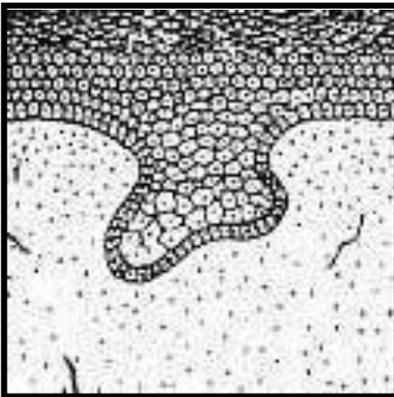


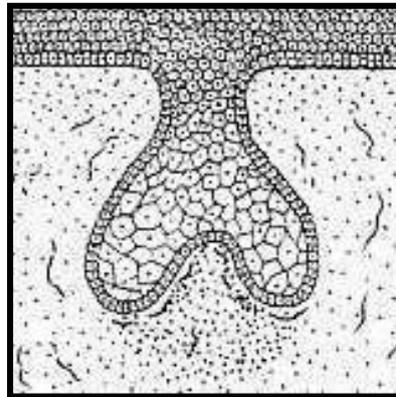
The development of the crown and the root of the tooth take place within the bone in the jaw. Development of primary teeth occurs both prenatally and postnatally, whereas the development of permanent teeth is entirely postnatally.

The tooth passes through stages named according to their shapes:

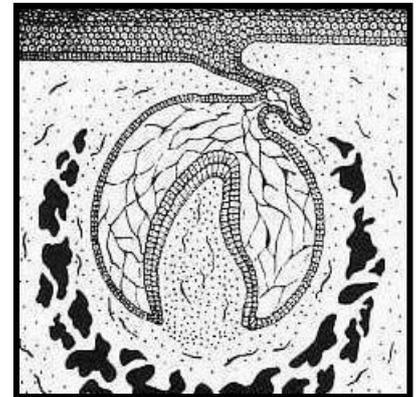
1. Bud stage.



2. Cap stage.



3. Bell stage.



Eruption of Teeth

Prior to eruption, tooth crowns are forming from lobes and are calcifying within the jawbones. After crown calcification is completed, the tooth root starts to form and the tooth moves through bone toward the surface (eruption process) and through the oral mucosa into the oral cavity (eruption or emergence). After eruption, the root continues to form until root formation is completed.

Tooth eruption is a developmental process whereby the tooth moves in an axial direction from its anatomical position within the jaw into its functional position within the oral cavity. The term “eruption” also mean a continuous process of tooth movement from within its socket until it reaches the final functional position.

Crown and Root Development Steps 1. Crown Calcification of Primary Teeth

The crowns of all 20 primary teeth begin to calcify between 4 and 6 months in utero. Crown completion of all primary teeth occurs within the first year after birth.

2. Root Formation and Emergence of Primary Teeth

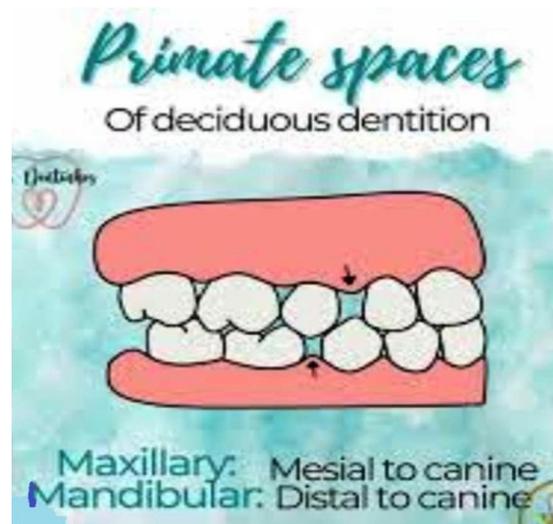
Root formation for primary teeth begins once the enamel on the crown is formed, and at this time, the tooth starts its occlusal movement through bone toward the oral cavity. After the primary tooth crowns erupt into the oral cavity from about age 6 months to 2 years. They continue to erupt until they occlude with teeth in the opposite arch.

3. Order of Emergence of Primary Teeth (from 6 months to about 2 year old)

Tooth	Eruption Time (in months)
Mandibular central incisors	6 - 6.5
Mandibular lateral incisors	7
Maxillary central incisors	7.5
Maxillary lateral incisors	8
Mandibular first molars	12-16
Maxillary first molars	12-16
Mandibular canines	16-20
Maxillary canines	16-20

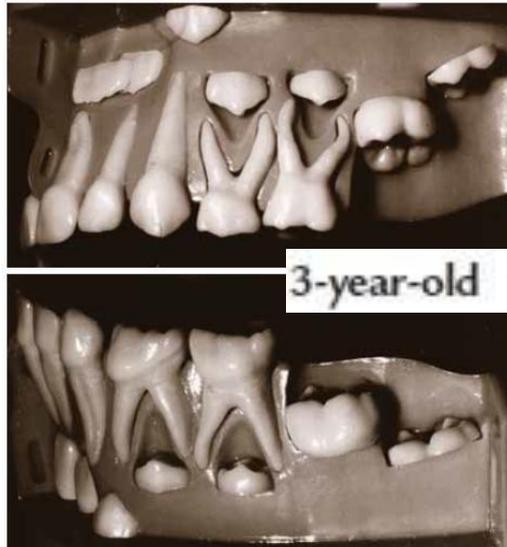
Mandibular second molars	20-30
Maxillary second molars	20-30

As primary teeth erupt, developmental spaces occur between anterior teeth, as the maxillae and the mandible bones grow larger. These spaces occur mesial to the maxillary canines and distal to the mandibular canines are called **primate spaces** which they provide room for the secondary incisors and canines, which are wider than their predecessors.



4. Root Completion of Primary Teeth

Root completion occurs 1 to 2 years after the emergence of the crown. The complete primary dentition (with 20 teeth) is in the mouth from about 2 years of age to about 6 years, during which *no permanent teeth* are visible in the mouth, but permanent teeth are forming within the jaws.



5. *Exfoliation (Shedding) of Primary Teeth with the Simultaneous Eruption of the Permanent Teeth*

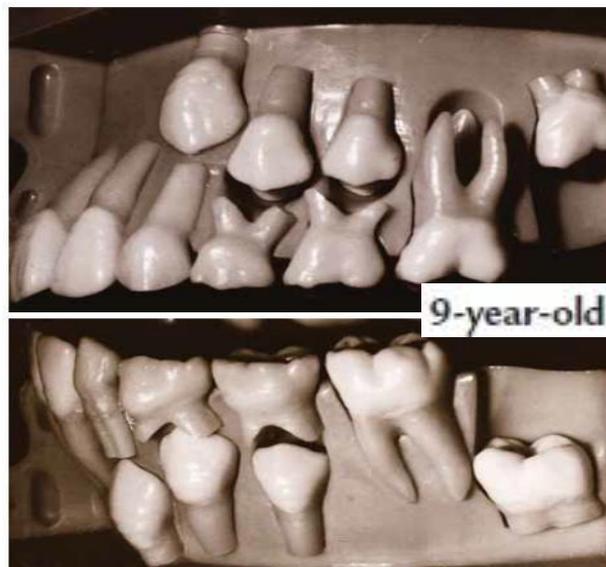
Only about 3 years after roots completion, primary tooth roots begin to **resorb**, usually at the apex or on one side near the apex. **Resorption** of a primary tooth root is the gradual dissolving away of the root due to the underlying eruption of the succedaneous tooth that will replace it. Root resorption continues as succedaneous teeth move closer to the surface until deciduous teeth become loose and finally “fall off”. This process of shedding is called **exfoliation**. When a primary tooth is shed, the crown of the succedaneous tooth is close to the surface and ready to emerge.



6. Mixed Dentition (from about 6 to 12 years old)

When there are both primary and permanent teeth visible in the mouth, the dentition is known as a **mixed dentition**. Mixed dentition begins at about age 6 years old when the first molars erupt. The mixed dentition ends at about age 12 when all primary teeth have been replaced. Usually, 24 teeth are seen in the mouth throughout the mixed dentition (20 teeth [primary or their permanent successors], plus the four first molars). At 12 years old, all succedaneous teeth have replaced their primary predecessors marking the end of mixed dentition. When the second molars erupt, 28 teeth are present.

Soon after the 6-year first molars erupt, their eruptive forces, along with their tendency to drift toward the mesial, push the primary teeth forward. If this were to continue, there would be insufficient space for the premolars to come in. The primary molar root flare, primary molar crown size wider mesiodistally than their premolar successors, and primate spaces all help to preserve sufficient space for the premolars and secondary canines.



7. Crown Formation of Permanent Teeth

For the permanent dentition, crown formation and calcification are completed about 3 to 4 years prior to eruption into the mouth.

8. Order of Emergence for Permanent Teeth

After the permanent first molars erupt, the order of eruption for the succedaneous teeth is essentially the same as the order of exfoliation of the primary teeth they replace.

Most common eruption sequence in maxillary arch:

6-1-2-4-3-5-7-8 or

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

Most common eruption sequence for mandibular arch:

(6-1)-2-3-4-5-7-8

or

(6-1)-2-4-3-5-7-8

-In the permanent dentition, most teeth in the mandibular arch erupt slightly earlier than their maxillary counterparts.

-Roots of permanent teeth are completed *about 3 years* after their emergence into the oral cavity.

-Teeth continue to erupt to compensate for wear (attrition) on the incisal or occlusal surface and/or when there are no opposing teeth.

Eruption Times of Permanent Teeth

Maxillary Teeth	Eruption Time (in years)
Central incisor	7-8
Lateral incisor	8-9
Canine	11-12
First premolar	10-11

Second premolar	10-12
First molar	6-7
Second molar	12-15
Third molar	17-21

Mandibular Teeth	Eruption Time (in years)
Central incisor	6-7
Lateral incisor	7-8
Canine	9-10
First premolar	10-12
Second premolar	11-12
First molar	6-7
Second molar	11-13
Third molar	17-21

The Importance of Deciduous Teeth

1. Allow proper mastication.
2. Prevents malocclusion.
3. Guide the eruption of the permanent teeth.
4. Esthetics.
5. Phonetics.

Principal Differences between Deciduous and Permanent Teeth:

General Differences:

1. The deciduous teeth are 20 in number while the permanent teeth are 32 in number.
2. The deciduous teeth are smaller in all dimensions.
3. The deciduous teeth show less morphology variations.
4. The enamel of the deciduous teeth is whiter, and more opaque so they are whiter than the permanent teeth.
5. The enamel of the deciduous teeth is thinner (0.5-1mm), while in the permanent teeth it is (1.5-2.5 mm).

Crown Differences:

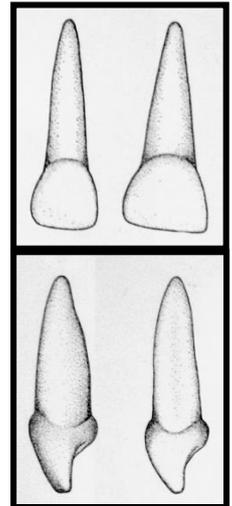
1. The crowns of the deciduous teeth are more constricted at the cervix.
2. The cervical ridges in all deciduous teeth are more prominent.
3. The intercuspatal distance of the deciduous teeth is more constricted buccolingually.
4. The crowns of the deciduous anterior teeth are wider mesiodistally as compared with the crown's length.

Root Differences:

1. Lack of root trunk in the deciduous molars.
2. The roots of the deciduous teeth are shorter, weaker, and narrower.
3. The roots of the deciduous teeth are longer in proportion to the crown.
4. The roots of the deciduous molars are wider than the crown, to allow more room for the development of the successor permanent teeth.

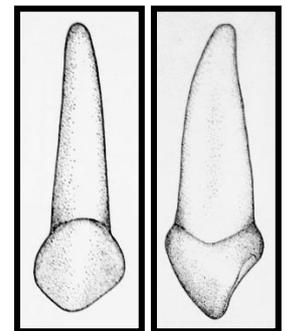
Maxillary Deciduous Teeth Central and Lateral Incisors

1. The mesiodistal width is more than the labiolingual dimension.
2. The root : crown ratio is increased.
3. From the mesial aspect, the crown appears thicker because of the short crown's length.



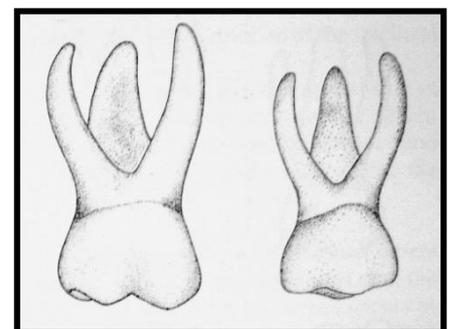
Canine

1. From the labial aspect, the crown is more constricted at the cervical area, so the cusp and the slopes are seen more developed.
2. The mesial slope of the cusp is longer than the distal slope.
3. The mesial and distal contact areas are at the same level.
4. The root:crown ratio is increased.
5. From the mesial aspect, the crown appears thicker labiolingually because of the short crown's length.



First Molar

1. There are four cusps: mesiolingual (largest), mesiobuccal, distobuccal and distolingual (smallest).
2. There are three roots: lingual, mesiobuccal, and distobuccal.

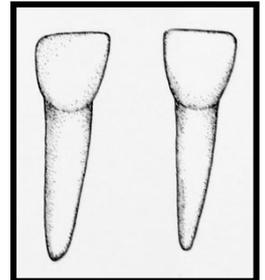


Second Molar

1. There are five cusps (four well developed and one supplemental) which are the mesiolingual (largest), mesiobuccal, distobuccal, distolingual and the fifth cusp (supplemental cusp).
2. There are three roots: lingual, mesiobuccal, and distobuccal roots.

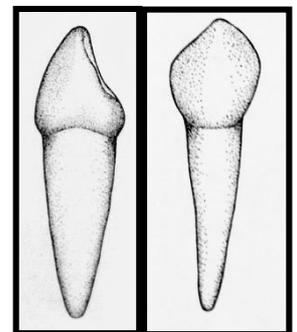
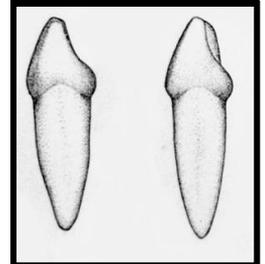
Mandibular Deciduous Teeth Central and Lateral Incisors

1. They are wider mesiodistally in relation to their length more than the permanent mandibular incisors.
2. The root:crown ratio is increased.
3. The labiolingual width appears more due to the short crown's length.



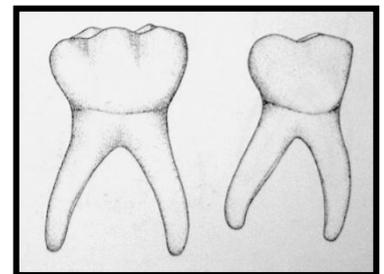
Canine

1. The labiolingual dimension is much less than the maxillary deciduous canine.
2. The cervical ridge is less pronounced than the maxillary deciduous canine.
3. The distal slope of the cusp is larger than the mesial slope.



First Molar

1. There are four cusps: mesiolingual (largest), mesiobuccal, distobuccal and distolingual (smallest).
2. There are two roots: mesial and distal roots.



Second Molar

1. There are five cusps: mesiolingual, mesiobuccal, distobuccal, distolingual and distal cusp).
2. There are two roots: mesial and distal roots.