

Introduction

Lec.1

Dental Anatomy

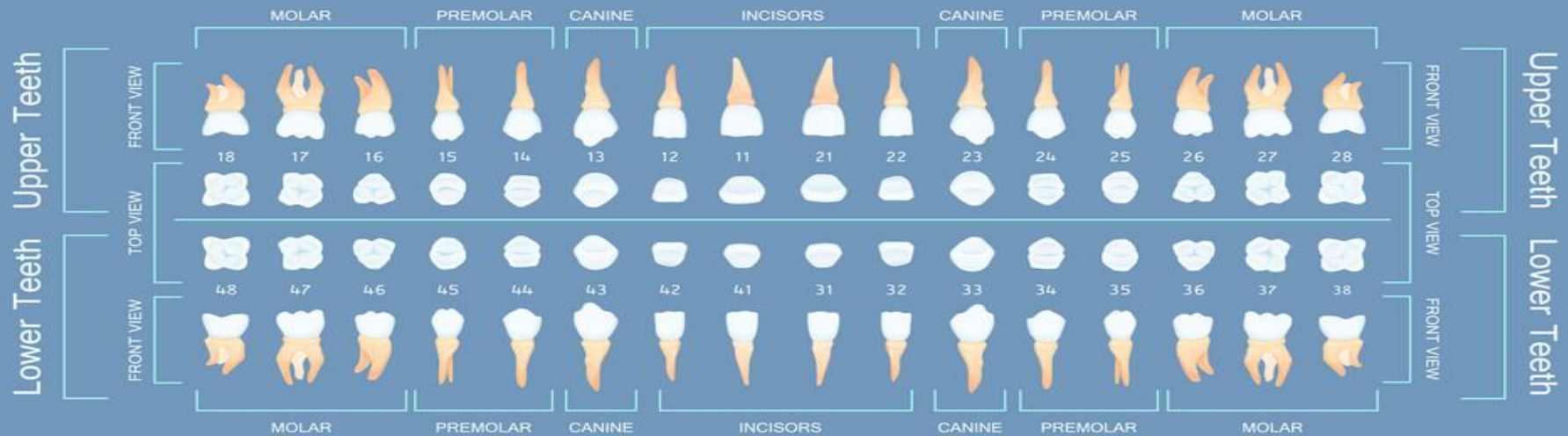
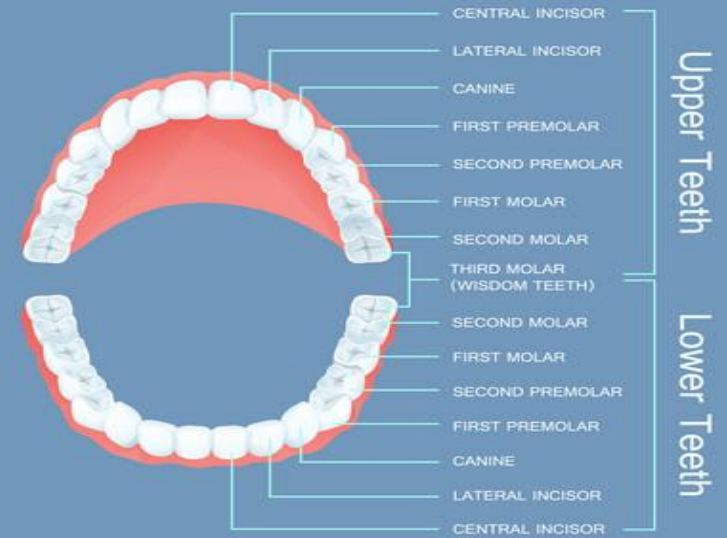
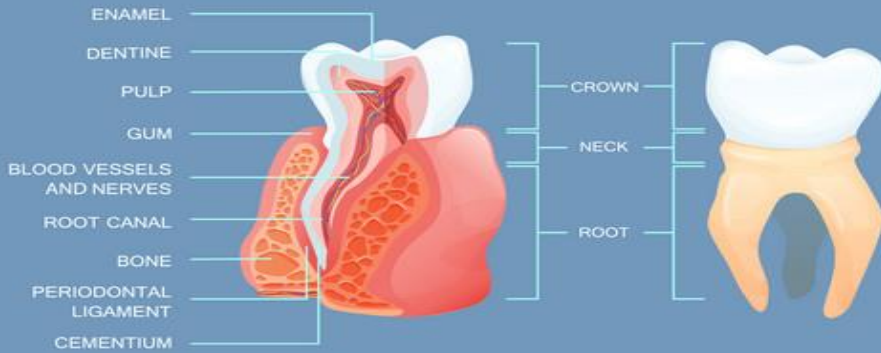
**1st - grade- College of Dentistry
University of Al Muthana**

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Dental anatomy



Dental Anatomy

- is the base of understanding the dental field.
- Dental Anatomy teaches the development of teeth, the name, shape and structure of each part of the tooth.

Nomenclature

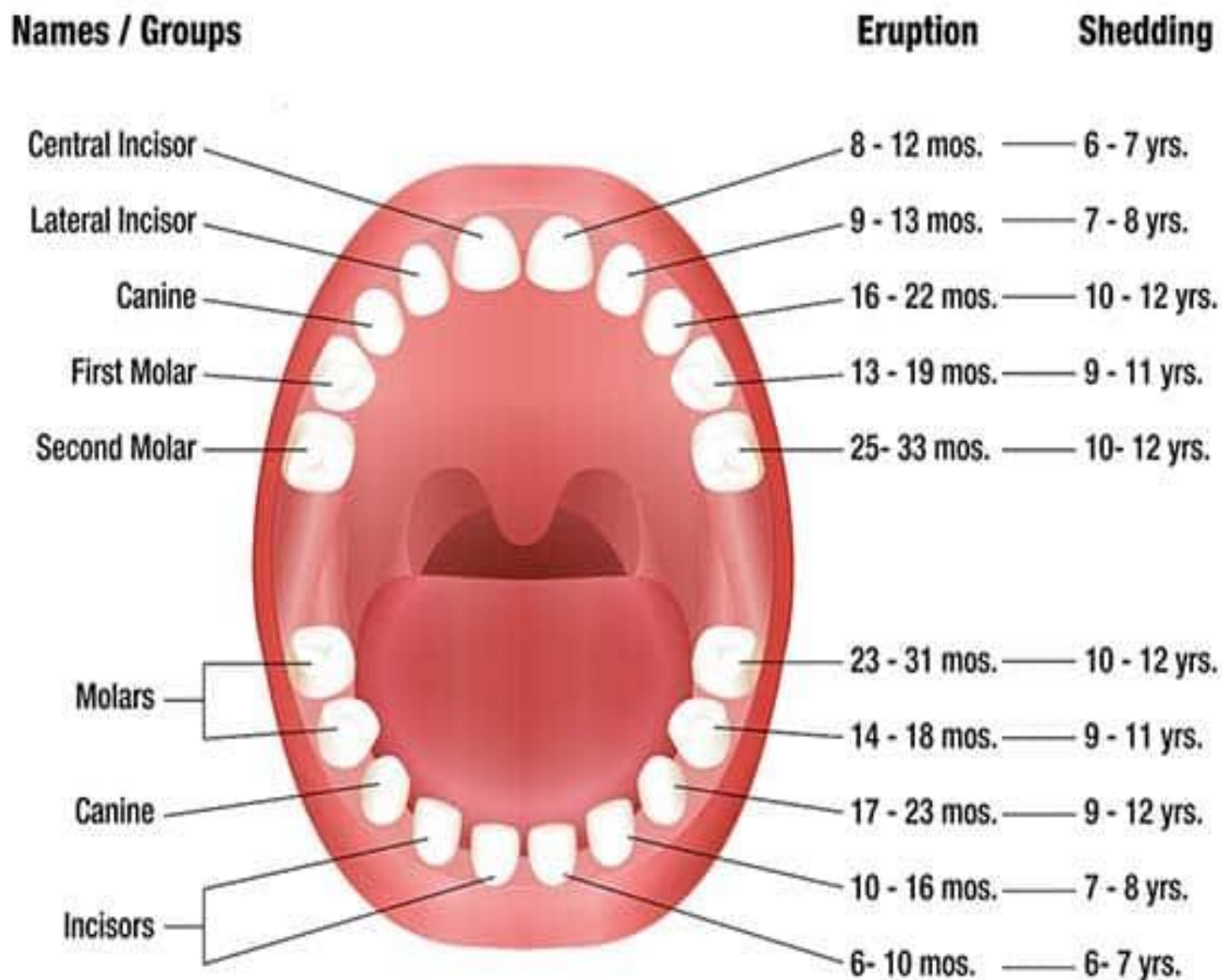
- **Dense = tooth in Latin**
- **Dental = anything related to teeth**
- **Heterodont, which means that he has different-shaped teeth.**
- **Hiphyodont, which means that he has two sets of teeth; deciduous teeth (primary teeth) and permanent teeth.**

The Deciduous Teeth

- At birth, there are no teeth present in the mouth, but many teeth in various stages of development are found in the jaws.
- After birth (post-natal period), the eruption of deciduous teeth starts at six months and lasts until two and a half years.
- The deciduous teeth stay until the permanent teeth erupt at about 6 years of age, when the transition to the permanent dentition begins.

Baby Tooth Development Chart

(Primary teeth, deciduous teeth, temporary teeth, or milk teeth)



$$I \frac{2}{2} \quad C \frac{1}{1} \quad M \frac{2}{2} = 10 \text{ (for each side)}$$



- The deciduous teeth are 20 in number.
- They have the following formula:
- **I = Incisors (central and lateral).**
- **C = Canine.**
- **M = Molars (first and second).**

The Permanent Teeth

- The transition to permanent dentition begins with the emergence and eruption of the first permanent molars at the age of six years, followed by shedding of the deciduous teeth and emergence and eruption of the remaining permanent teeth.
- This process requires about 20 years to be completed.
- The number of permanent teeth, including third molars when present, is 32.

$$I^{\frac{2}{2}} C^{\frac{1}{1}} P^{\frac{2}{2}} M^{\frac{3}{3}} = 16 \text{ (for each side)}$$

- **I = Incisors (central and lateral).**
- **C = Canine.**
- **P = Premolars (first and second).**
- **M = Molars (first, second and third).**

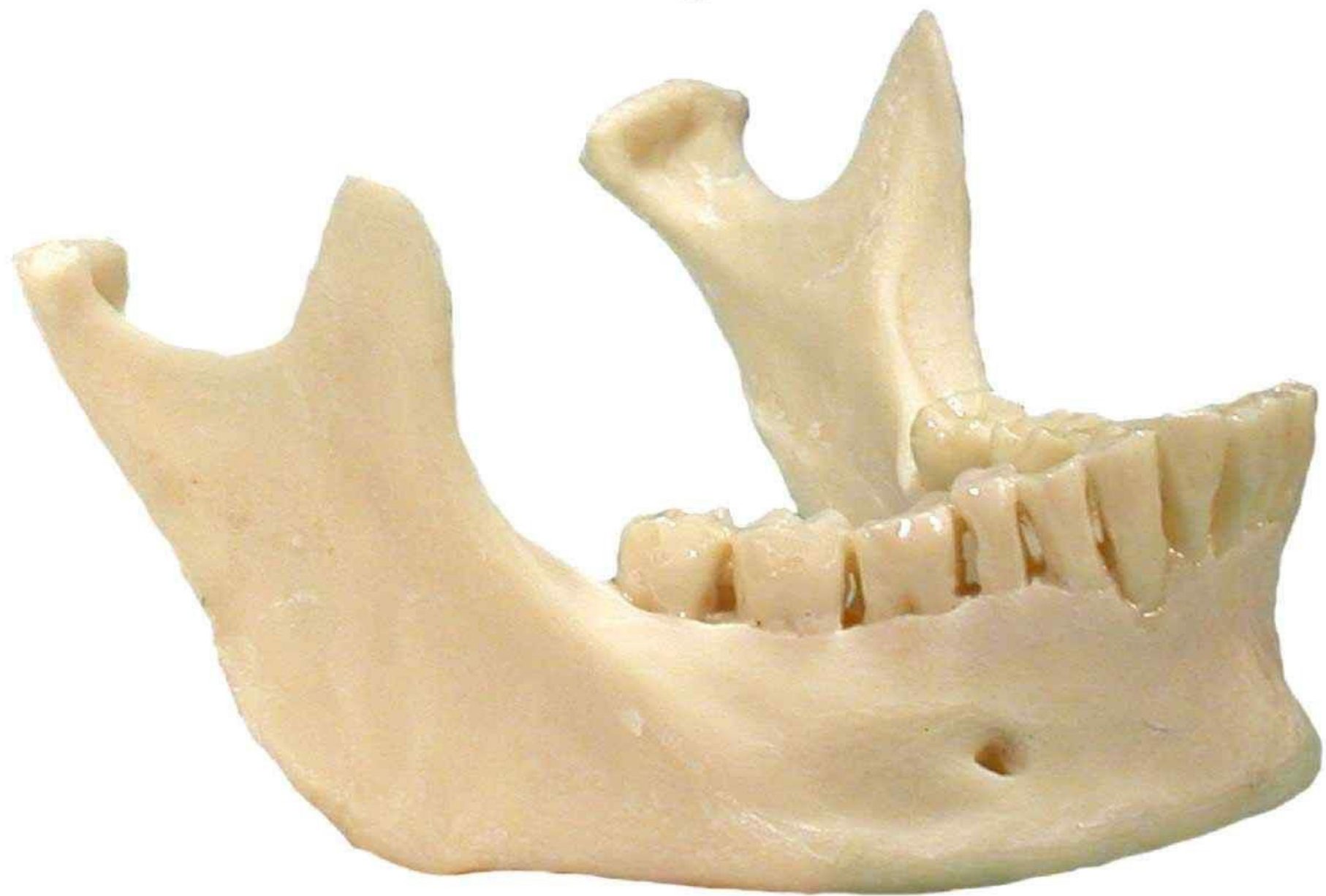


Anterior and Posterior Teeth

- Teeth are grouped into:
 1. Anterior teeth which include the incisors and the canines.
 2. Posterior teeth which include the premolars and molars.

- **The Jaw The jaw is the bone which carries the teeth.**
- **There are two jaws:**
 - 1. The upper jaw, which is fixed, and is called “The Maxilla”.**
 - 2. The lower jaw, which is movable, and is called “The Mandible”.**







Types of Dentition

1. Deciduous (baby) teeth

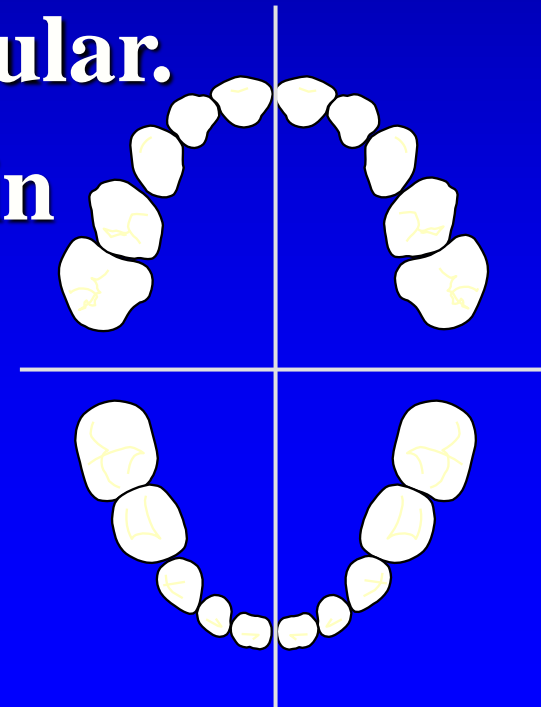
a. Twenty (20) primary teeth.

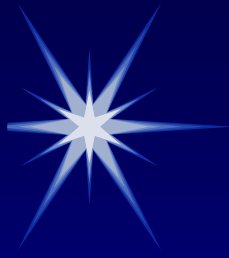
b. Arches - maxillary and mandibular.

c. Quadrants - each arch divided in half.

(1) Maxillary right and left.

(2) Mandibular right and left.





Deciduous Teeth

d. Teeth in each quadrant.

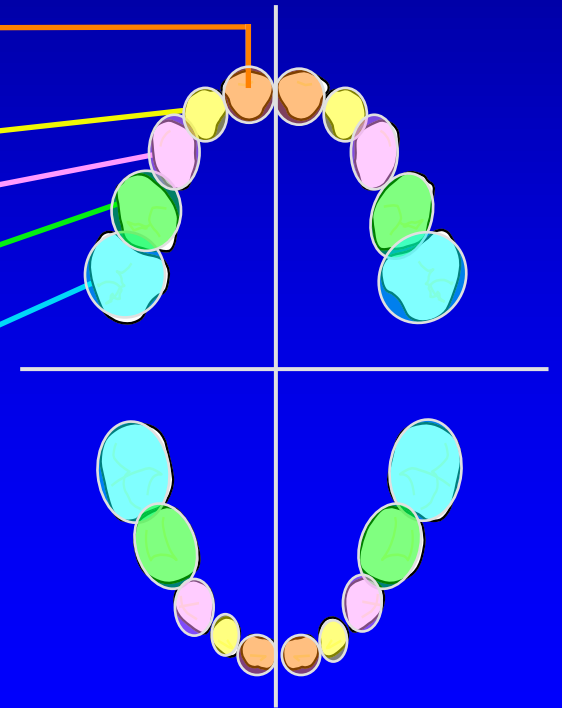
(1) Central incisor

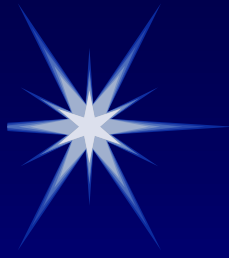
(2) Lateral incisor

(3) Cuspid

(4) 1st molar

(5) 2nd molar



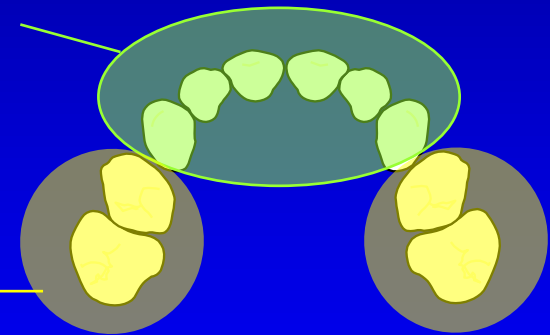


Deciduous Teeth

e. Anterior and posterior teeth.

(1) Anterior - centrals, laterals, and cuspids.

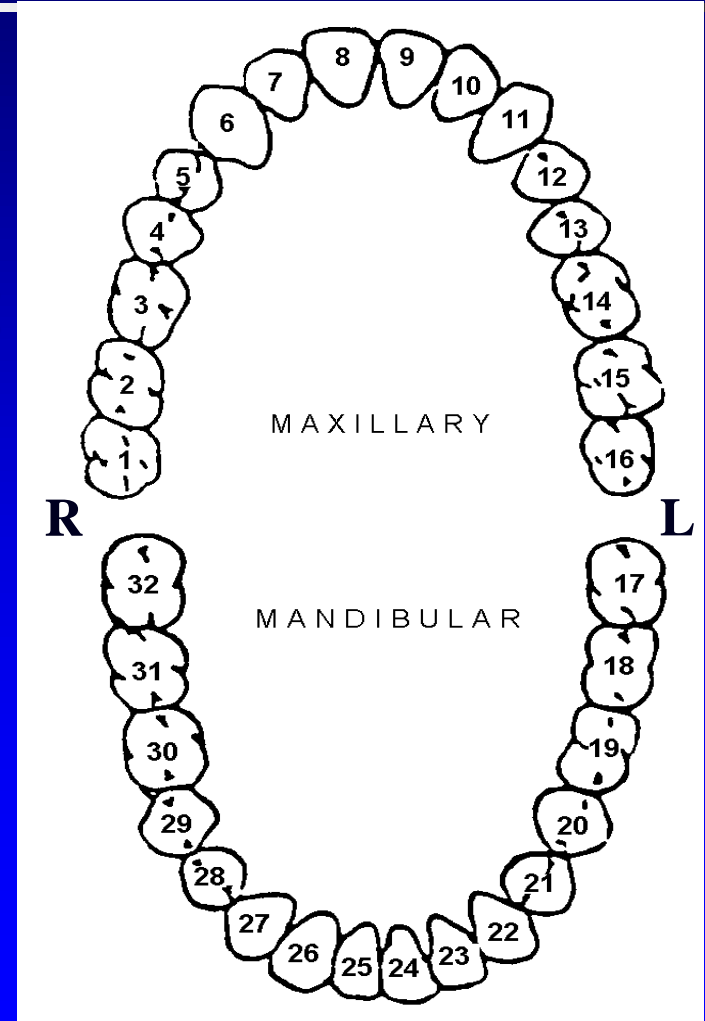
(2) Posterior - molars.





Types of Dentition

2. Permanent teeth.
 - a. Thirty-two (32) permanent teeth.
 - b. Arches - maxillary & mandibular.



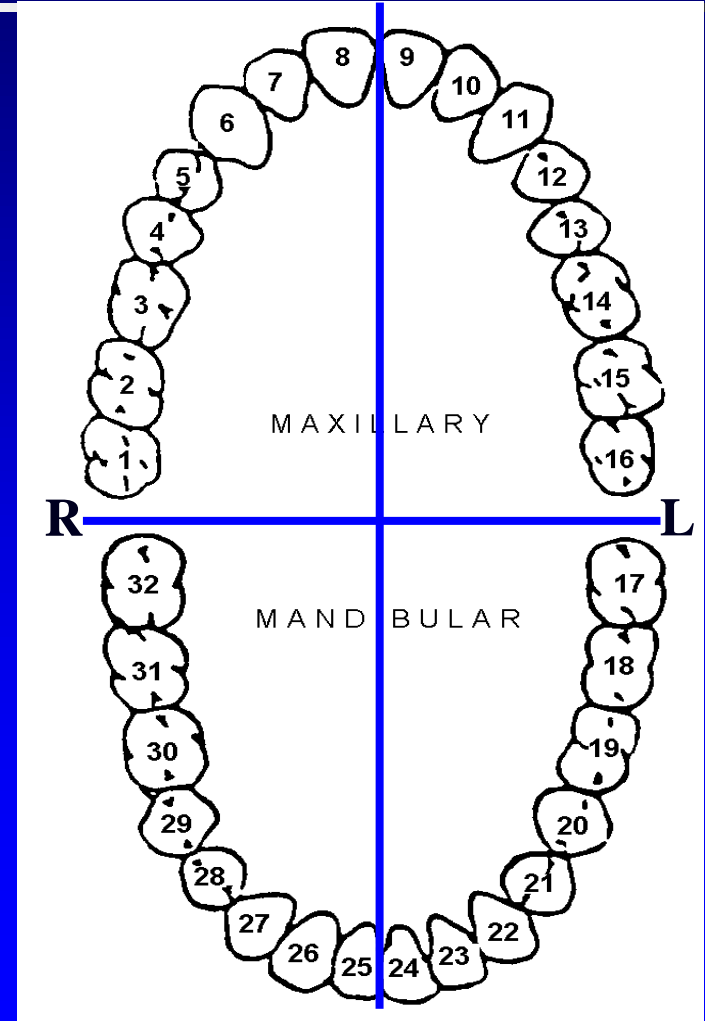


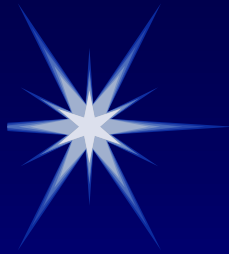
Permanent Teeth

c. Quadrants.

(1) Maxillary right and left.

(2) Mandibular right and left.





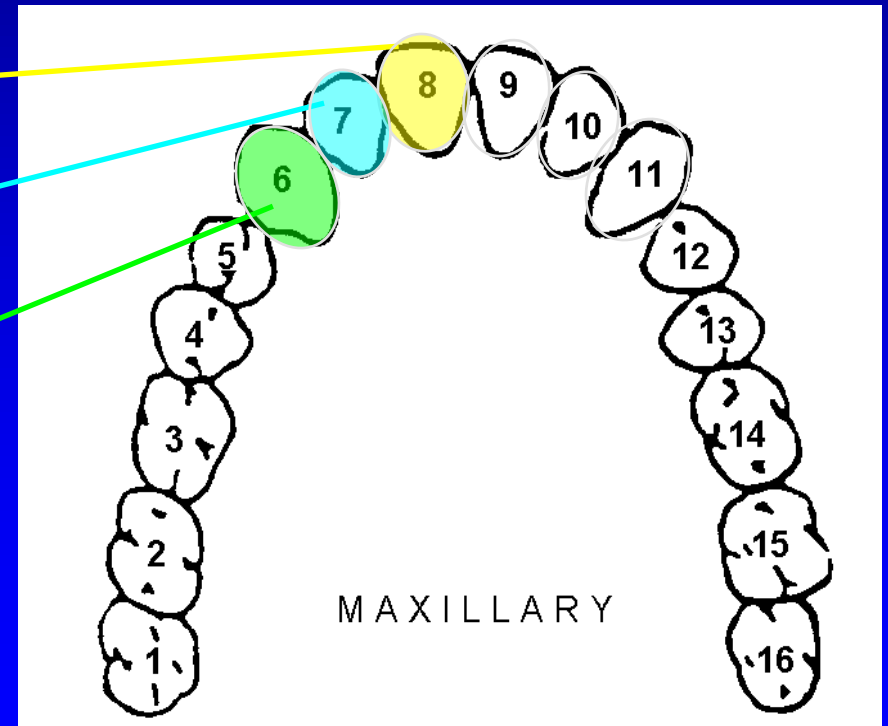
Permanent Teeth

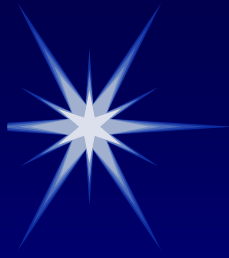
d. Teeth in each quadrant.

(1) Central incisor.

(2) Lateral incisor.

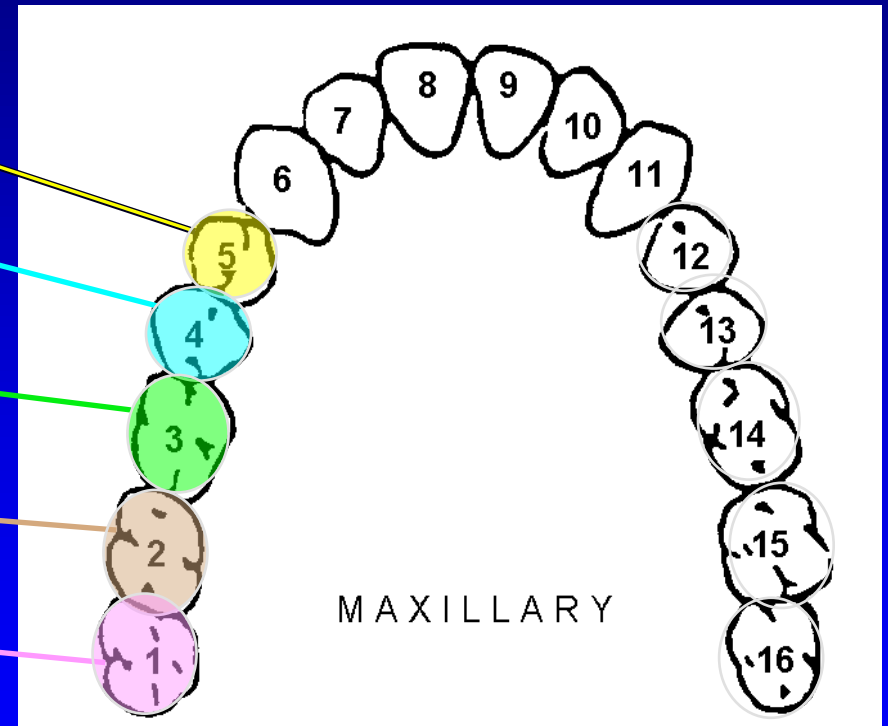
(3) Cuspid (canine).

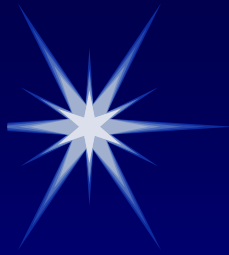




Permanent Teeth

- (4) 1st bicuspid
- (5) 2nd bicuspid
- (6) 1st molar
- (7) 2nd molar
- (8) 3rd molar
(wisdom tooth)



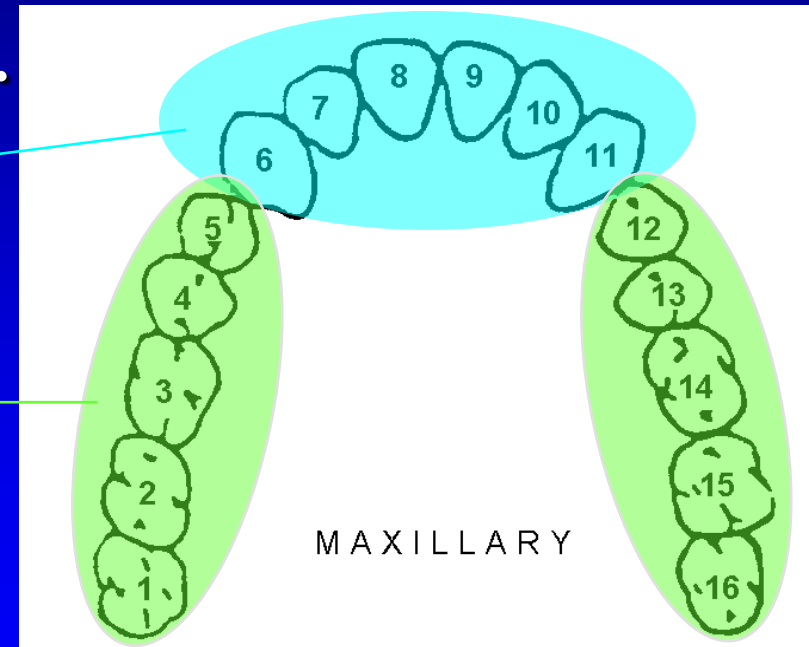


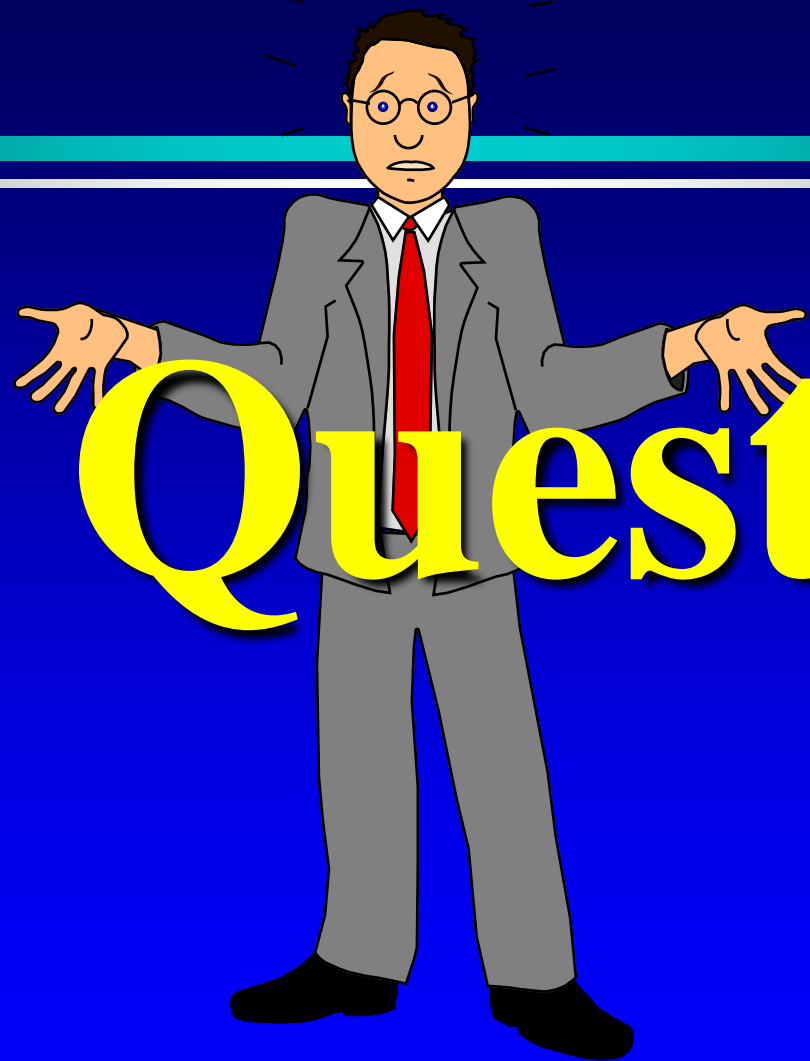
Permanent Teeth

e. Anterior and posterior teeth.

(1) Anteriors - central, lateral and cuspids.

(2) Posteriors - bicuspids and molars.





Any Questions

Introduction

Lec.2

Dental Anatomy

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Anatomy

of

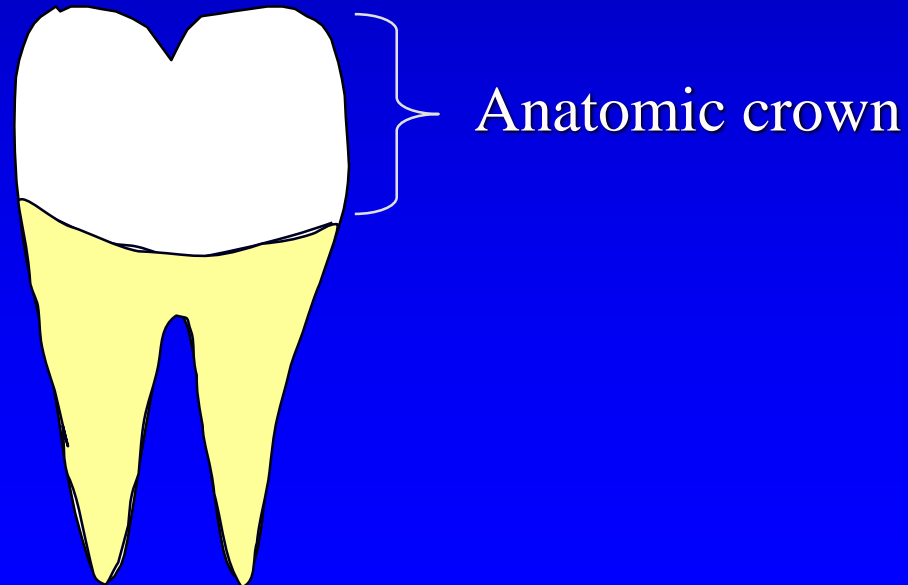
tooth



Dental Anatomy

1. Crown :

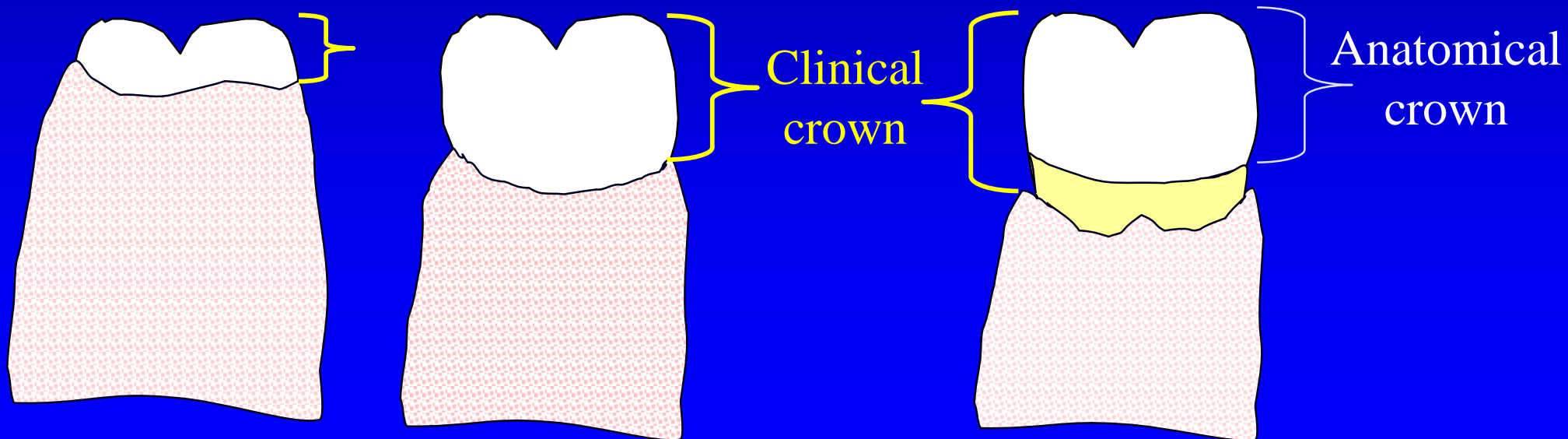
- a. Anatomical crown: portion of tooth covered with enamel





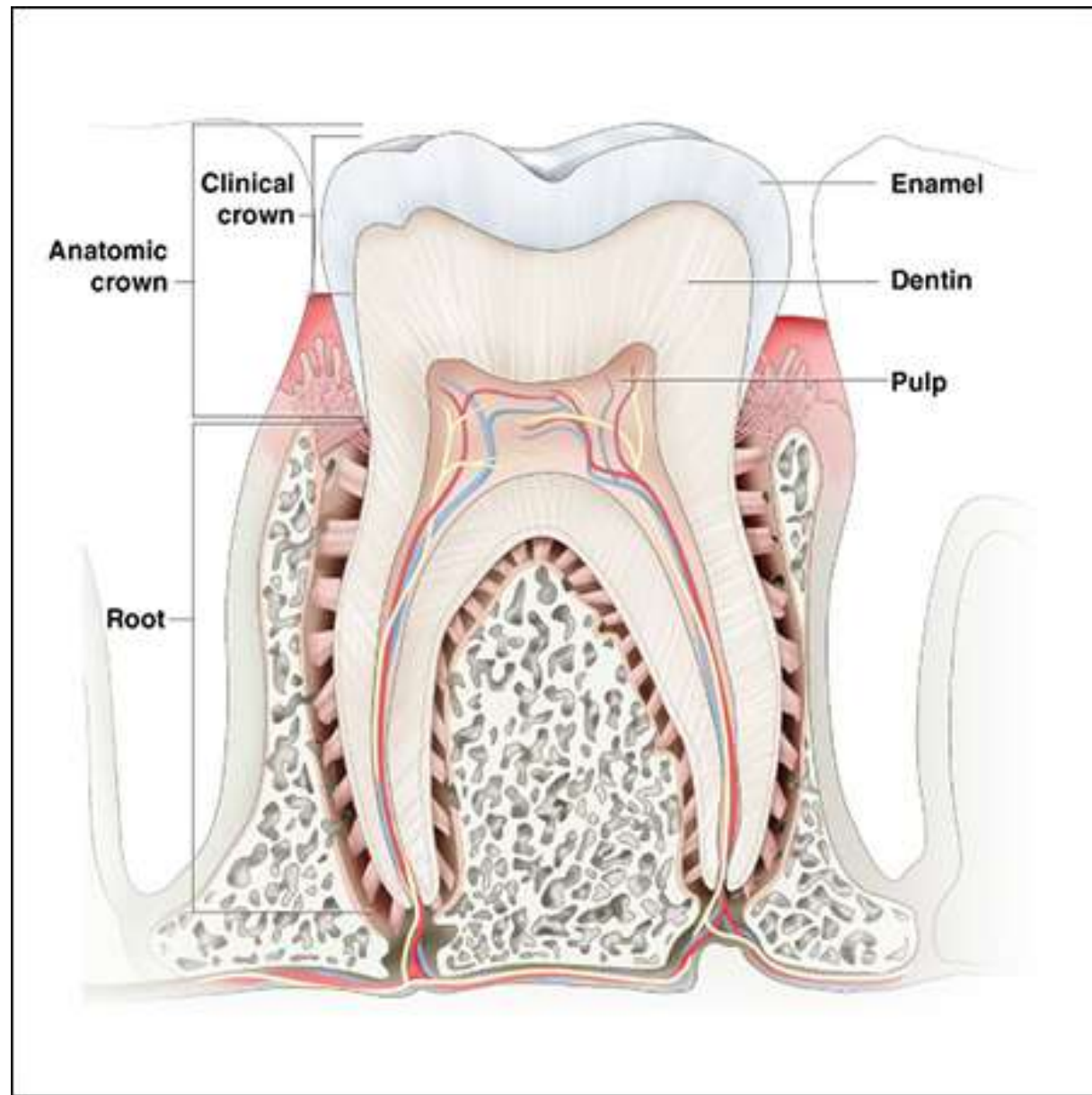
Dental Anatomy

b. **Clinical crown:** visible part of tooth above the gum line .



- **The anatomic crown** differs from the clinical crown in that the anatomic crown is the top area of your teeth coated in enamel,
- **while**
- **the clinical crown** is the visible part of your teeth not covered by your gums, including your visible anatomic crowns and visible root.

- **The cervical line or (cimento- enamel junction) separates the anatomic crown from the anatomic root**

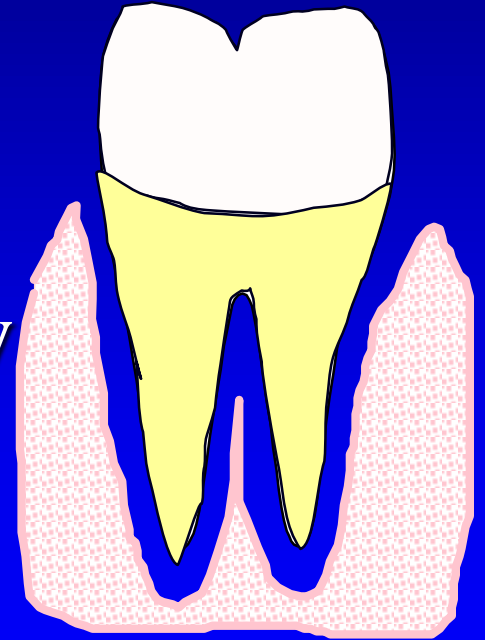




Dental Anatomy

2. Root:

Part of tooth embedded in the alveolar process and covered by cementum.

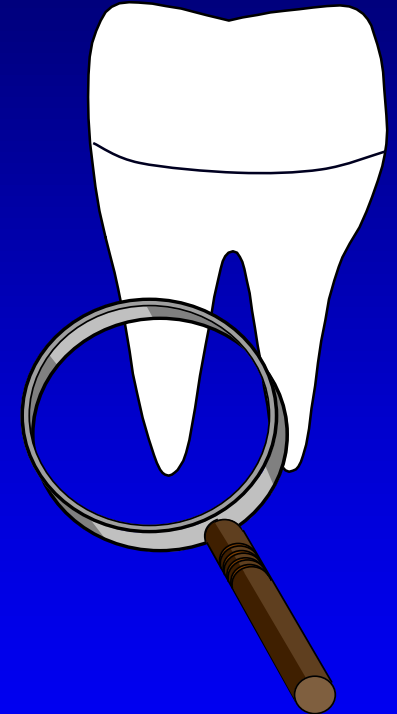
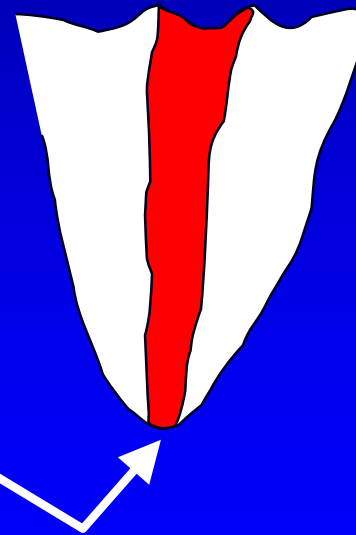


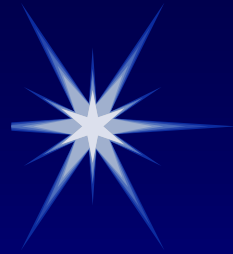


Dental Anatomy

3. **Apex:** tapered end of root tip.

4. **Apical foramen:**
opening at
the root tip.





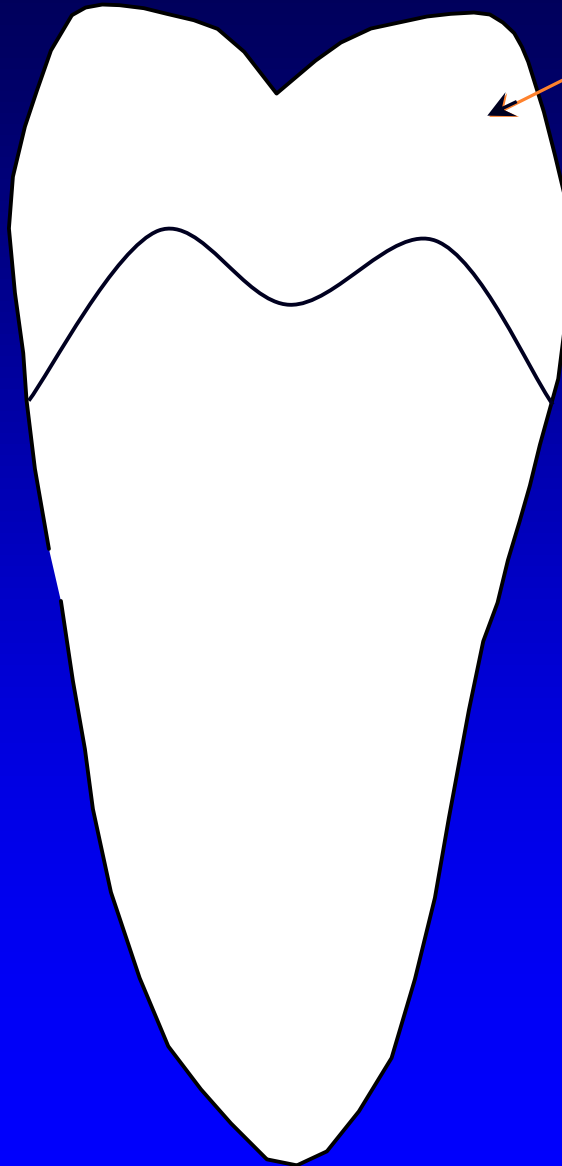
Dental Anatomy

Tissues of the tooth:

a. Enamel

- (1) Makes up anatomic crown.
- (2) Hardest material in the human body.
- (3) Incapable of remodeling and repair.

Enamel

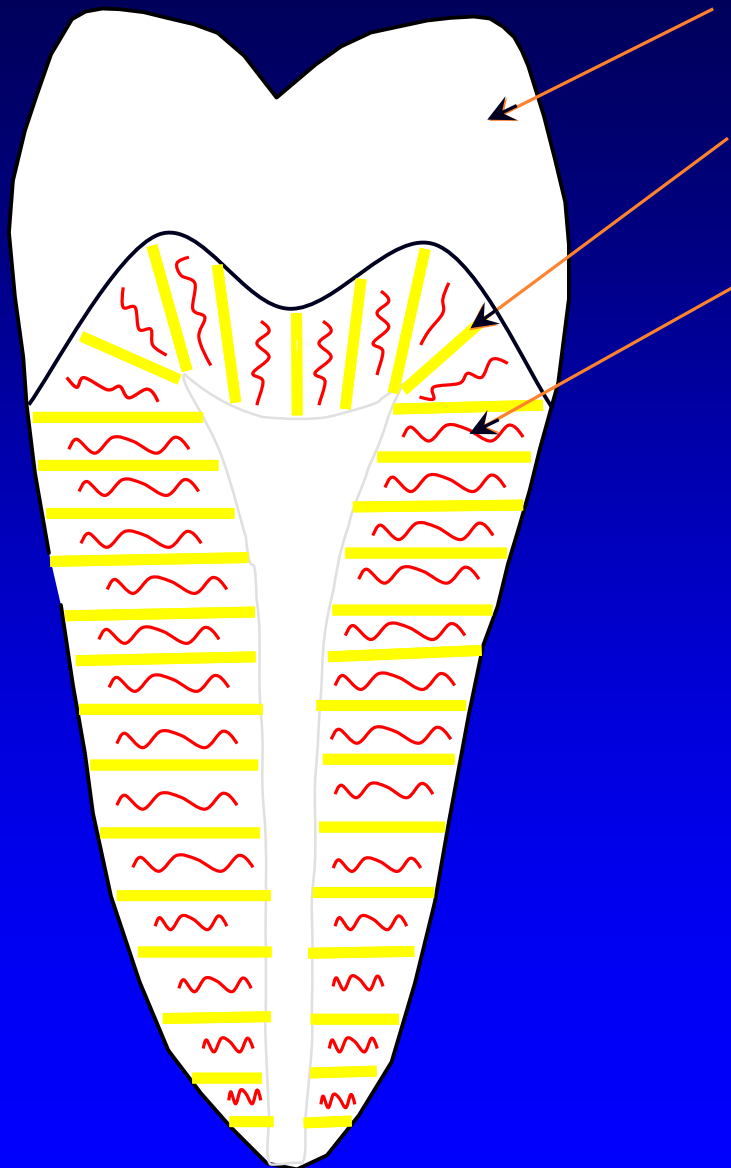




Dental Anatomy

b. Dentin

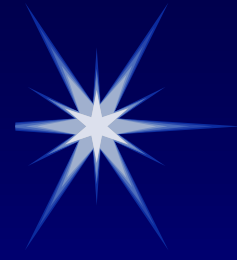
- (1) Makes up bulk of tooth.
- (2) Covered by enamel on crown and cementum on the root.
- (3) Not as hard as enamel.
- (4) Exposed dentin is often sensitive to cold, hot, air, and touch (via dentinal tubules).



Enamel

Dentin

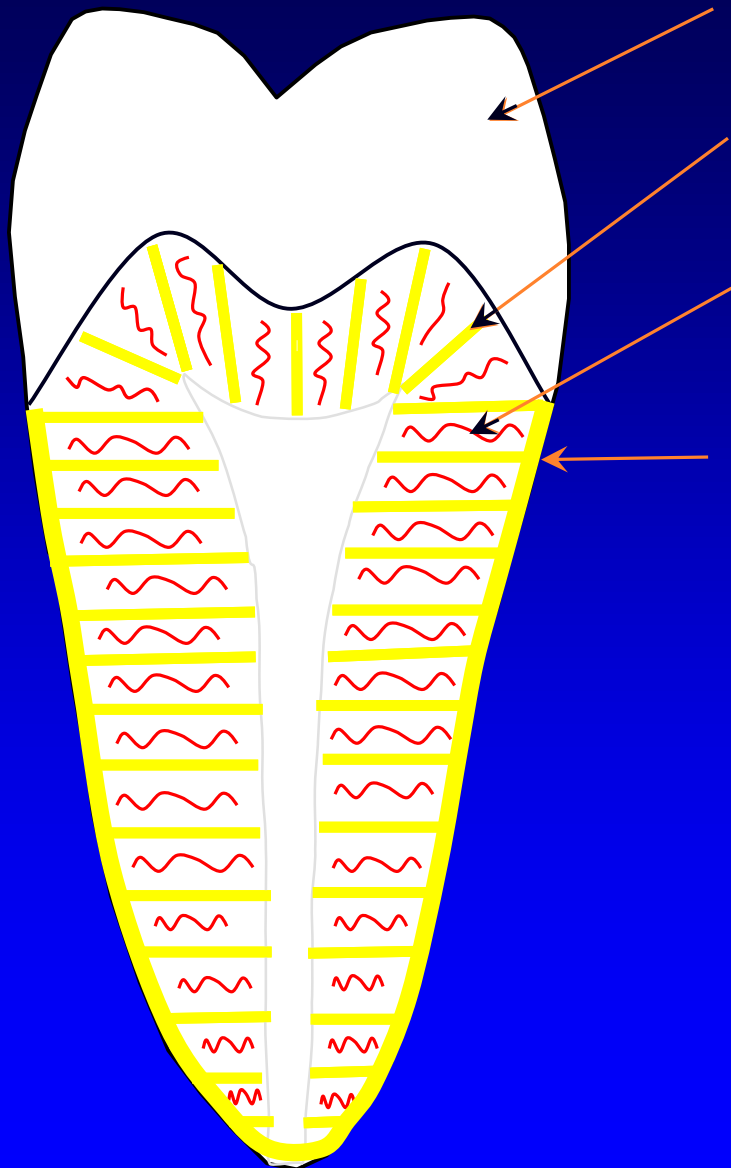
Dentinal
Tubules



Dental Anatomy

c. Cementum

- (1) Covers root of tooth.
- (2) Overlies the dentin and joins the enamel at the cemento-enamel junction (CEJ).
- (3) Primary function is to anchor the tooth to the bony socket with attachment fibers.



Enamel

Dentin

Dentinal
Tubules

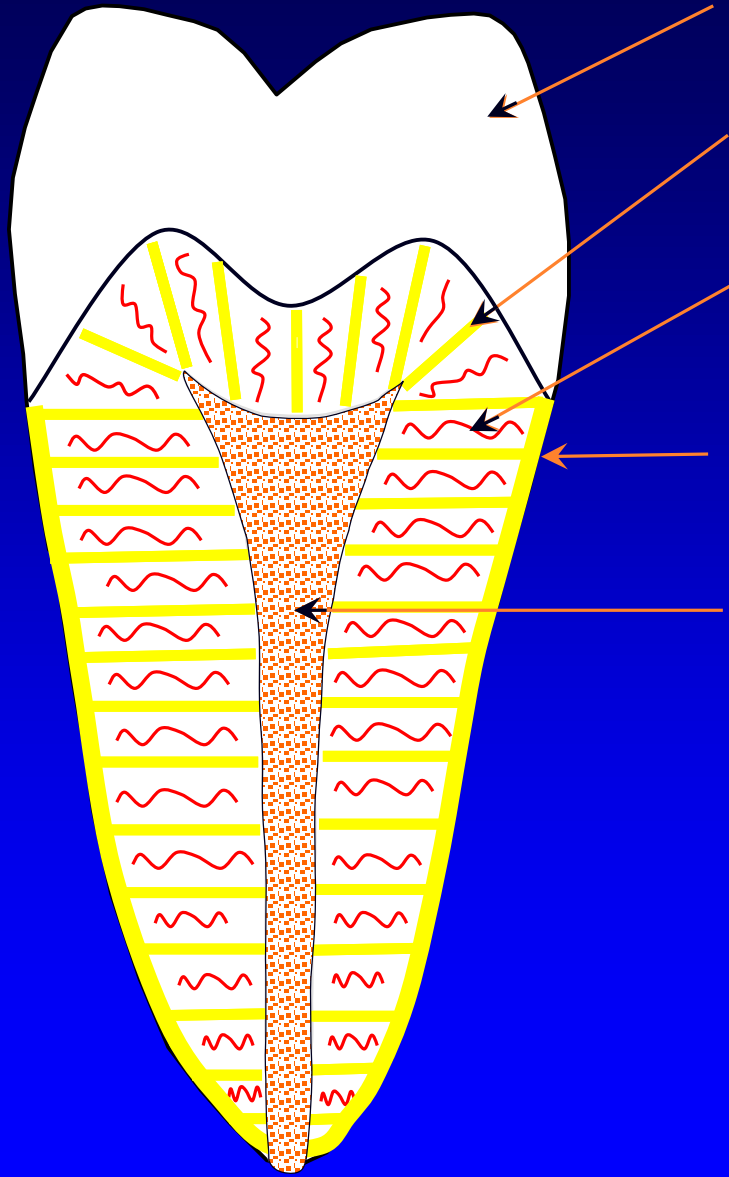
Cementum



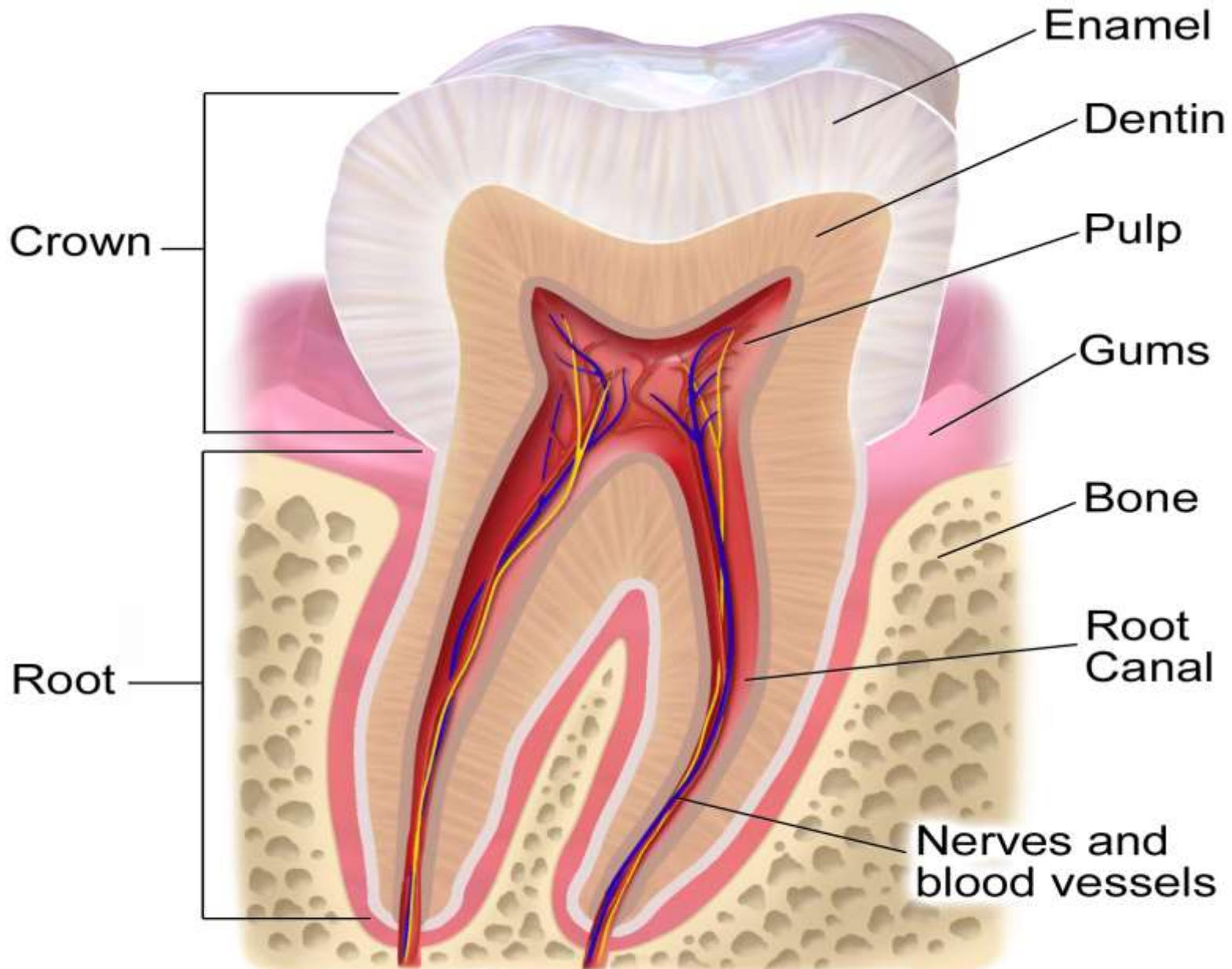
Dental Anatomy

d. Pulp

- (1) Made up of blood vessels and nerves entering through the apical foramen.
- (2) Contains connective tissue, which aids interchange between pulp and dentin.



- Enamel
- Dentin
- Dentinal Tubules
- Cementum
- Pulp



Tooth Anatomy

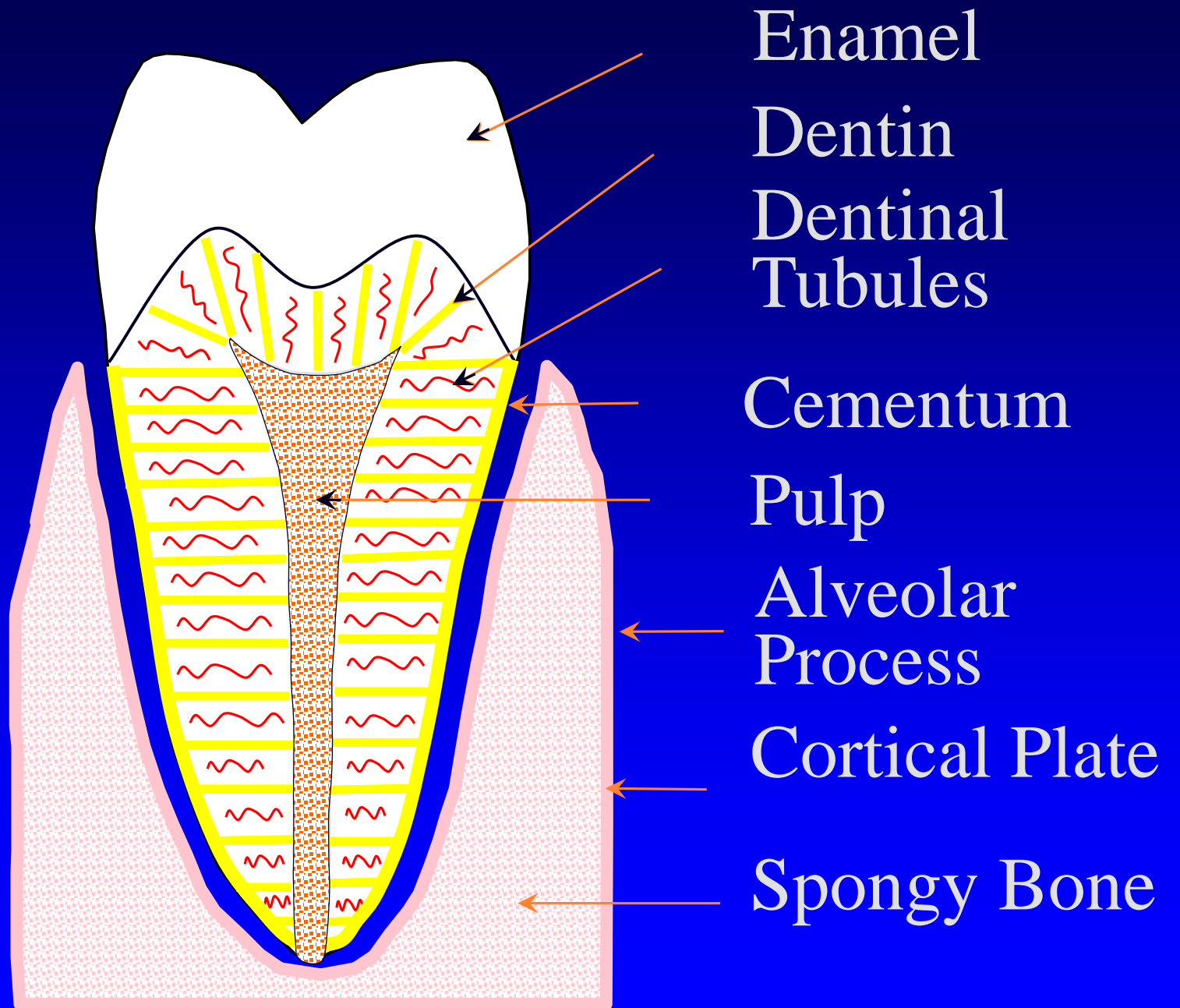


Dental Anatomy

e. Periodontium

a. Alveolar process

- (1) Bone extensions of the maxillae and mandible that supports the teeth.
- (2) Cortical plate is the dense outer layer of bone covering the spongy (cancellous) bone



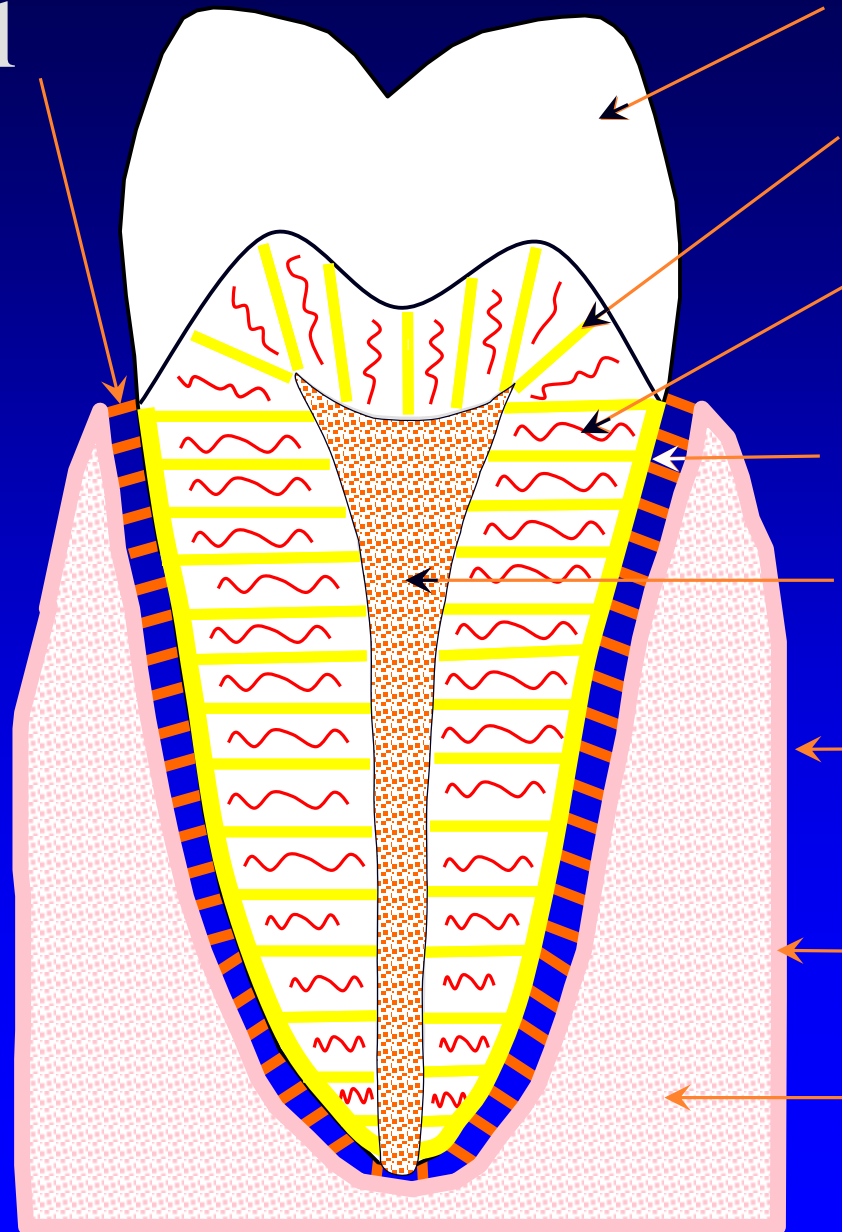


Dental Anatomy

b. Periodontal ligaments

- (1) Dense connective fibrous tissues that connect teeth to the alveolar bone.
- (2) One end is embedded in cementum and other end in bone.
- (3) Supports and protects the tooth from normal shock.

Periodontal
Ligaments



Enamel

Dentin

Dentinal
Tubules

Cementum

Pulp

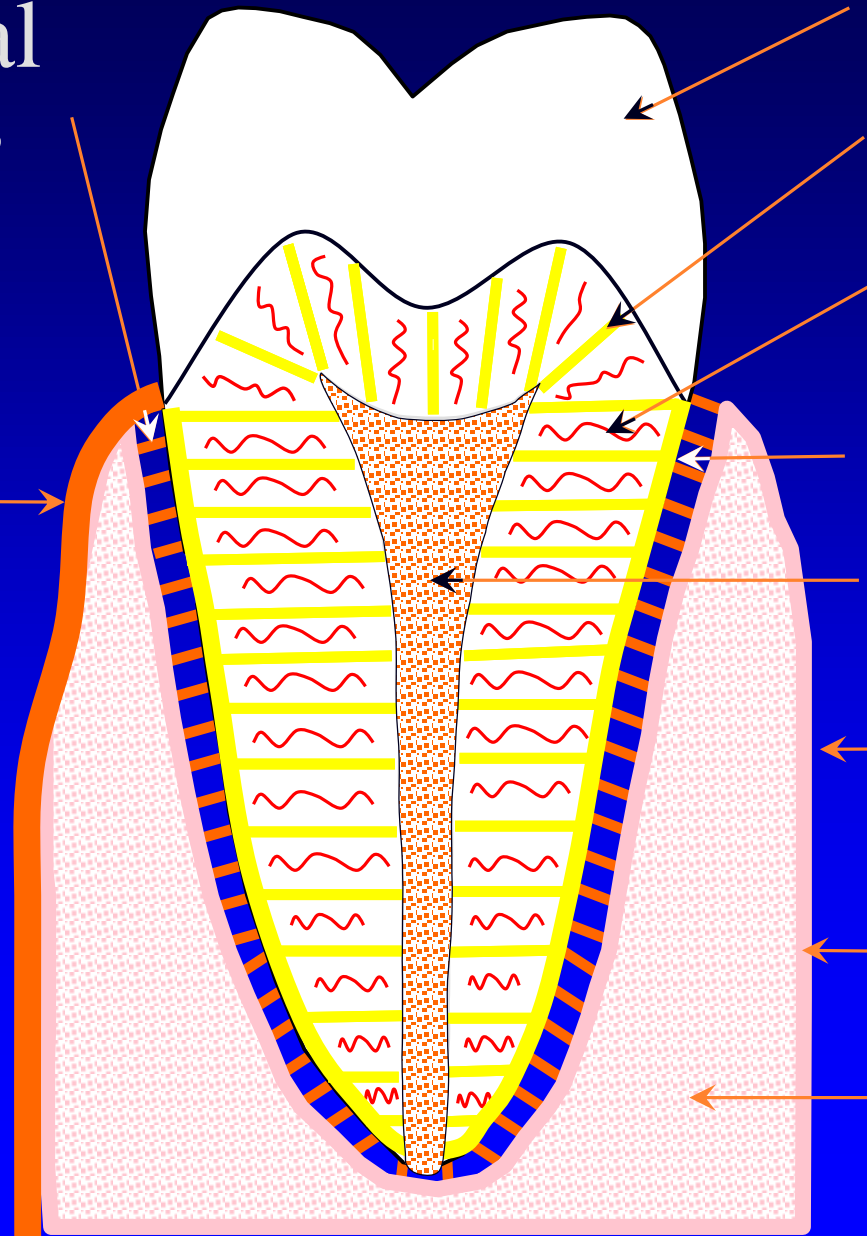
Alveolar
Process

Cortical Plate

Spongy Bone

Periodontal
Ligaments

Gingiva



Enamel

Dentin

Dentinal
Tubules

Cementum

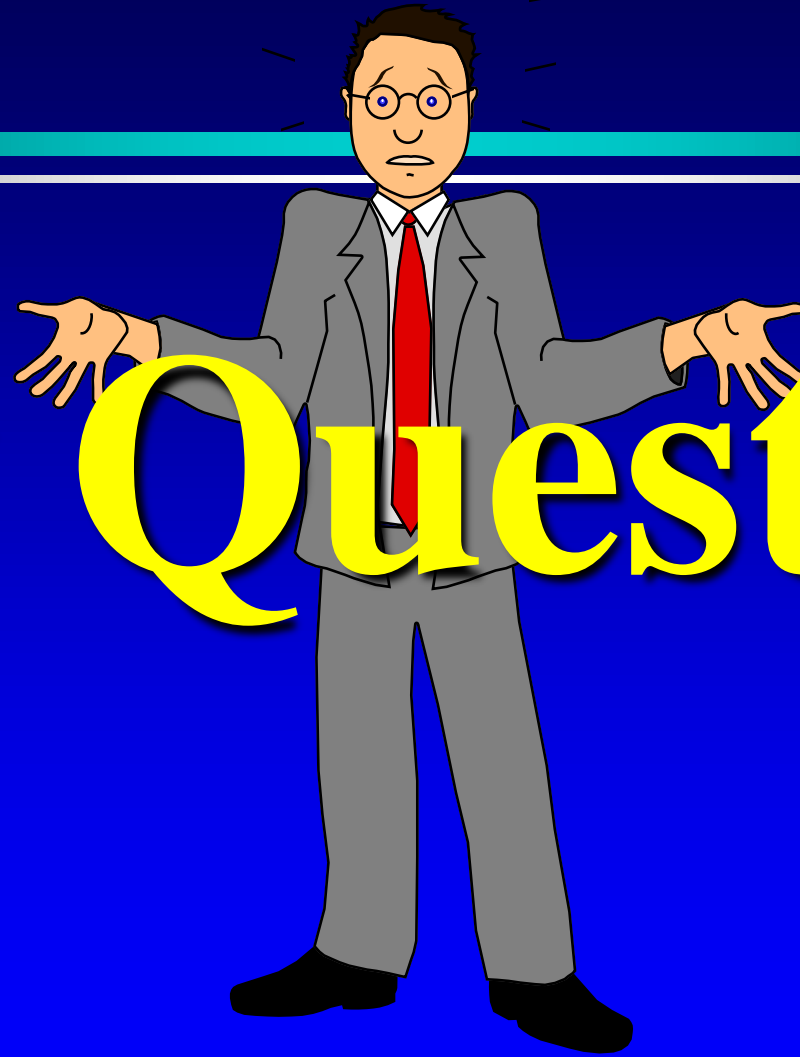
Pulp

Alveolar
Process

Cortical Plate

Spongy Bone

Any Questions



Numbering Systems

Lec.3

Dental Anatomy

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Tooth Identification Systems

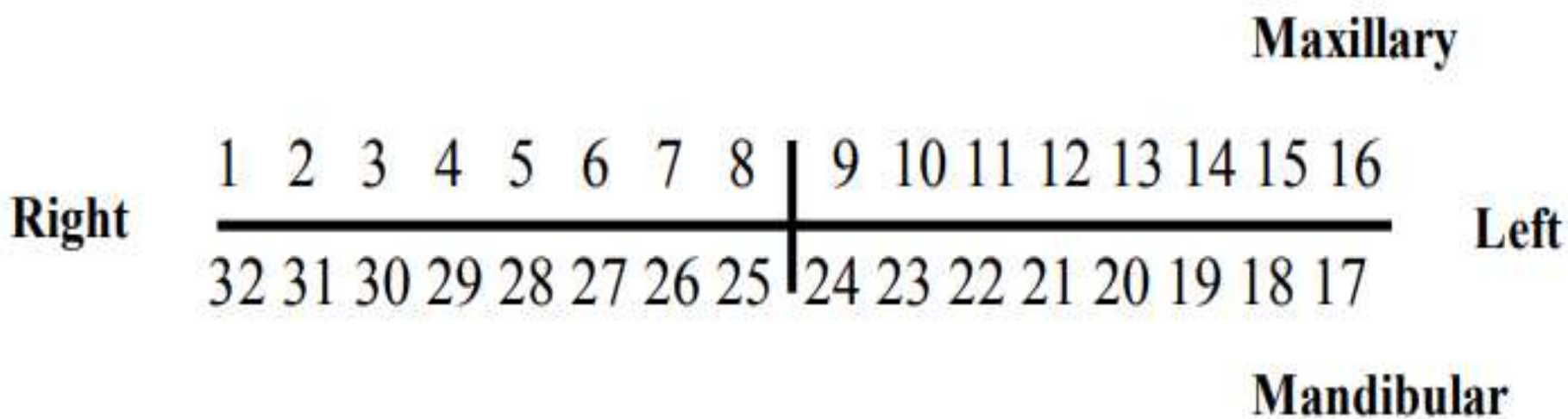
- 1. Universal notation system**
- 2. Palmer notation system**
- 3. F.D.I system**

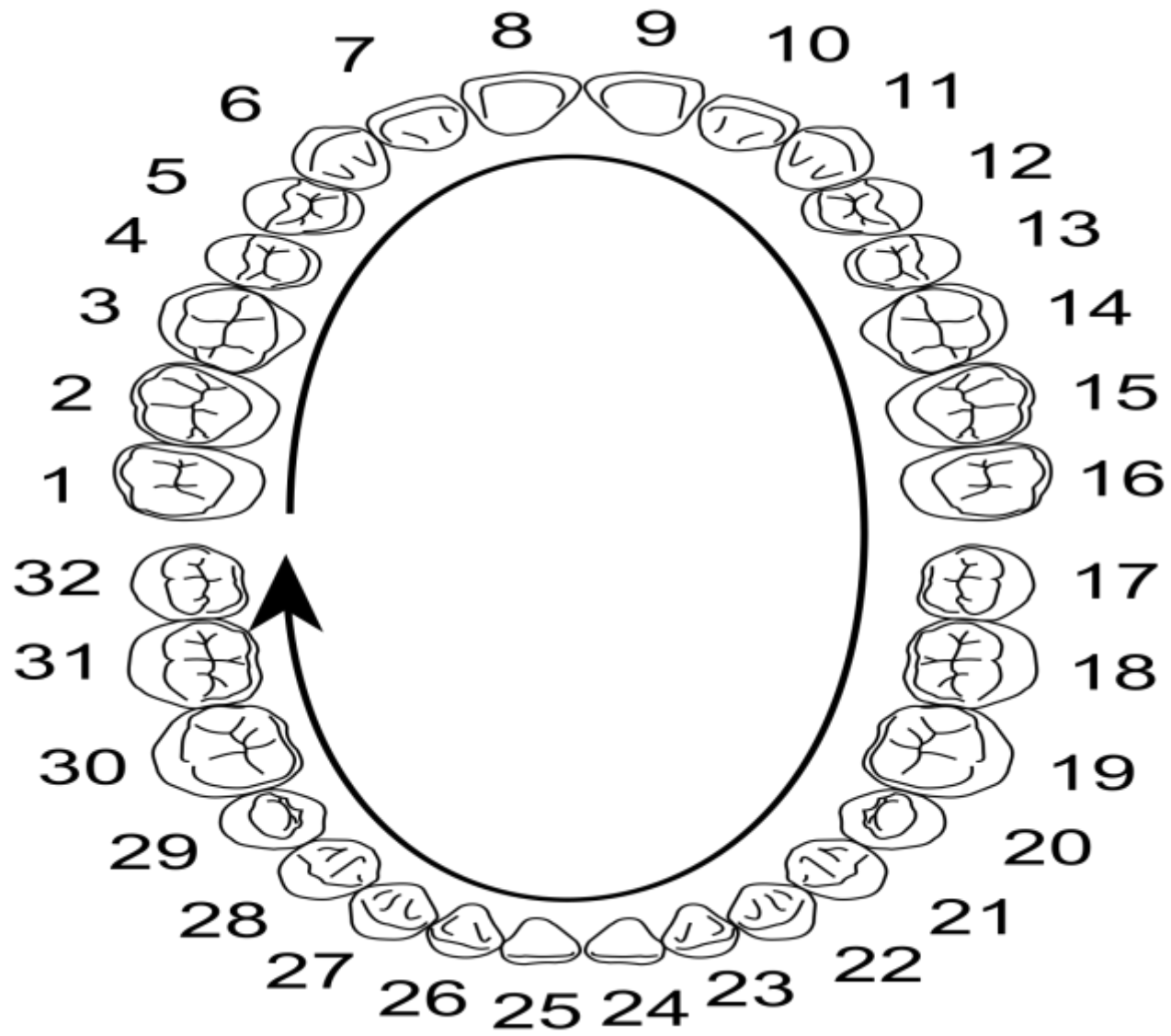
Universal notation system

- The **Universal Numbering System**, sometimes called the "American System", is a dental notation system commonly used in the United States.

- first suggested by **Parreidt 1882.**
- It uses numbers 1 through 32 for the permanent dentition.

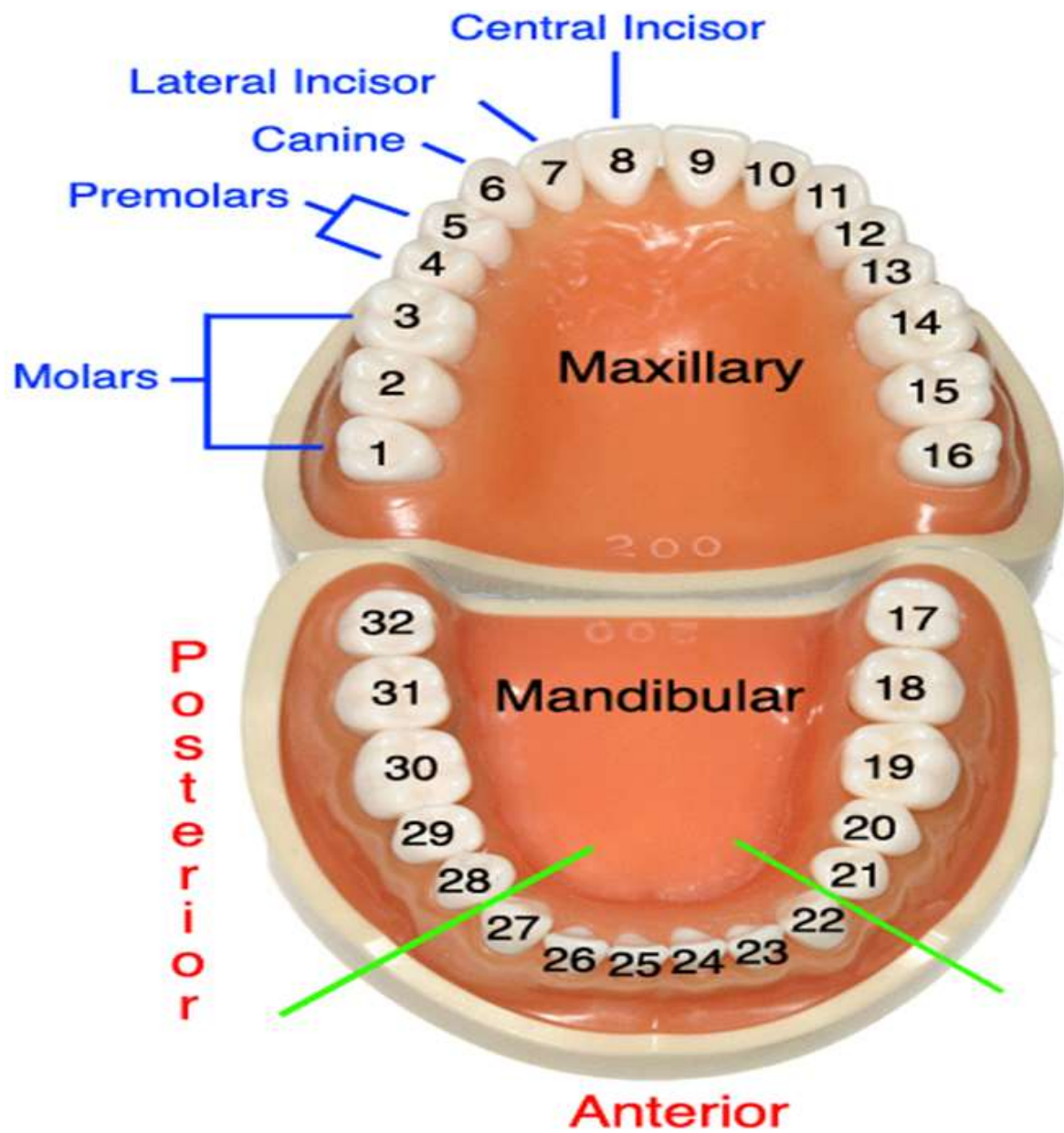
- **Universal method** – starting at the rear right upper molar and preceding to the rear left upper molar, teeth are numbered 1 to 16. Then, the bottom teeth are numbered from left to right 17 to 32.
- This numbering system allows for all **32 teeth**, including wisdom teeth, to be present.





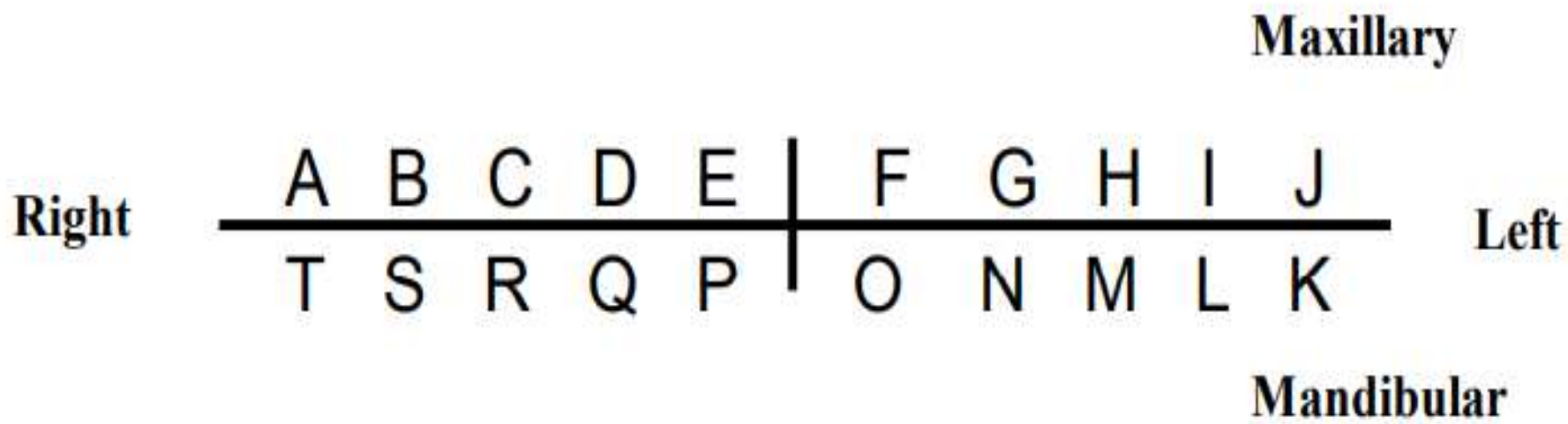
A. Permanent Teeth:

- Examples
- **#11:** Permanent Maxillary Left Canine.
- **#29:** Permanent Mandibular Right Second Premolar.
- **#8:** Permanent Maxillary Right Central Incisor.

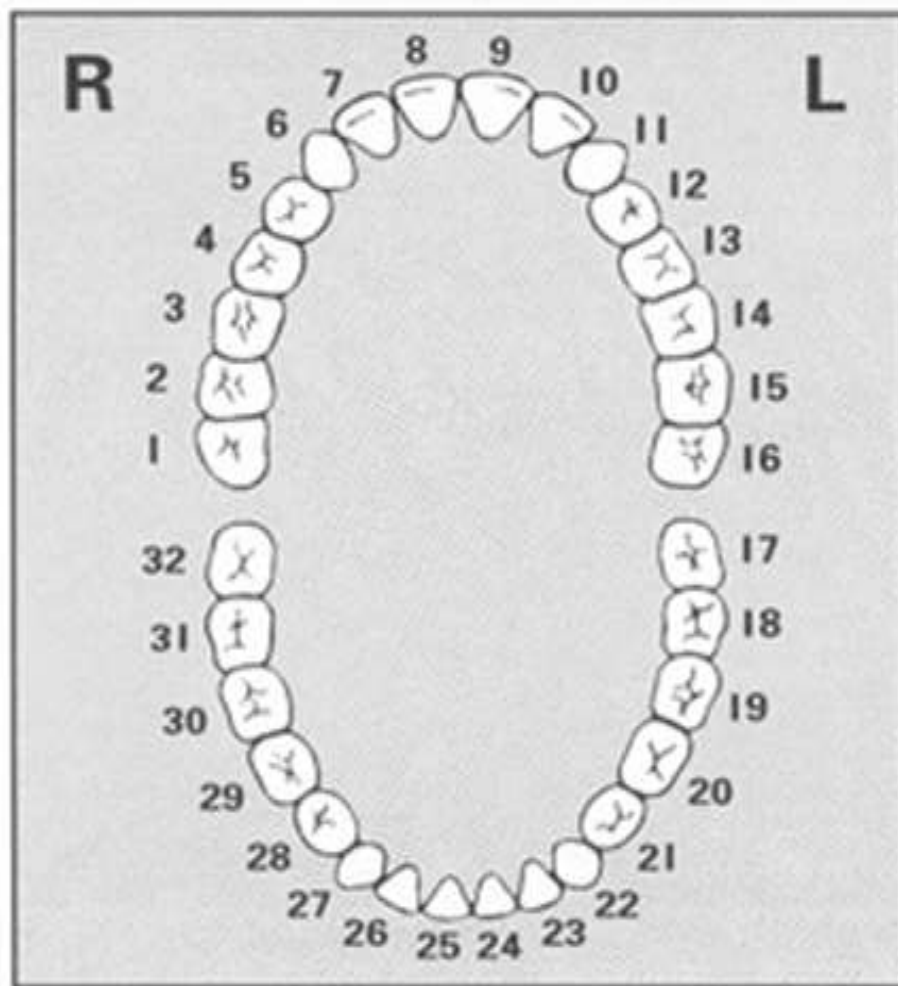


B. Deciduous Teeth:

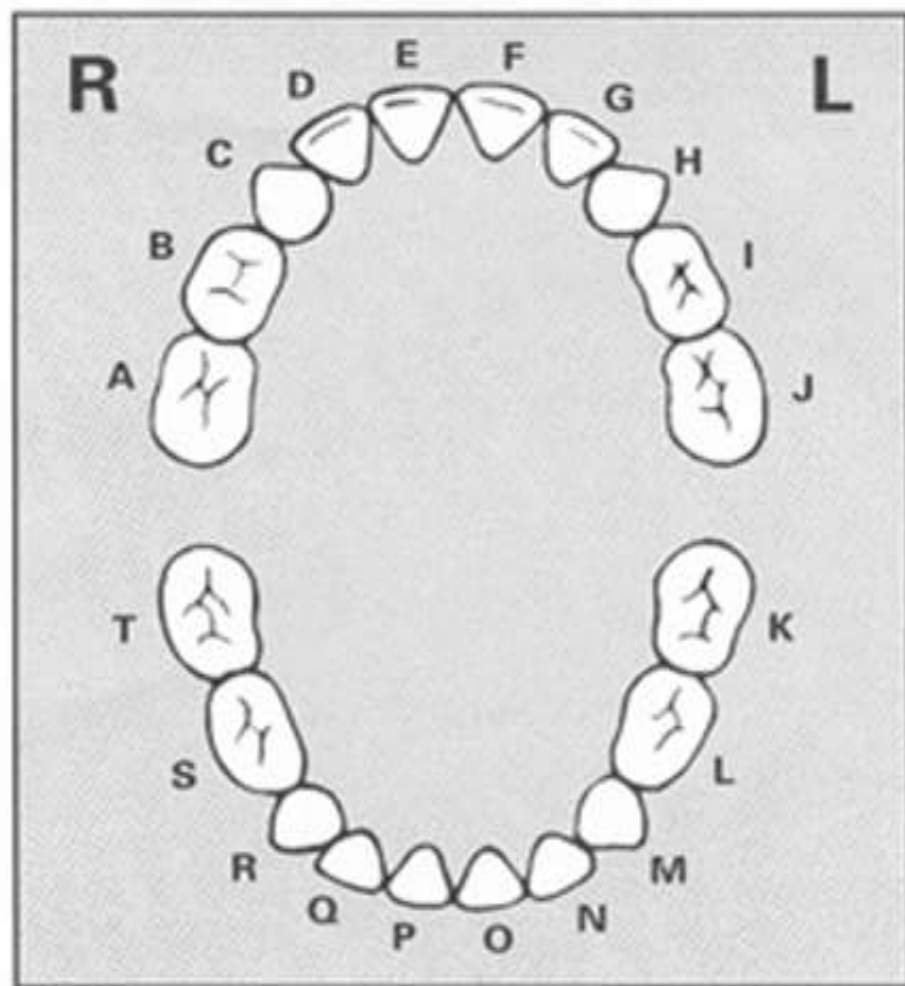
- Examples:
- **#B:** Deciduous Maxillary Right First Molar
- **#O:** Deciduous Mandibular Left Central Incisor
- **#D:** Deciduous Maxillary Right Lateral Incisor



Permanent Dentition



Primary Dentition



Palmer notation system

- The Palmer notation consists of a symbol (┘ ┌ ┐ └) designating in which quadrant the tooth is found and a number indicating the position from the midline.
- Adult teeth are numbered 1 to 8, with deciduous (baby) teeth indicated by a letter A to E.



8 7 6 5 4 3 2 1 | 1 2 3 4 5 6 7 8

8 7 6 5 4 3 2 1 | 1 2 3 4 5 6 7 8

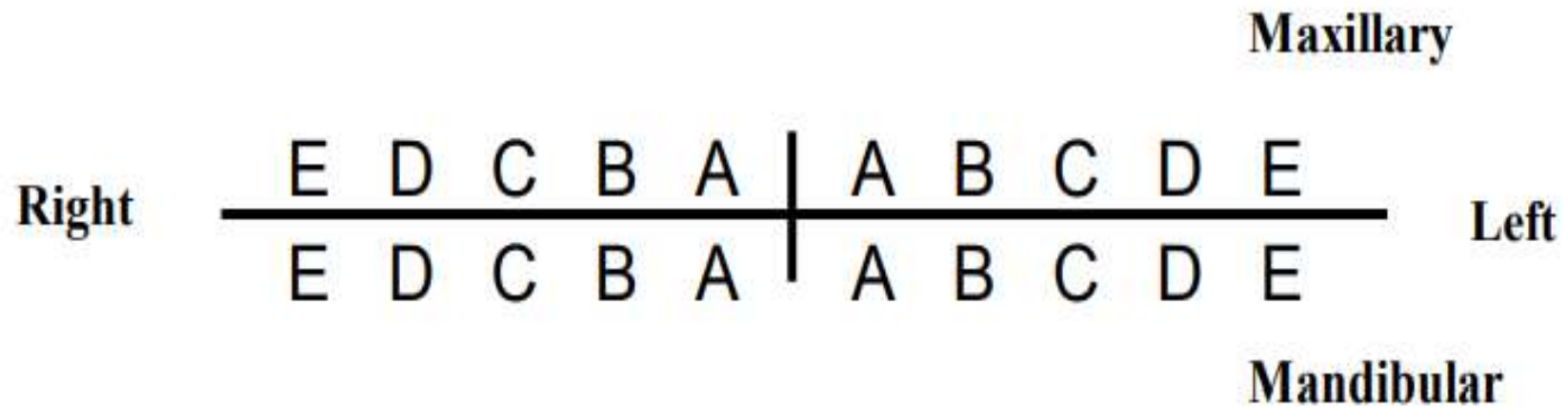
Examples:

└6┘ Permanent Maxillary Right First Molar

└3┘ Permanent Mandibular Left Canine

└8┘ Permanent Maxillary Left Third Molar

B. Deciduous Teeth:



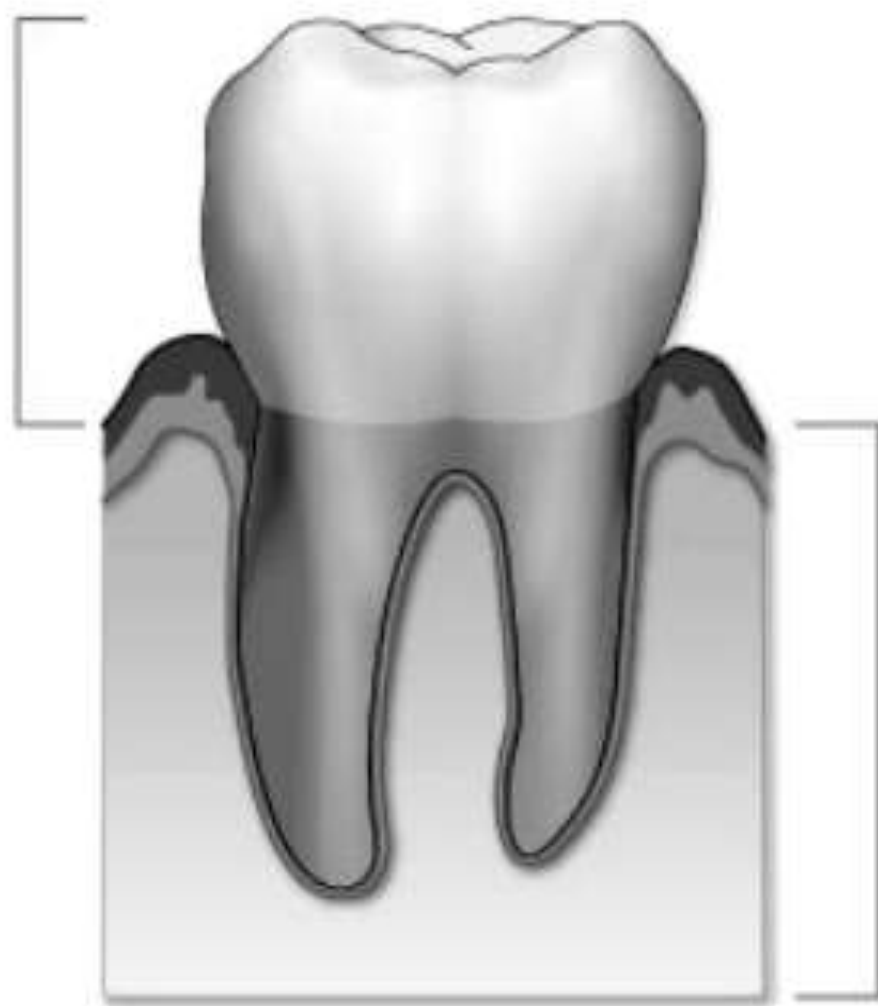
Examples:

- ┌ B Deciduous Mandibular Left Lateral Incisor
- └ E Deciduous Maxillary Right Second Molar
- └ C Deciduous Mandibular Right Canine

Crown and Root

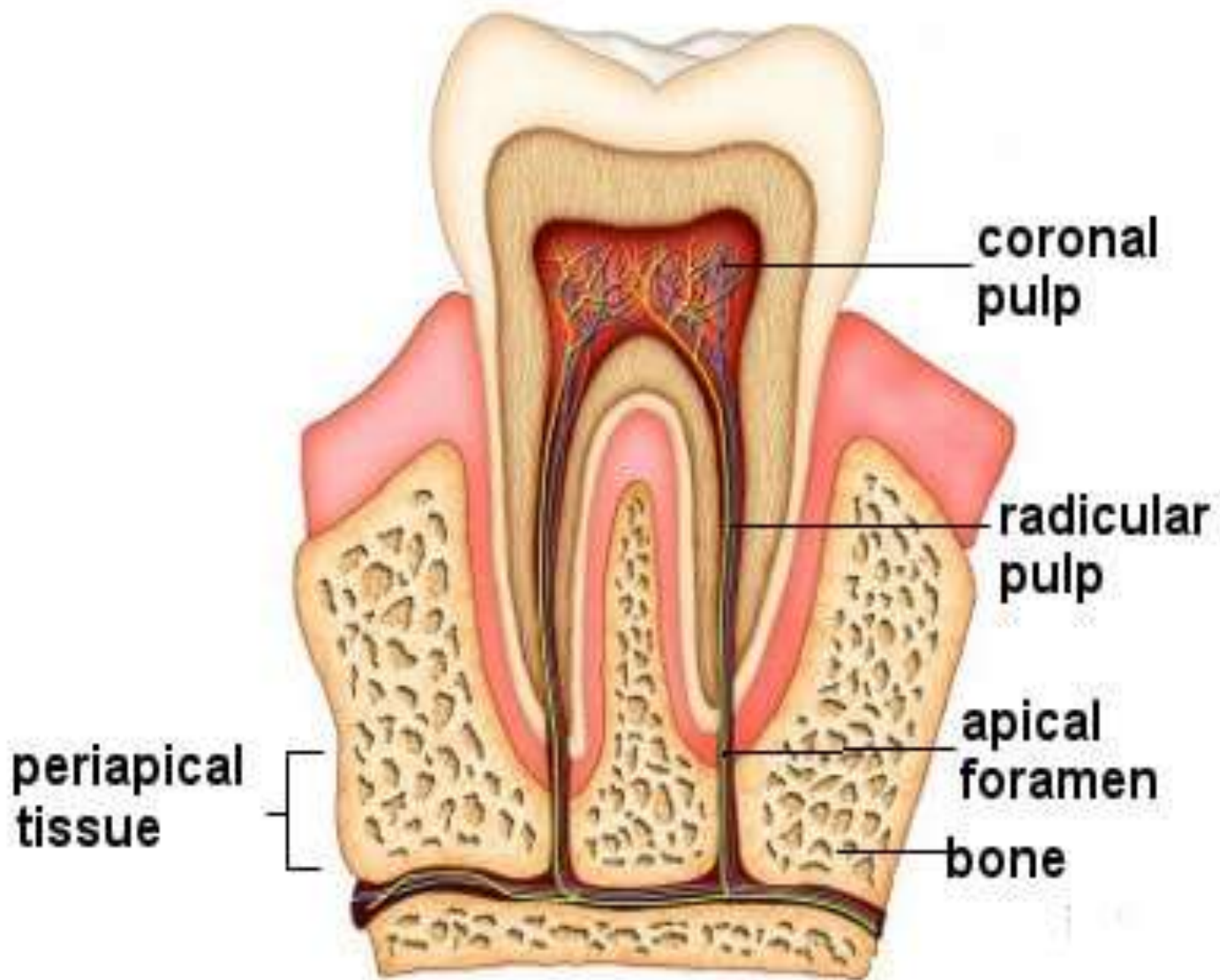
- Each tooth has a crown and root.
- The crown is covered with enamel.
- The root is covered with cementum and they join at the cemento-enamel junction (CEJ) or cervical line.
- The enamel, cementum and dentin are the hard tissues of the tooth. The major bulk of the tooth is dentin.

Crown



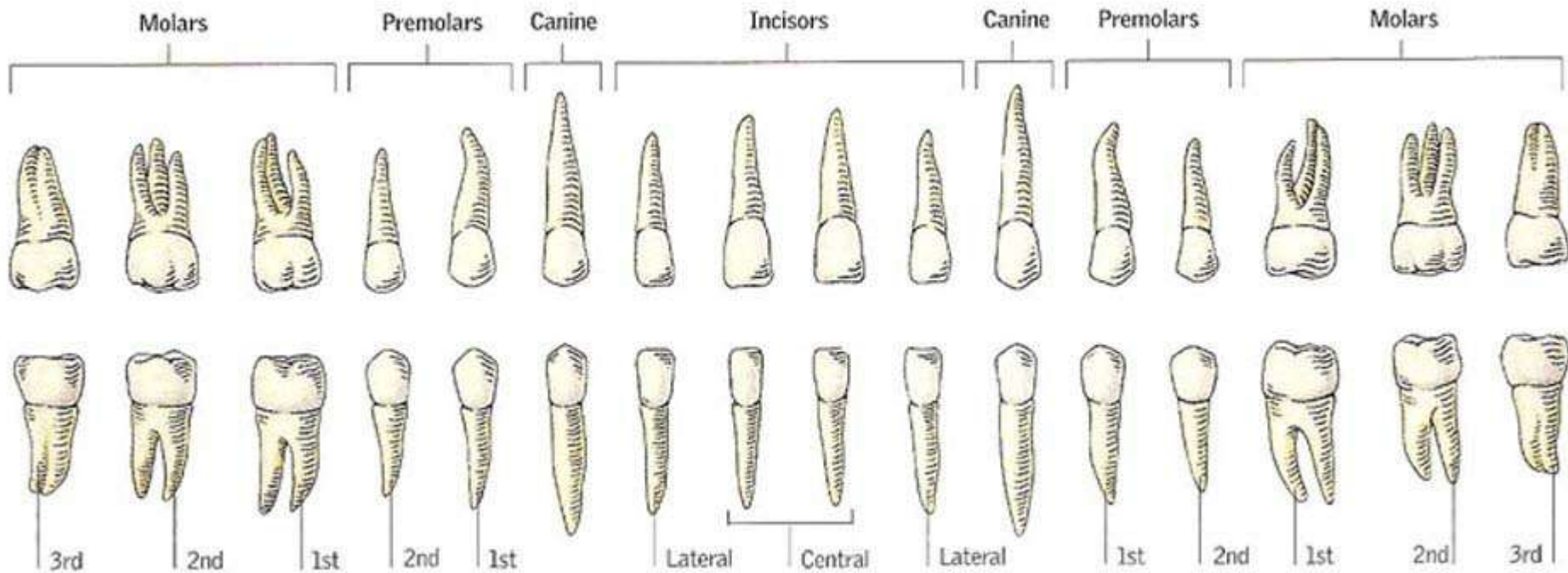
Root

- **Dental pulp:** is the soft tissue of the tooth and present in the pulp chamber and pulp canal.
- **Pulp chamber:** is the part of dental pulp in the crown.
- **Pulp canal:** is the part of dental pulp in the root.

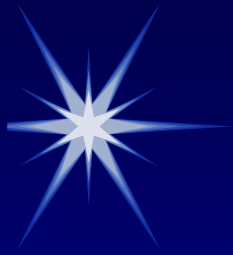
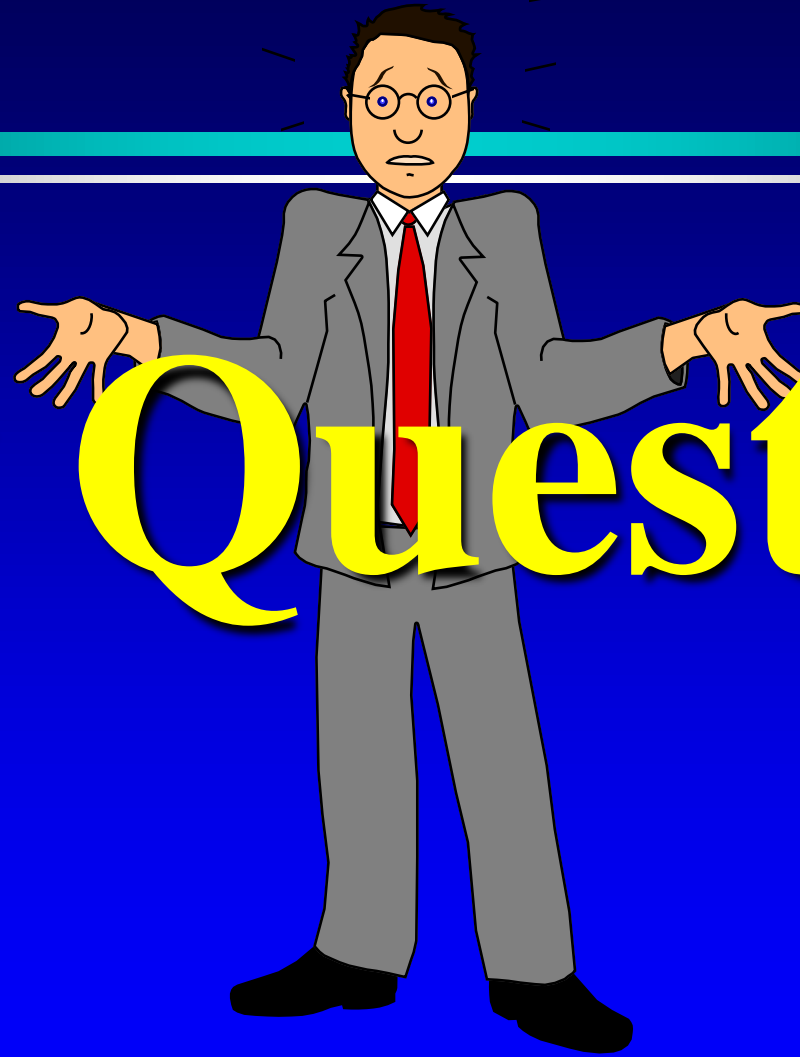


The number of roots:

- 1. Single root:** in all anterior teeth, mandibular premolars and maxillary second premolar.
- 2. Two roots with bifurcation:** in mandibular molars and maxillary first premolar.
- 3. Three roots with trifurcation:** in maxillary molars.



Any Questions



Anatomical Land marks

Lec.4

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Anatomical Landmarks

- In order to study an individual tooth intelligently, we must be able to recognize all landmarks of importance by name.
- These include:

(1) Cusp:

it is an elevation or mound on the crown portion of a tooth making up a divisional part of the occlusal surface.

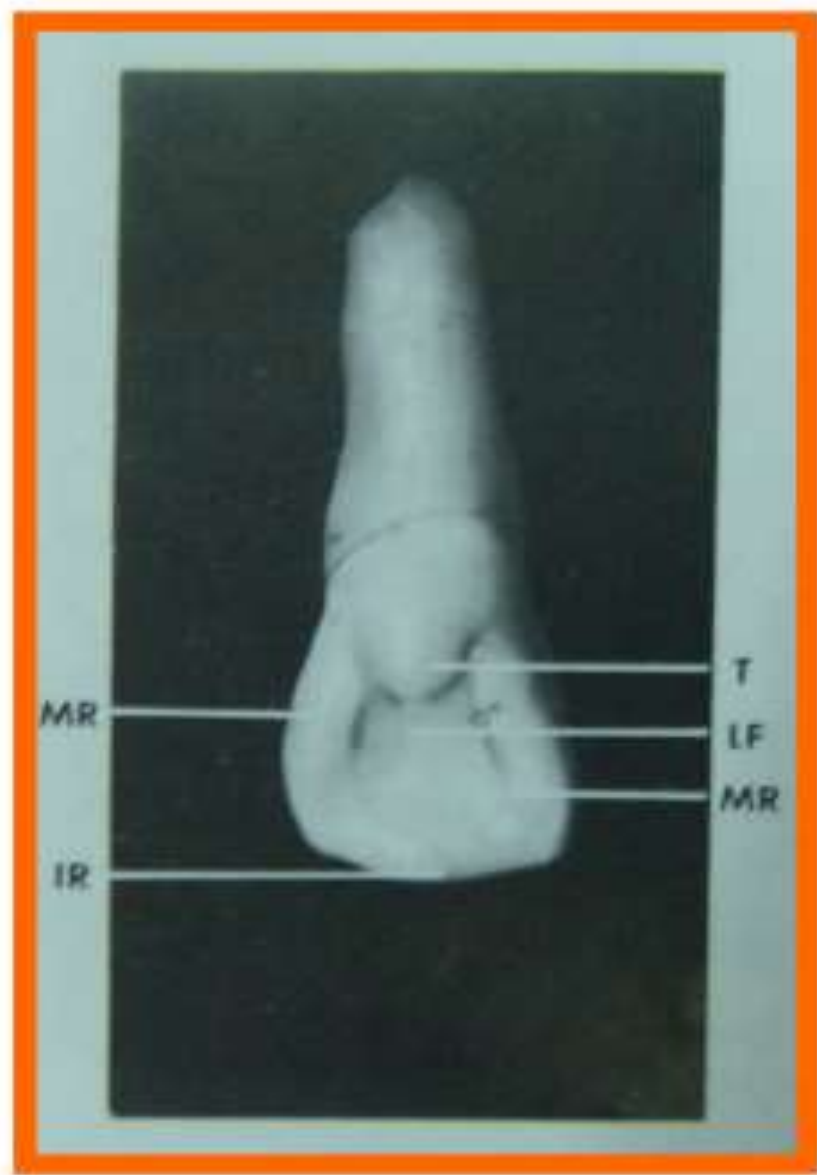
6



(2) Tubercle:

it is a smaller elevation on some portion of the crown produced by an extra formation of enamel.

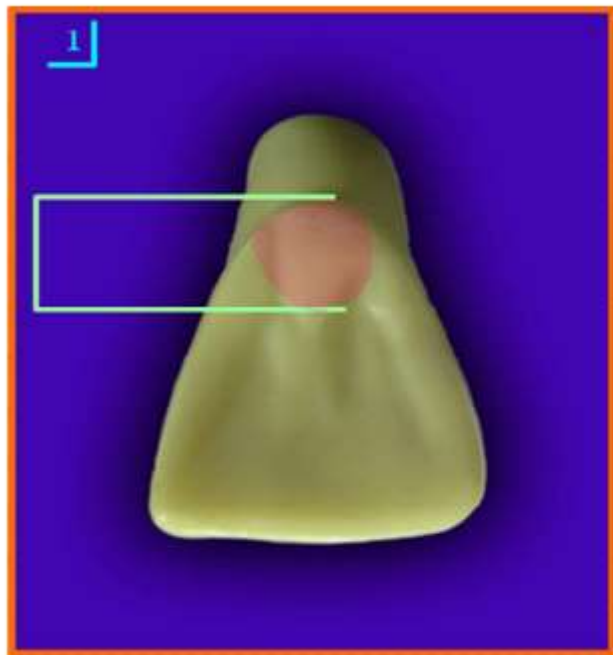
- These are deviations from the typical form.





(3) Cingulum (Latin word for girdle):

- it is the lingual lobe of an anterior tooth.
- It makes up the bulk of the cervical third of the lingual surface.
- Its convexity mesiodistally resembles a girdle encircling the lingual surface at the cervical third.



(4) Ridge

- is any linear elevation on the surface of a tooth and is named according to its location (e.g., buccal ridge, incisal ridge, marginal ridge).

(a) Marginal ridges:

- these are rounded borders of the enamel that form the mesial and distal margins of the occlusal surfaces of premolars and molars and the mesial and distal margins of the lingual surfaces of the incisors and canines.

6



1



(b) Triangular ridges:

- these descend from the tips of the cusps of molars and premolars toward the central part of the occlusal surfaces.
- They are so named because the slopes of each side of the ridge are inclined to resemble two sides of a triangle.
- They are named after the cusps to which they belong, e.g., the triangular ridge of the buccal cusp of the maxillary first premolar.



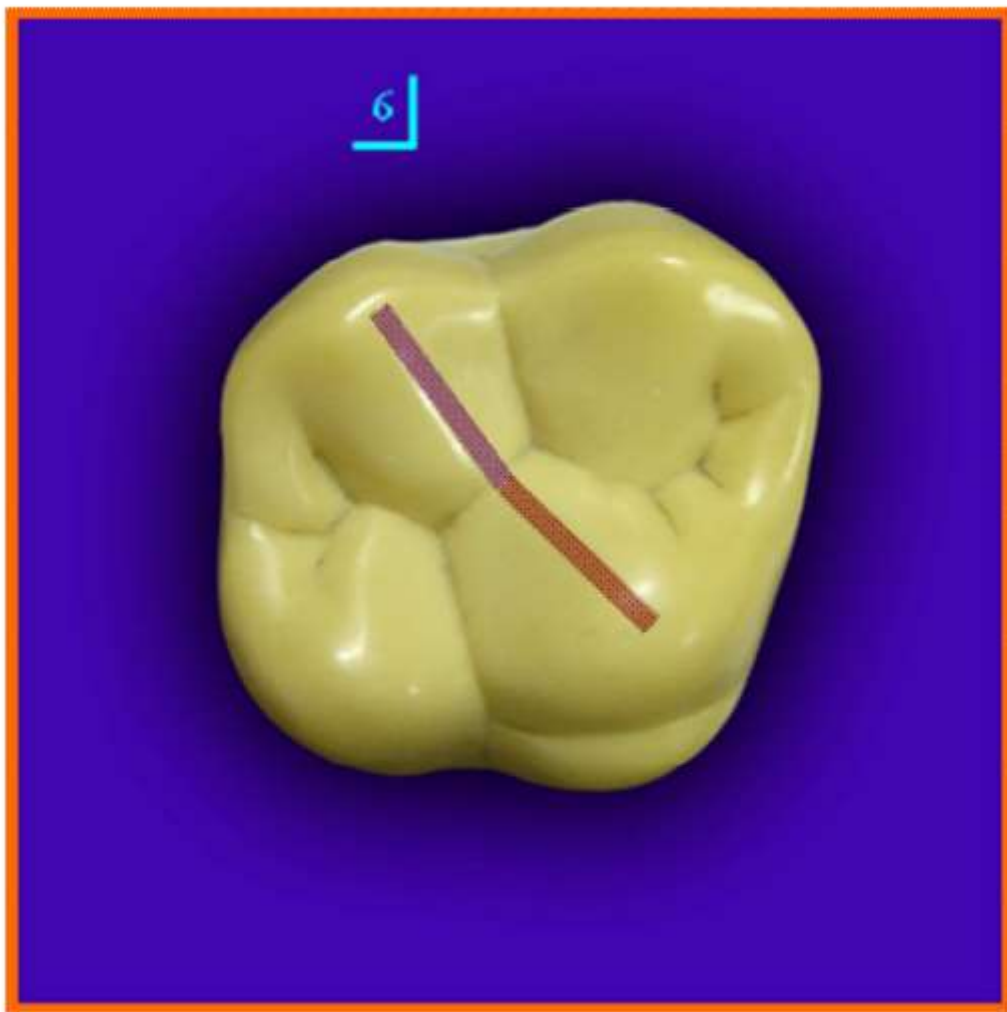
(c) Transverse ridge:

- it is the union of two triangular ridges crossing transversely the surface of a posterior tooth.



(d) Oblique ridge:

- it is a ridge crossing obliquely the occlusal surfaces of maxillary molars.
- It is formed by the union of the triangular ridge of the distobuccal cusp and the distal cusp ridge of the mesiolingual cusp.



(5) Fossa:

- it is an irregular depression or concavity.
 - (a) Lingual fossa:** it is located on the lingual surface of anterior teeth.
 - (b) Central fossa:** it is located on the occlusal surface of molars.
 - (c) Triangular fossa:** it is located on the occlusal surfaces of molars and premolars, mesial or distal to marginal ridges.



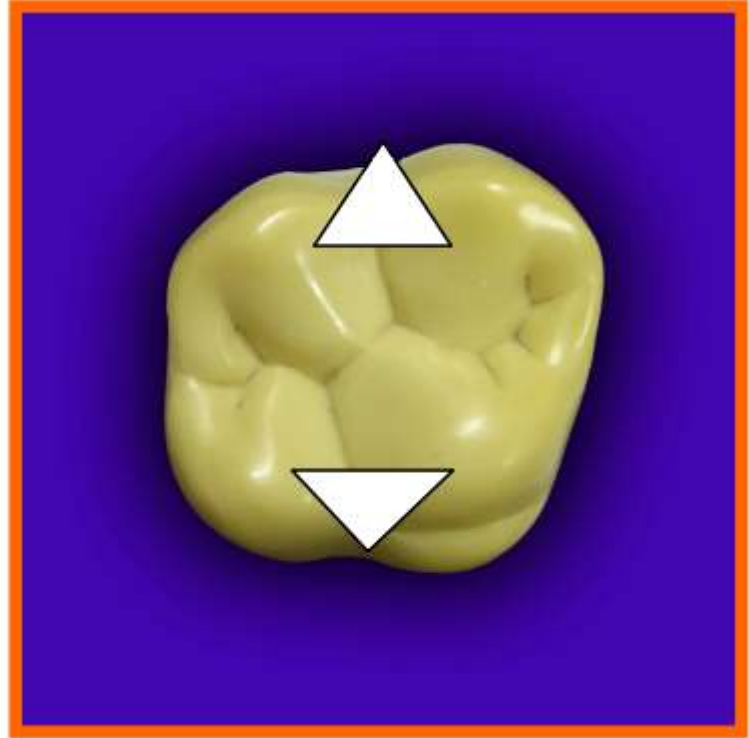


6



(6) Sulcus:

- it is a long depression or valley in the surface of a tooth between ridges and cusps, the inclines of which meet at an angle.
- A sulcus has a developmental groove at the junction of its inclines.



(7) Developmental groove:

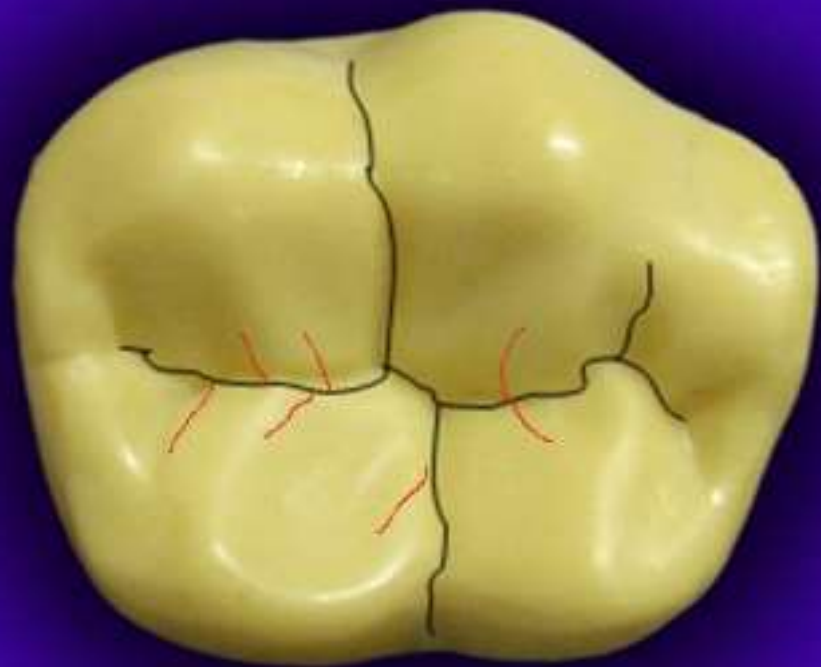
it is a shallow groove or line between the primary parts of the crown or root.



(8) Supplemental groove:

- it is a less distinct, shallow linear depression on the surface of a tooth, but is supplemental to a developmental groove and does not mark the junction of primary parts.

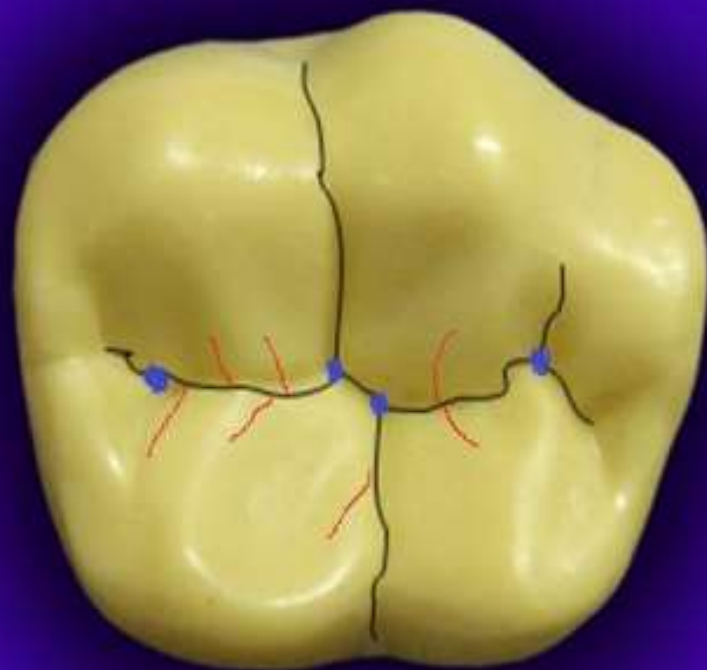
6



(9) Pit:

it is a small pinpoint depression located at the junction of developmental grooves or at terminals of those grooves, e.g., central pit is a term used to describe a landmark in the central fossa of molars where developmental grooves join.

6



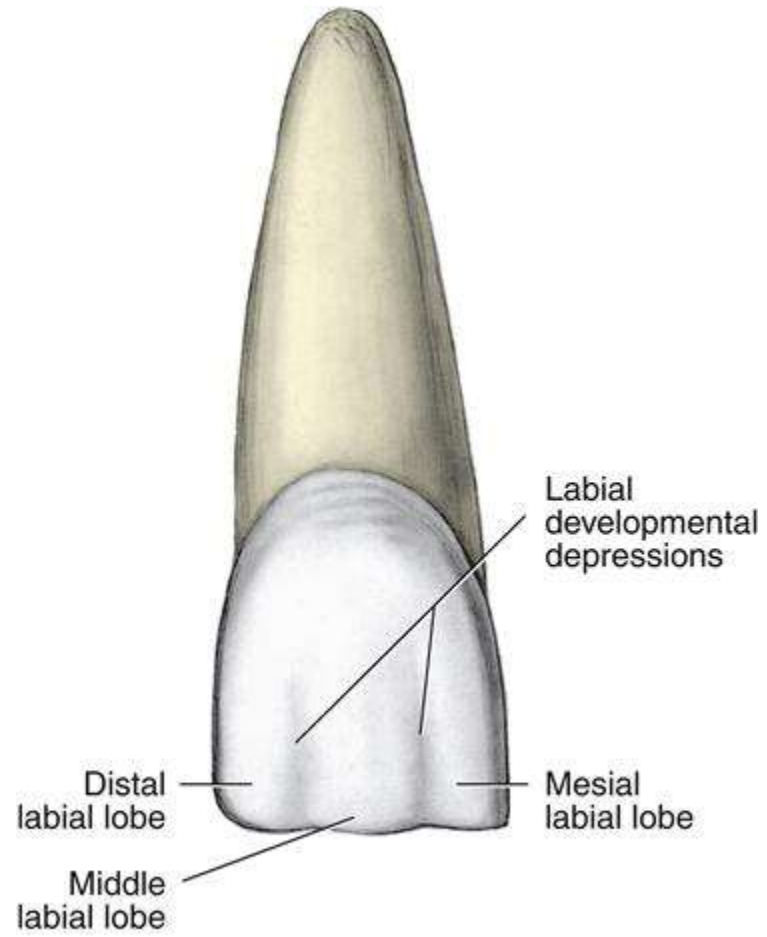
(10) Mamelon:

- it is any one of the three rounded protuberances found on the incisal ridges of newly erupted incisor teeth.



(11) Lobe:

- it is one of the primary sections of formation in the development of the crown.
- Cusps and mamelons are representative of lobes.

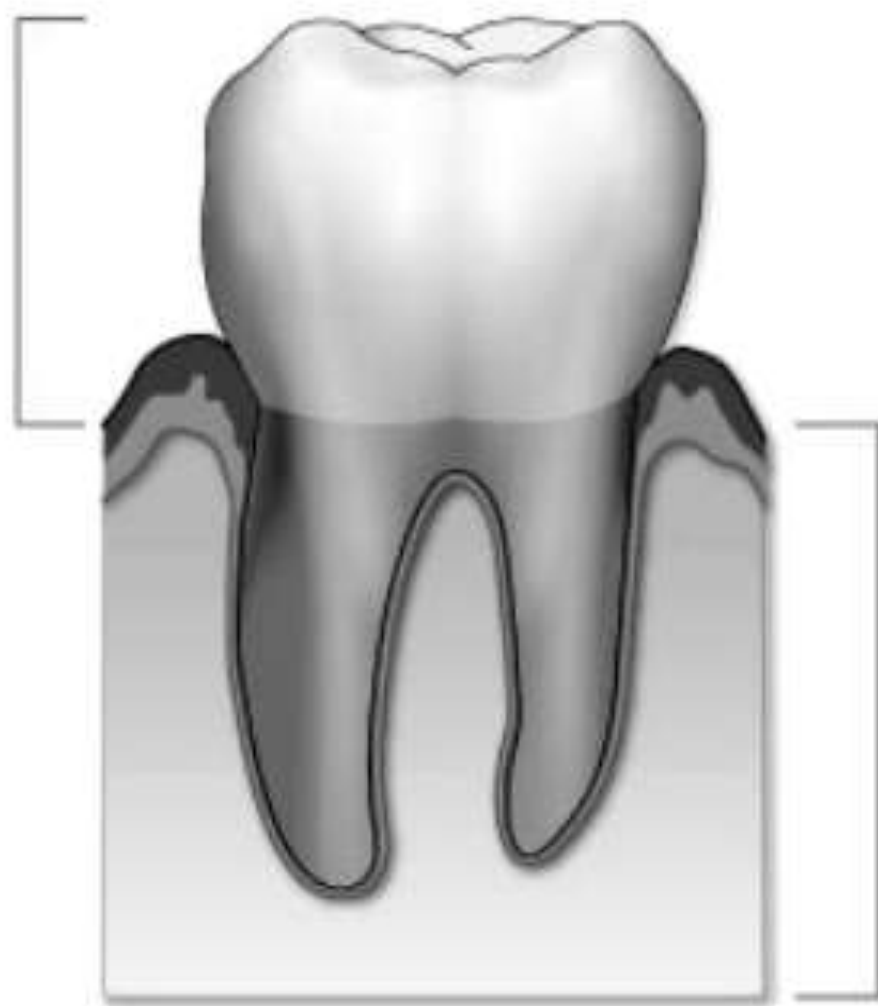


Labial View

Crown and Root

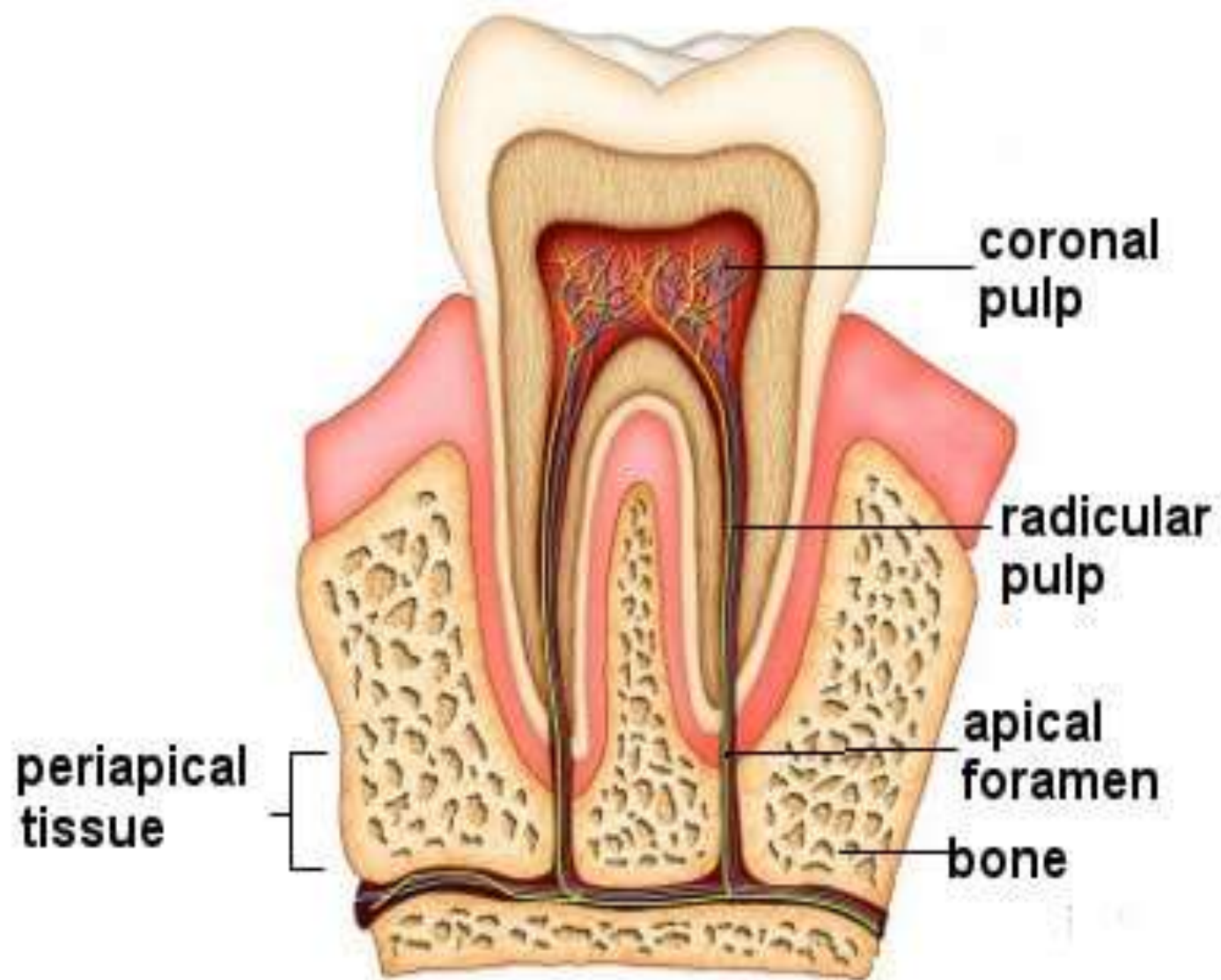
- Each tooth has a crown and root.
- The crown is covered with enamel.
- The root is covered with cementum and they join at the cemento-enamel junction (CEJ) or cervical line.
- The enamel, cementum and dentin are the hard tissues of the tooth. The major bulk of the tooth is dentin.

Crown



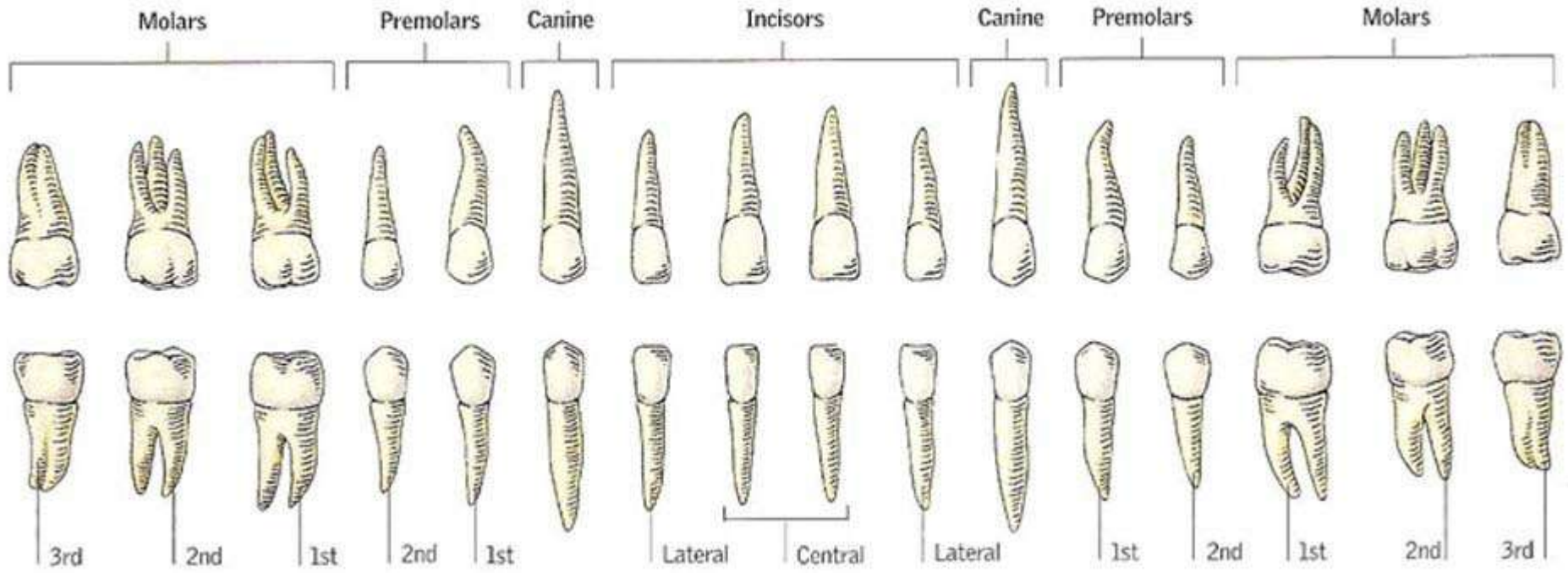
Root

- **Dental pulp:** is the soft tissue of the tooth and present in the pulp chamber and pulp canal.
- **Pulp chamber:** is the part of dental pulp in the crown.
- **Pulp canal:** is the part of dental pulp in the root.



The number of roots:

- 1. Single root:** in all anterior teeth, mandibular premolars and maxillary second premolar.
- 2. Two roots with bifurcation:** in mandibular molars and maxillary first premolar.
- 3. Three roots with trifurcation:** in maxillary molars.



Surfaces and Ridges

- The crowns of incisors and canines have **(4)** surfaces and a ridge
- and the crowns of the premolars and molars have **(5)** surfaces.
- **The surfaces are:**

1. Labial surface:

- is the surface which is towards the lip in incisors and canines (= in anterior teeth).

2. Buccal surface:

- is the surface which is towards the cheek in premolars and molars (= in posterior teeth).
- The labial and buccal surfaces could be termed as the "Facial" surfaces.

3. Lingual surface:

- is the surface which is facing the tongue (all teeth).

4. Occlusal surface:

- is the surface of the posterior teeth coming in contact with the teeth in the opposite jaw during closing the mouth.
- In anterior teeth, this surface is called "Incisal ridge".

5. Proximal surface:

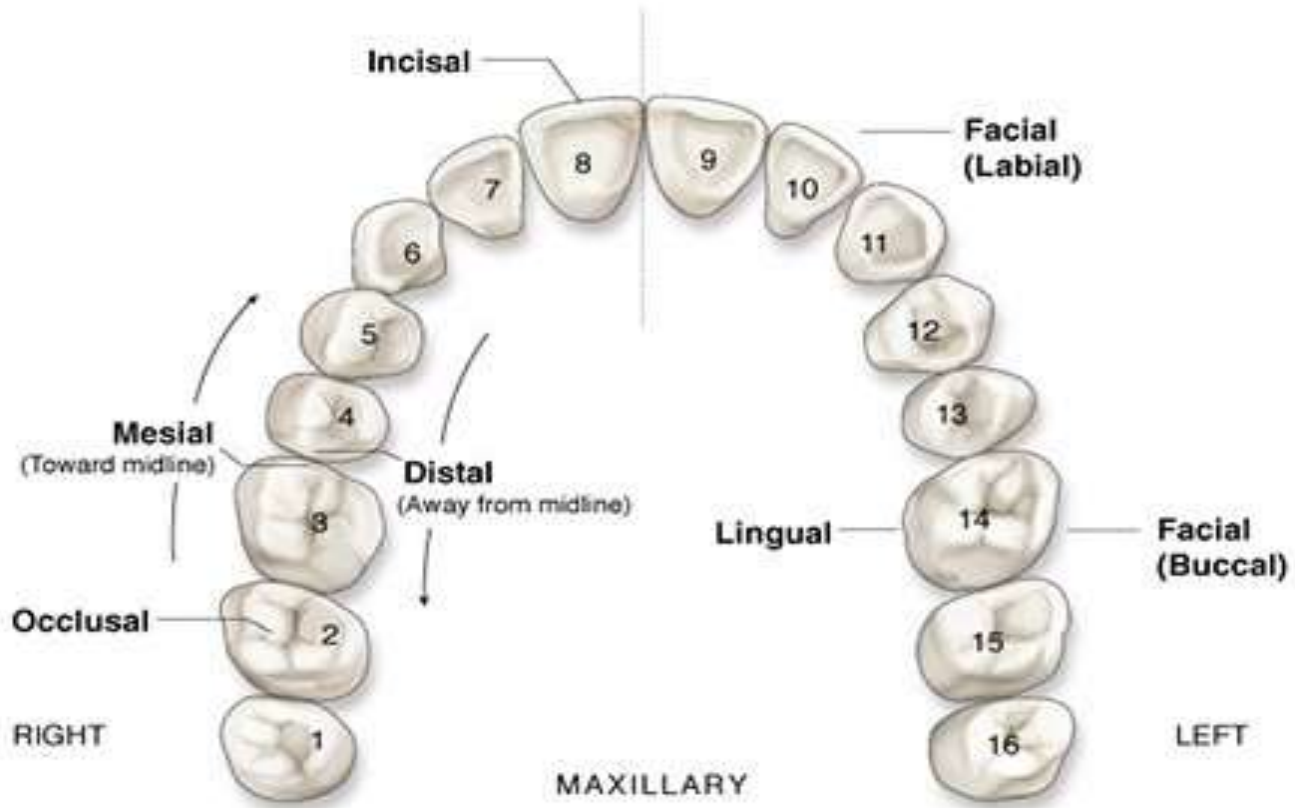
- is the surface of the tooth facing towards adjacent teeth in the same dental arch.

a. Mesial surface: is the surface which is facing towards the median line.

b. Distal surface:

- is the surface which is facing away from the median line.
- All teeth have their mesial surfaces touching the distal surfaces of the adjacent **tooth except the maxillary and mandibular central incisors** (both permanent and deciduous).

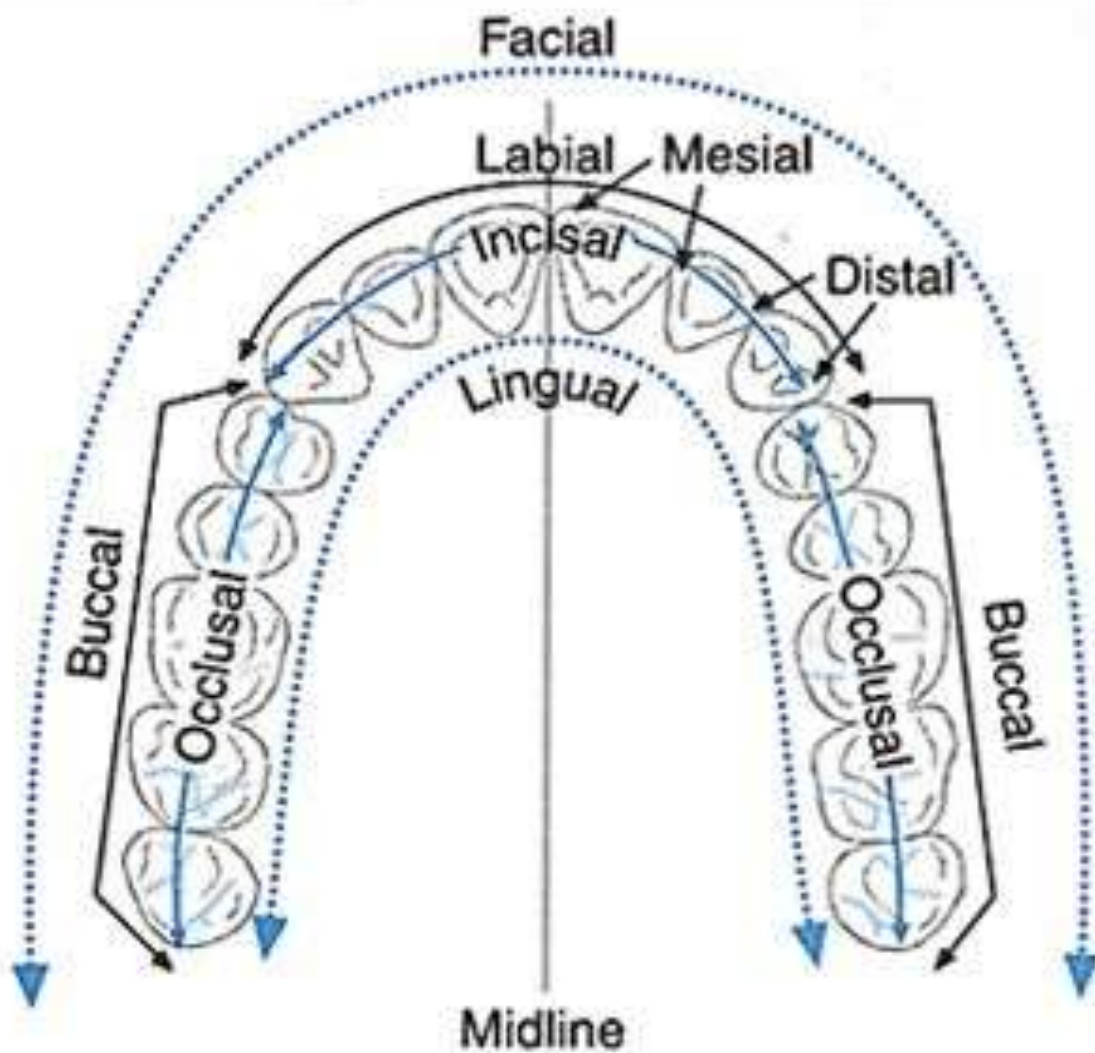
DIRECTIONAL REFERENCES



Incisal view



Occlusal view

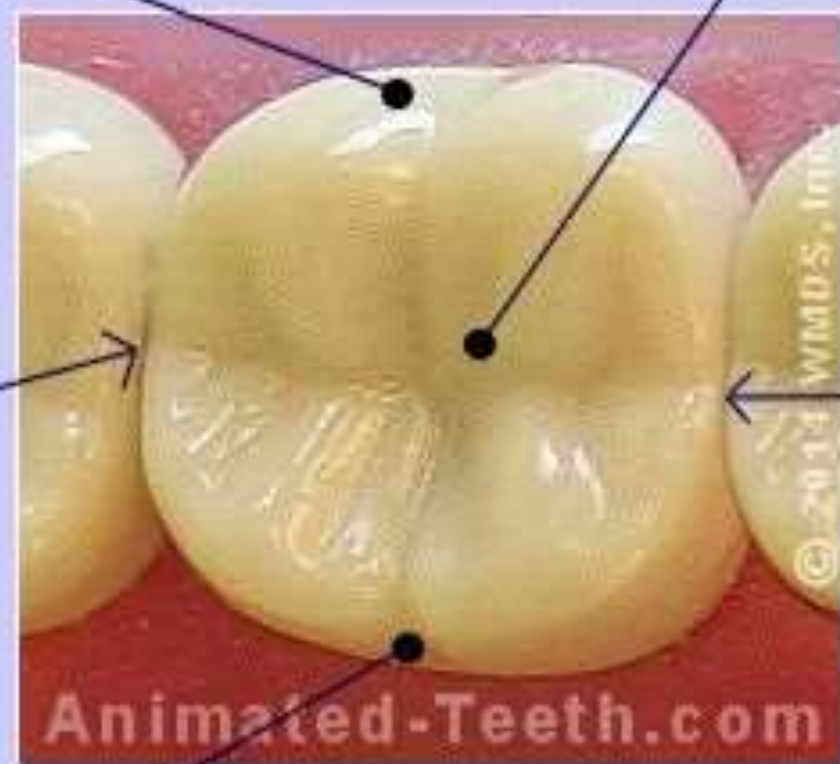


Facial (Buccal)

Occlusal

Distal

Mesial

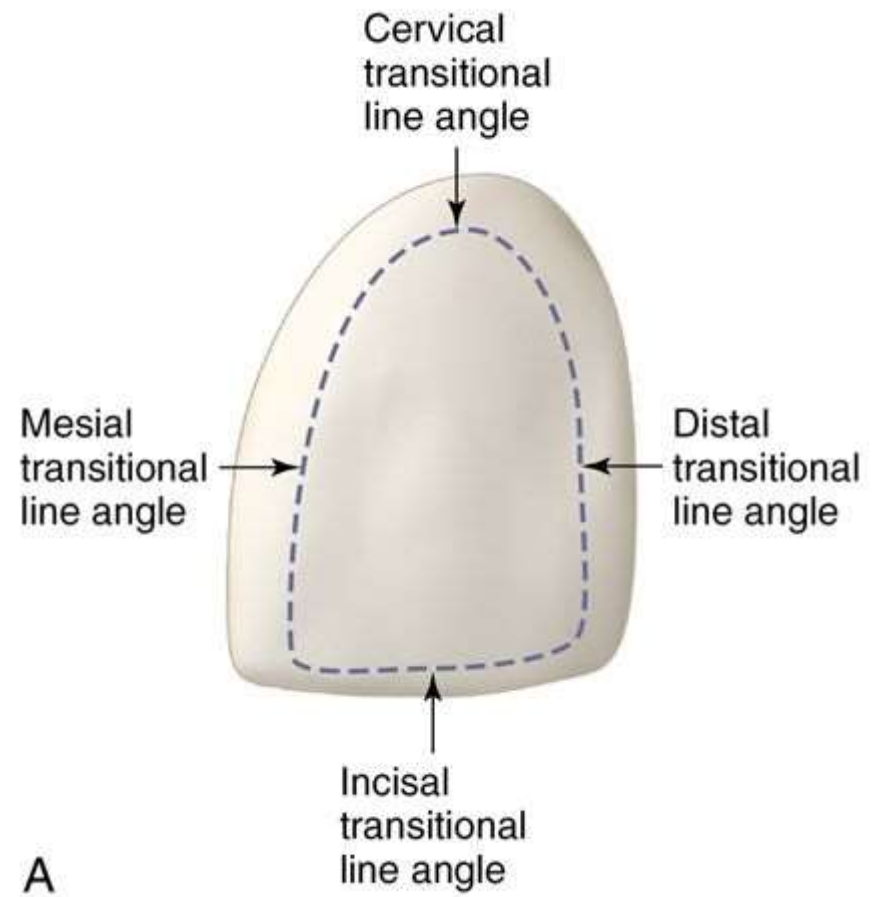
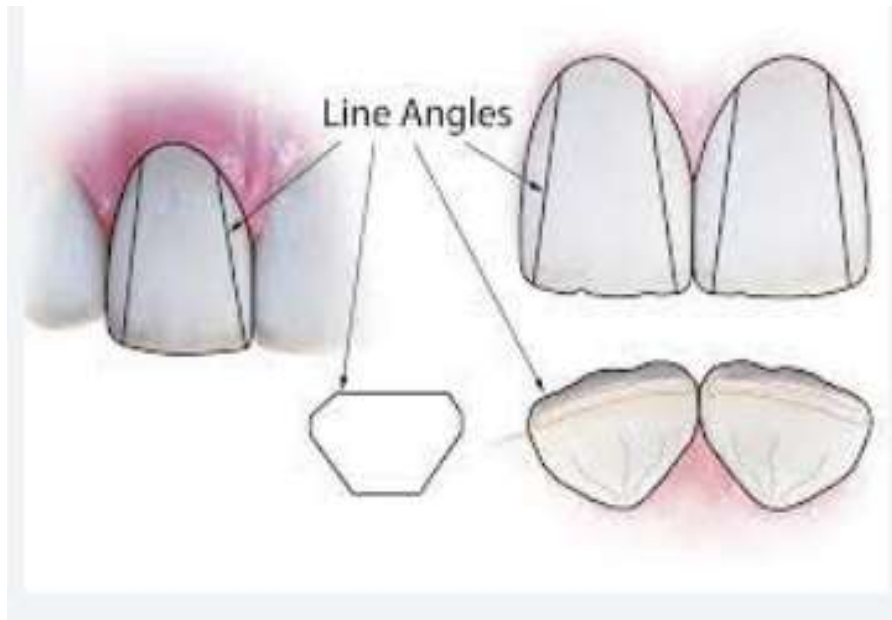


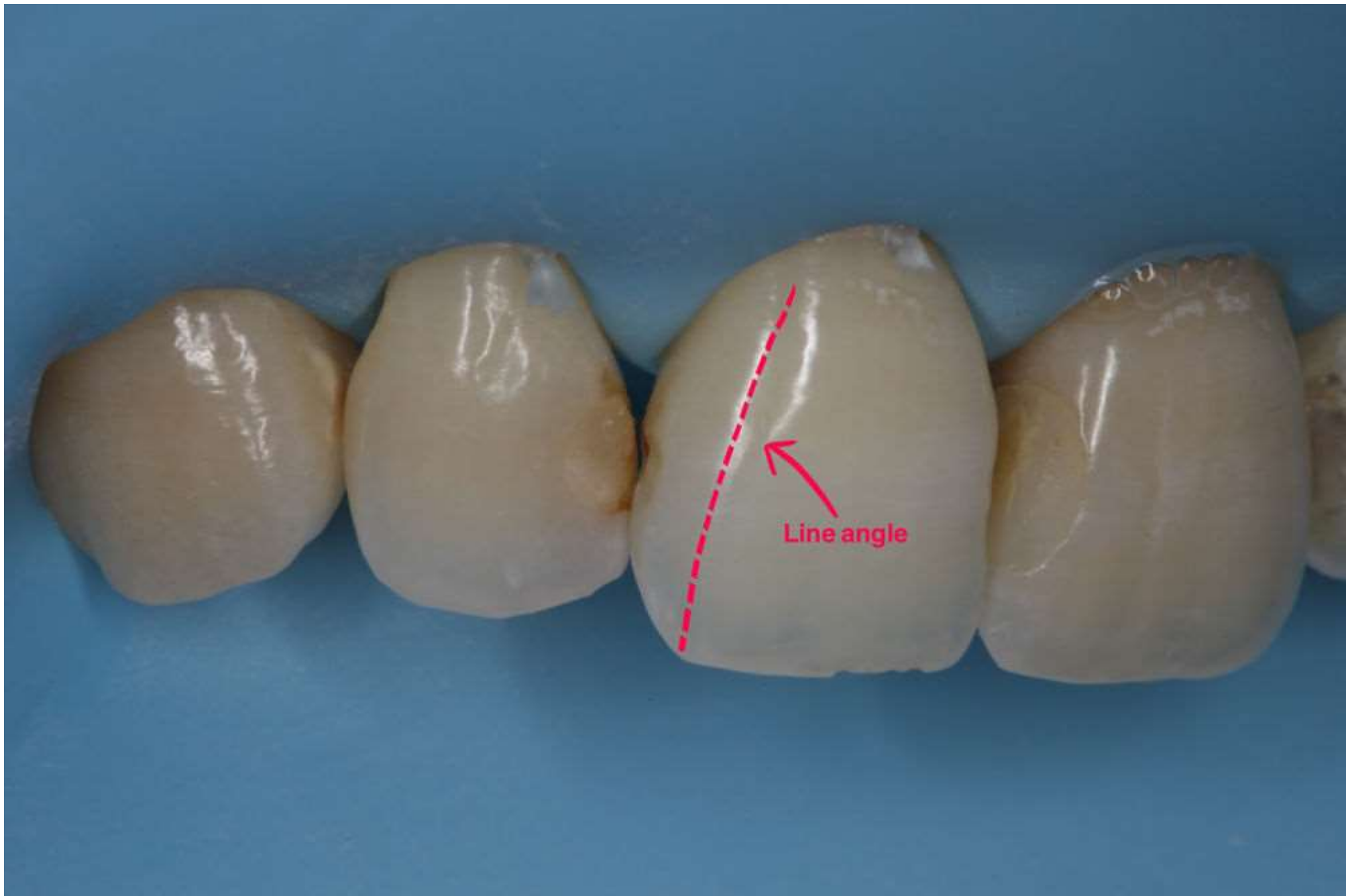
Lingual

Front of Mouth ➔

Contact area:

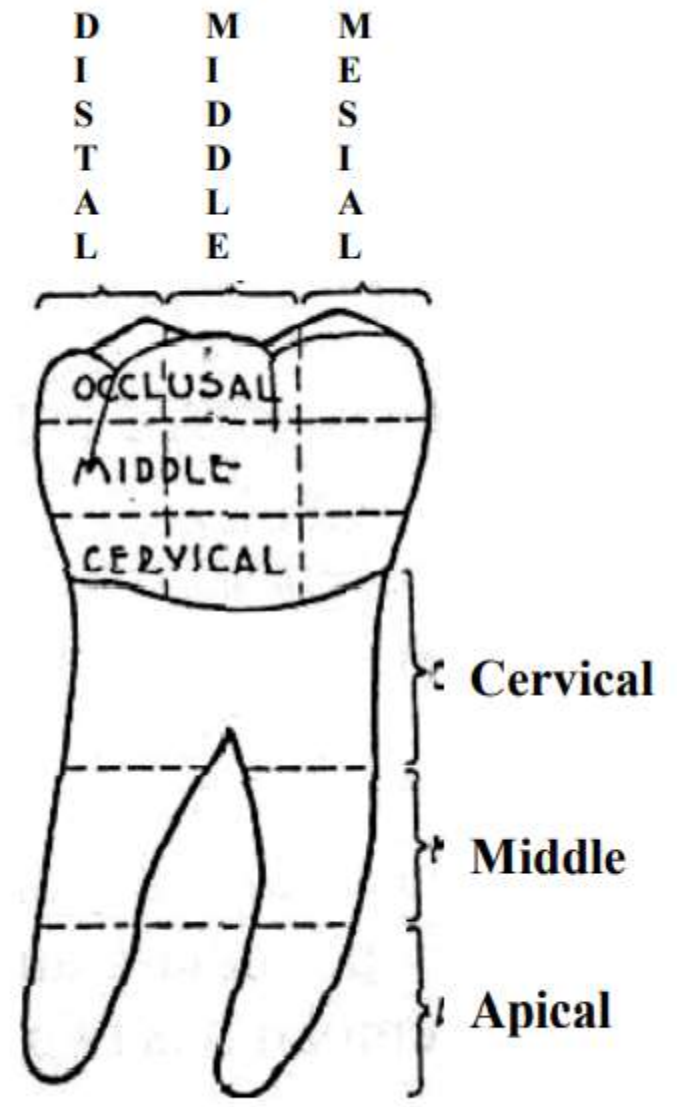
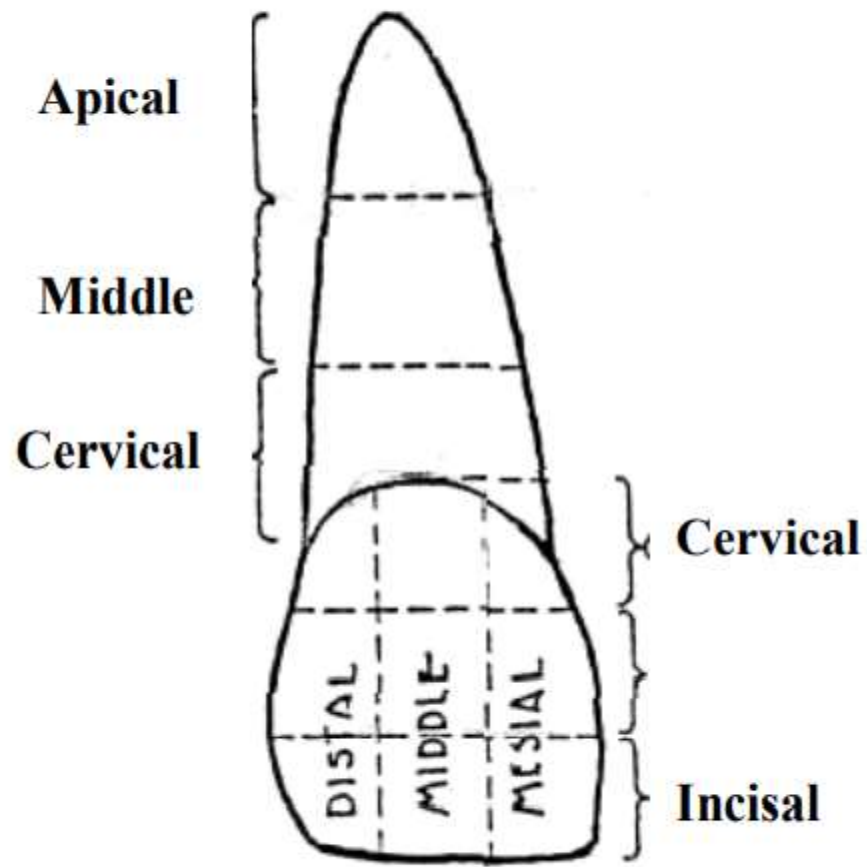
- the area of the mesial or distal surface of the tooth which touches its neighbor in the arch.
- **Line angle:** it is formed by the junction of two surfaces and gets its name from these surfaces. Example: mesio-labial line angle.
- **Point angle:** it is formed by the junction of three surfaces and gets its name from these surfaces. Example: mesio-linguo-incisal point angle.



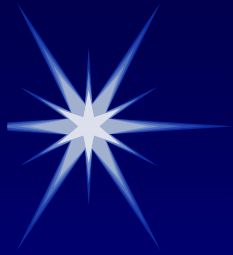
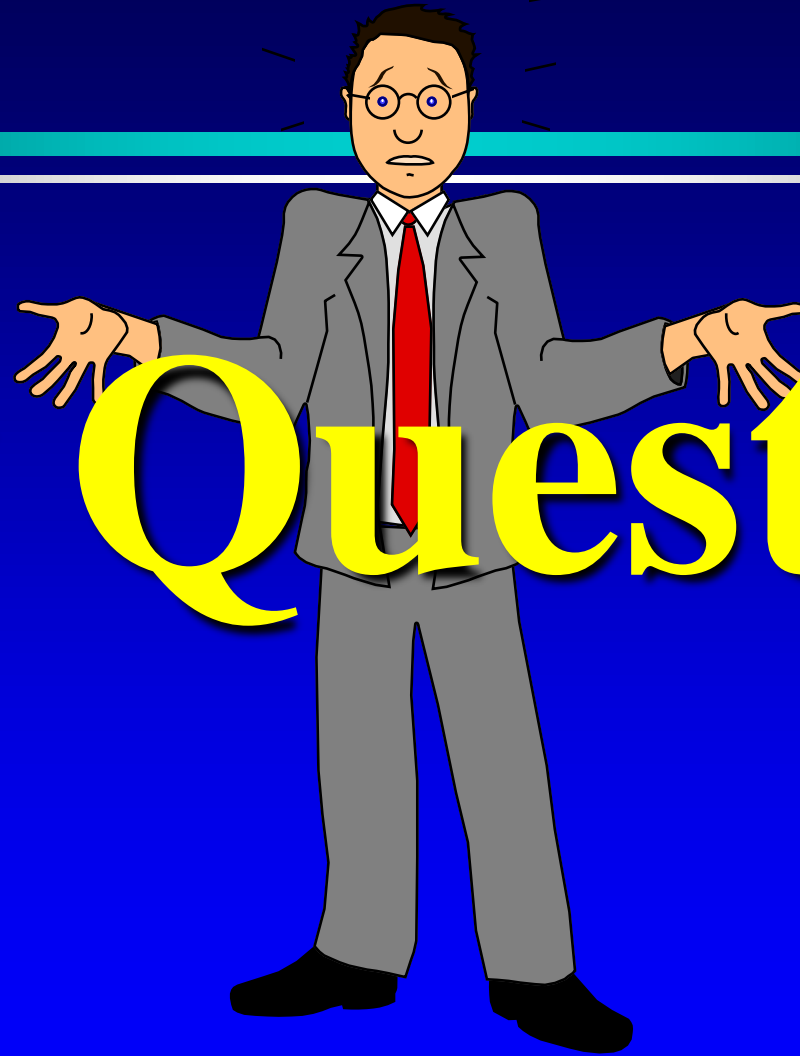


Division of the crown into thirds:

- For description, the crown and the root are divided into thirds according to the position of the surface.



Any Questions



Permanent Incisors

Lec.5

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Permanent incisors

- are **eight** in number; four maxillary and four mandibular.
- **The major function** of the incisors is **to incise or cut the food during mastication process.**
- In addition, they play important roles in **supporting the lips and maintaining a desirable esthetic appearance**, and also they are **important in phonetics (speech).**

Characteristic features of incisor's crown

1. Incisal ridge and edge.

- Incisal ridge is that portion of the crown which makes up the complete incisal portion.
- The term Incisal edge is used when an angle is formed by the occlusal wear which creates flattened surface linguo-incisally



2. Presence of mamelons.

3. Marginal ridges are longitudinally positioned.

4. Lingual fossa.

5. Cingulum.



Labial



Lingual



Incisal



Mesial



Distal

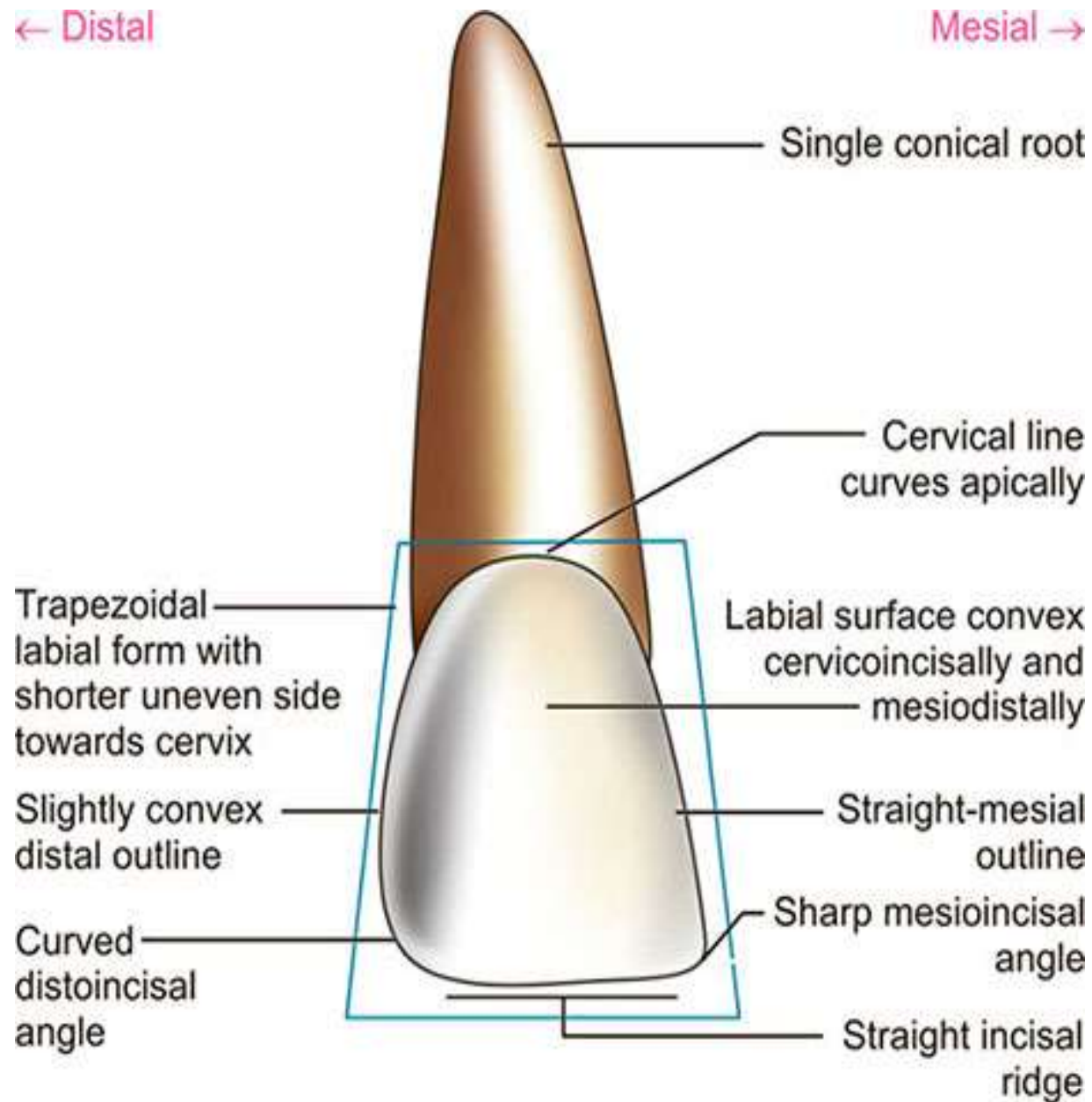
Permanent Maxillary Central Incisor

Principal identifying features

- 1. It is the widest anterior tooth mesio-distally.**
- 2. It has a square or rectangular appearance.**
- 3. Straight mesial outline, and rounded distal outline.**

← Distal

Mesial →



4. Sharp mesio-incisal angle and rounded disto-incisal angle.

5. Mamelons on the incisal ridge (in newly erupted teeth).

6. Well marked marginal ridges, lingual fossa and well developed cingulum.

7. Single tapered root.

Labial Aspect

1. The mesial outline is slightly convex with a crest of curvature near the mesio-incisal angle.
2. The distal outline is more convex than mesial outline with the crest of curvature being at the junction between incisal and middle thirds.



3. The incisal outline in newly erupted teeth has elevations called "Mamelons". With age, they will wear off and straight incisal outline is seen.

4. The cervical outline of the crown follows a semi-circular direction with the curvature directed towards the root.

5. The root is cone shaped with a blunt apex. It is 2-3 mm longer than the crown.

6. A line drawn through the center of the root and crown tends to parallel the mesial outline of the crown and root.

Lingual Aspect

1. The crown and root taper lingually, therefore, **mesio-distal dimension of the lingual surface is narrower than that of the labial surface.**

2. Below the cervical line, there is a smooth convexity called "**Cingulum**" which is confluent with raised marginal ridges mesially and distally.

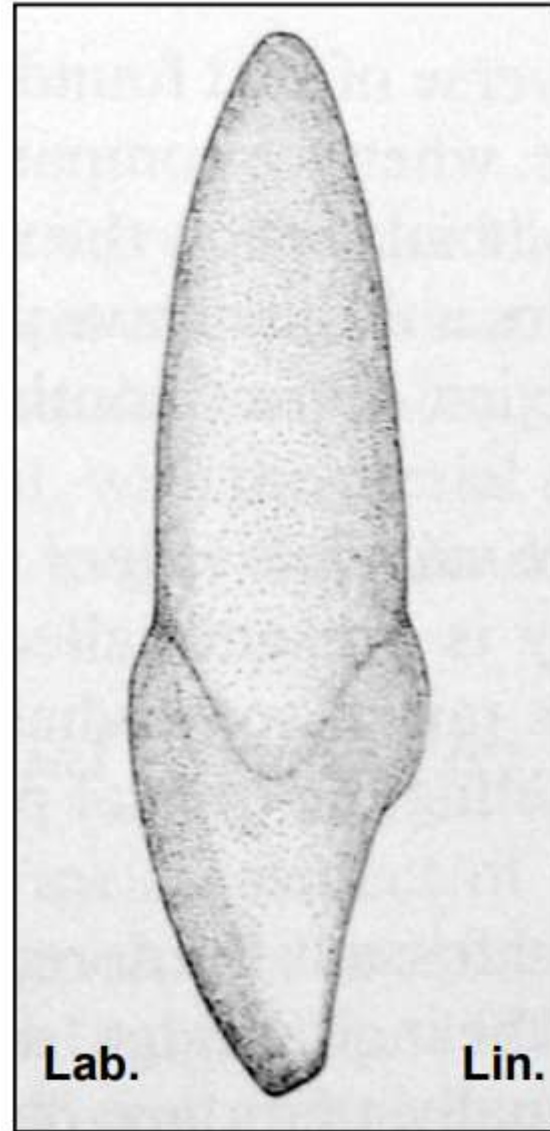


3. Incisally, there **is the lingual portion of the incisal ridge.**

- Between this ridge and the marginal ridges and the cingulum, a shallow concavity called **"the lingual fossa"** is present (usually have developmental grooves).

Mesial Aspect

1. **The crown is triangular in shape**, with the base at the cervix and the apex at the incisal ridge.
2. A line which bisects the crown will bisect the root.
3. The labial outline is **slightly convex**.

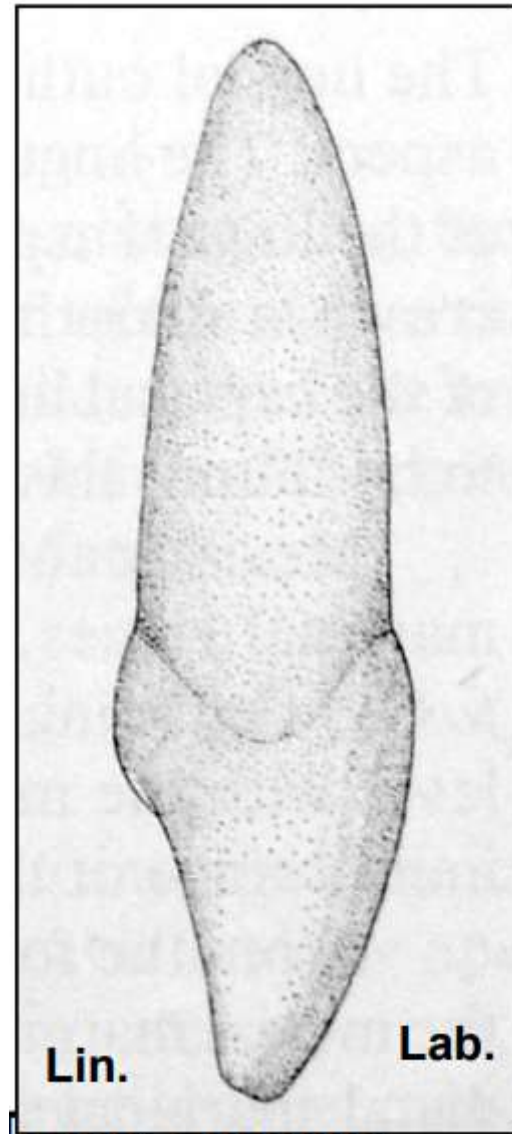


4. The lingual outline of the crown is convex at the cingulum, then becomes concave at the mesial marginal ridge, then slightly convex at the incisal ridge.

5. The cervical outline curves incisally more than any surface on any tooth, about 3-4 mm.

Distal Aspect

- There is little difference between distal and mesial outlines.
- The curvature of the cervical line **is less distally than mesially.**



Incisal Aspect

1. The incisal edge is centered over the root.
2. The labial outline of the crown is broad and flat.
3. The incisal edge and incisal ridge are well-defined.

Labial

D

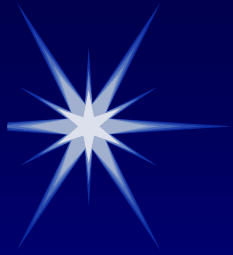
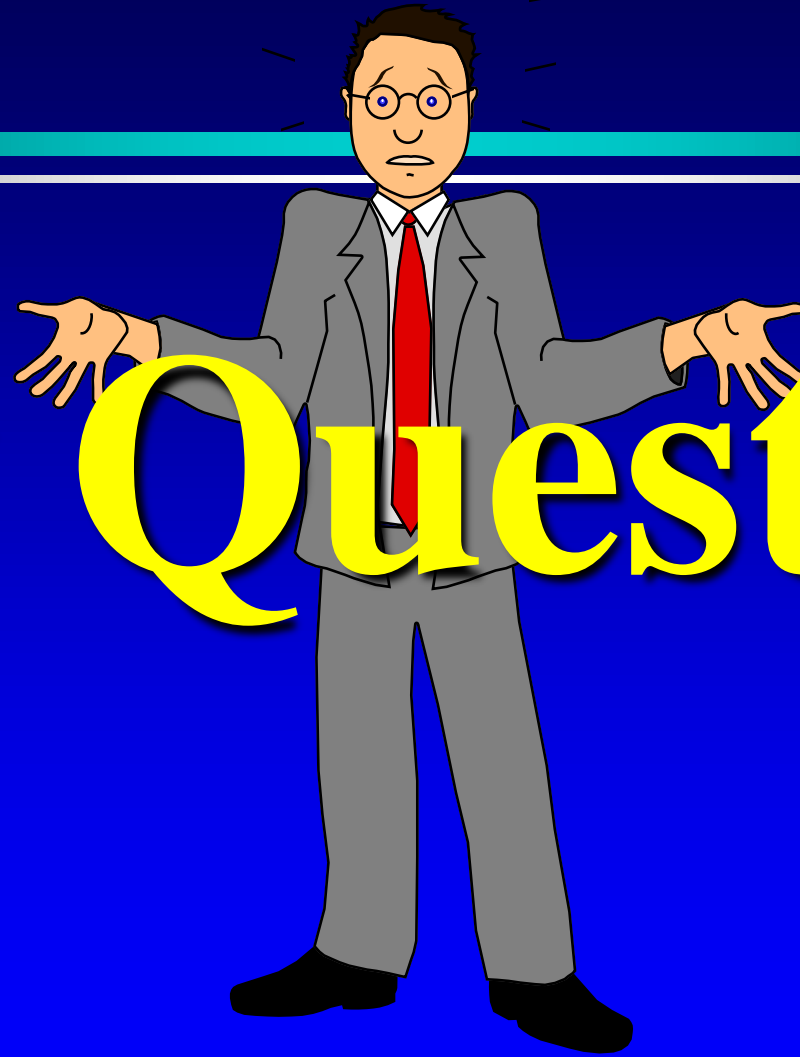


M

Lingual

4. The outline of lingual part tapers lingually to the cingulum.
5. The mesio-distal dimension labially is greater than that lingually.
6. The crown has triangular shape, as the root shape in cross-section

Any Questions



Maxillary lateral Incisor

Lec.6

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- The maxillary lateral incisor resembles the maxillary central incisor in **function, form and anatomy**, but is generally **smaller in all dimensions except the length of the root.**

Principle Identifying Features

- 1-The crown **is more rounded, shorter and narrower mesio-distally** than the maxillary central incisor.
- 2- The mesio-incisal angle is acute and the disto-incisal angle is more rounded.
- 3- It has a single root with **a tapered, distally curved, pointed apex.**
- 4-The lingual fossa **is more concave than** that of the maxillary central incisor.

Labial Aspect

1- The crown is shorter and narrower than that of the maxillary central incisor, but the root is as long as that of the maxillary central incisor or longer.

2-The labial surface of the crown is more convex than that of the maxillary central incisor.

3- The mesial outline resembles that of the maxillary central incisor with more rounded mesio-incisal angle, with the crest of curvature (contact point) located between the middle and incisal thirds.

4- The distal outline is more rounded, with the crest of curvature (contact point) at the center of the middle third.

5-The root tapers evenly, and curves distally at the apex.

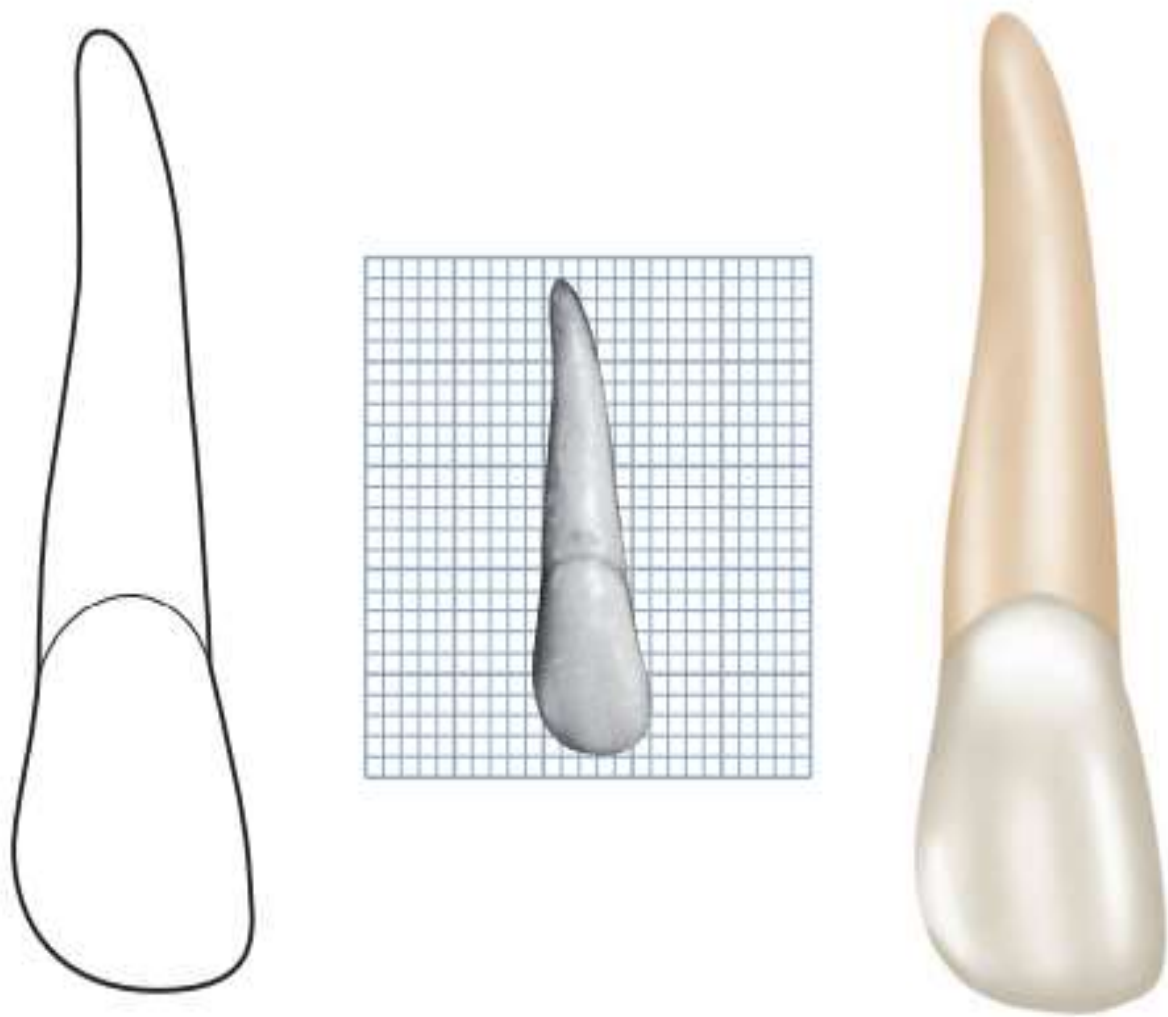
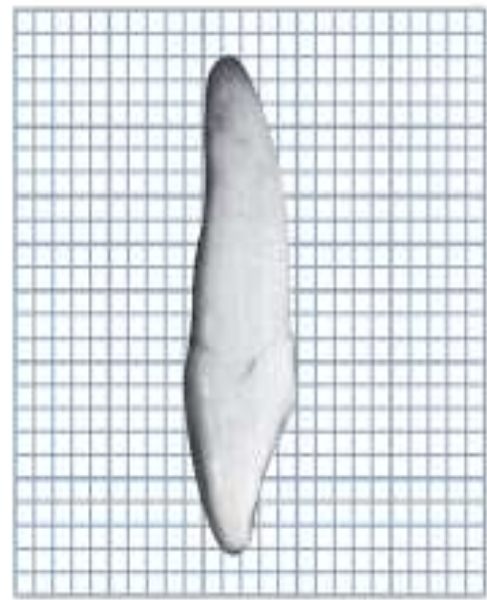
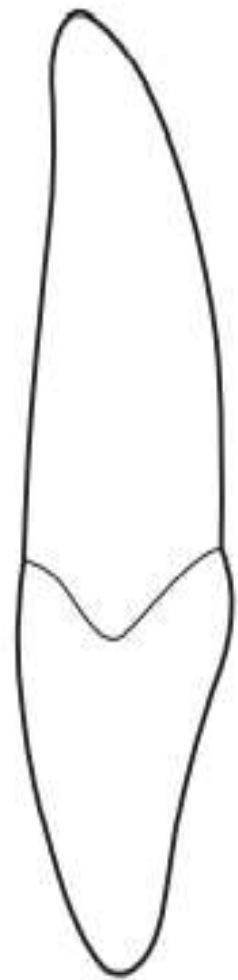


FIGURE 6-13 Maxillary right lateral incisor, labial aspect. (Grid = 1 sq. mm.)

Mesial Aspect

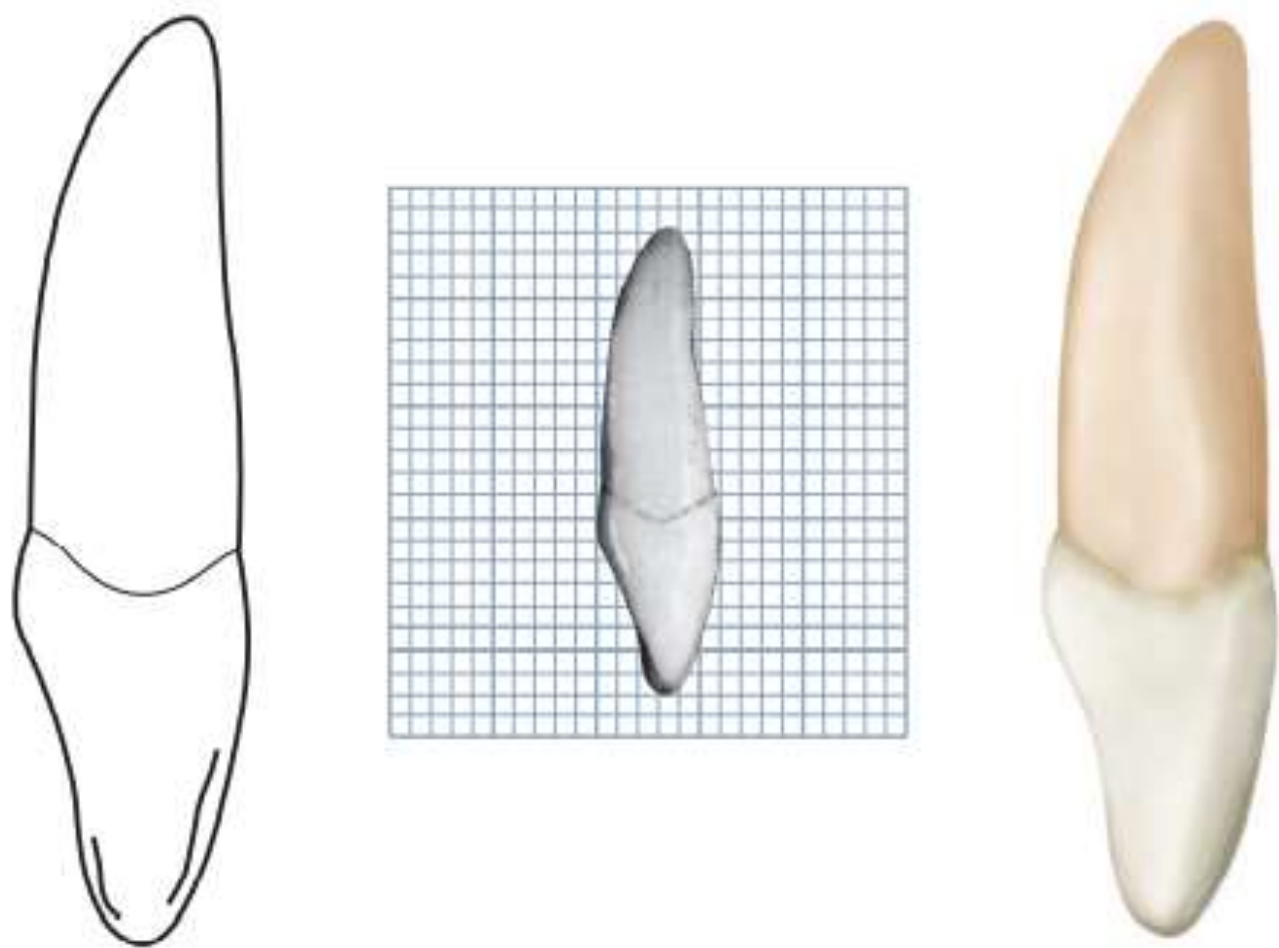
- 1- The crown is narrower labio-lingually than the maxillary central incisor.
- 2-The curvature of the cervical line is less than that of the maxillary central incisor.
- 3- The root appears as a tapered cone, and a line bisecting the root bisects the incisal ridge, which is well developed.



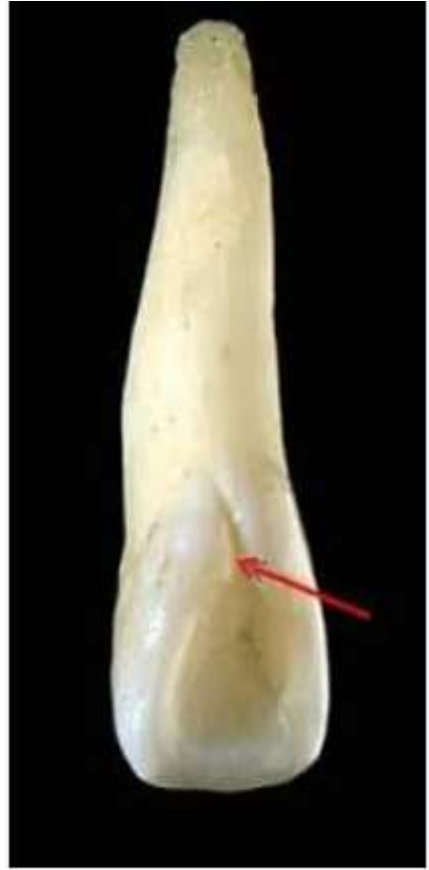
Distal Aspect

1- The curvature of the cervical line distally is less than that mesially.

2-It is not uncommon to find a developmental groove extending to the root.



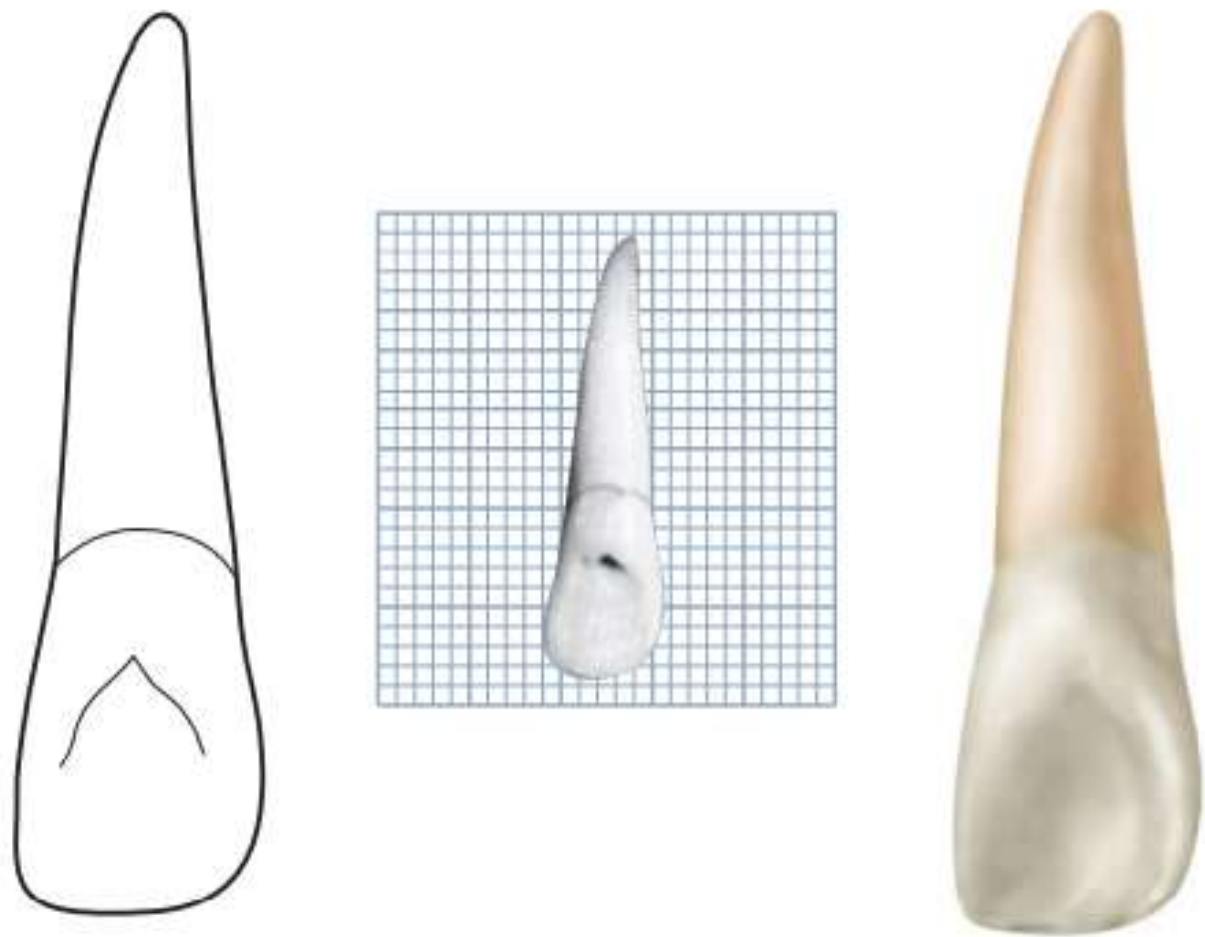
■ **FIGURE 6-16** Maxillary right lateral incisor, distal aspect. (Grid = 1 sq. mm.)



Lingual Aspect

1- The mesial and distal marginal ridges and the lingual portion of the incisal ridge are well marked with a more concaved lingual fossa.

2-The cingulum is prominent, with a tendency toward seeing a deep developmental groove within the lingual fossa.



■ **FIGURE 6-14** Maxillary right lateral incisor, lingual aspect. (Grid = 1 sq. mm.)

Incisal Aspect

1- The incisal aspect resembles that of the maxillary central incisor, but:

(A) The cingulum and incisal ridge may be large.

(B) The labio-lingual to mesio-distal measurement is larger, therefore, it resembles as a small canine.

2- From the incisal aspect, all maxillary lateral incisors exhibit more convexity labially and lingually.

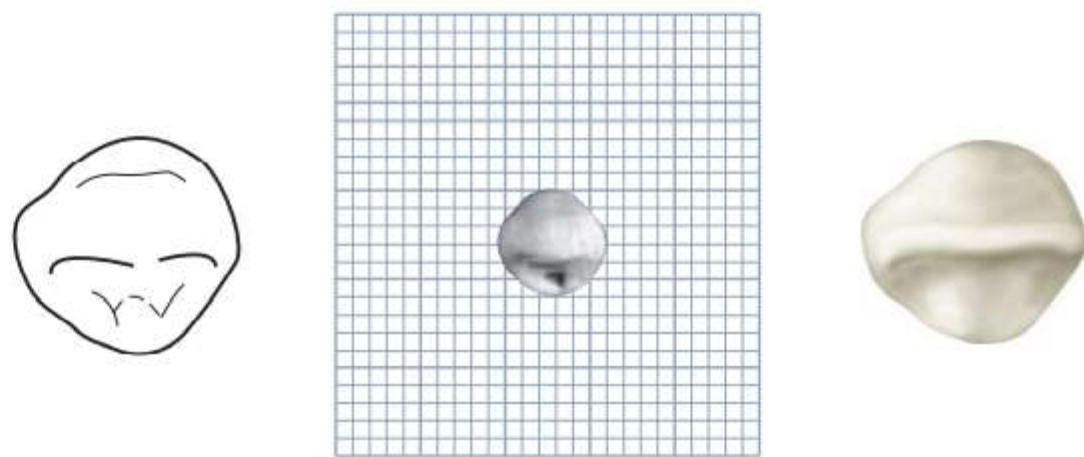


FIGURE 6-17 Maxillary right lateral incisor, incisal aspect. (Grid = 1 sq. mm.)

Variations from the typical form (Anomalies)

- 1- Peg-shaped lateral incisor, with a thin root and a small conical crown.
- 2- The maxillary lateral incisor may be congenitally missing.
- 3- Large developmental groove on the distal aspect extending to the root.



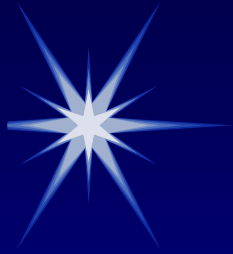
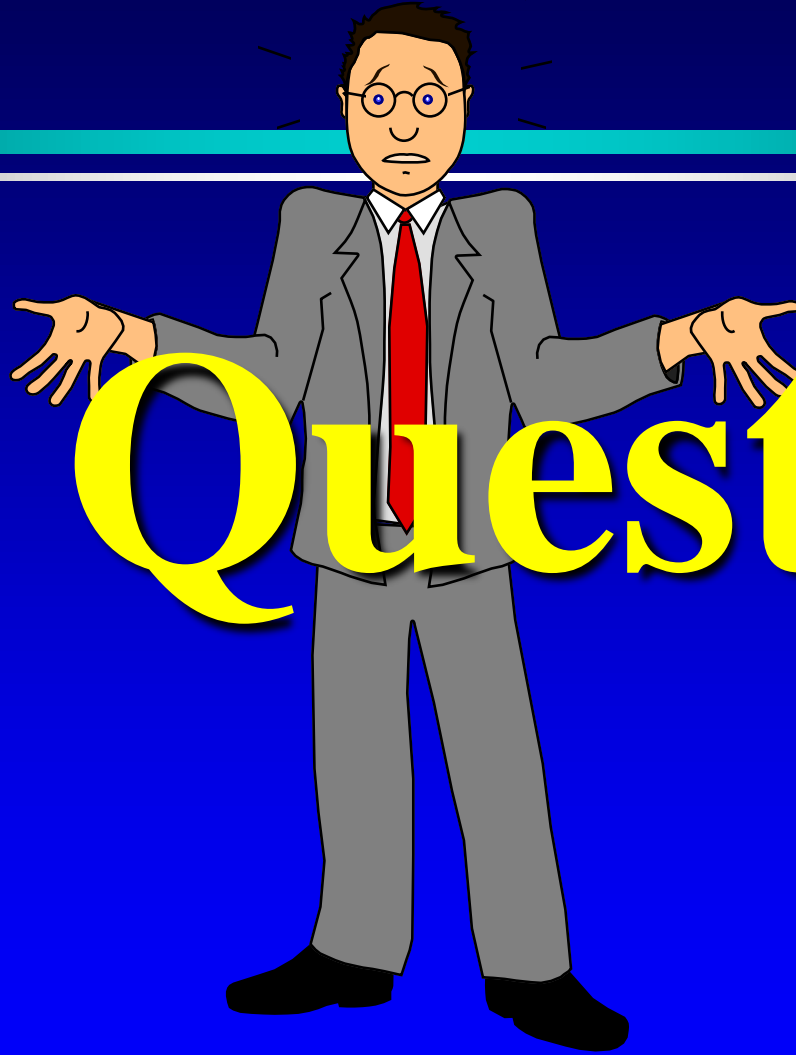


Main Differences between Maxillary Central and Lateral Incisor

	<i>Maxillary Central Incisor</i>	<i>Maxillary lateral incisor</i>
<i>Labial Aspect</i>	<p>1- The crown is longer and wider mesio-distally.</p> <p>2- Mesial outline is slightly convex with a crest of curvature near the mesio-incisal angle.</p> <p>3- Distal outline is more convex than mesial outline with the crest of curvature closer to the middle thirds.</p> <p>4-The root is shorter with a cone shaped and blunt apex.</p>	<p>1- The crown is shorter and narrower.</p> <p>2- Mesial outline is similar to the maxillary central Incisor with a acute and more rounded mesio-incisal angle with the crest of curvature at the junction between middle and incisal thirds.</p> <p>3- Distal outline is more rounded and the crest of curvature is at the center of the middle third.</p> <p>4- The root is longer than maxillary central incisor, tapers evenly and curves distally in a pointed apex.</p>

<p><i>Mesial Aspect</i></p>	<p>5- The crown is wider labio-lingually with a pronounced curvature of the cervical line.</p>	<p>5- The crown is narrower labio-lingually with the curvature of the cervical line less pronounced.</p>
<p><i>Distal Aspect</i></p>	<p>6-No developmental groove extending to the root.</p>	<p>6-A developmental groove extending from the side of the cingulum to the root may be found.</p>
<p><i>Lingual Aspect</i></p>	<p>7- Well defined lingual anatomical features.</p>	<p>7- More prominent cingulum with a more concave lingual fossa.</p>

Any Questions



Mandibular central Incisor

Lec.7

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Permanent Mandibular Incisors

- **Mandibular incisors are four in number;**
- **Two central incisors (right & left) and**
- **Two lateral incisors (right & left).**

Characteristic features of Perm. Mand. Incisors

1. **The mandibular incisors** have smaller mesio-distal dimensions than any of the other teeth.
2. **The contact areas** are near the incisal ridges mesially and distally.

3. The lingual surface is relatively smooth and featureless with the marginal ridges and the cingulum being not well developed.

4. The labial surface inclined lingually so that the incisal ridge is lingual to a line bisecting the root.

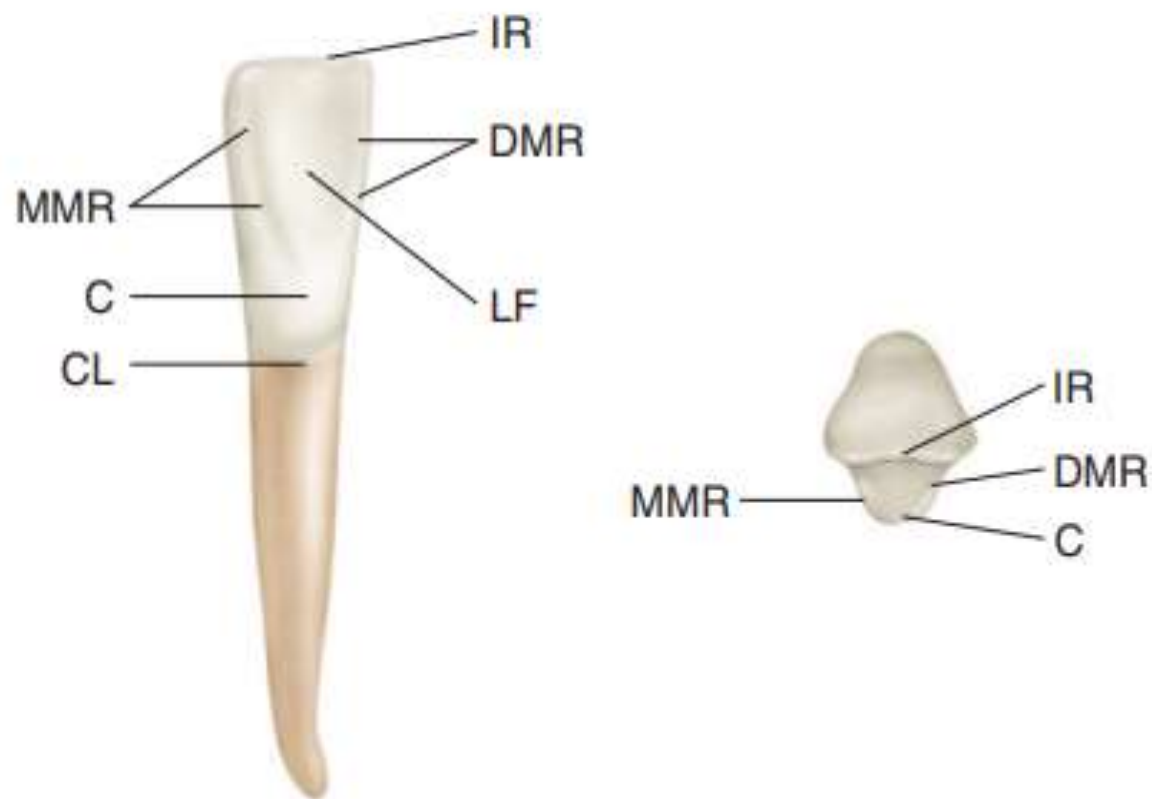


FIGURE 7-1 Mandibular right central incisor, lingual and incisal aspects.
IR, Incisal ridge; *DMR*, distal marginal ridge; *LF*, lingual fossa; *CL*, cervical line;
C, cingulum; *MMR*, mesial marginal ridge.

Permanent Mandibular Central Incisor

- Principal identifying features:

1. It is the **smallest tooth** in the permanent dentition.
2. The incisal ridge is **lingually inclined**.
3. Well-defined **distal longitudinal groove** is **seen on the root**.



Labial



Lingual



Incisal



Mesial



Distal

Labial Aspect

- 1. The incisal ridge** is straight and nearly at a right angle to the long axis of the tooth.
- 2. The disto-incisal angle** is more rounded than the mesio-incisal angle.
- 3. The contact areas** are incisal to the junction between incisal and middle thirds of the crown.

4. The mesial and distal root outlines are straight; with a distally curved apex.

5. The labial surface of the crown is smooth; being flat at the incisal third and becoming more convex as it goes cervically.



■ **FIGURE 7-2** Mandibular right central incisor, labial aspect. (Grid = 1 sq. mm.)

Lingual Aspect

- 1. The lingual surface of the crown is smooth with very slight concavity at the incisal third .**
- 2. No developmental grooves are found near the cingulum.**



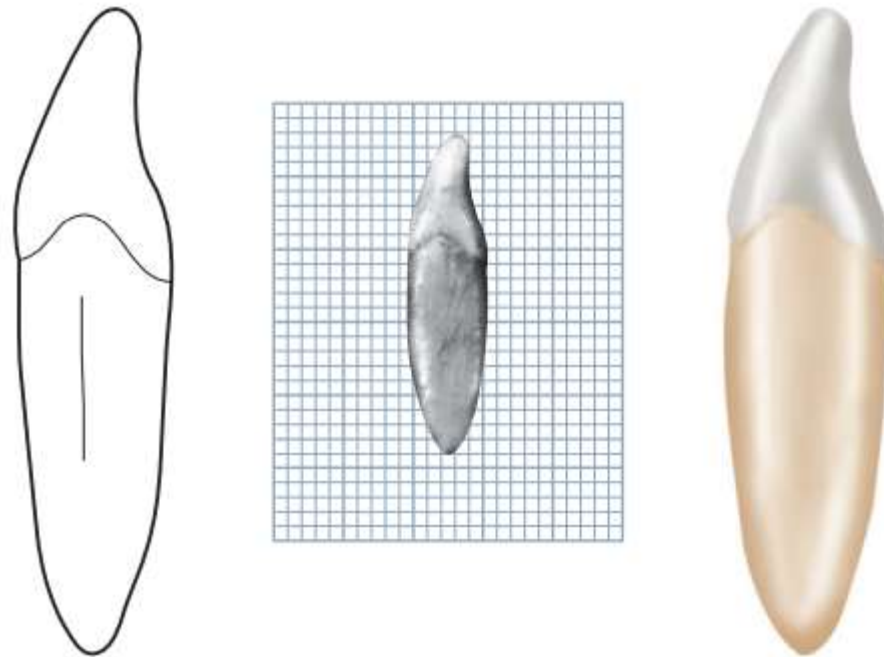
■ **FIGURE 7-3** Mandibular right central incisor, lingual aspect. (Grid = 1 sq. mm.)

Mesial Aspect

- 1. The labial outline** above the cervical curvature is straight.
- 2. The lingual outline** shows a shallow concavity ending to the blunt incisal ridge which is lingual to a line bisecting the root.

3. The curvature of the cervical line goes incisally.

4. The mesial surface of the root showed a **broad development depression** for most of the root and this become deeper at the junction of the middle and apical third.



■ **FIGURE 7-4** Mandibular right central incisor, mesial aspect. (Grid = 1 sq. mm.)

Distal Aspect

- 1. The cervical lines** curvature is less than that mesially.
- 2. The developmental depression** in the root is more marked than that on the mesial side with a deeper and more well-defined developmental groove in its center.

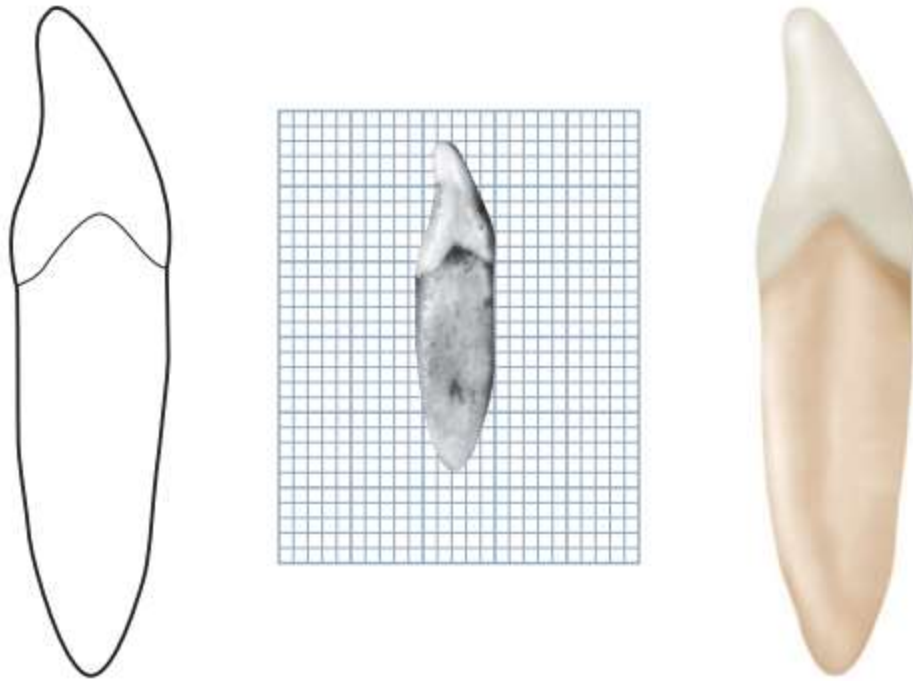


FIGURE 7-5 Mandibular right central incisor, distal aspect. (Grid = 1 sq. mm.)

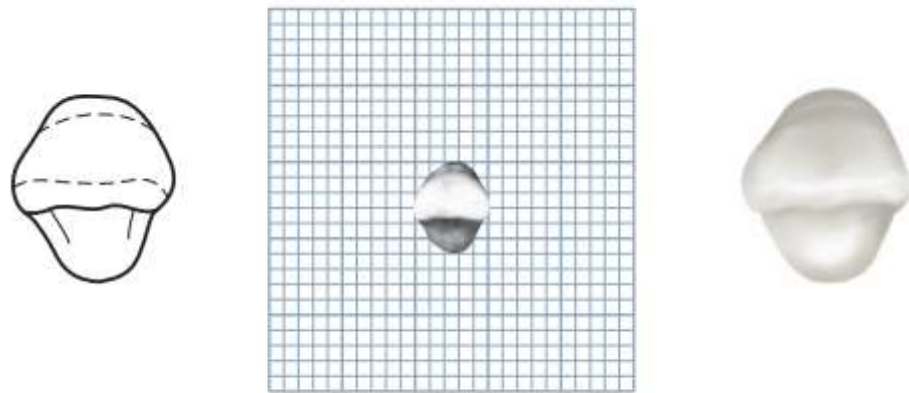
Incisal Aspect

1. The mesial half of the crown is almost identical to the distal half (bilateral symmetry).
2. The incisal edge is at a right angle to a line bisecting the crown labio-lingually. (Mark of identification).

3. At the incisal third, the labial surface of the crown is broad and slightly convex, and the lingual surface is slightly concave.

4. More of the labial surface may be seen than of the lingual surface from this aspect.

5. Labio-lingual diameter is greater than mesio-distal one.

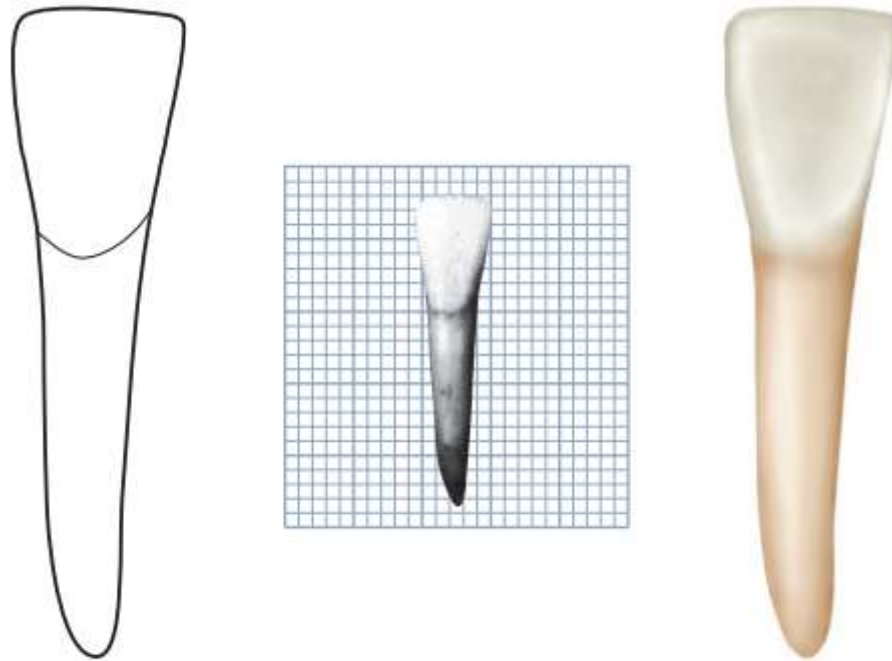


■ **FIGURE 7-6** Mandibular right central incisor, incisal aspect. (Grid = 1 sq. mm.)

Permanent Mandibular Lateral Incisor

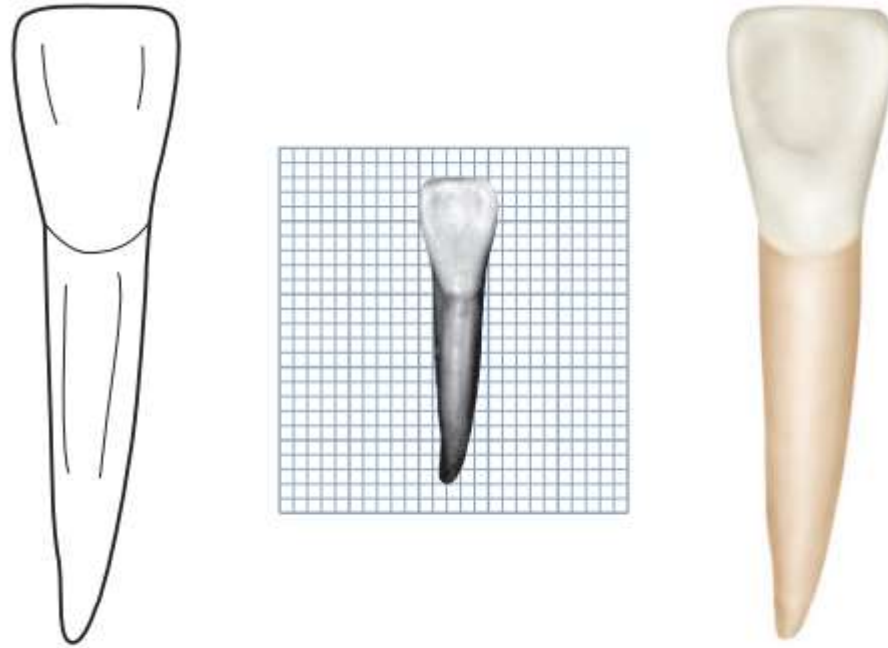
Principal identifying features

1. Slightly larger than the mandibular central incisors with fan shaped crown.
2. The crown is slightly longer, but the root is considerably longer than the mandibular central incisors.
3. The mesial side of the crown is longer than the distal side, causing the incisal ridge to slope downward in a distal direction.



■ **FIGURE 7-13** Mandibular right lateral incisor, labial aspect. (Grid = 1 sq. mm.)

4. The distal contact area is more towards the cervical area than mesial contact area.
5. Faint marginal ridges but more prominent than in mandibular central incisors.
6. The incisal edge is twisted distally in a lingual direction to follow the curvature of the lower arch.
7. There are mesial and distal developmental depressions on the root.

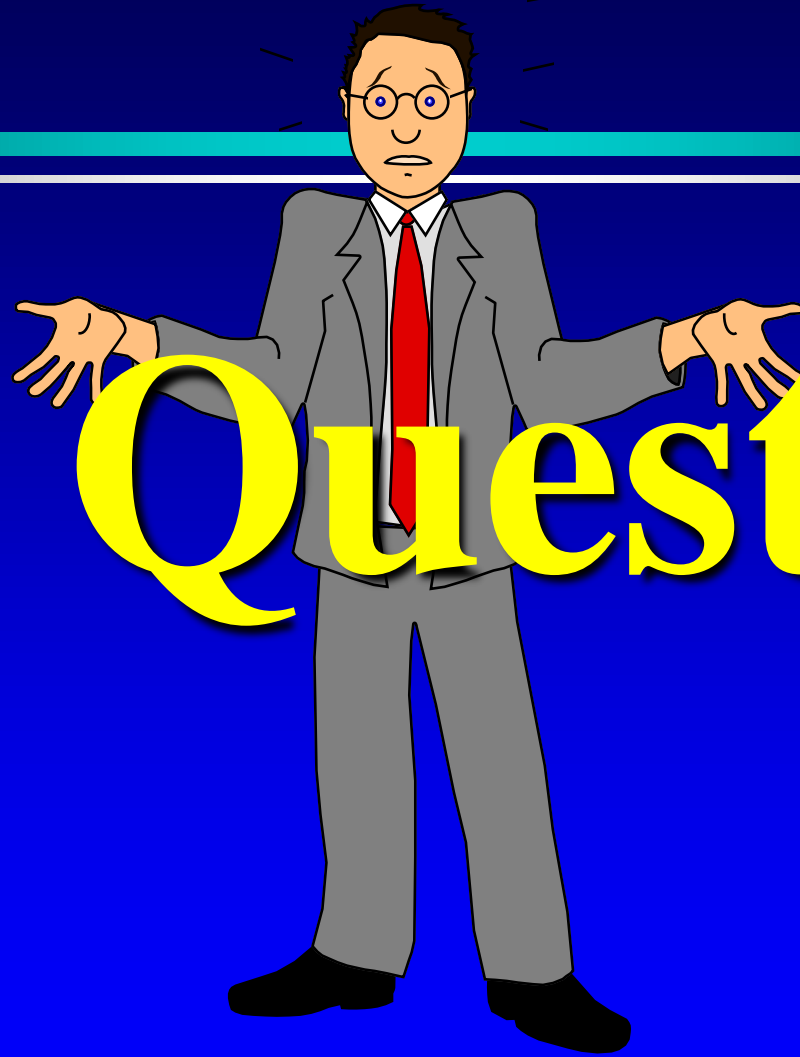


■ **FIGURE 7-14** Mandibular right lateral incisor, lingual aspect. (Grid = 1 sq. mm.)

Some differences between maxillary and mandibular central incisors

<i>Feature</i>	Max. central incisor	Mand. central incisor
<i>Location of the incisal ridge</i>	Centered over the root.	More lingually positioned.
<i>Labial outline (from mesial aspect)</i>	Convex cervically, slightly convex to the incisal ridge.	Slightly convex cervically, straight to the incisal ridge.
<i>Lingual aspect</i>	Featurefull.	Featureless.
<i>Contact areas</i>	More cervically.	More incisally.
<i>Size</i>	Larger.	Smaller.

Any Questions



Permanent Canines

Lec.8

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General Characteristic Features of the Canines

1. The canines are placed at the “corners” of the mouth, which help in keeping facial expressions at the cosmetic value.
2. The canines are the longest teeth in the mouth.
3. The canines are the strongest teeth in the mouth.

4. The canines are the most stable teeth in the mouth because of the followings:

- They have large labio-lingual dimension.

- They have long roots, which are well anchored in the alveolar bone.

- The crown shape of the canine allows for “self-cleansing”, so they stay for longer time.

5. The middle labial lobe is highly developed incisally into a strong, well-formed cusp.

The Permanent Maxillary Canine

Principal Identifying Features

1. Single pointed cusp.
2. The distal slope of the cusp is longer than the mesial slope.
3. Marked convex labial outline and bulky palatal cingulum.
4. Very long single root.

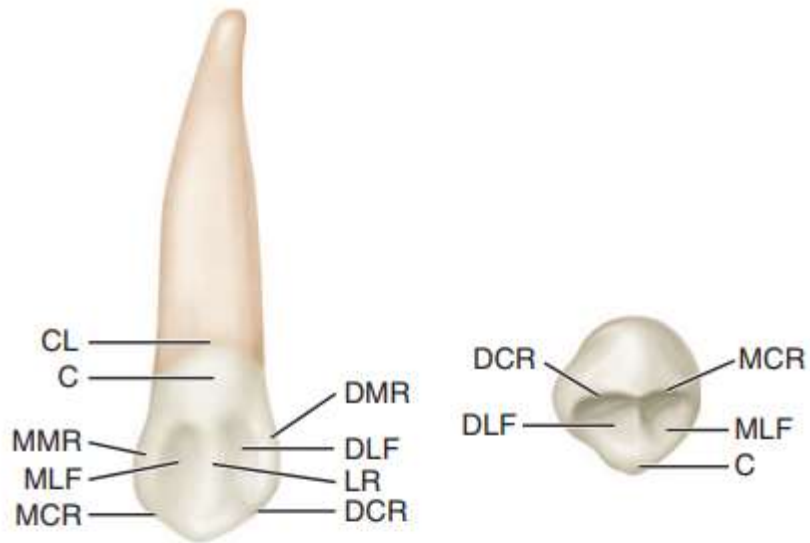


FIGURE 8-1 Maxillary right canine, lingual and incisal aspects. *CL*, Cervical line; *C*, cingulum; *MMR*, mesial marginal ridge; *MLF*, mesiolingual fossa; *MCR*, mesial cusp ridge; *DCR*, distal cusp ridge; *LR*, lingual ridge; *DLF*, distolingual fossa; *DMR*, distal marginal ridge.

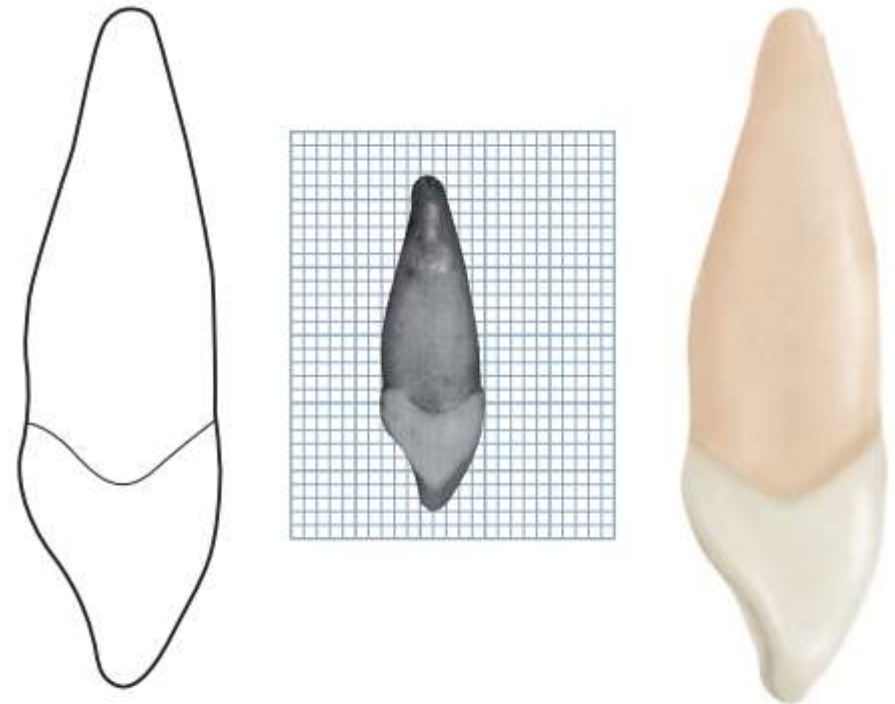


FIGURE 8-4 Maxillary left canine, mesial aspect. (Grid = 1 sq. mm.)

The Labial Aspect

1. The mesial outline of the crown is convex from the cervical line to the crest of curvature, which is located at the junction of the incisal and middle thirds.
2. The distal outline of the crown is slightly concave from the cervical line to the crest of curvature, which is located at the center of the middle third.

3. The tip of the cusp is in a line with the center of the root.

4. The distal slope of the cusp is longer than the mesial slope.

5. The cervical line is convex toward the root

6. The labial surface is smooth except for a shallow depression mesially and distally dividing the three lobes, with the middle one much more developed producing the labial ridge.

7. The root is long and conical, with the apex curved distally.

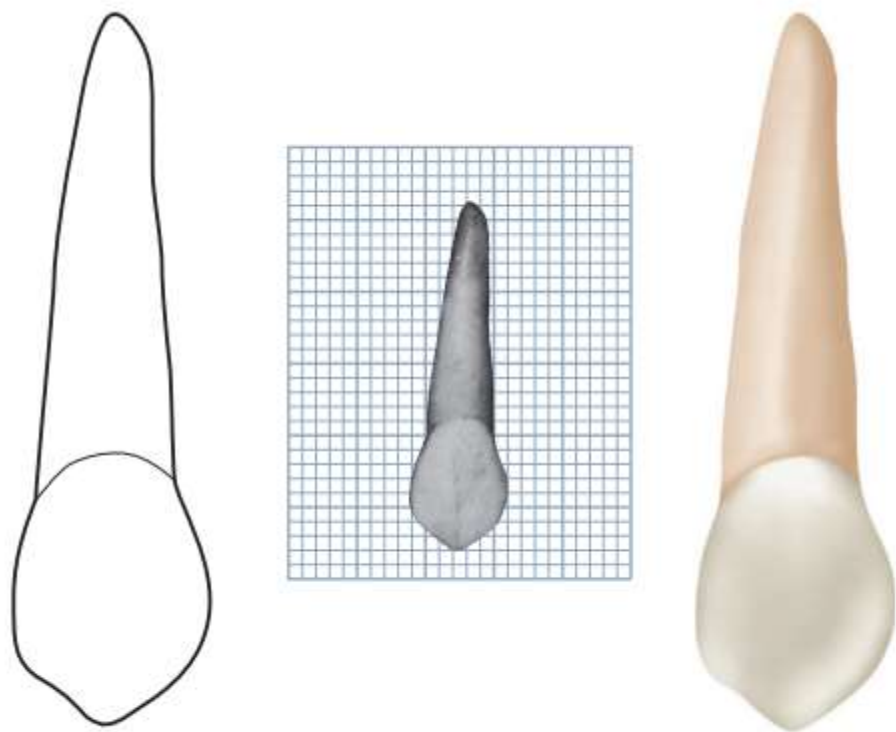
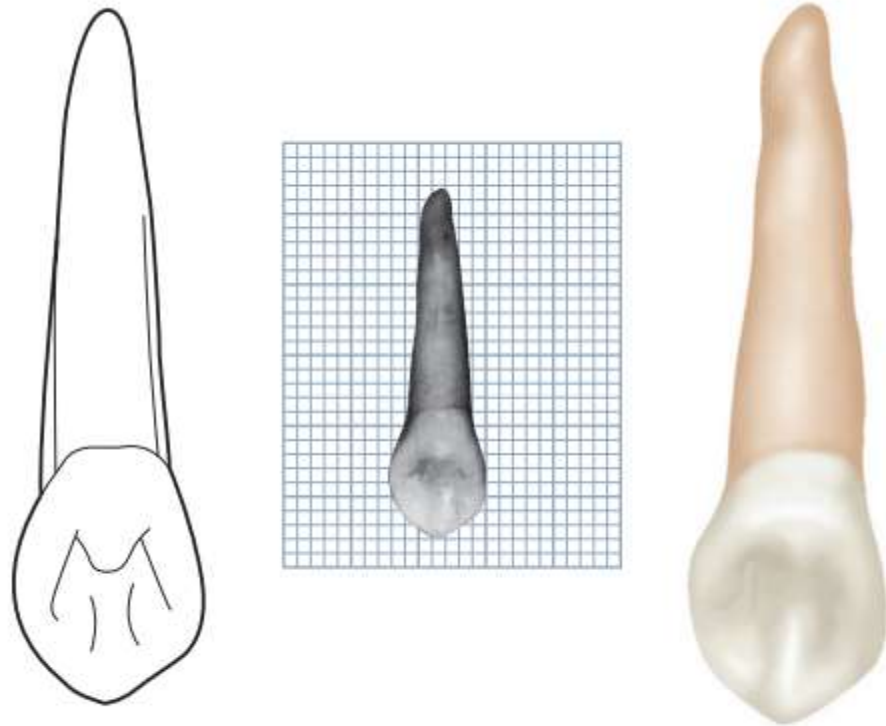


FIGURE 8-2 Maxillary left canine, labial aspect. (Grid = 1 sq. mm.)

The Lingual Aspect

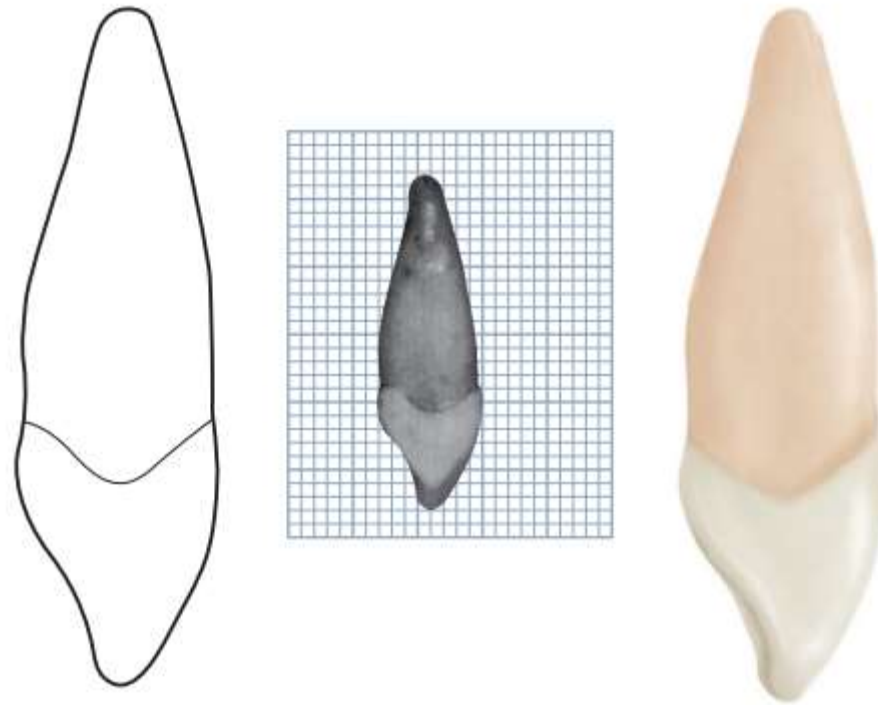
1. The tooth is narrower lingually than labially (i.e., tapered lingually).
2. The cingulum in the maxillary canine is larger than that in the maxillary central and lateral incisors.
3. There is a well developed lingual ridge confluent with the cusp tip, which divides the lingual fossa into two fossae.
4. There is a developmental depression mesially and distally extending for most of the root length.



■ **FIGURE 8-3** Maxillary left canine, lingual aspect. (Grid = 1 sq. mm.)

The Mesial Aspect

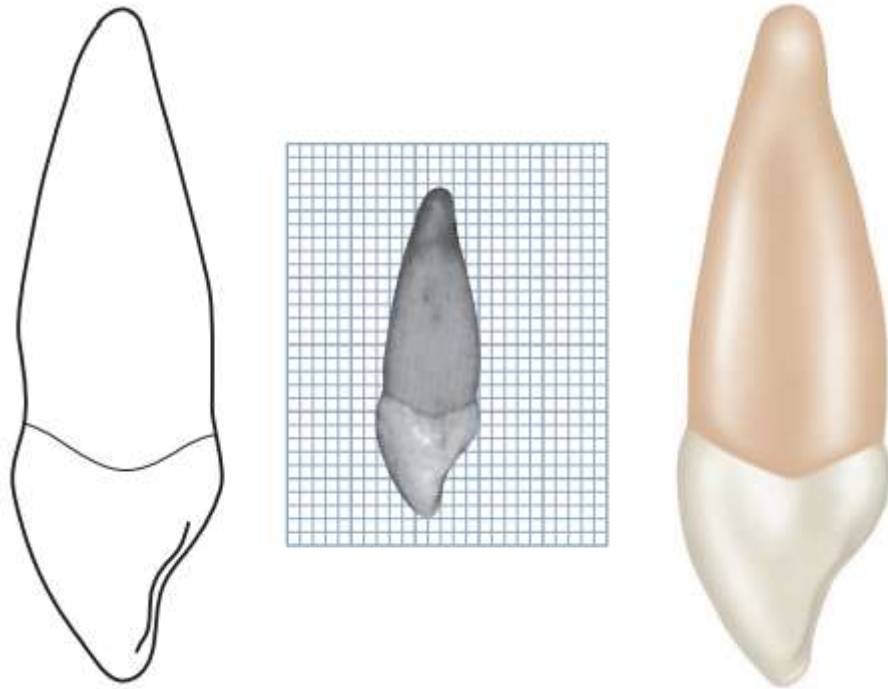
1. The labial and lingual outlines of the crown are more convex than that in the maxillary central and lateral incisors, with the crest of curvature (labially and lingually) located at the cervical thirds.
2. The curvature of the cervical line is 2.5 mm towards the cusp.
3. A line bisecting the cusp is labial to a line bisecting the root.
4. There is a developmental depression extending on part of the root.



■ **FIGURE 8-4** Maxillary left canine, mesial aspect. (Grid = 1 sq. mm.)

The Distal Aspect

1. The curvature of the cervical line is less distally than mesially (as in the maxillary central and lateral incisors).
2. The developmental depression of the root is more pronounced distally than mesially.



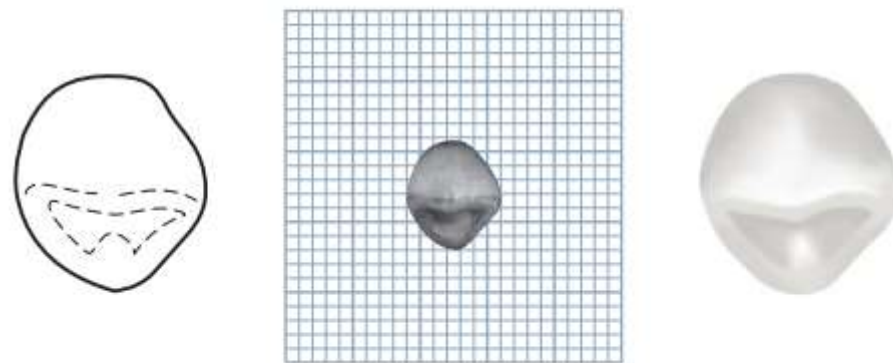
■ **FIGURE 8-5** Maxillary left canine, distal aspect. (Grid = 1 sq. mm.)

The Incisal Aspect

1. The labio-lingual dimension is greater than the mesio-distal dimension.
2. The ridge of the labial lobe is very noticeable labially, with its greatest convexity at the cervical third.

3. The cingulum is well developed and makes a small arc when compared with the labial outline which makes a large arc.

4. The tip of the cusp is labial to the center labio-lingually, and at or slightly mesial to the center mesio-distally.



■ **FIGURE 8-6** Maxillary left canine, incisal aspect. (Grid = 1 sq. mm.)



Labial



Lingual



Incisal



Mesial



Distal

The Permanent Mandibular Canine

Principal Identifying Features

1. The mandibular canine is narrower mesio-distally and labio-lingually than the maxillary canine.
2. The lingual surface of the crown of the mandibular canine is shorter than that of the maxillary canine, with less developed cingulum and less prominent marginal ridges.
3. The cusp of the mandibular canine is not as well-developed as that of the maxillary canine.

4. The tip of the cusp is not in a line with the center of the root.

5. The mesial slope of the cusp is shorter than the distal slope.

6. The distal outline of the crown is more rounded than the mesial outline.

7. The mesial surface of the crown is nearly straight with the mesial surface of the root, with the contact area being near the mesio-incisal angle.

8. The distal contact area is located more incisally than the maxillary canine.

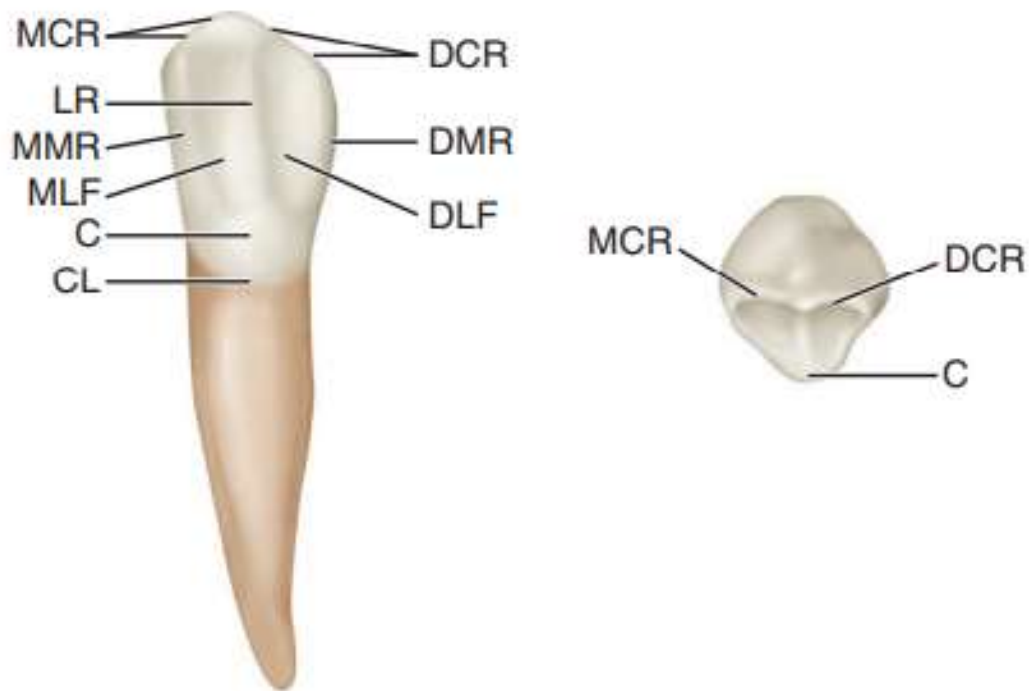
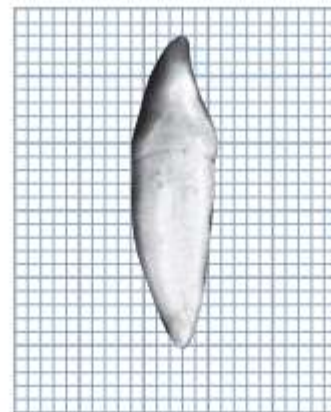
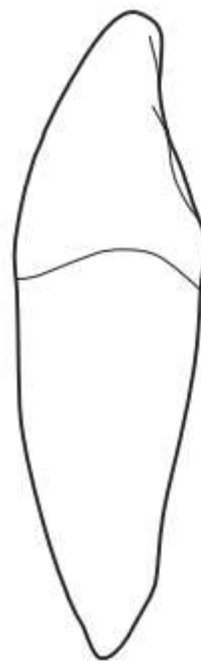
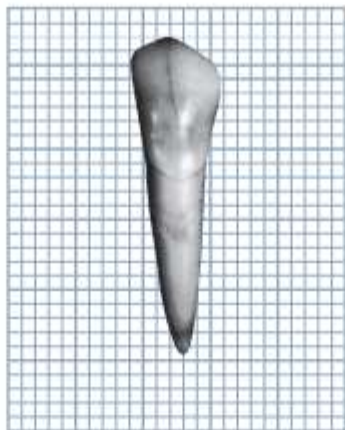
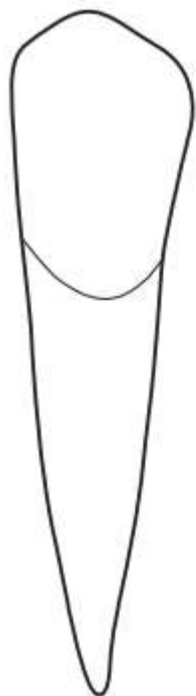


FIGURE 8-13 Mandibular right canine, lingual and incisal aspects.

MCR, Mesial cusp ridge; *LR*, lingual ridge; *MMR*, mesial marginal ridge;

MLF, mesiolingual fossa; *C*, cingulum; *CL*, cervical line; *DLF*, distolingual fossa;

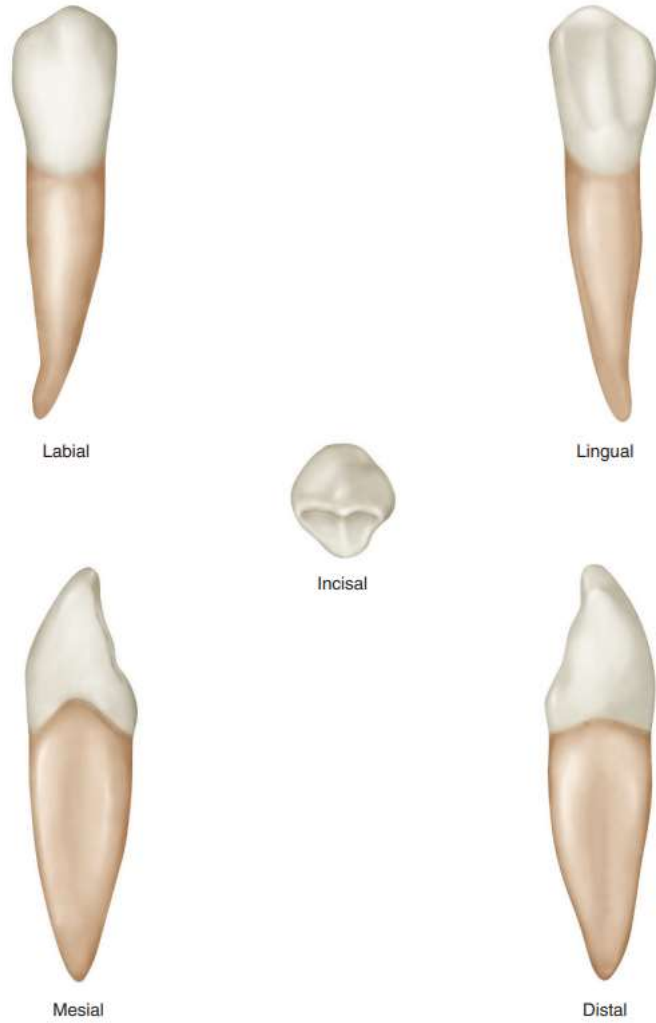
DMR, distal marginal ridge; *DCR*, distal cusp ridge.



■ **FIGURE 8-14** Mandibular left canine, labial aspect. (Grid = 1 sq. mm.)

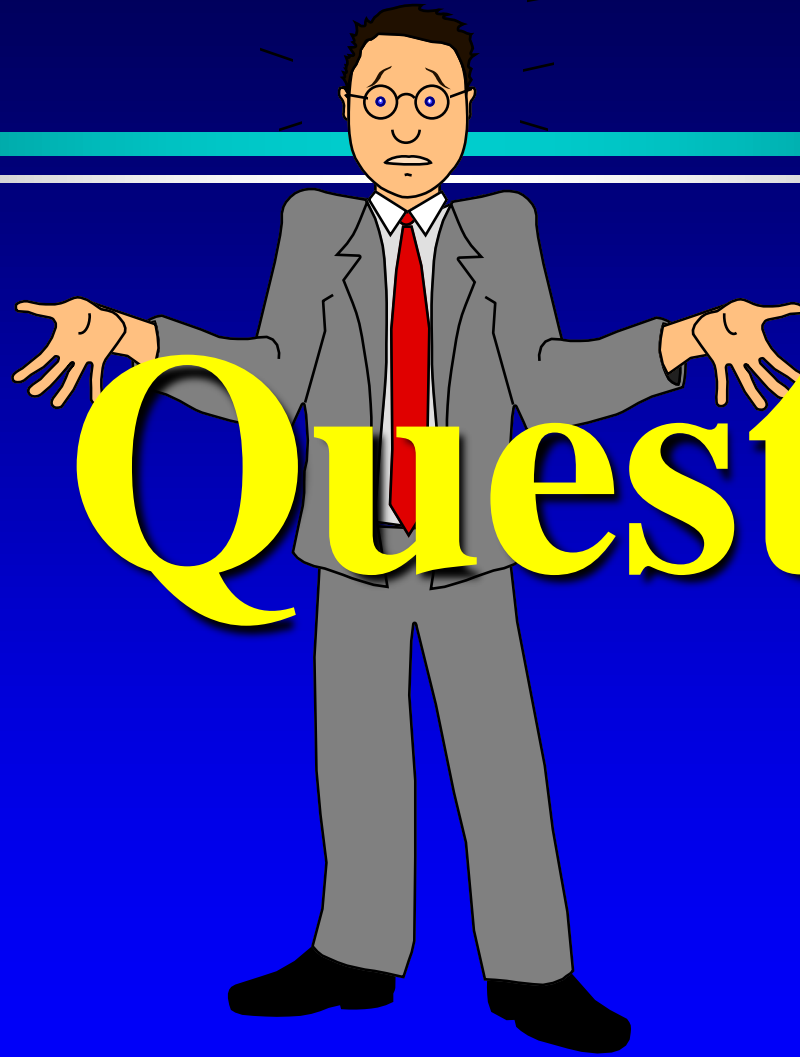
■ **FIGURE 8-17** Mandibular left canine, distal aspect. (Grid = 1 sq. mm.)





■ FIGURE 8-20 Mandibular right canine.

Any Questions



Permanent Maxillary Premolars

Lec.9

Dental Anatomy

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- The maxillary premolars are **four** in number: two in the right and two in the left.
- They are **posterior** to the canines and **anterior** to the molars.
- **The maxillary premolars** have shorter crowns and shorter roots than those of the maxillary canines.
- **The maxillary first premolar** is larger than the maxillary second premolar.

- Premolars are named so because they are anterior to molars in permanent dentition.
- They succeed the deciduous molars (there are no premolars in deciduous dentition).
- are also called “bicuspid -having two cusps-“, but this name is not widely used because the mandibular first premolar has one functional cusp.

- **The premolars are intermediate between molars and canines in:**
- **Form:** The labial aspect of the canine and the buccal aspect of premolar are similar.
- **Function:** The canine is used to tear food while the premolars and molars are used to grind it.
- **Position:** The premolars are in the center of the dental arch.

Some characteristic features to all posterior teeth:

1. Greater relative facio-lingual measurement as compared with the mesio-distal measurement.
2. Broader contact areas.
3. Contact areas nearly at the same level.
4. Less curvature of the cervical line mesially and distally.
5. Shorter crown cervico-occlusally when compared with anterior teeth.

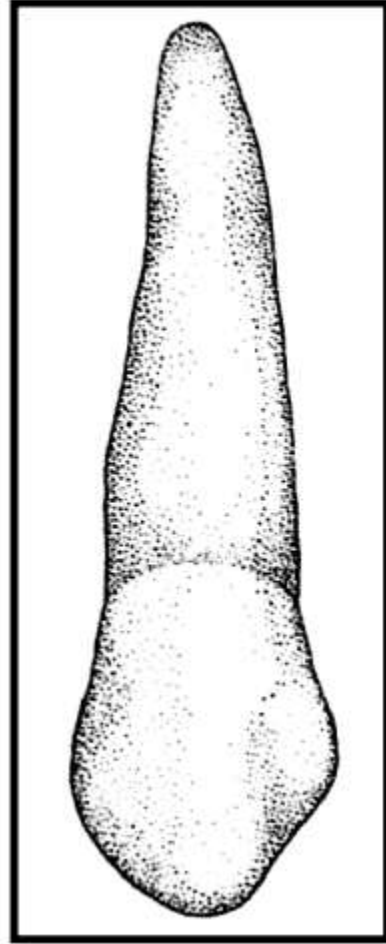
Maxillary First Premolar

Principal identifying features:

1. Two sharply defined cusps, buccal (1mm) longer than the lingual.
2. Mesial slope of the buccal cusp is longer than the distal slope.
3. Two roots; buccal and palatal, and the bifurcation is at the middle third of the root.
4. Developmental depression on the mesial surface of the crown extending to the root.
5. Central developmental groove interrupts the mesial marginal ridge.

Buccal Aspect

- From this aspect, the crown is roughly trapezoidal in shape.
 1. The mesial outline is slightly concave from the cervical line to the “relatively broad curvature of ” the contact area.
 2. The crest of curvature of the mesial contact area is immediately occlusal to the center of the middle third.



3. The distal outline of the crown is straighter than that mesially.

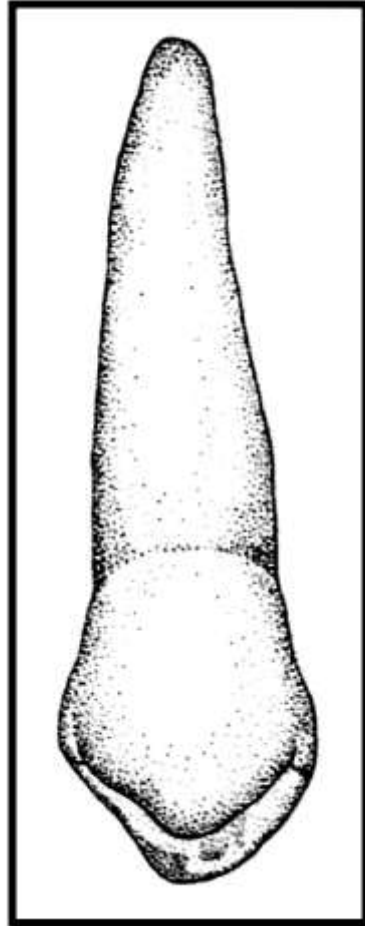
4. The distal contact area has a broader curvature than that found mesially with its position slightly more occlusally. In spite of that, the contact areas are nearly at the same level with each other.

5. The mesial slope of the cusp is straight and longer than the distal slope, which is shorter and more curved.

6. Buccal surface of the crown is convex showing a strongly developed middle buccal lobe. The ridge which is continuous from the tip of the cusp to the cervical line is called the buccal ridge.

Lingual Aspect

1. The crown tapers toward the lingual because the lingual cusp is narrower than the buccal cusp.
2. The lingual cusp is smooth and spheroidal. The cusp tip is pointed with mesial and distal slopes meeting at a right (90°) angle.



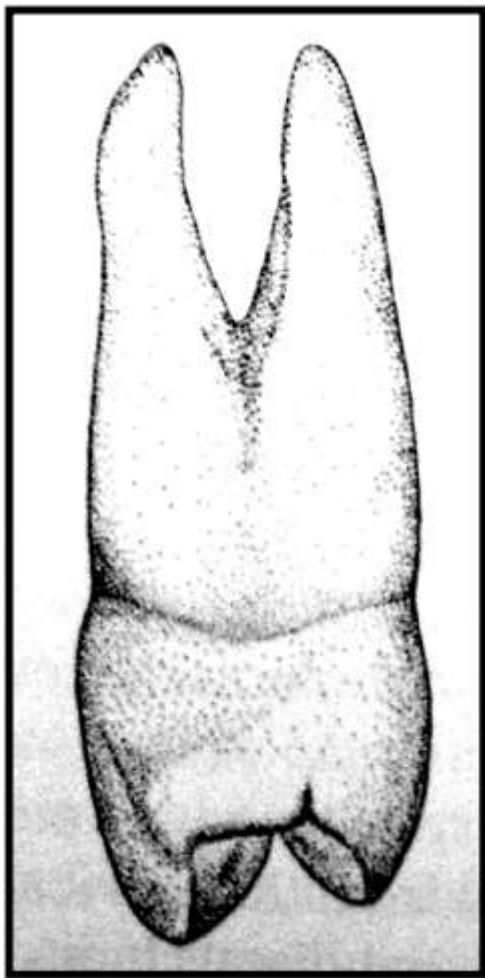
3. The mesial and distal outlines lingually are convex being continuous with the slopes of the lingual cusp.

4. The lingual cusp is shorter than the buccal cusp.

5. The apex of the lingual root “of a two-rooted tooth” is more blunt than the buccal one.

Mesial Aspect

1. The crown is roughly trapezoidal, with the longest uneven side is toward the cervical line, and the shortest is toward the occlusal portion.
2. The tips of the cusps are well within the confines of the root trunk.
3. The cervical line has less curvature (1mm) than any anterior tooth.



4. The buccal outline is convex and the crest of curvature is within the cervical third (near the junction between the cervical and middle thirds) and then become less convex till the cusp tip.

5. The lingual outline is convex and the crest of curvature is within the middle third (near the center of the middle third).

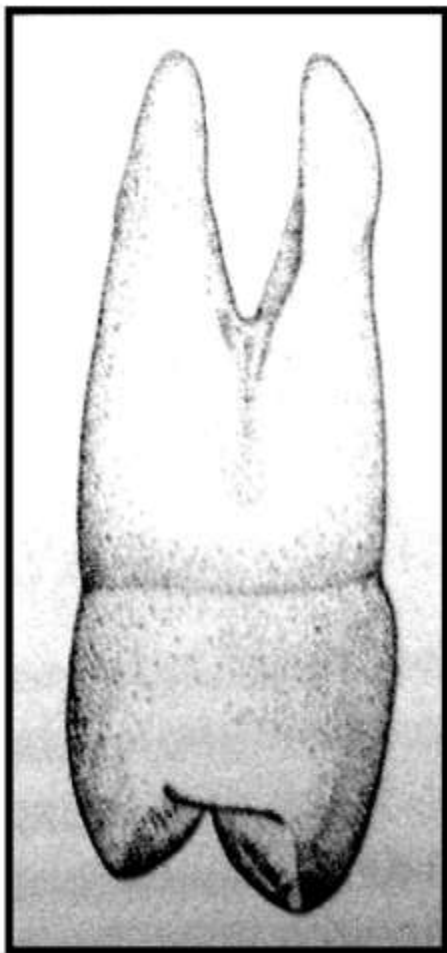
6. The mesial marginal ridge is at the level of the junction of the middle and occlusal thirds and is crossed by the mesial developmental groove.

7. The root is bifurcated for half of its total length.

8. The mesial developmental depression starts from the contact area to the bifurcation area.

Distal Aspect

- The differences between distal and mesial aspects are:
 1. The curvature of the cervical line is less distally than mesially.
 2. There is no developmental groove crossing the distal marginal ridge.
 3. There is no developmental depression.



Occlusal Aspect

1. It resembles an unequal hexagon (six-sided figure). The buccal sides are equal, the mesial side is shorter than the distal side and the mesio-lingual side is shorter than the disto-lingual side.
2. The distal crest of curvature is buccal to the mesial crest of curvature.
3. The bucco-lingual dimension is much greater than the mesio-distal dimension

4. The occlusal surface is circumscribed by the cusps and marginal ridges.
5. A central developmental groove divides the crown into buccal and lingual parts.
 - It extends from near the distal marginal ridge to the mesial marginal ridge where it joins the mesial marginal developmental groove.

6. In the mesial and distal triangular fossae, there are two developmental grooves (mesio-buccal and disto-buccal grooves respectively) that join the central groove.

- The junctions of these grooves make the developmental pits (mesial and distal developmental pits respectively).

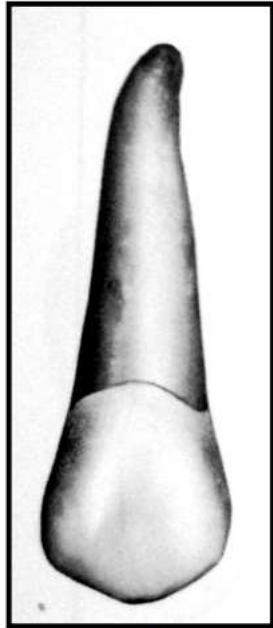
7. The lingual cusp is sharper and more pointed than the buccal cusp.

Maxillary Second Premolar

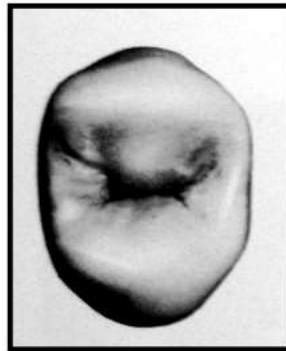
Principal identifying features

1. The buccal and lingual cusps are equal in height.
2. The mesial slope of the buccal cusp is shorter than the distal slope.
3. The mesial surface has no developmental depression.
4. Has a single root

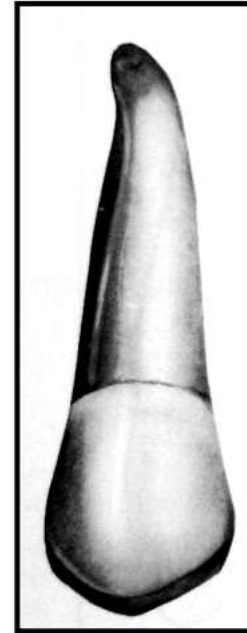
5. The occlusal surface is more rounded or oval.
6. The central developmental groove is shorter and more irregular with more supplemental grooves on the occlusal surface.
7. There is no mesial groove crossing the mesial marginal ridge.



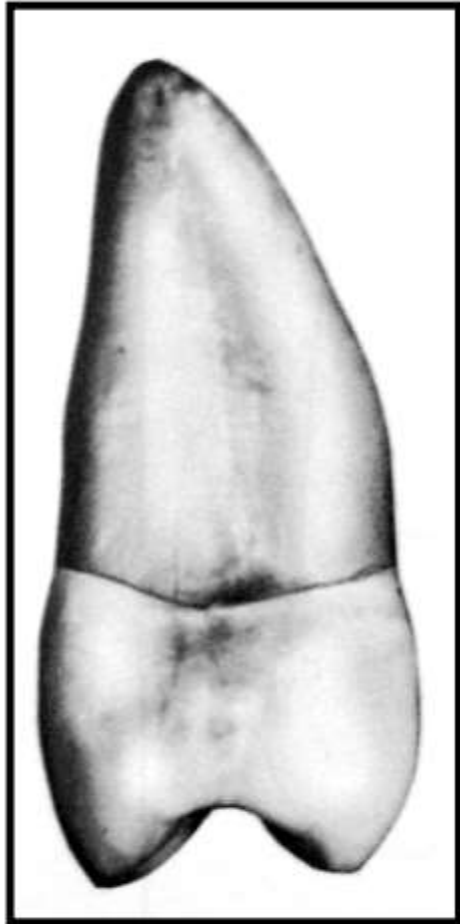
Buccal Aspect



Occlusal Aspect

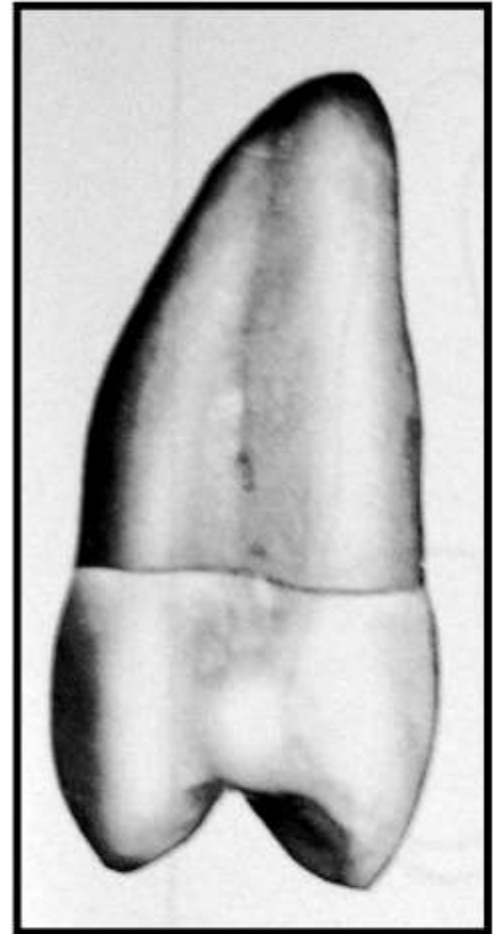


Lingual Aspect



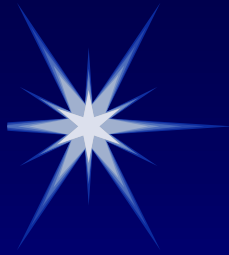
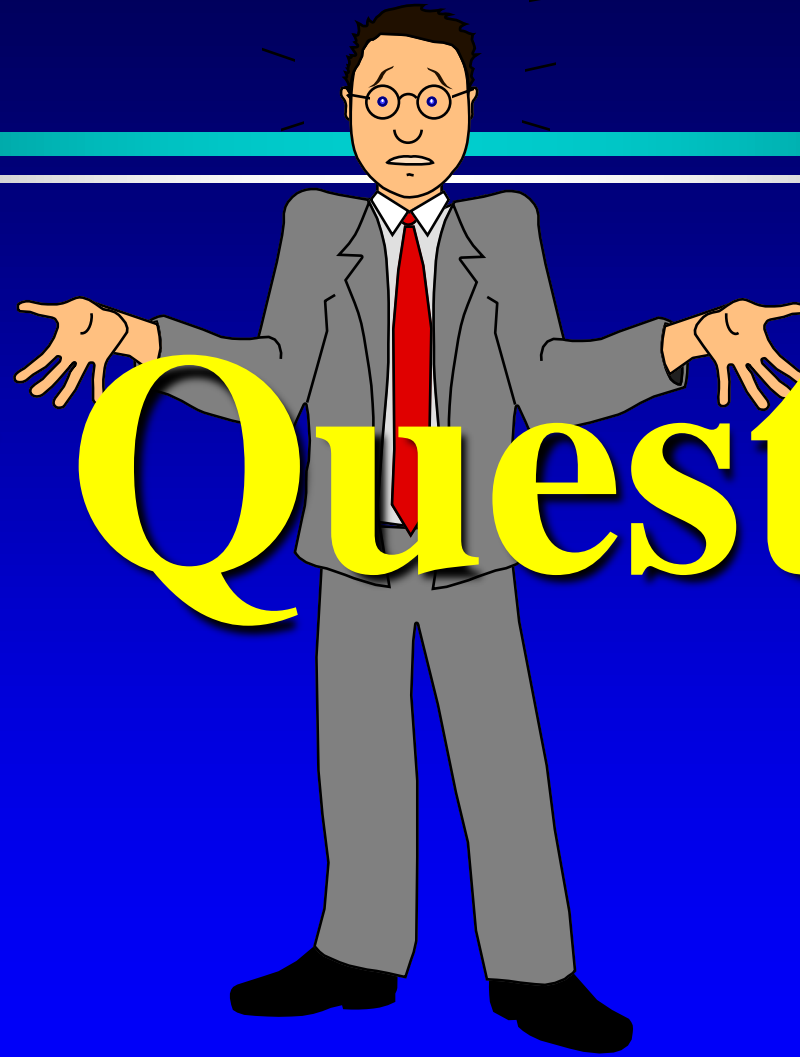
Mesial Aspect

8



**Distal Aspect
Dental Anatomy**

Any Questions



Permanent Mandibular Premolars

Lec.10

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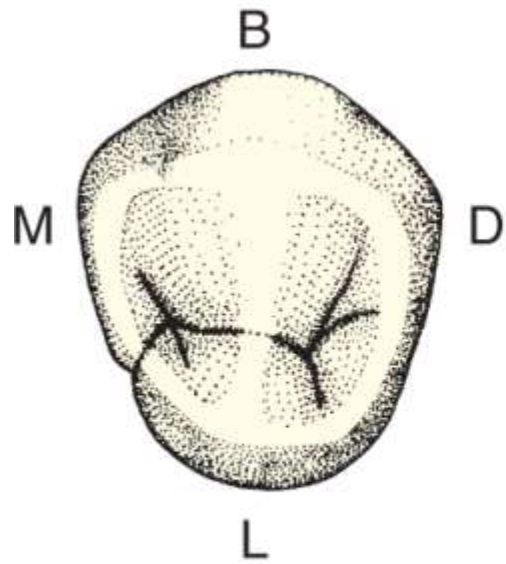
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Mandibular First Premolar

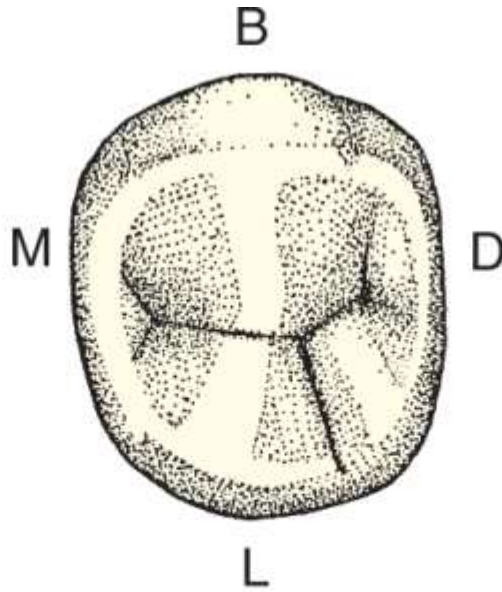
- It is the smallest premolar in the human dentition.
- It resembles both the mandibular canine and the mandibular second premolar in function and has some of the characteristics of each of them.

A. Characteristics that resemble those of the mandibular canine:

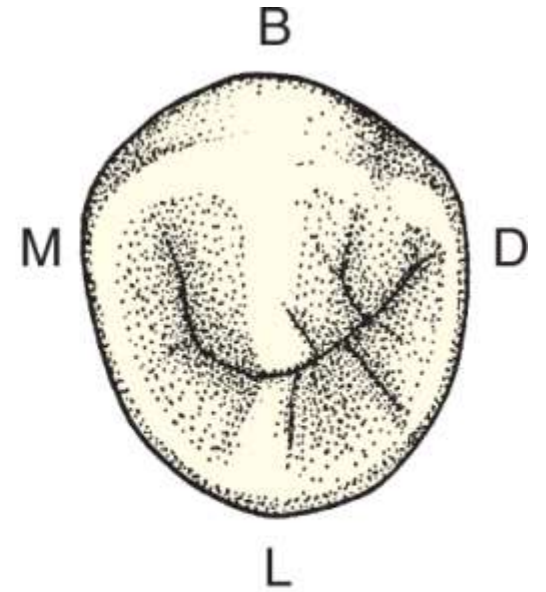
1. The buccal cusp is long, sharp, and is the only occluding cusp.
2. The bucco-lingual measurement is similar to that of the mandibular canine.
3. The occlusal surface slopes sharply lingually in a cervical direction.
4. The mesio-buccal cusp ridge is shorter than the disto-buccal cusp ridge.
5. The outline form from the occlusal aspect resembles the incisal aspect of the mandibular canine.



Mandibular right
first premolar



Three-cusp type
Mandibular right



Two-cusp type
second premolar

B. Characteristics that resemble those of the mandibular second premolar:

1. The mesial and distal contact areas are located at nearly the same level.
2. The curvature of the cervical line mesially and distally is similar.
3. The tooth has more than one cusp.
4. The length of the root of the mandibular first premolar is closer to the length of the root of the mandibular second premolar.

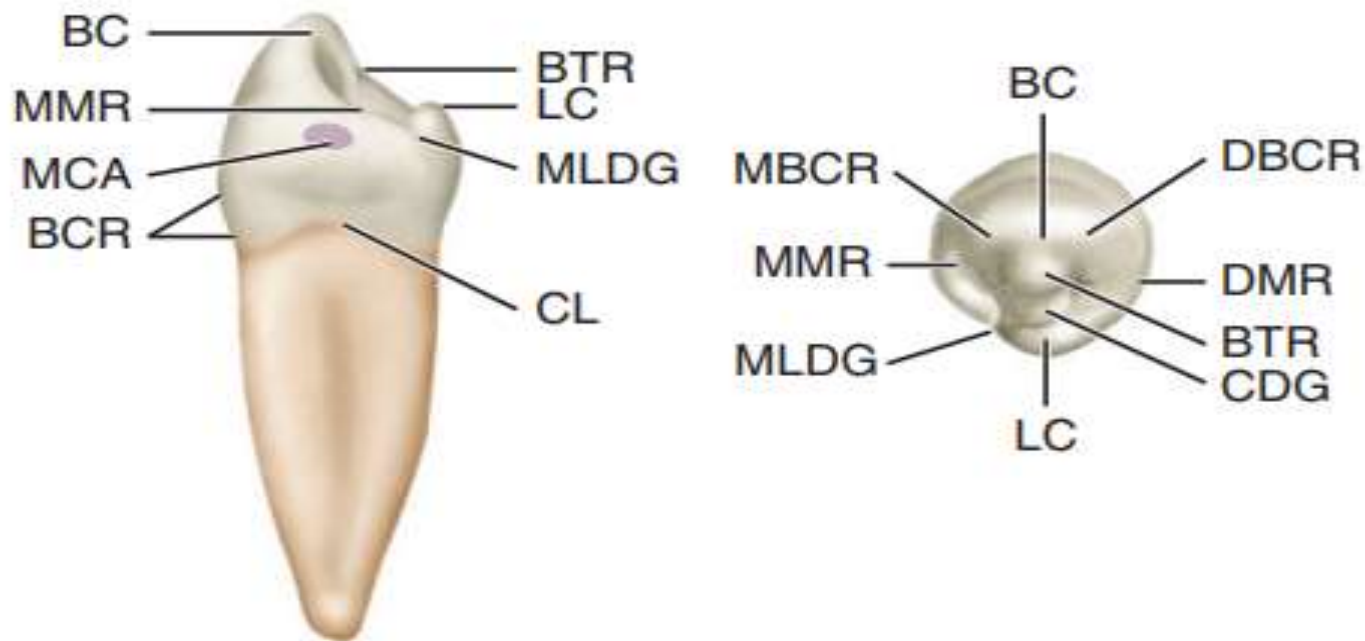


FIGURE 10-1 Mandibular right first premolar, mesial and occlusal aspects. *BC*, Buccal cusp; *BTR*, buccal triangular ridge; *LC*, lingual cusp; *MLDG*, mesiolingual developmental groove; *CL*, cervical line; *BCR*, buccal cervical ridge; *MCA*, mesial contact area; *MMR*, mesial marginal ridge; *DBCRCR*, distobuccal cusp ridge; *DMR*, distal marginal ridge; *CDG*, central developmental groove; *MBCRCR*, mesiobuccal cusp ridge.

Principal Identifying Features

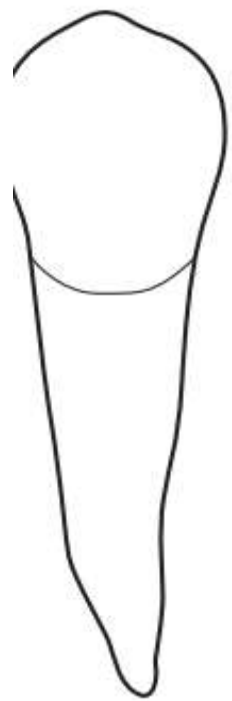
1. Marked lingual inclination of the crown.
2. Two cusps: buccal and lingual; the buccal cusp is larger, and the lingual cusp is like a more developed cingulum.
3. Circular occlusal outline.
4. Single rounded root.

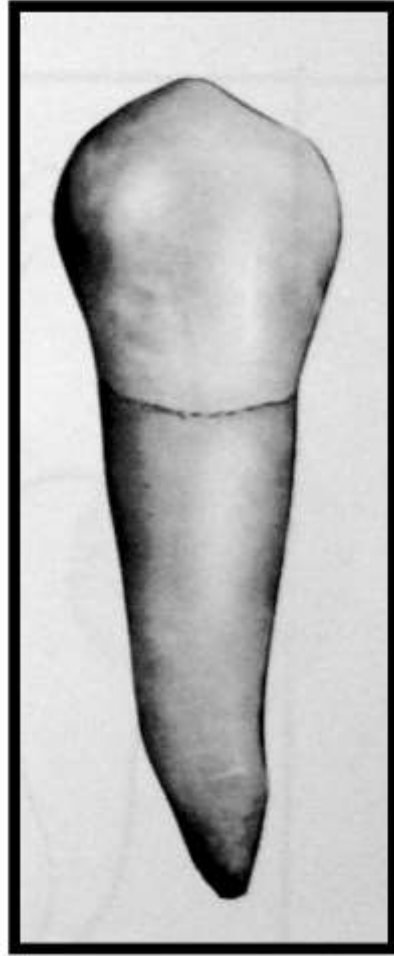
The Buccal Aspect

1. The crown is roughly trapezoidal with a prominent middle buccal ridge, which continues from the cusp tip to the cervical line.
2. The mesial slope of the buccal cusp is shorter than the distal slope.
3. The contact areas mesially and distally are broad and at the same level.

4. The mesial and distal outlines from the cervical line to the crest of curvature are slightly concave.

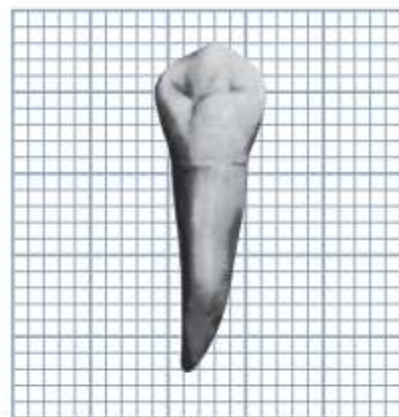
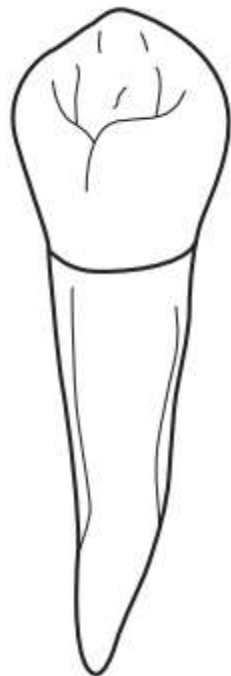
5. The tip of the buccal cusp is sharp and located mesial to the long axis of the crown.

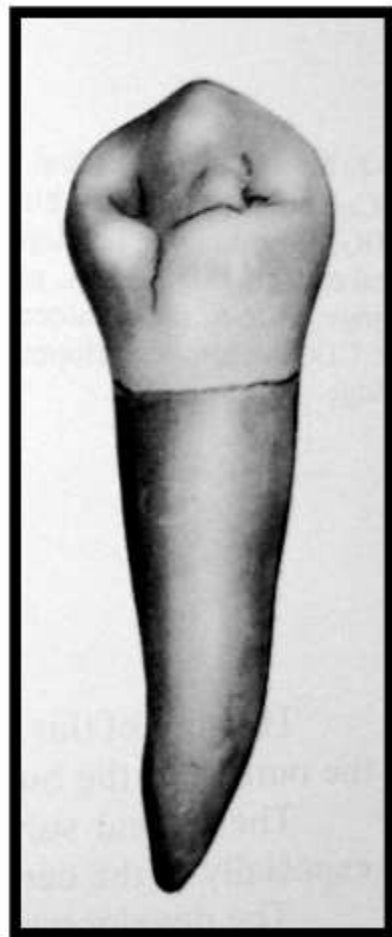




The Lingual Aspect

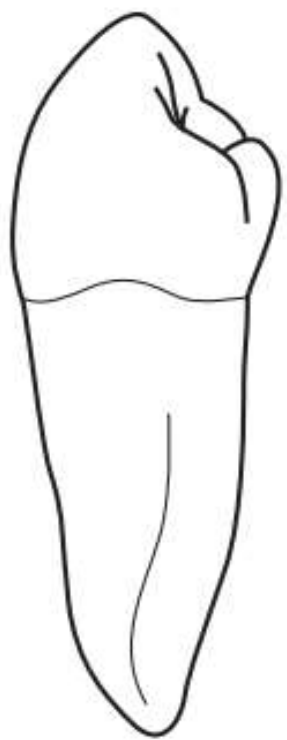
1. The crown and the root taper lingually, and the occlusal surface inclines greatly cervically.
2. The lingual cusp is poorly developed, but is pointed.
3. There is a developmental groove named "mesio-lingual developmenal groove", which divides the lingual cusp into the mesio-buccal and lingual lobes.





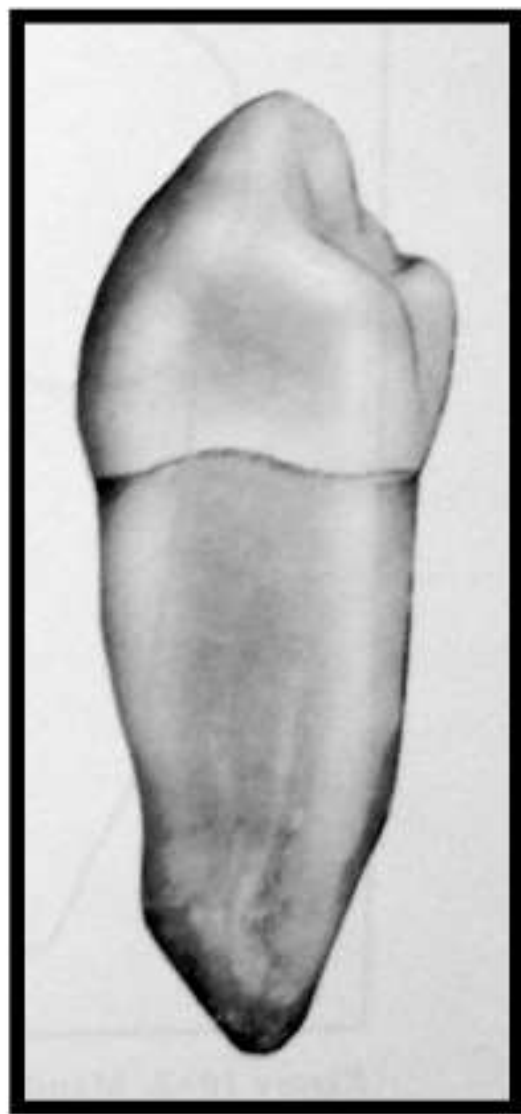
The Mesial Aspect

1. The tip of the buccal cusp nearly reaches the center of the root, and the convexity of the lingual outline of the cusp will be lingual to the lingual outline of the root.
2. The buccal outline is very curved, and the crest of curvature is near the middle third of the crown.
3. The lingual outline is less curved than the buccal outline, with the crest of curvature at the center of the middle third.



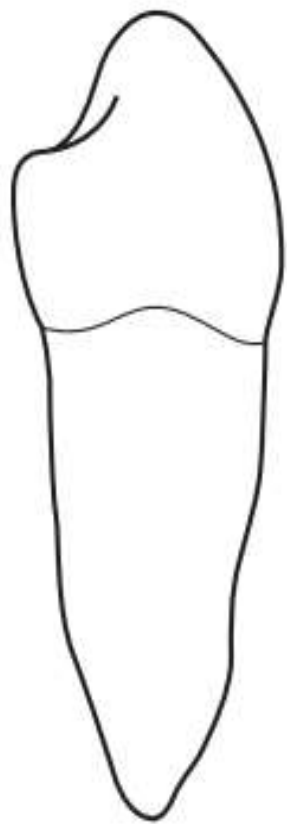
4. The height of the lingual cusp is two-thirds the height of the buccal cusp from the cervical line to the tip of the cusp.

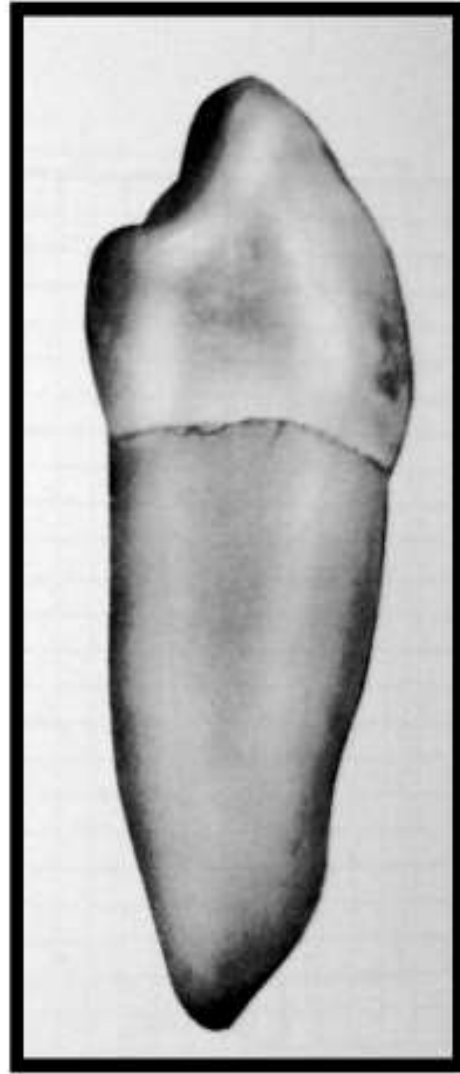
5. The surface of the crown mesially is smooth except for the presence of the mesio-lingual developmental groove.



The Distal Aspect

- The distal aspect of the mandibular first premolar differs from the mesial aspect in the following points:
 1. There is no developmental groove in the distal aspect.
 2. The distal marginal ridge is higher than the mesial marginal ridge, with less inclination lingually.
 3. The curvature of the cervical line distally is nill.





The Occlusal Aspect

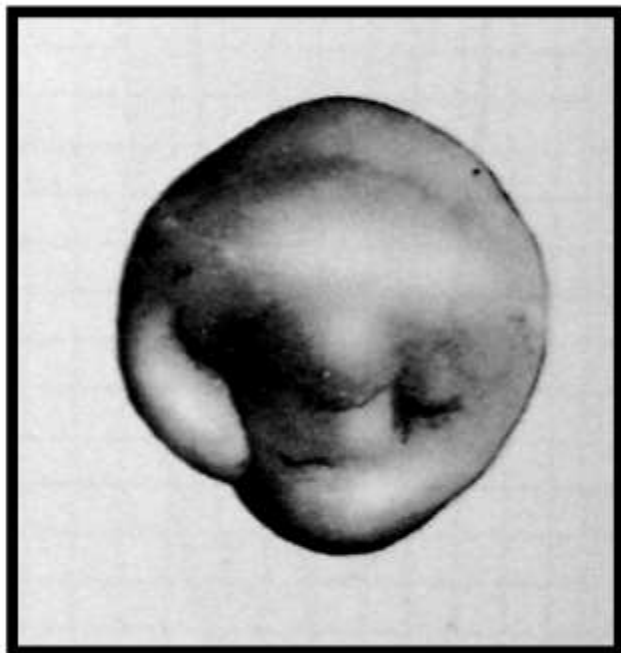
1. The buccal ridge is prominent.
2. The mesio-buccal and disto-buccal line angles are rounded and prominent.
3. The crown converges sharply to the center of the lingual surface.
4. The marginal ridges are well developed.
5. The lingual cusp is small.



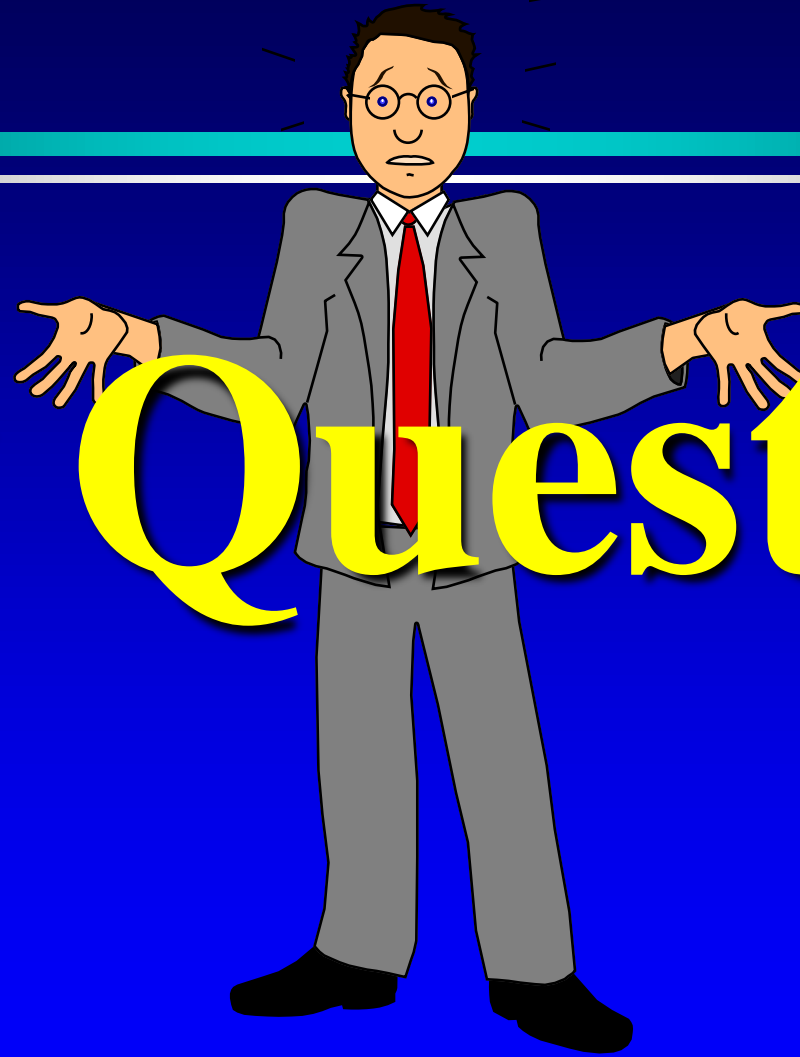
6. The triangular ridge of the buccal cusp is large, while the triangular ridge of the lingual cusp is small.

7. There are two fossae: mesial and distal fossae.

8. The mesial contact area is smaller than the distal contact area because it is constricted by the mesio-lingual developmental groove.



Any Questions



Permanent Mandibular Second Premolar

Lec.10

Dental Anatomy

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Principal identifying features

1. It is larger than the mandibular first premolar.
2. The cusps are more equal in size with less pointed tips.
 - Usually this tooth has three cusps, one buccal and two lingual; or may have only two cusps, one buccal and one lingual.
3. The occlusal outline is almost square in appearance with no mesio-lingual developmental groove.

Buccal Aspect

1. The buccal cusp is shorter and less pointed than that of mandibular first premolar.
2. The contact areas are broad and high (appear to be higher because of the shorter buccal cusp).
3. The root is broader mesio-distally than that of mandibular first premolar ending with a more blunt apex.



FIGURE 10-13 Mandibular left second premolar, buccal aspect.
(Grid = 1 sq. mm.)

Lingual Aspect

- The lingual surface of the crown is smooth and spheroidal.
- From this aspect, this tooth differs from the mandibular first premolar in:
 1. The lingual cusps are more developed (longer cusps).
 2. Less occlusal surface may be seen.

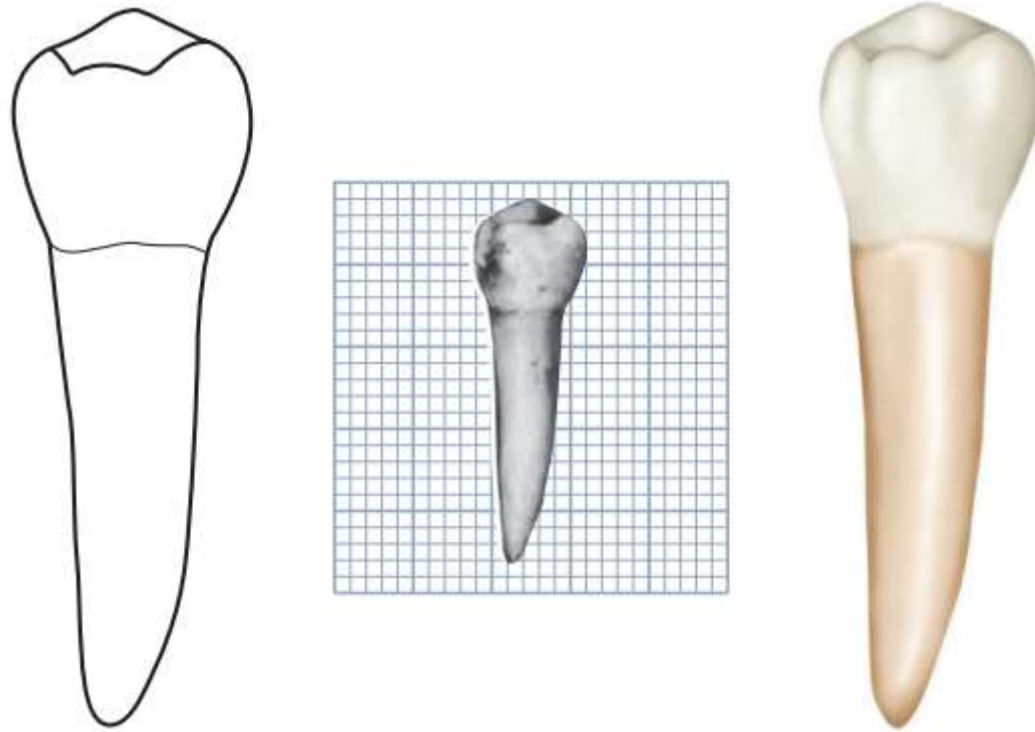


FIGURE 10-14 Mandibular left second premolar, lingual aspect.
(Grid = 1 sq. mm.)

3. **A. In the three cusps type:** there are two lingual cusps, the mesio-lingual is larger than the disto-lingual cusp and are divided by the lingual developmental groove.

B. In the two cusps type: there is a large cusp of the same height as in the three cusps type.

- There is a developmental depression disto-lingually where the lingual cusp ridge joins the distal marginal ridge.

Mesial Aspect

- From this aspect, this tooth differs from the mandibular first premolar in:
 1. The crown and the root are wider bucco-lingually.
 2. The buccal cusp is not nearly centered over the root trunk, and it is shorter.

3. The marginal ridge is at a right angle to the long axis of the tooth with less occlusal surface may be seen.

4. There is no mesio-lingual developmental groove on the crown.

5. The root is longer with more blunt apex.

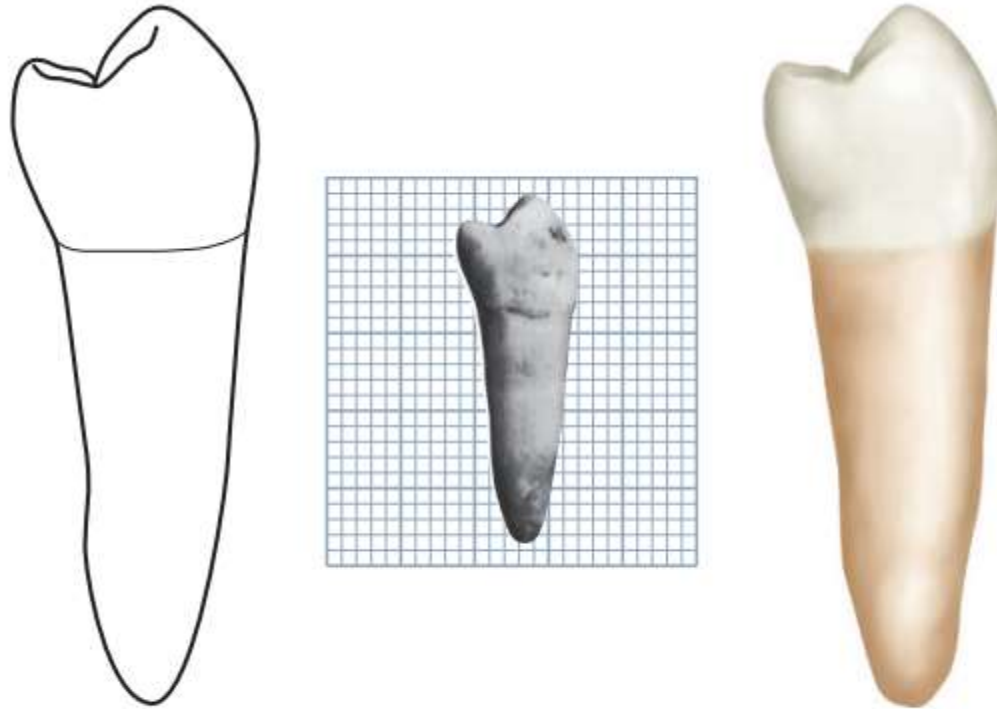


FIGURE 10-15 Mandibular left second premolar, mesial aspect.
(Grid = 1 sq. mm.)

Distal Aspect

1. All the three cusps may be seen.
2. The distal marginal ridge is lower than that mesially, revealing more of the occlusal surface.

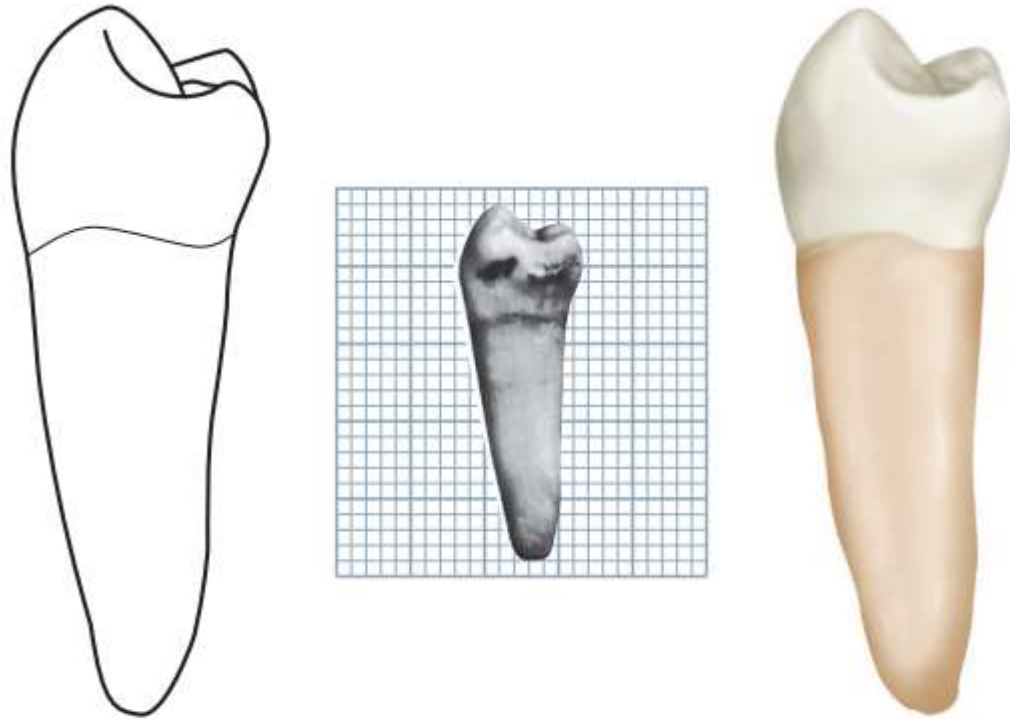


FIGURE 10-16 Mandibular left second premolar, distal aspect.
(Grid = 1 sq. mm.)

Occlusal Aspect

A. Three cusps type:

1. The occlusal aspect is square in shape.
2. Three cusps: the buccal is the largest, followed by the mesio□lingual cusp, and then the distolingual cusp.
3. Each cusp has a well-formed triangular ridge separated by deep developmental grooves which form a Y-shape on the occlusal surface.

4. There are three developmental grooves:

A. Mesial developmental groove ending in the mesial triangular fossa.

B. Distal developmental groove ending in the distal triangular fossa.

C. Lingual developmental groove separating the two lingual cusps.

5. These grooves converge in a central pit, which is placed slightly towards the distal side.

6. Supplemental grooves are often seen.

B. Two cusps type:

1. Appear more rounded than the more angular three cusps type.
 2. There is one well-developed lingual cusp which is large and opposite the buccal cusp.
 3. A central developmental groove travels in a mesio-distal direction with its terminals centered in the mesial and distal triangular fossae.
- Sometimes mesial and distal developmental pits in the centers of these fossae may be seen.

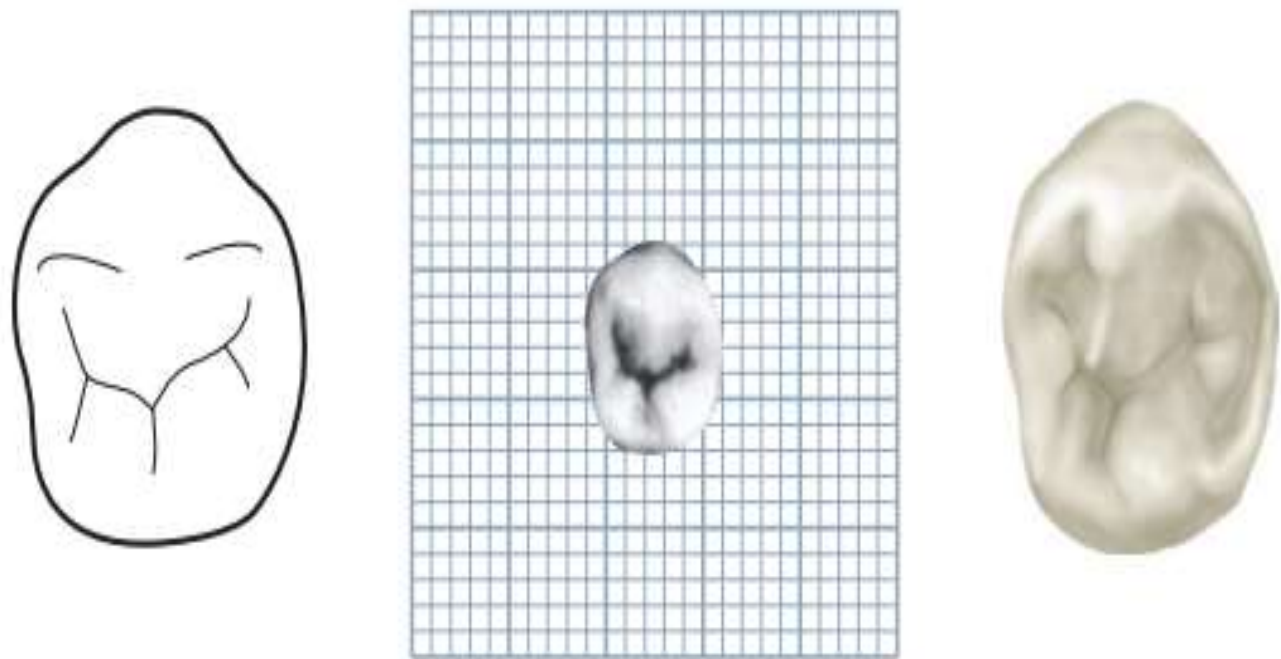


FIGURE 10-17 Mandibular left second premolar, occlusal aspect.
(Grid = 1 sq. mm.)

Any Questions

