. Due to bruxism, grinding and clenching.
- Abrasion- to wear due to a foreign substance. Commonly seen from traumatic tooth brushing
- Erosion- loss of tooth surface from chemical agents. For example: vomiting, sucking on lemons and candies.
- Abfraction- cervical stress lesion seen as v shaped wedge shaped defect at the CEJ.
- Tooth fracture- that range from small chips to large breaks.
- Dental caries- infectious and transmissible bacteria caused disease characterized by acid dissolution of enamel and breakdown of organic dental tissues.

h) Define centric occlusion and relation

- Centric occlusion- voluntary, habitual position of teeth that allows max contact when the teeth are closed
- Centric relation- the endpoint of closure of the mandible

i) Define overbite, over jet, cross bite, open bite

- Ref: Darby Ch. 13
- Overbite- vertical overlap of the max and mandibular incisors. Its normal if the max overlap within the incisal third of the mandibular incisors.

- Overjet- horizontal overlap or distance between the lingual surface of the max incisors and the labial surface of the labial surface of the mand incisors.

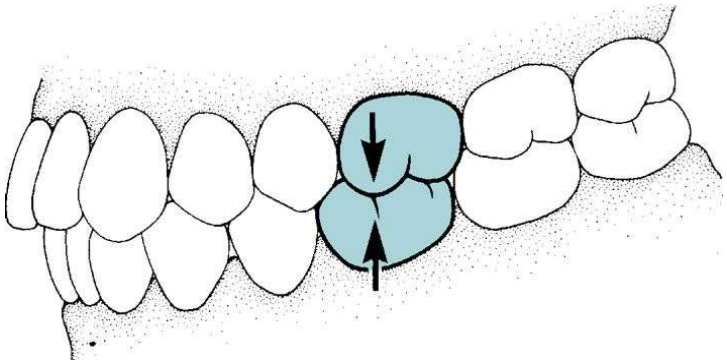
- Crossbite- malocclusion in the transverse plane of space that exists when the buccal cusps of the max teeth are lingual to their normal relationship to the max. May be anterior/posterior

- Openbite- malocclusion of the vertical plane of space in which the max and mandibular teeth fail to meet when teeth are occluded, so an open space can be seen.

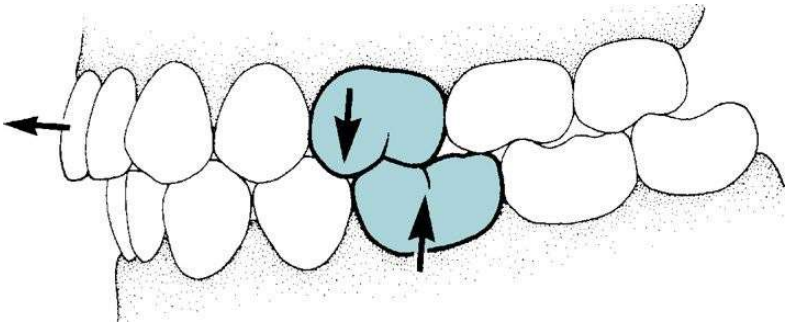
j) Discuss Angle's three types of malocclusion, and include the relationships involving molars and canines, and facial profiles

- Ref: Darby Ch. 13, Brand & Isselhard Ch. 6
  - Malocculsion occurs when there is a lack of overall ideal form in the dentition when in centric occlusion. There are three types of malocclusion: Class I,II,III. Class II is divided into two divisions. Malocclusion is classified on the right and left sides of the dentition.
  - Class I – similar to normal occlusion but there are mal- relationships between individual or groups of teeth. Ex- openbite, end to end bite, crossbite.
    - Mesiobuccal cusp of the max permanent first molar occludes with the buccal groove of the mandibular (mand) first permanent molar. Or the maxillary permanent canine occludes with the distal half of the mand permanent canine and the mesial half of the mand first premolar.
  - Class II- referred to skeletal malocclusions due to the differences in the size or abnormal relationship between the maxilla and the mandible. Mesognathic profile
    - Buccal groove of the mand first permanent molar is distal to the mesiobuccal cusp of the max first permanent molar by at least a width of a premolar. The canine relationship is that the distal of the mand permanent canine is distal to the mesial surface of the max permanent canine by at least the width of a premolar. Retrognathic profile.
      - Division I – max incisors protrude facially from the mand incisors
      - Division II- one or more of the max central incisors are lingually inclined or retruded
  - Class III- mand is relatively large compared with the maxilla. Prognathic profile. Molar relationship is the buccal grove of the mand first permanent molar is mesial to the

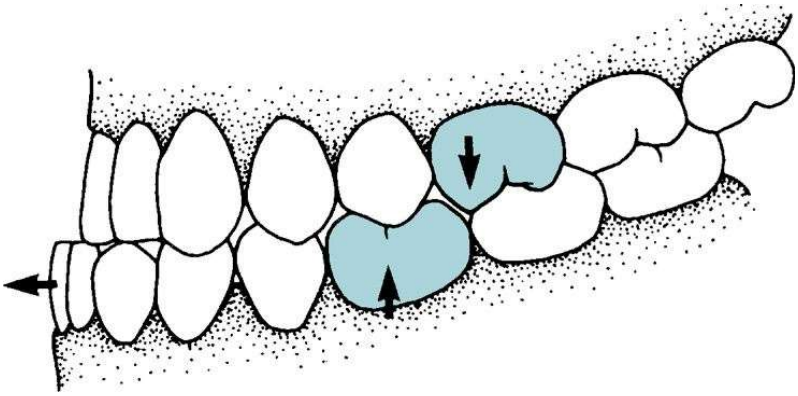
mesiobuccal cusp of the max first molar by the width of at least a premolar. The canine is the distal surface of the mand permanent canine is mesial to the mesial surface of the max canine by at least the width of a premolar.



Class I Occlusal Relationship



Class II Occlusal Relationship



Class III Occlusal Relationship

k) Discuss parafunctional habits and their effects

- **Discussed above**

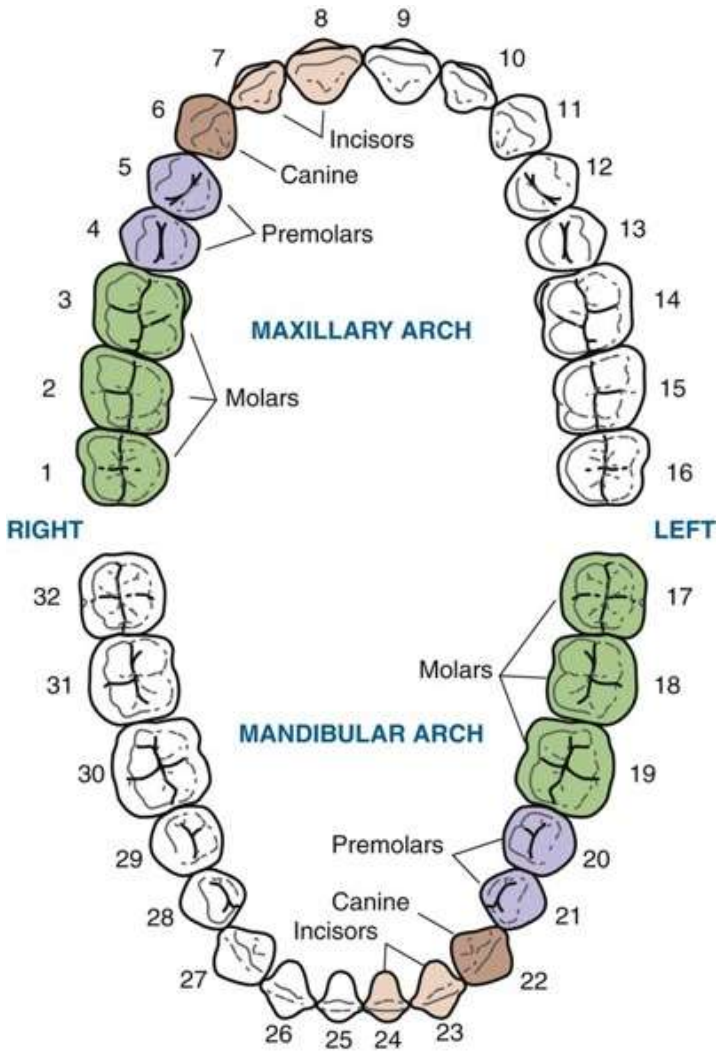
Manual for Section B-2

Tooth Numbering System

Ref: Brand & Isselhard Ch. 10; Darby & Walsh Ch. 14

a) Describe the classification of arches, quadrants and sextants

- Two arches – maxillary and mandibular
- Four quadrants – upper right (Q1), upper left (Q2), lower left (Q3), lower right (Q4)
- Six sextants (three per arch) - starting from the upper left 3rd molar to 1st premolar, canine to canine and 1st premolar to 3rd molar

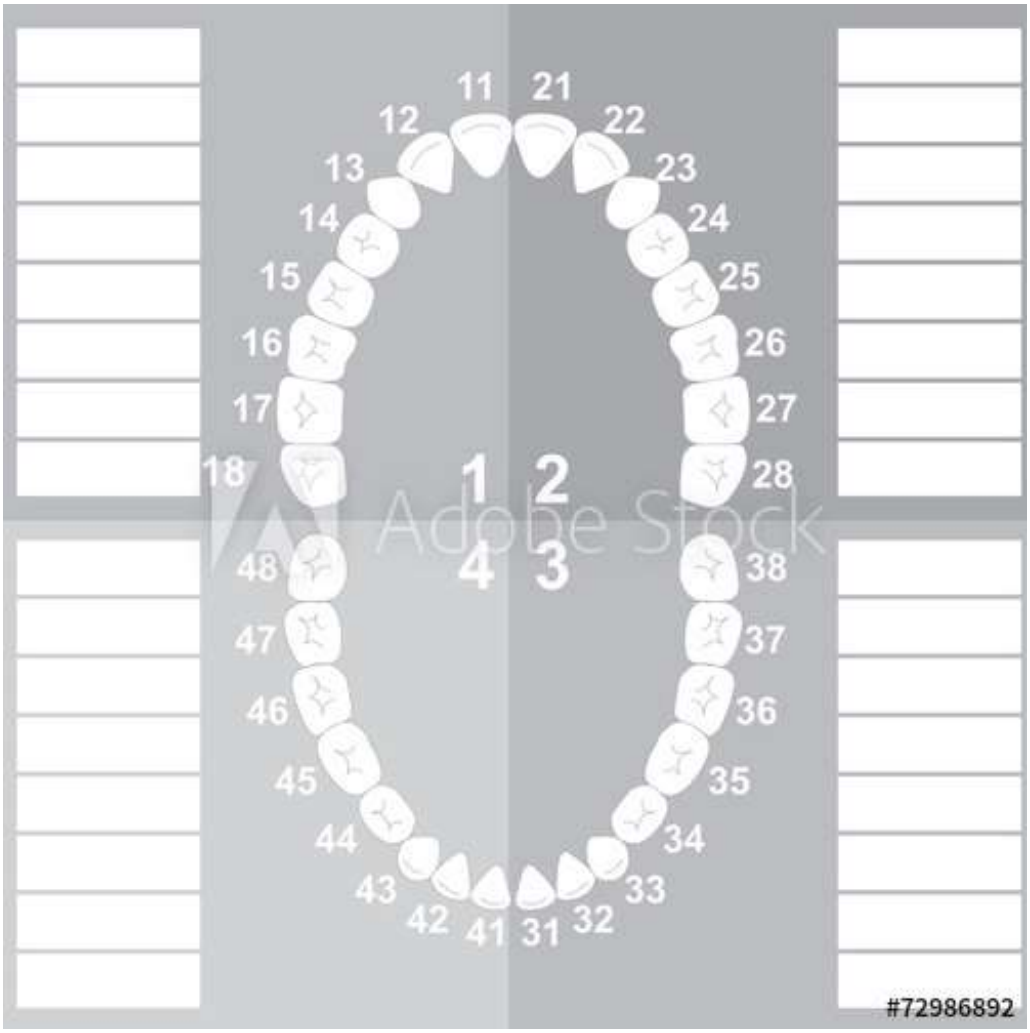


b) Describe the Universal tooth numbering system for permanent and primary teeth

- Arabic numerals 1-32 for permanent teeth starting from the upper right 3rd molar and working down to the lower right 3rd molar
- For primary teeth the letters A –T are used. A starts in the upper right 1st primary molar and ends in the lower right 1st primary molar

c) Describe the Federation Dentaire Internationale (FDI) system for permanent and primary teeth

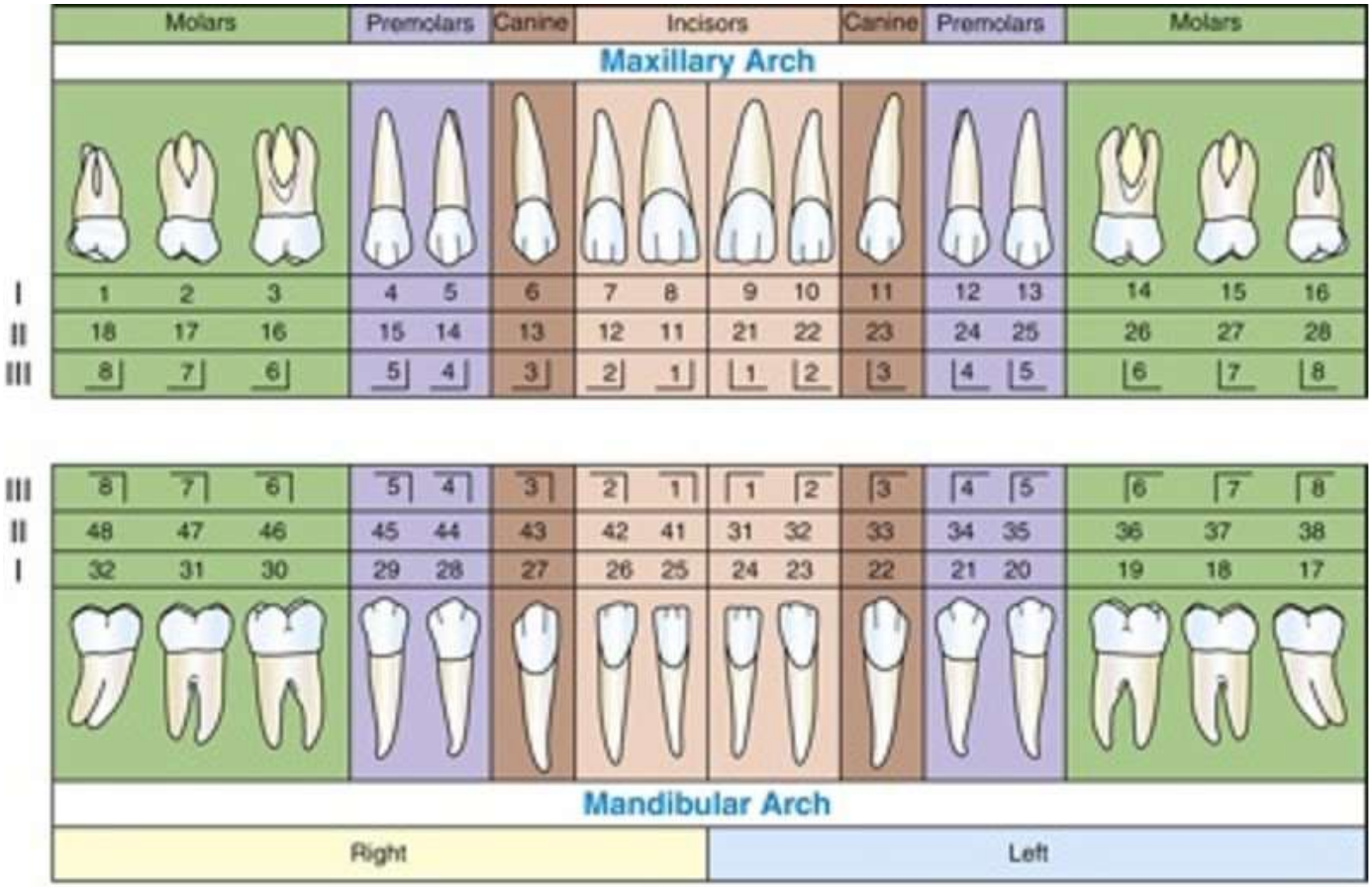
- Every tooth is given a 2 digit number
- The first digit is the quadrant the tooth is in and if the tooth is permanent or primary
- The second number is the position of the tooth closest to the midline. The lowest number is closest to the midline and increases posteriorly
- There are 4 quadrants Q1 – Q4 and each tooth is number 1 -8. Starting as Q1 for the maxillary upper right and is numbered 1-8. So the first tooth would be 11 and the last would be 18. Q2 is the upper left again labeled 21-28. Q3 in the mandibular lower left is 31-38 and the mandibular lower right 41-48
- Primary teeth have their own first digit number as quadrant 5-8 and the second digit ranges from 1-5



d) Describe the Palmer notation system for permanent and primary teeth

- Gives a directional bracket to each quadrant.
- The teeth closest to the midline (central incisors) have the lowest number and increases posteriorly. 1 for permanent teeth and A for deciduous teeth
- Teeth are also identified by the position above/below the horizontal max/mand dividing line

e) Identify and code teeth within the mouth using any of the 3 systems



I Universal Tooth Designation System
II International Standards Organization Designation System
III Palmer Notation Method

Manual for Section B-3

Primary & Secondary Dentition

Ref: Bath Balogh & Fahrenbach Ch. 15-18; Brand & Isselhard Ch. 11-16; Darby & Walsh Ch. 14

a) Understand difference between primary, secondary, and mixed dentition

- Primary dentition–20 deciduous teeth
- Secondary teeth – 32 permanent teeth
- Mixed dentition–comprises of permanent and primary teeth

b) Describe and identify the types and number of teeth in each quadrant for permanent and secondary dentition

- Primary teeth consists of:
  - 4 central incisors (2 in each arch)
  - 4 lateral incisors (2 in each arch)
  - 4 first molars (2 in each arch)
  - 4 canines (2 in each arch)
  - 4 second molars (2 in each arch)
- Permanent teeth consist of:
  - 4 Central incisors (2 in each arch)
  - 4 Lateral incisors (2 in each arch)
  - 4 Canines (2 in each arch)
  - 4 First premolars (2 in each arch)
  - 4 Second premolars (2 in each arch)
  - 4 First molars (2 in each arch)
  - 4 Second molars (2 in each arch)
  - 4 Third molars (2 in each arch)

c) Discuss how many teeth are in primary and permanent dentition

- Primary dentition–20 deciduous teeth
- Secondary teeth – 32 permanent teeth

d) Discuss eruption schedule of primary teeth

- central incisors, erupt 6.5-8 months
- lateral incisors, erupt 7-9 months
- first molars, erupt 12-16 months
- canines, erupt 16-21 months
- 2nd molars, erupt 21-30 months

e) Discuss eruption schedule of permanent teeth

- Max:
  - Central incisors 7-8 yrs
  - Lateral incisors 8-9 yrs
  - Canine 11-12 yrs
  - First premolars 10-11 yrs
  - Second premolar 10-12 yrs
  - First molar 6-7 yrs

  - Second molar 12-13 yrs
  - Third molar 17-22 yrs
- Mand:
  - Central incisors 6-7 yrs
  - Lateral incisors 7-8 yrs
  - Canine 9-10 yrs
  - First premolars 10-12 yrs
  - Second premolar 11-12 yrs
  - First molar 6-7 yrs
  - Second molar 12-13 yrs
  - Third molar 17-22 yrs

f) Discuss important clinical considerations for each dentition period

- Primary dentition
  - People do not think that primary teeth are as important are permanent but they hold spaces for the permanent teeth
  - Enamel and dentin are thinner and risk of endodontic complications are greater
  - Pulp chamber and horns are larger increasing possibility of pulpal exposure when tooth is being filled
  - Poor oral hygiene without adult supervision
  - Baby bottle caries
  - Early aggressive periodontitis
  - Orthodontic interventions including; retainers, space maintainers, removal of teeth for spacing
  - mamalons
- Mixed dentition
  - “ugly duckling stage” – different tooth colors, teeth are not the same size, temporary edentulous areas, and crowding
  - Gingiva is inflamed during this process
  - Oral hygiene is difficult due to increased plaque biofilm retention
  - Orthodontic care may be started
  - Early aggressive periodontitis
- Permanent dentition
  - Anterior
    - Attrition, open bite
    - Dense in dente, Hutchinson’s incisors, talon cusps, diastema, mesodens, supernumerary tooth, peg lateral, anadontia, dilacerations of crown or root, dentigerous cyst
    - Lingual pits / linguogingival groove of incisors are susceptible to cavities due to bacterial plague retention
    - Plaque, stain , and calculus deposits
    - Overactive tight lips may make the max incsors lingually inclined
    - Dentinal hypersensitivity due to attrition
  - Posterior
    - Due to close proximity of sinus- sinusitis may be mistaken for tooth pain and vice versa
    - With loss of premolar the molar will drift mesially

- Anadontia. Mulberry molars, enamel pearls, tubercles, dilaceration, root fusion, concrescence, dentogerous cyst, peg third molars, accessory roots
- bacterial plaque biofilm and calculus adhere to concavities and furcations on exposed root leading to advancing periodontal disease
- Removal of third molars due to infection, caries, cysts. Periodontal disease
- Deep pits and fissures that can lead to caries
- Loss of first molar is followed by mesial inclination drift of second molar and molar on opposing arch supererupts into space

g) Discuss how a dental educator can integrate knowledge of dentition into preventive measures

- Education on oral self care to child and caregivers for prevention of oral diseases

Objectives for Section B-4

Soft Tissue Structures of the Oral Cavity

Ref: Darby & Walsh Ch. 13; Brand & Isselhard Ch. 22, 23; Ibsen & Phelan Ch. 5

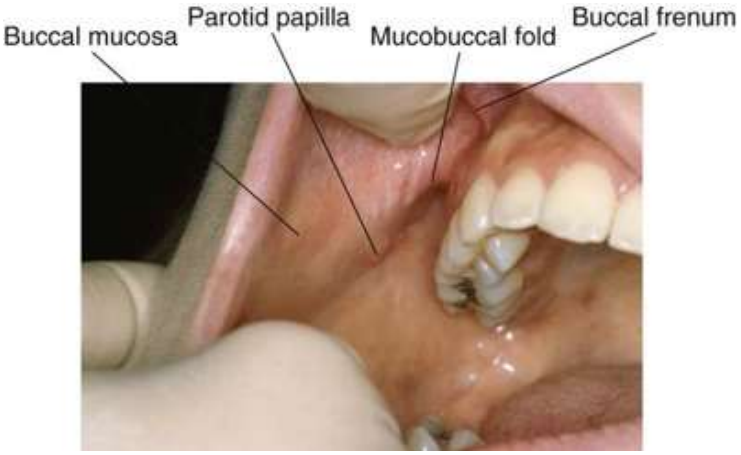
a) Define the boundaries of the oral cavity

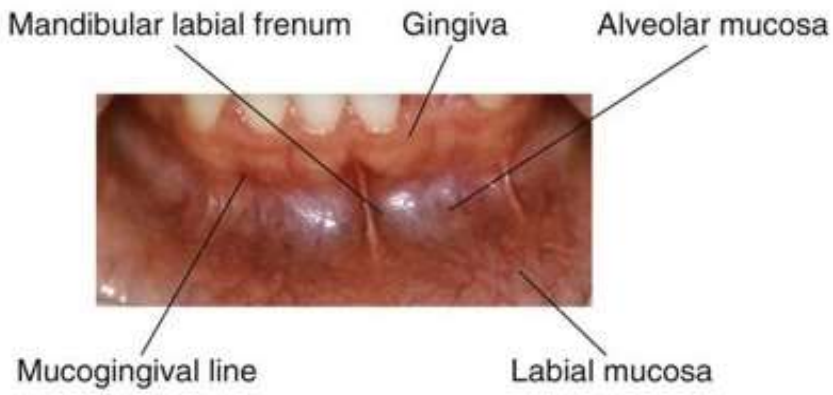
- The oral cavity is the beginning of the digestive system and forms a common pathway with the respiratory system.
- It begins at the lips and cheeks and extends into the palatine tonsils.
- It can be divided into two parts:
  - The vestibule – space between the lips, cheeks, and teeth
  - Oral cavity proper – area surrounded by the teeth/alveolar ridges to the palatine tonsils and includes the floor of the mouth to the hard and soft palate

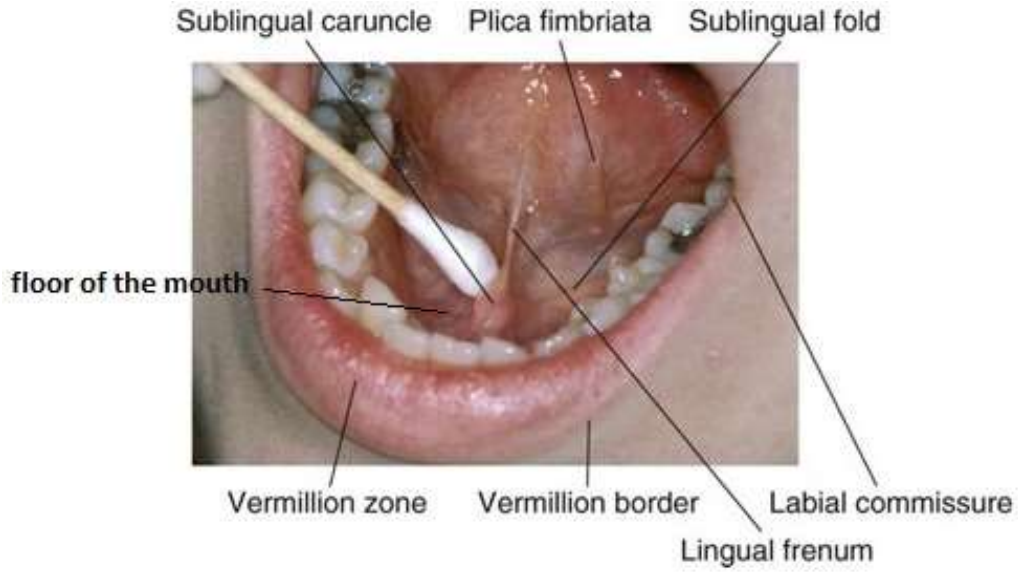
b) Define and identify lips, vestibule, hard palate, soft palate, gingiva, buccal mucosa, labial mucosa, alveolar mucosa, tongue, floor of mouth, torus, exostosis, frenum, uvula, tonsils

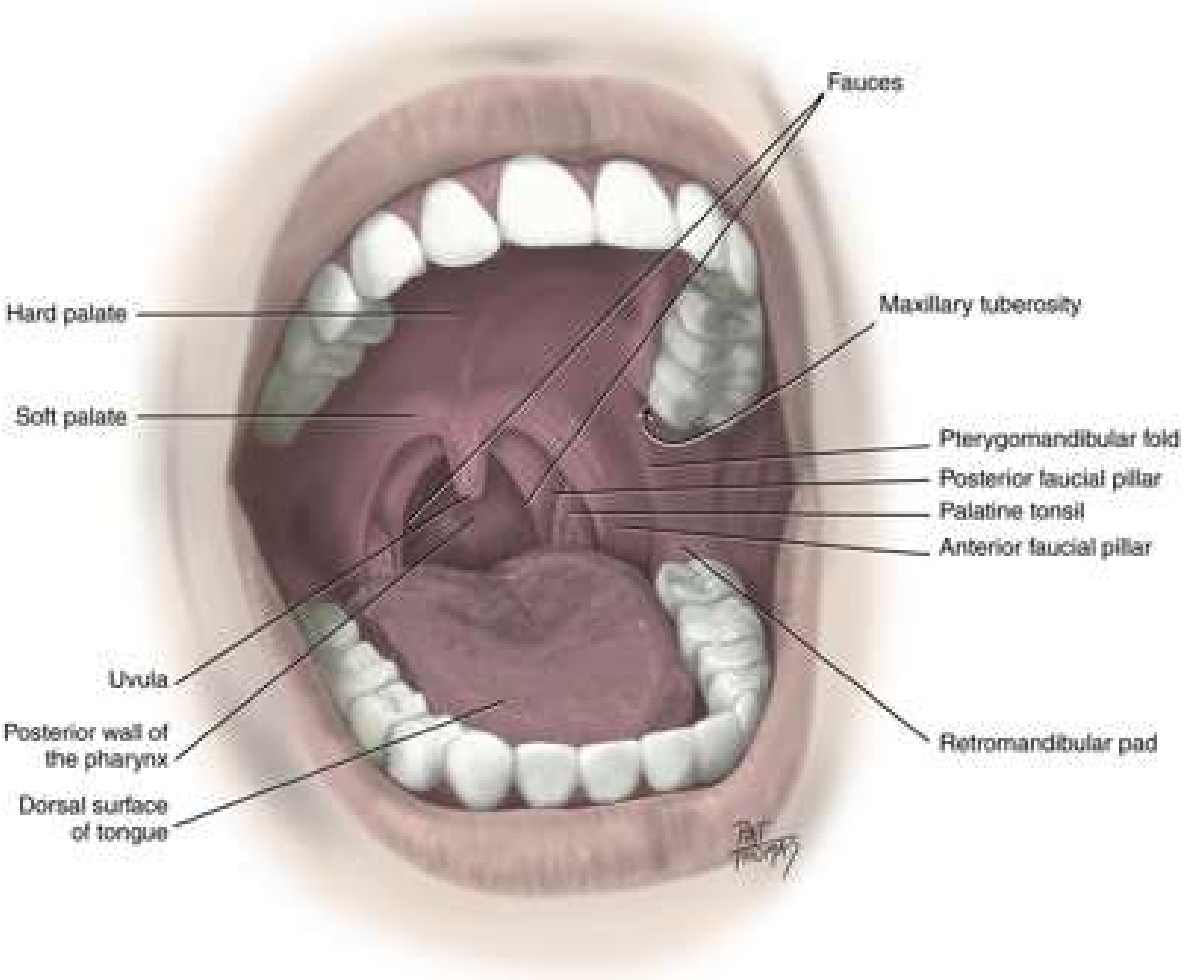
- Lips- junction between wet mucosa and dry skin tissue
  - Vermillion border- border of the lips transitional zone is of reddish tissue
  - Philtrum – midline indentation
- Vestibule- bounded anteriorly by the lips and laterally by the cheeks
  - Mucobuccal fold – where the lips or cheeks turn towards the gingiva
- Hard palate- Wide, narrow, high arching curvature vault or flat in contours.
  - Made up of rugae – transverse ridges of epithelial and connective tissue.
  - Singular bulge of tissue at midline posterior to the central incisors is called the incisive papilla.
  - Contains the incisive foramen and the greater palatine foramina
  - There is a junction between the hard and the soft palate. At the end of the hard palate is the posterior nasal spine and on either side of it are fovea palatinae which have minor salivary glands.

- Soft palate- stretches from the hard palate to the posterior portion of the oral pharynx. Helps in speech and swallowing. Contains minor salivary glands.
- Gingiva- gum tissue that surrounds the teeth and alveolar bone. It is attached and is slightly pink. Can be pigmented due to melanocytes.
- Buccal mucosa – inner portion of the lips
- Labial mucosa- inner cheek
- Alveolar mucosa- mucosa lying against the alveolar bone. Loosely attached and moveable. Red in color.
- Tongue- different parts of the tongue
    - Anterior 2/3 is called the body, posterior 1/3 called pharyngeal, tip of the tongue is called the apex
- Floor of mouth-
- Exotoses – localized developmental growths of bone found on the cortical plate. That can be single, multiple, unilateral, bilateral. Can be located in the canine, premolar or molar region. Mandibular/ palatal tori.
- Frenum- connective tissue that forms that the midline of the upper and lower lips. If upper frenum extends over alveolar ridge it may push the maxillary central incisors forming a diastema. Which may be surgically removed. If the lower frenum extends close to the gingiva it can cause gingival recession. Frenums are also in the canine and premolar region of both arches.
- Uvula- hangs from the posterior margin of the soft palate
- Tonsils- masses of lymphoid tissue that remove toxins from the body. Found at the side of the throat at the back of the tongue.






Sublingual caruncle
Plica fimbriata
Sublingual fold
floor of the mouth
Vermillion zone
Vermillion border
Labial commissure
Lingual frenum


Fauces
Hard palate
Maxillary tuberosity
Soft palate
Pterygomandibular fold
Posterior faucial pillar
Palatine tonsil
Anterior faucial pillar
Uvula
Posterior wall of the pharynx
Dorsal surface of tongue
Retromandibular pad

c) Identify and differentiate between normal and abnormal tissues in the oral cavity

- Darby Ch. 12
- Lips- skin and lip cancer, lichen planus, candidiasis,
- Buccal, labial mucosa, parotid glands, alveolar ridges, and attached gingiva – oral cancer, lichen planus, candidiasis, excessive salivary flow, xerostomia, abscesses, fistulas, swellings, halitosis, necrotizing periodontal diseases, sweet fruity breath associated with diabetes, trauma.
- Palate and pharynx including hard, soft paltate, tonsillar pillars, uvula, portion of the oropharynx and nasopharynx – denture stomatitis, oral cancer, tonsillitis, trauma
- Tongue- hairy leukoplakia, ankyloglossia, enlargement, induration, oral cancer, extreme loss of papilla, trauma, dysphagia.
- Floor of the mouth- sialothiasis, blocked ducts, ranula, xerostomia, excessive salivary flow, tenderness, color changes, ankyloglossia, induration, enlargement, oral cancer.