

The permanent maxillary premolars

The premolars are so named because they are anterior to the molars. They succeed the deciduous molars. The premolars have two cusps one buccal & one lingual, giving rise to the term bicuspid, a term which is widely used in the United States. *However, because the mandibular first premolar has only one functioning cusp & the mandibular second premolar has three on the average, the term bicuspid is not generally acceptable.*

The maxillary premolars are developed from the same number of lobes as anterior teeth, which is four. *The primary difference in development is the well-formed lingual cusp*, developed from the lingual lobe which is represented by the cingulum development on incisors & canines.

The maxillary premolars resembling the canines when viewed from the buccal aspect. *The buccal cusp of maxillary first premolar is long & sharp assisting the canine as a prehensile or tearing tooth.* The mandibular first premolar assists the mandibular canine in the same manner.

The second premolars, both maxillary & mandibular, have cusps less sharp than that of maxillary & mandibular first premolars, & their cusps intercusp with the opposing teeth when the jaws are brought together, *this makes them more efficient as grinding teeth* & they function much like the molars, to a lesser degree.

The premolar crowns & roots are shorter than those of the maxillary canines, but their crowns are a little longer than those of molars.

Because of the cusp development buccally & lingually, *the marginal ridges are in a more horizontal plane* & are considered part of the occlusal surface of the crown rather than of the lingual surface, as in the case of incisors & canines.

When premolars have two roots, one is placed buccally & one lingually.

Maxillary first premolar

Principal identifying features:

- This tooth has two sharply defined cusps, the buccal cusp is usually about 1mm longer than the lingual cusp.
- The crown is angular & the buccal line angles are prominent.
- It has two roots, buccal & lingual, the bifurcation often occurs at the middle third of the root, when this tooth has one root, this root will contain two pulp canals.
- The mesial slope (cusp ridge) of the buccal cusp is longer than the distal slope.
- There is developmental depression on the mesial surface of the crown extending to the root.
- It has a well-defined central groove extending to the mesial marginal ridge.

The maxillary first premolars have some characteristics common to all posterior teeth (compared with anterior teeth) these are:

- 1- greater relative faciolingual measurement as compared with mesiodistal measurement.
- 2- broader contact areas.
- 3- contact areas are more nearly at the same level.
- 4- less curvature of the cervical line mesially & distally.
- 5- shorter crown cervicoocclusally.

TABLE 9-1 Maxillary First Premolar

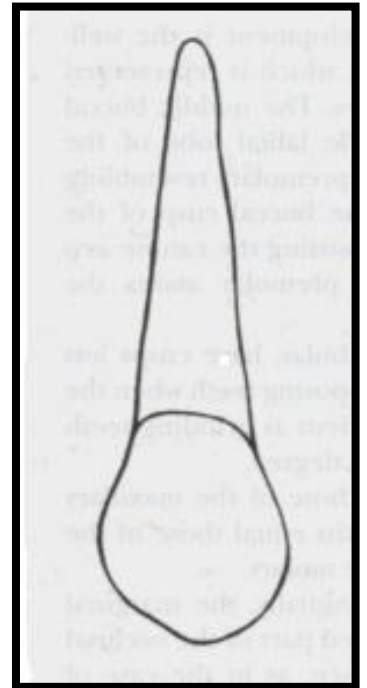
	First evidence of calcification	1½-1¾ yr						
	Enamel completed	5-6 yr						
	Eruption	10-11 yr						
	Root completed	12-13 yr						
MEASUREMENT TABLE								
	CERVICO- OCCLUSAL LENGTH OF CROWN	LENGTH OF ROOT	MESIODISTAL DIAMETER OF CROWN	MESIODISTAL DIAMETER OF CROWN AT CERVIX	LABIO- OR BUCCOLINGUAL DIAMETER OF CROWN	LABIO- OR BUCCOLINGUAL DIAMETER OF CROWN AT CERVIX	CURVATURE OF CERVICAL LINE—MESIAL	CURVATURE OF CERVICAL LINE—DISTAL
Dimensions* suggested for carving technique	8.5	14.0	7.0	5.0	9.0	8.0	1.0	0.0
*In millimeters.								

Buccal aspect

- The crown is roughly *trapezoidal* & exhibits little curvature at the cervical line (less than those of anterior teeth). The reason for this is that the curvature of the cervical line on the mesial & distal is less, therefore, the continuation buccally is less.
- The *mesial outline of the crown* is slightly concave above the contact area. The contact area represented by a relatively broad curvature the crest of which lies immediately occlusal to the center of the middle third.
- The mesial slope of the buccal cusp is rather straight, sometimes is notched (with slight indentation), in other instances a concave outline is noted. ***The mesial slope of the buccal is longer than the distal slope*** which is shorter & more curved. This arrangement places the tip of the buccal cusp distal to a line bisecting the buccal surface of the crown.
- The *distal outline of the crown* above the contact area is straighter than that of the mesial, it may be somewhat concave. The contact area is represented by a broader curvature than is found mesially, & the crest of curvature tends to be a little more occlusal.

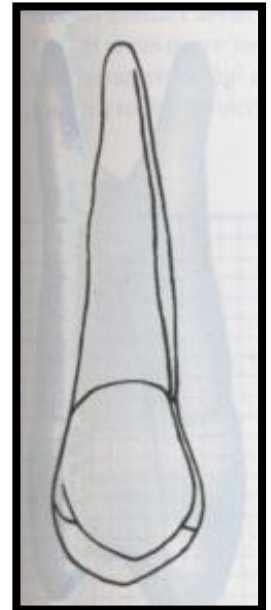
However, the contact areas mesially & distally are more nearly at the same level than those found on anterior teeth.

A line bisecting the contact areas at the crest of curvature will be slightly more than half the distance from the cervical line to the tip of the cusp. ***This is characteristic of all the posterior teeth.***
- The buccal cusp is long, coming to a pointed tip, resembling the canine in this respect.
- The buccal surface of the crown is convex showing a well-developed middle buccal lobe to a ***buccal ridge***.
- Mesial & distal to the buccal ridge, at or occlusal to the middle third, ***developmental depressions*** usually seen.
- The root is much shorter than the canine root, but the outline from the buccal aspect resembles the labial aspect of the canine root.



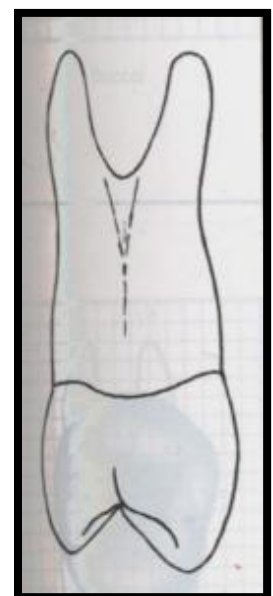
lingual aspect

- The crown tapers toward the lingual, since the lingual cusp is narrower than the buccal cusp.
- The lingual cusp is smooth & spheroidal & the cusp tip is pointed, with mesial & distal slopes meeting at an angle of about 90 degrees.
- Sometimes the crest of the smooth lingual portion of the crown that terminates at the point of the lingual cusp is called the *lingual ridge*.
- The mesial & distal outlines of the lingual portion of the crown are convex being continuous with the mesial & distal slopes of the lingual cusp straightening out as they join the mesial & distal sides of the lingual root.
- Since the lingual portion is narrower than the buccal portion, it is possible to see part of the mesial & distal surfaces of crown & root from the lingual aspect.
- Since the lingual cusp is not so long as the buccal cusp, the tips of both cusps, with their mesial & distal slopes, may be seen from the lingual aspect.
- The lingual portion of the root (or of the lingual root) is smooth & convex at all points. The apex of the lingual root tends to be more blunt than the buccal root apex.



Mesial aspect

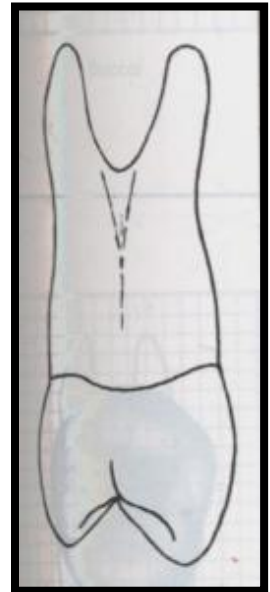
- The mesial aspect of the crown is also roughly *trapezoidal* with the shortest uneven side toward occlusal surface.
- The tips of the cusp are well within the confines of the root trunk. That is, the measurement from the tip of the buccal cusp to the tip of the lingual cusp is less than the buccolingual measurement of the root at its cervical portion. (*This is characteristic for all posterior maxillary teeth*).
- The curvature of the cervical line is less than that on the mesial aspect of any of the anterior teeth.
- The *buccal outline* of the crown curves outward below the cervical line, the crest of curvature is located approximately at the junction of cervical & middle third or within the cervical third. Below the crest of curvature, the buccal outline is less convex.



- The ***tip of the buccal cusp*** is directly below the center of the buccal root.
- The ***lingual outline*** of the crown may be described as a smoothly curved line starting at the cervical line & ending at the tip of the lingual cusp. The crest of this curvature is most often near the center of the middle third.
- In most cases, ***the tip of the lingual cusp*** is on a line with the lingual border of the lingual root.
- The lingual cusp is always shorter than the buccal cusp.
- From this aspect, it is noted that ***the cusps*** of the maxillary first premolar are long & sharp, with the mesial marginal ridge at about the level of the junction of the middle & occlusal thirds.

- Immediately cervical to the mesial contact area, centered ***on the mesial surface***, there is a ***marked depression called the mesial developmental depression which is bordered buccally & lingually by the mesiobuccal & mesiolingual line angle. This mesial concavity continues apically beyond the cervical line, joins a deep developmental depression between the root & ends at the root bifurcation. (This is a distinguishing feature of this tooth).***

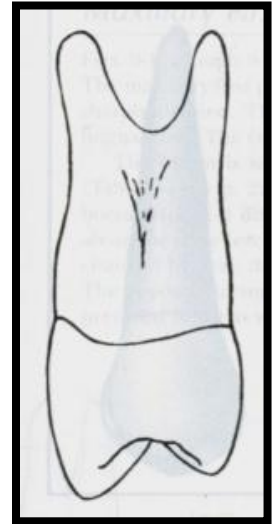
- ***Another distinguishing feature of this tooth is a well-defined developmental groove in the enamel of the mesial marginal ridge.*** This marginal groove is continuous with the central groove of the occlusal surface of the crown, crossing the marginal ridge immediately lingual to the mesial contact area & terminating a short distance cervical to the mesial marginal ridge on the mesial surface.
- The buccal outline of the buccal root & the lingual outline of the lingual root are straight above the cervical line with a tendency toward buccal or lingual inclination apical to the middle thirds.
- The root trunk is long, making up about half of the root length. The root is bifurcated for half its total length.



Distal aspect

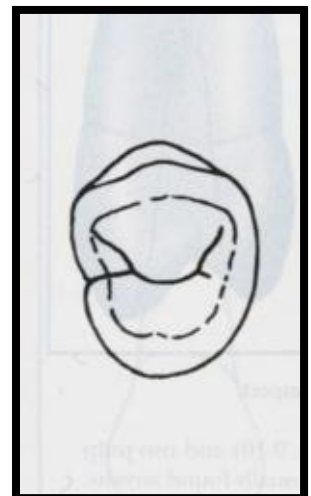
From this aspect, the anatomy of the crown & root of the maxillary first premolar differs from that of the mesial aspect, & as follows:

- The ***crown surface*** is convex at all points except for a small flattened area just cervical to the contact area & buccal to the center of the distal surface.
- The curvature of the cervical line is less on the distal than on the mesial surface.
- There is no developmental groove crossing the distal marginal ridge of the crown.
- The root trunk is flattened on the distal surface above the cervical line with no developmental signs.
- The bifurcation of roots is near the apical third, with no developmental groove leading to it.

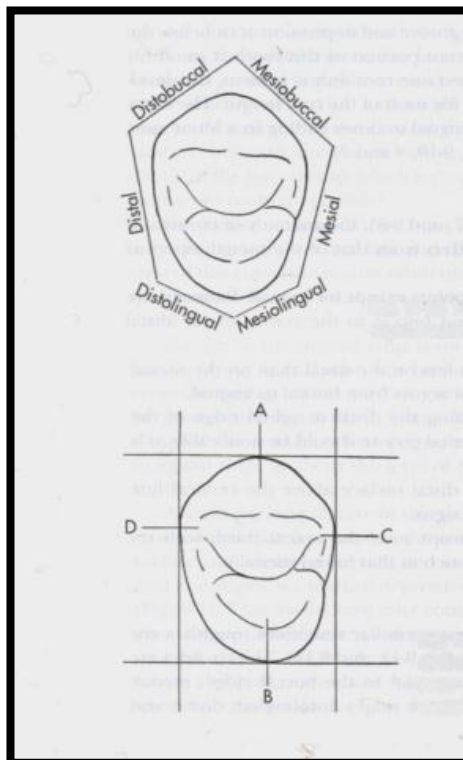


Occlusal aspect

- The occlusal aspect of the maxillary first premolar resembles roughly a ***six-sided*** or ***hexagonal*** figure which is not equilateral. ***The two buccal sides are nearly equal, the mesial side is shorter than the distal side & the mesiolingual side is shorter than the distolingual side.***
- The crest of the distal contact area is somewhat buccal to that of the mesial contact area.
- The crest of the buccal ridge is somewhat distal to that of the lingual ridge.
- The crown is wider on the buccal than on the lingual.
- The buccolingual dimension of the crown is much greater than the mesiodistal dimension.
- The occlusal surface is circumscribed by the cusp ridges & marginal ridges.
- The angle formed by the convergence of the mesiobuccal cusp ridge & the mesial marginal ridge approaches a right angle. The angle formed by the convergence of the distobuccal cusp ridge & distal marginal ridge is acute.



- When looking at the occlusal aspect, posing the tooth so that the line of vision is in line with the long axis, ***we see more of the buccal surface of the crown than of the lingual surface*** that is because the tip of the buccal cusp is nearer to the center of the root trunk than is the lingual cusp.
- A well-defined central developmental groove divides the surface evenly buccolingually, extending from a point just mesial to the distal marginal ridge to the mesial marginal ridge, where it joins the mesial marginal developmental groove.
- There are two developmental grooves join the central groove inside the mesial & distal triangular fossae. These grooves are called the ***mesiobuccal & distobuccal developmental grooves***. The points of union are named the ***mesial & distal developmental pits***.
- The buccal triangular ridge of the buccal cusp is more prominent than the lingual triangular ridge.
- The lingual cusp is pointed more sharply than the buccal cusp.



Maxillary right first premolar

Maxillary second premolar

Maxillary second premolar

It is closely resembles the first premolar & supplements it in function.

Generally, the maxillary second premolar is less angular, giving a more rounded effect to the crown from all aspects, it has a single root.

The two teeth have about the same dimensions on the average, except for a tendency toward greater length of the second premolar.

Buccal aspect

- The buccal cusp of the second premolar is not as long as that of the first premolar.
- The mesial slope of the buccal cusp is usually shorter than the distal slope.
- The buccal ridge of the crown may not be so prominent when compared with the first premolar.

Lingual aspect

Little variation may be seen except that the lingual cusp is longer, making the crown longer on the lingual side.

Mesial aspect

- The buccal cusp of the second premolar is shorter than that of the first premolar with the buccal & lingual cusp more nearly the same length.
- There may be greater distance between cusp tips, a condition that widens the occlusal surface buccolingually.
- There is no deep developmental depression on the mesial surface of the crown, the crown surface is convex.
- A shallow developmental depression appears on the single tapered root.
- There is no deep developmental groove crossing the mesial marginal ridge.

Distal aspect

There is no significant difference except that there is a developmental depression in the middle third of the root, where it tends to be deeper than on the mesial root surface.

Occlusal aspect

- The outline of the crown is more rounded or oval, rather than angular.
- The central developmental groove is shorter & more irregular & there is a tendency toward multiple supplementary grooves radiating from the central groove.

END