

MAXILLARY AND MANDIBULAR PREMOLARS

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LET'S BEGIN!

Use your arrows to move from
one slide to another

LEARNING OBJECTIVES

At the end of this presentation, you should be able to:

1. Know the different functions of premolars.
2. Recognize the maxillary and mandibular premolars upon seeing them.
3. Describe the different characteristics of the maxillary and mandibular premolars.
4. Differentiate them from one another.

HOW WILL WE ANALYZE TEETH?

Premolars are the first posterior teeth you'll be studying. Premolars are so varied that they do not look like each other even though they are all in the same class.

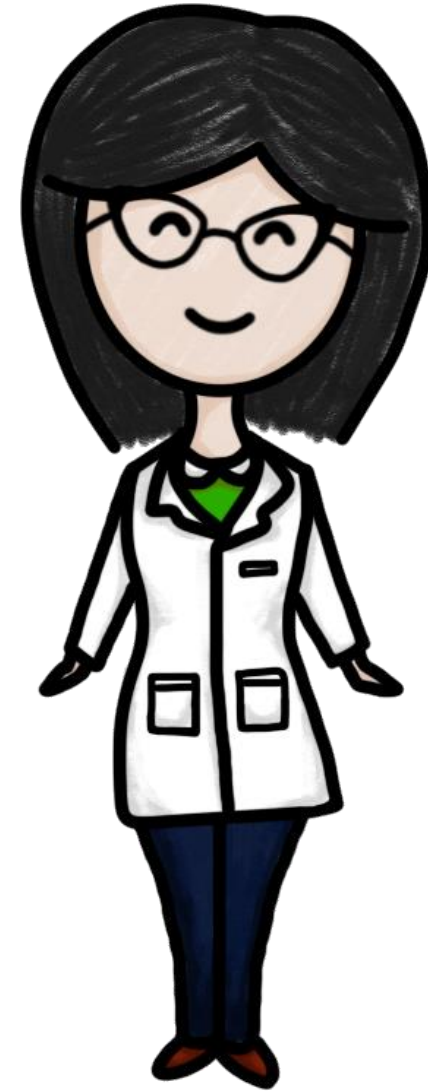
Like before, we'll tackle them starting with the general characteristics of all premolars, or class traits. Then we move on to the arch traits and lastly, the type traits or characteristics specific to each tooth.

You'll learn which characteristics we look for **per surface**.

Are you ready?

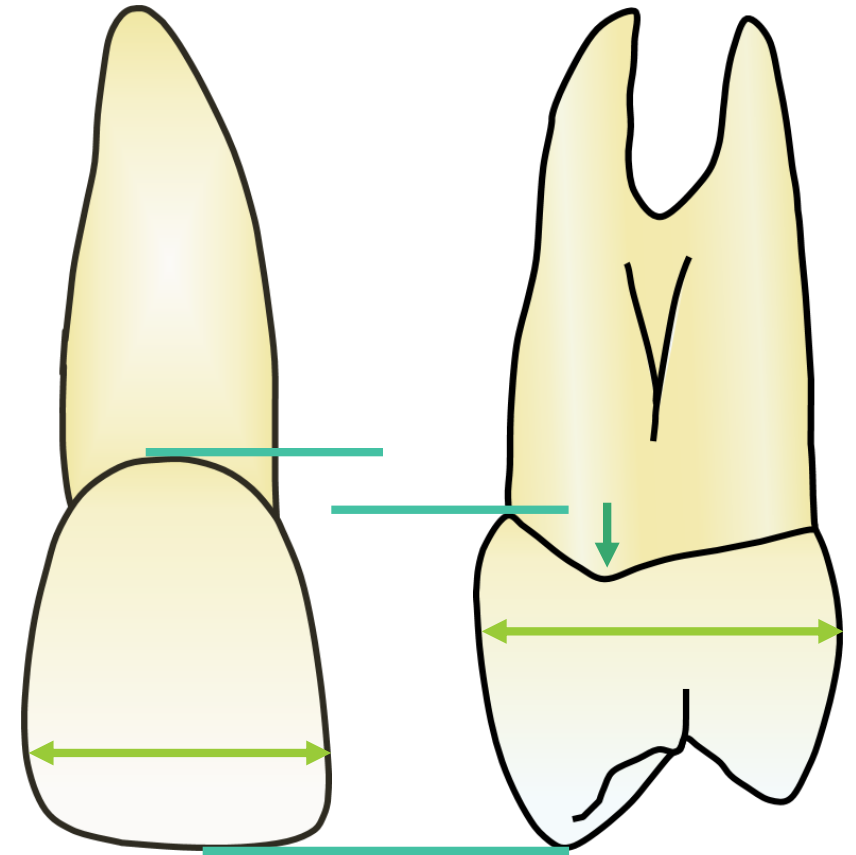
BUT WAIT!!!

Before we talk about the details of the
premolars
(and before you leave the anteriors behind),
let us talk about the difference between
anterior teeth and posterior teeth.



ANTERIOR TEETH VS POSTERIOR TEETH

- ❑ Relatively **greater buccolingual** measurement than mesiodistal
- ❑ Broader contact areas
- ❑ Contact areas more nearly at the same level than anterior teeth
- ❑ **Less curvature of CEJ** mesially and distally
- ❑ **Shorter crown** cervicoincisally vs anterior teeth



GENERAL DESCRIPTION OF PREMOLARS

FUNCTIONS

1st premolars, because of their long and sharp buccal cusp like those of canines, assist canines in **shearing** or **cutting food**.

2nd premolars, on the other hand, function with molars in **grinding food**. The blunt cusps articulate with the antagonist on closing which makes them fairly efficient grinders.



FUNCTIONS

Premolars **maintain the vertical dimension** of the face.

They also **support the corners of the mouth and cheeks** to keep them from sagging.



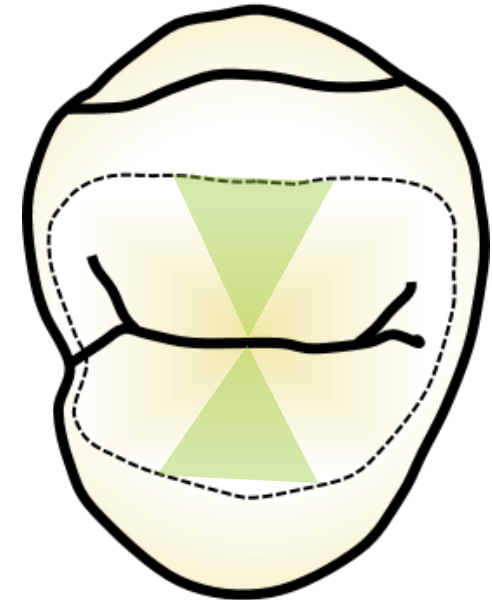
LOOK!

Observe on this patient how the anterior teeth flared and how the mandibular teeth are almost touching the palate? Originally, the patient's anterior teeth weren't flaring but due to the loss of the posterior teeth, the bite of the patient collapsed (loss of vertical dimension), transferring all the forces to the anterior teeth over time.



GENERAL CHARACTERISTICS

- ❑ Has 2-3 cusps
 - Triangular ridges form **transverse ridges**
- ❑ Cervical line is more occlusal, slightly greater on the mesial

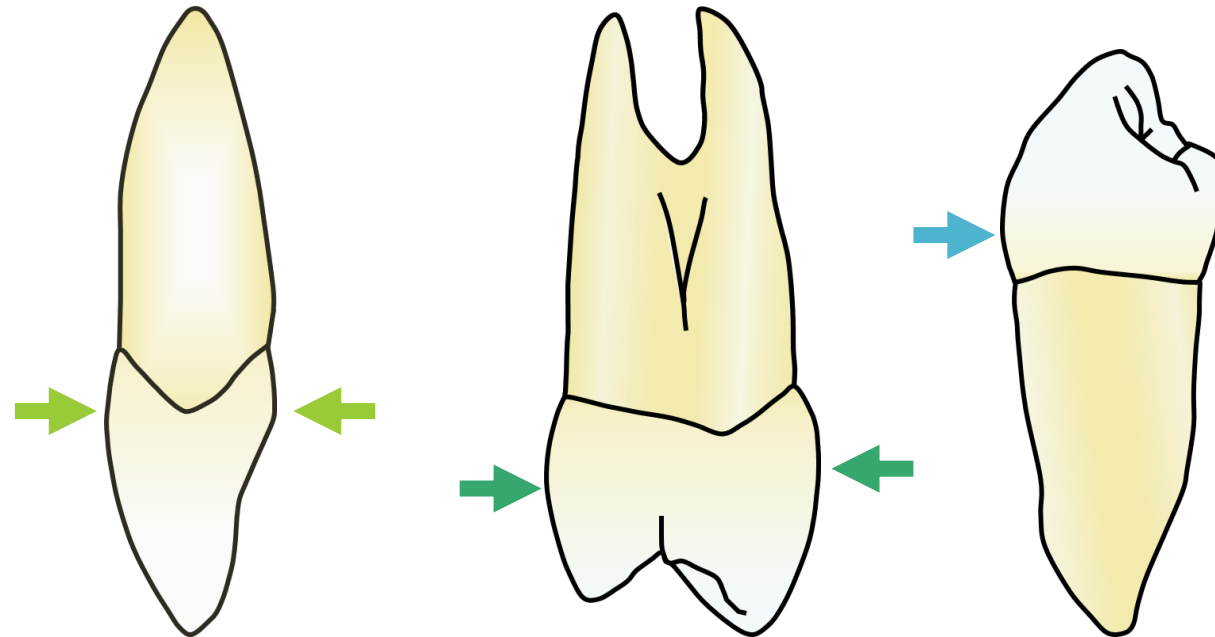


DID YOU KNOW?

The premolars developed from 4 lobes (3 buccal and 1 lingual) like the anterior teeth. However, the lingual lobe of premolars develop fully into the lingual cusp (compare with cingulum of anteriors). An exception is the three-cusp type 2nd premolar which developed from 2 lingual lobes. Therefore, the term *bicuspid*, is a misnomer.

GENERAL CHARACTERISTICS

- Crest of curvature is generally **more occlusally** positioned on buccal and lingual than anteriors **except** mandibular first premolars



MAXILLARY PREMOLARS



GENERAL DESCRIPTION

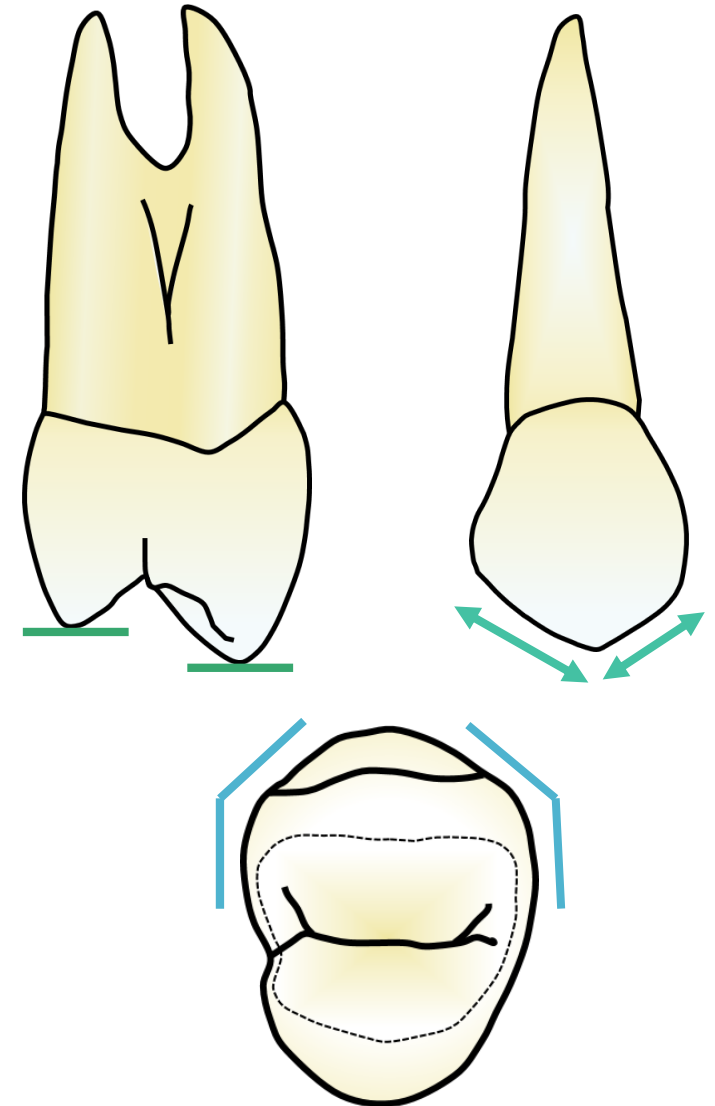
- ❑ 4 maxillary premolars (FDI, Universal)
- ❑ Posterior to canine, anterior to molars
- ❑ **Rectangular form:** wider buccolingually than mesiodistally
- ❑ **2 well-developed cusps**, height are more or less the same
- ❑ 1-2 roots
- ❑ Erupt:
 - ❑ 1st: 10-11 y/o
 - ❑ 2nd: 10-12 y/o



MAXILLARY FIRST PREMOLARS

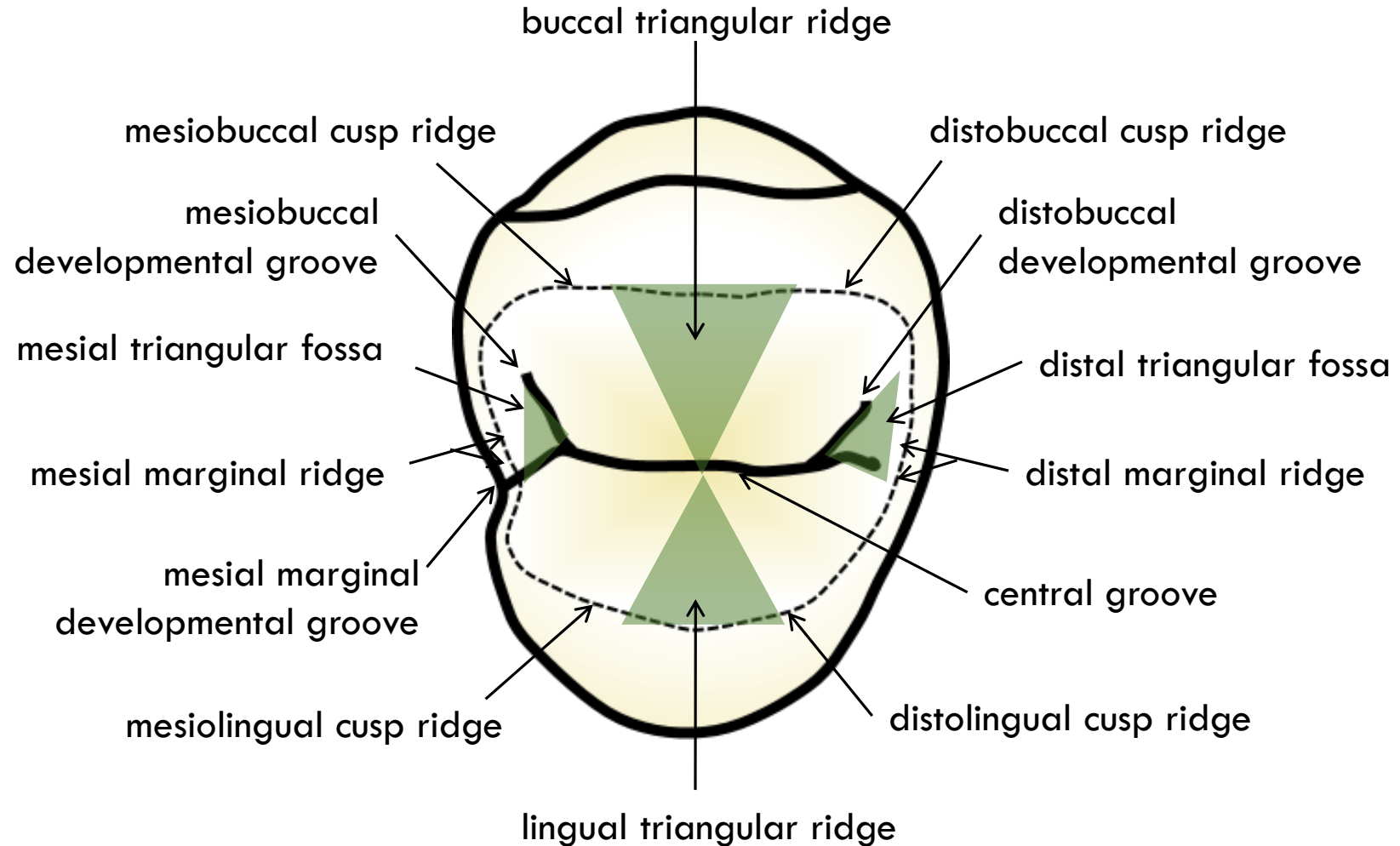
GENERAL FEATURES

- ❑ **Widest** of all the premolars
- ❑ Buccal cusp usually **longer** than lingual cusp
- ❑ **Mesial cusp slope** of the buccal cusp is **LONGER** than the distal
- ❑ Crown is more **ANGULAR** and buccal line angles prominent
- ❑ Most have 2 roots and 2 pulp canals even with just one root

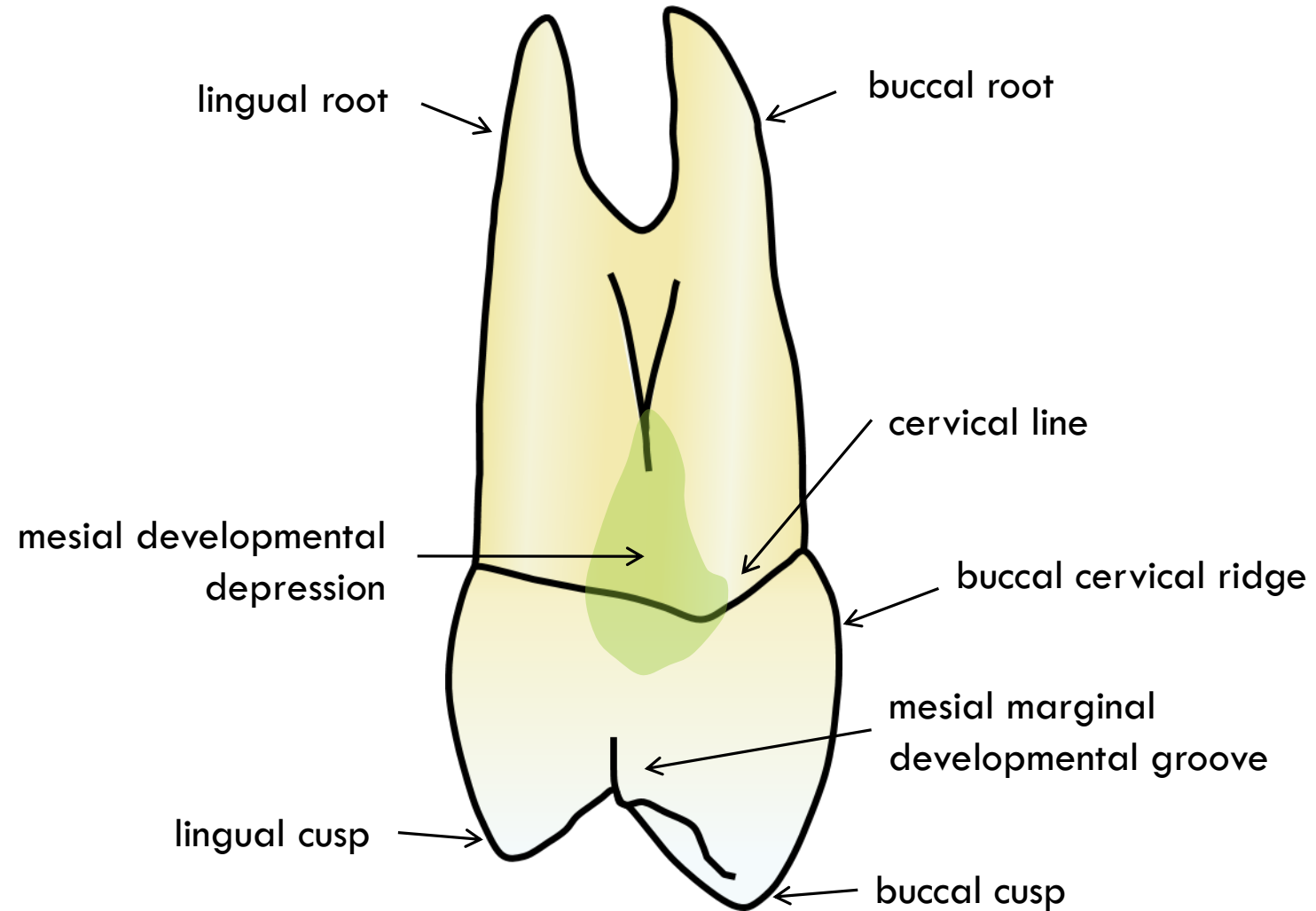


Tooth #24

LANDMARKS

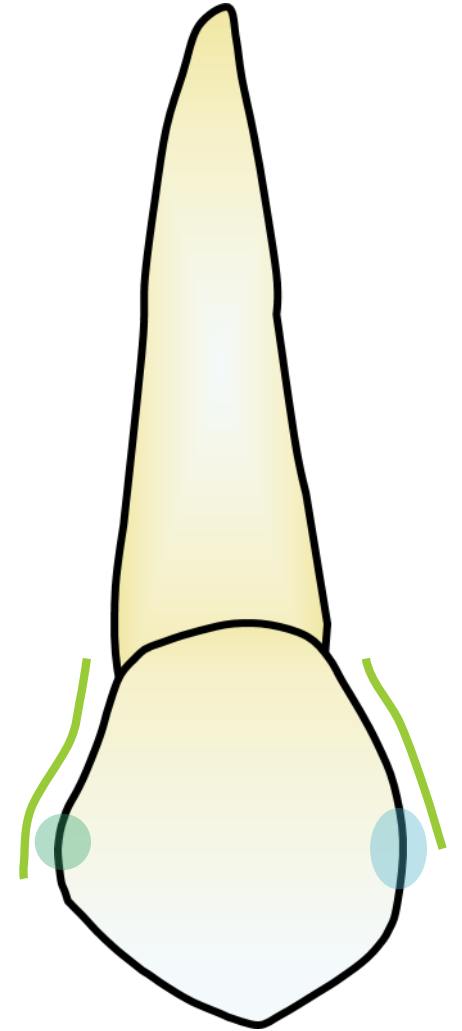


LANDMARKS



BUCCAL

- Outline: trapezoid (Wheeler's)/pentagon (Woelfel)
 - Mesial: **slightly concave** from the cervical
 - Distal: **straight** from the cervical
- Contact area: broader and more occlusal on the distal
 - **Mesial:** middle of middle third
 - **Distal:** middle third



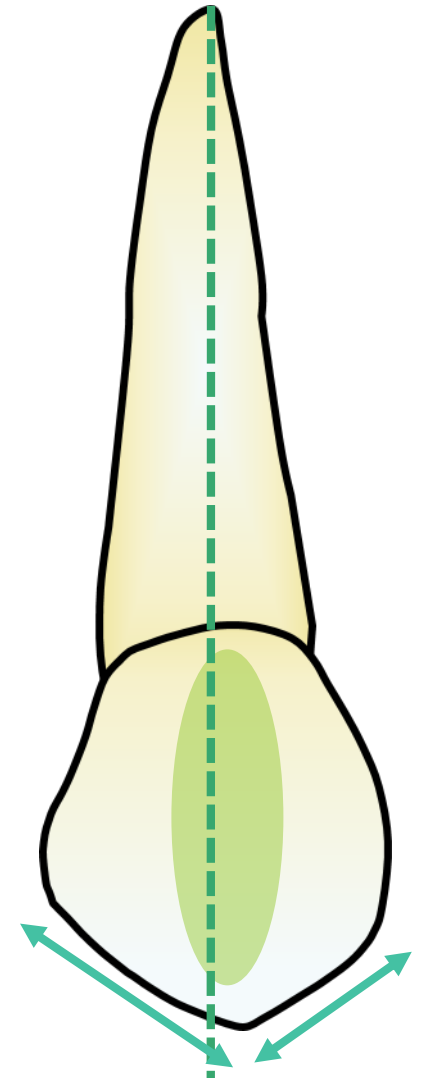
BUCCAL

- ❑ Mesial cusp slope is straight and **LONGER** than distal
- ❑ Prominent **BUCCAL RIDGE**
 - bound by developmental depressions
- ❑ Tip of the buccal cusp is **distal** to the long axis



DID YOU KNOW?

The maxillary first premolar is the ONLY tooth in the canine-bicuspid class with the mesial cusp slope longer than the distal.



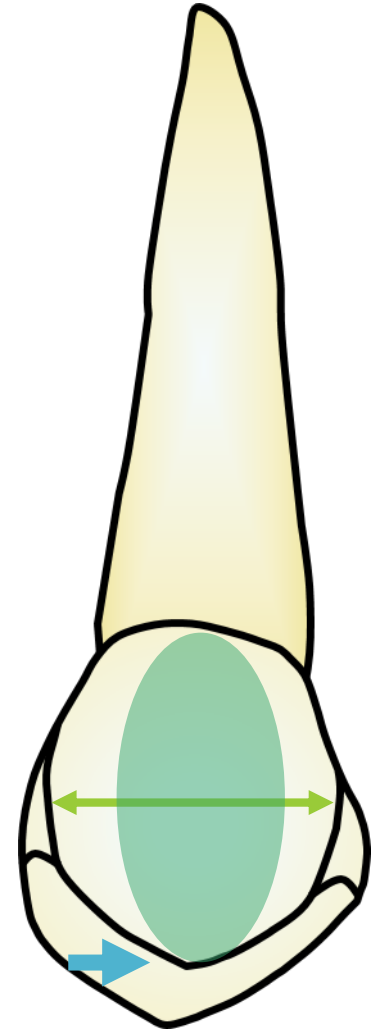
LINGUAL

- ❑ Lingual cusp is **narrower** mesiodistally
 - crown tapers lingually
- ❑ Smooth and spheroidal lingual cusp (**shorter** than the buccal cusp around 1mm at an average)
- ❑ **Lingual ridge** (*not very prominent*)
- ❑ Tip of the lingual cusp bends **towards the mesial**



REMEMBER THIS:

The cusp tips of maxillary first premolars are always in opposition. If the buccal cusp tip is not yet worn, you'll always see it more to the distal while the lingual cusp is ALWAYS towards the mesial.



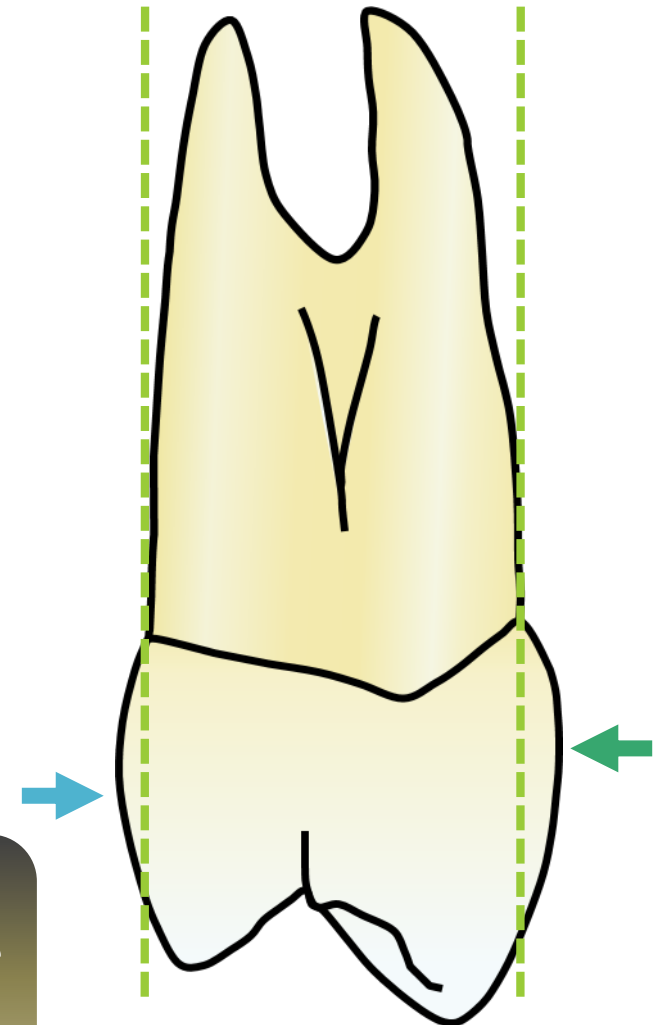
PROXIMALS

- ❑ Cusps are **within the confines** of the root trunk
- ❑ 2 roots: buccal and lingual
- ❑ Outline:
 - **Buccal:** crest of curvature more cervical or junction of cervical and middle third
 - **Lingual:** crest is more center of middle third



REMEMBER THIS:

Another characteristic of ALL posterior maxillary teeth is that the cusp tips are all within the confines of the root trunk. Meaning, the distance between the buccal and lingual cusp tips will never be more than the buccolingual dimension of the cervical portion of the root.



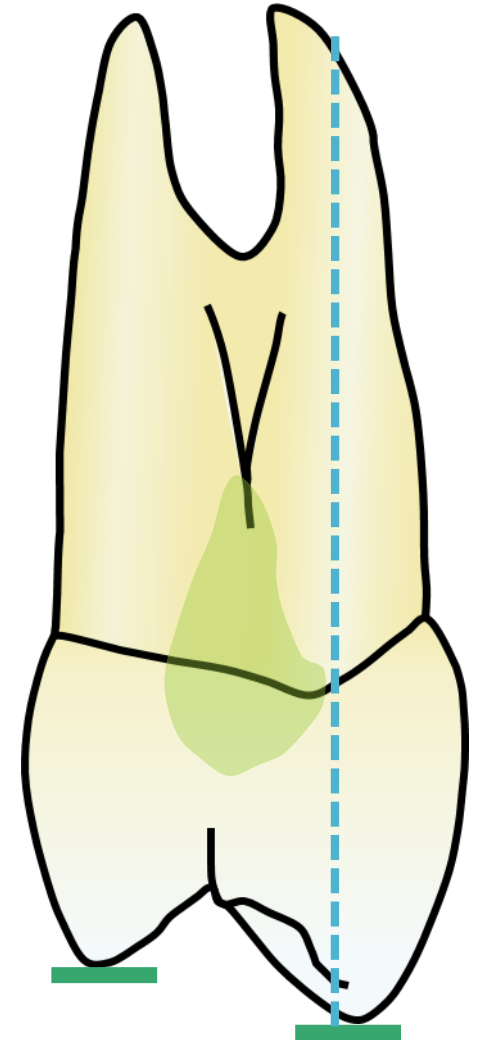
PROXIMALS

- ❑ Buccal cusp **LONGER** than lingual cusp
- ❑ The buccal cusp tip is **directly below** the center of the buccal root
- ❑ **MESIAL DEVELOPMENTAL DEPRESSION:**
indicates the presence of 2 canals even if there is only 1 root



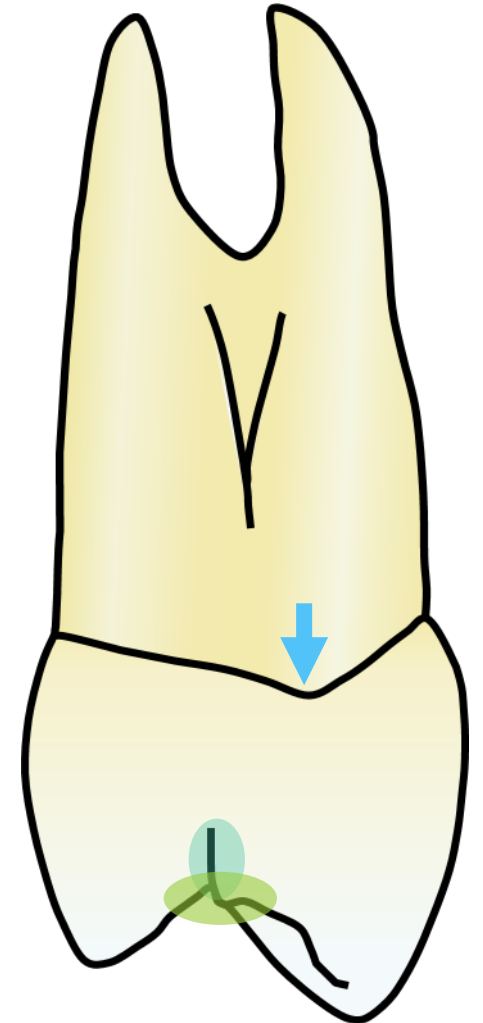
DID YOU KNOW?

The mesial developmental depression can only be found on maxillary first premolars. Maxillary second premolars do not have this feature.



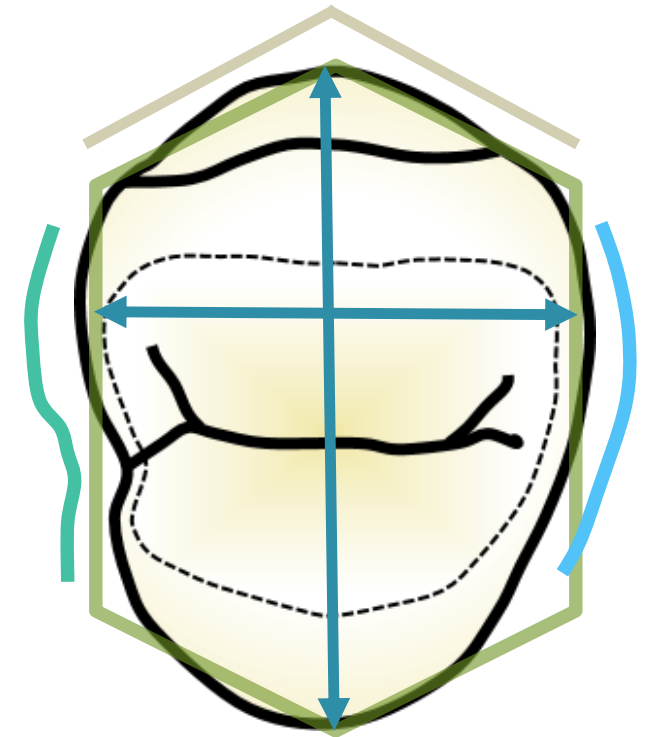
PROXIMALS

- ❑ **MESIAL MARGINAL DEVELOPMENTAL GROOVE:**
an extension of the central groove traversing the mesial marginal ridge
- ❑ Mesial marginal ridge is **more occlusal**
- ❑ CEJ dips occlusally but **more shallow** (even shallower on the distal)



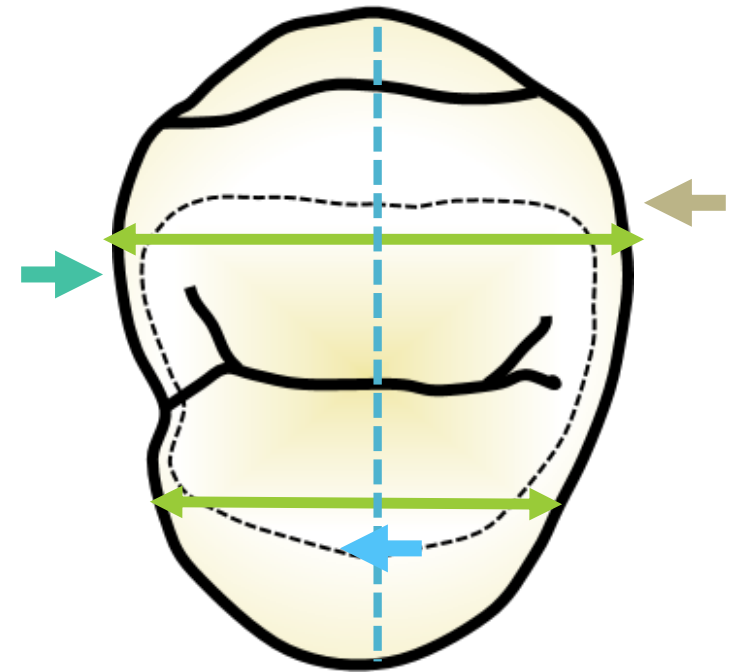
OCCLUSAL

- Outline: **hexagon**
 - **Mesial:** straight or concave and shorter than distal outline
 - **Distal:** more convex
- Buccal surface is wide and shaped like an **inverted V** because of the buccal ridge
- Buccolingual dimension is **GREATER** than mesiodistal dimension



OCCLUSAL

- ❑ The crown is **wider** on the buccal than lingual
- ❑ Tip of the lingual cusp is **always mesial** to the center of the tooth
- ❑ The central groove extends to join the mesial marginal developmental groove
- ❑ Contact areas:
 - **Mesial:** near or at the junction of the buccal and middle thirds
 - **Distal:** more buccal than the mesial contact area

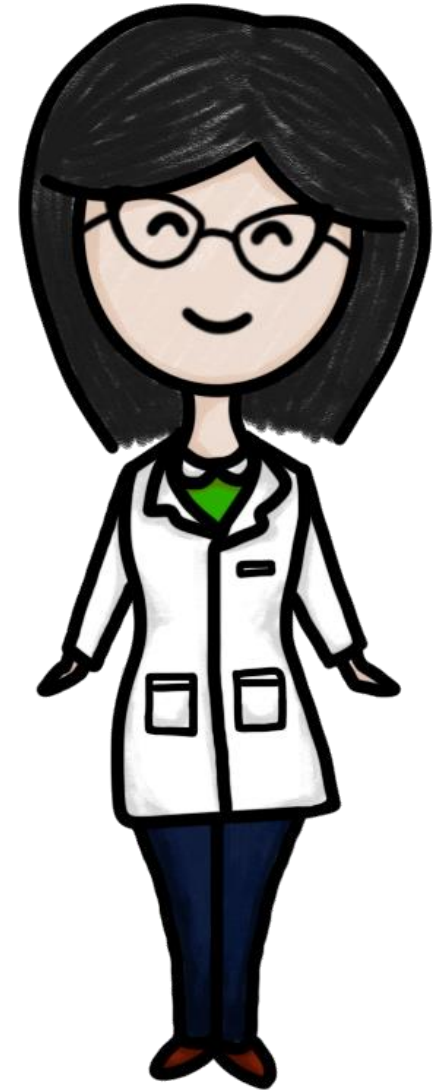


MAXILLARY SECOND PREMOLARS



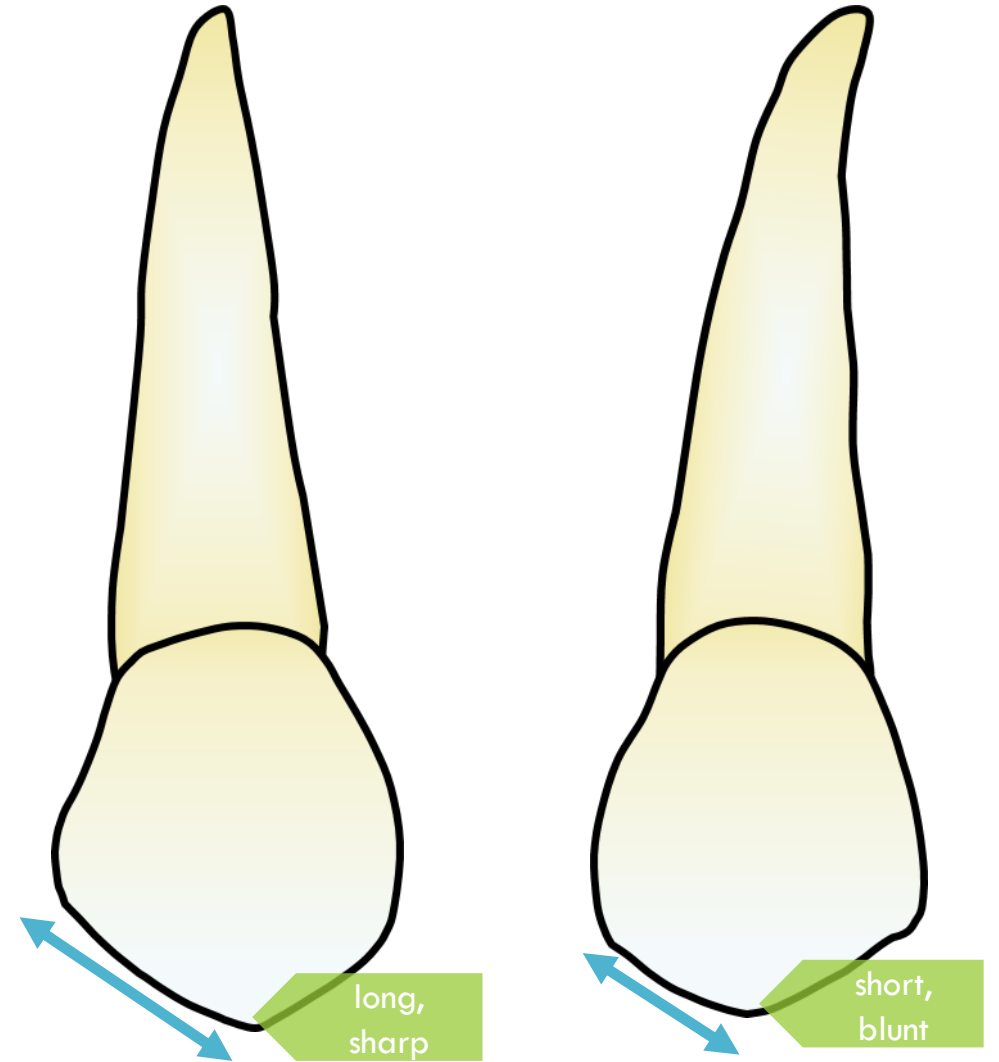
The maxillary second premolar resemble the maxillary first premolar and supplements it in function.

The following slides show the variations.



BUCCAL

- ❑ Buccal cusp is **shorter and more blunt**
- ❑ Mesial slope is **SHORTER** than the distal slope
- ❑ Buccal surface is smoother, buccal ridge may not be as prominent

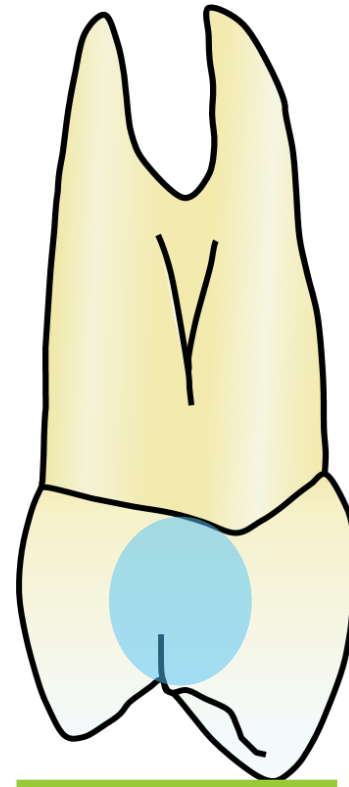


Tooth #24

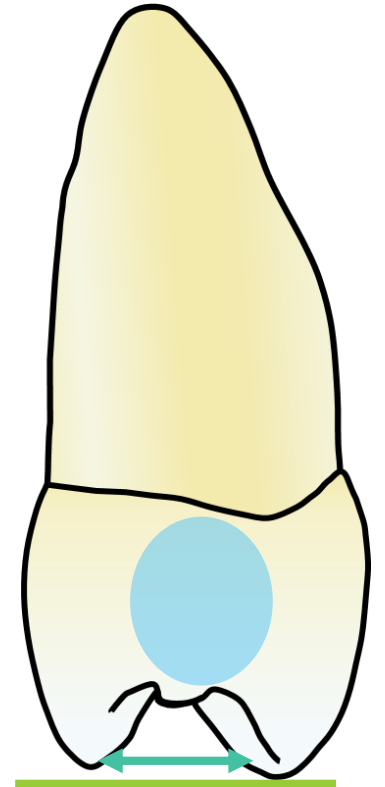
Tooth #25

PROXIMALS

- ❑ Cusps are nearly the **same height**
- ❑ **Greater distance** between cusp tips
- ❑ No developmental depression or groove (**smoother mesial surface**)
- ❑ Usually with one root with one canal



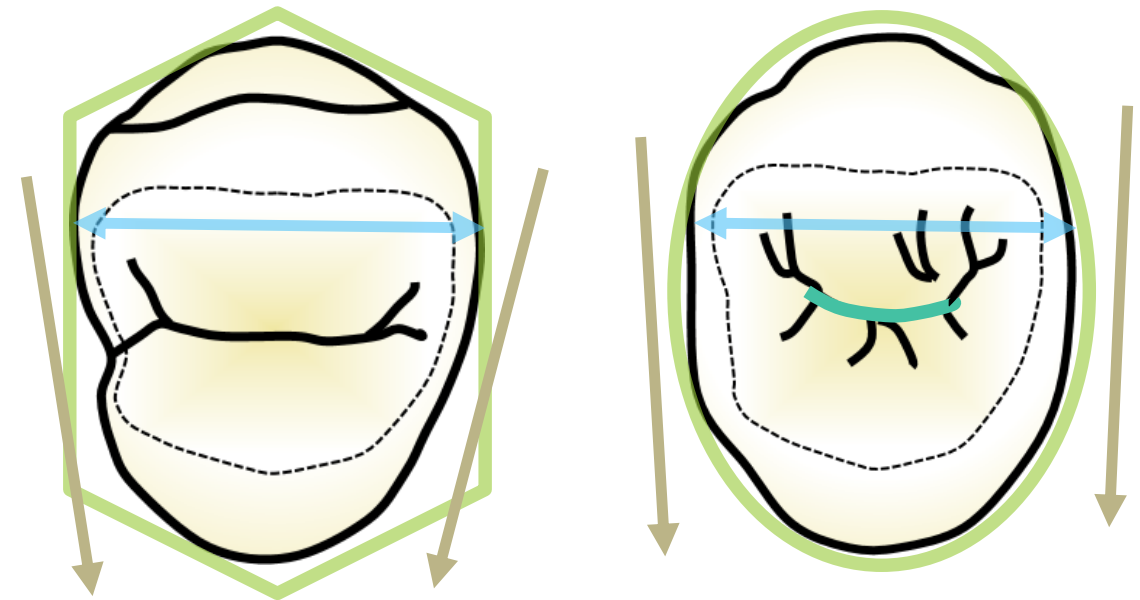
Tooth #24



Tooth #25

OCCLUSAL

- Outline: more rounded or **oval**, less angular
- Central groove is shorter and more irregular with more supplemental grooves giving it a **“wrinkled appearance”**
- **Narrower** mesiodistally
- **Less taper** to lingual



Tooth #24

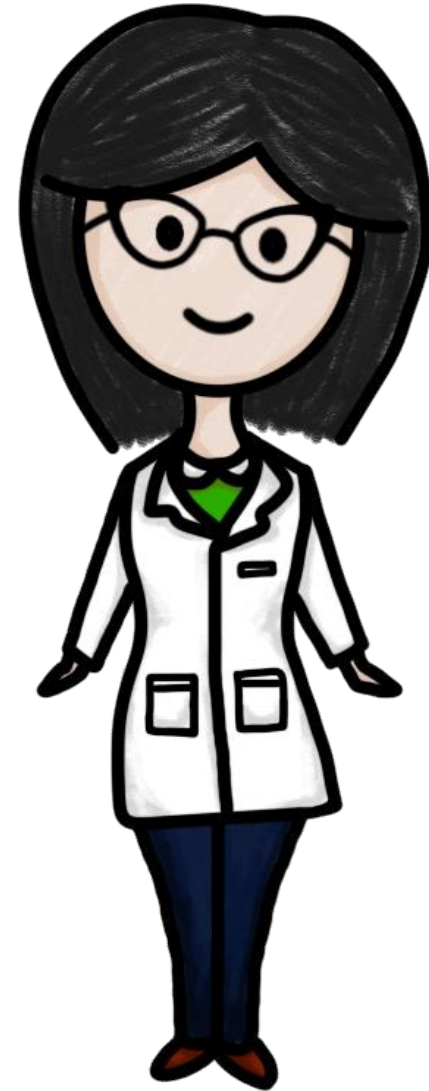
Tooth #25

HOW ARE YOU?

Are you still there?

Maxillary premolars look more alike than mandibular premolars. It can get confusing sometimes, but with enough practice, you'll get the hang of it.

Take a-minute breather here and when you're ready, take out your mandibular premolar models and let's start!



MANDIBULAR PREMOLARS



GENERAL DESCRIPTION

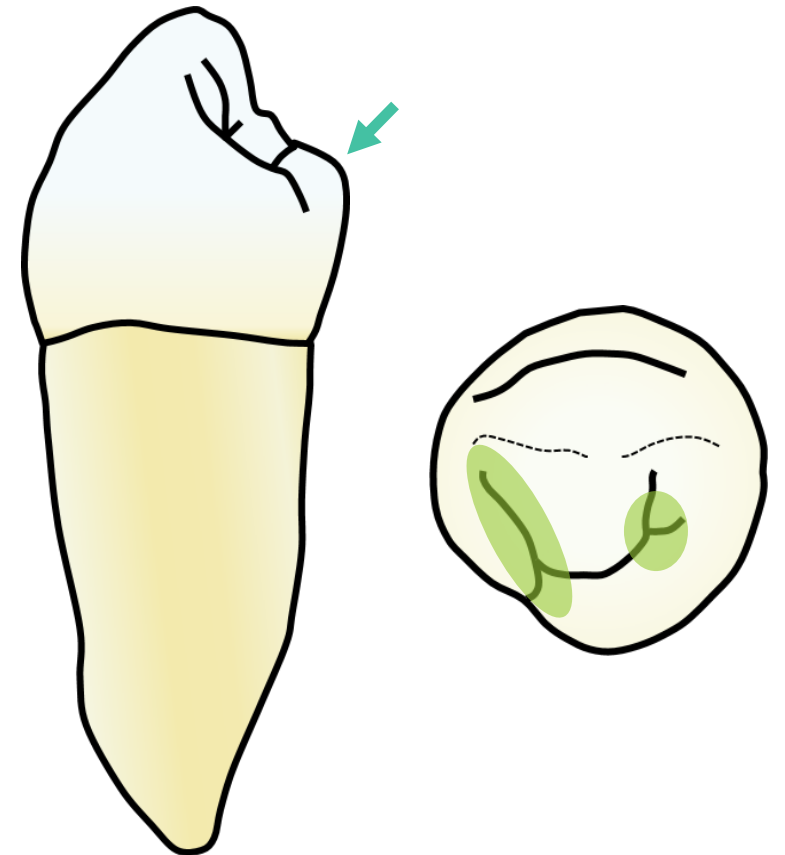
- ❑ 4 mandibular premolars (FDI, Universal)
- ❑ Posterior to canines, anterior to molars
- ❑ 1st premolars: from 4 lobes, similar characteristics to canines
- ❑ 2nd premolars: from 4-5 lobes, similar characteristics to molars
- ❑ **1st premolar is smaller than 2nd premolar,** opposite of the maxillary counterparts
- ❑ Erupt:
 - 1st: 10-12 y/o
 - 2nd: 11-12 y/o



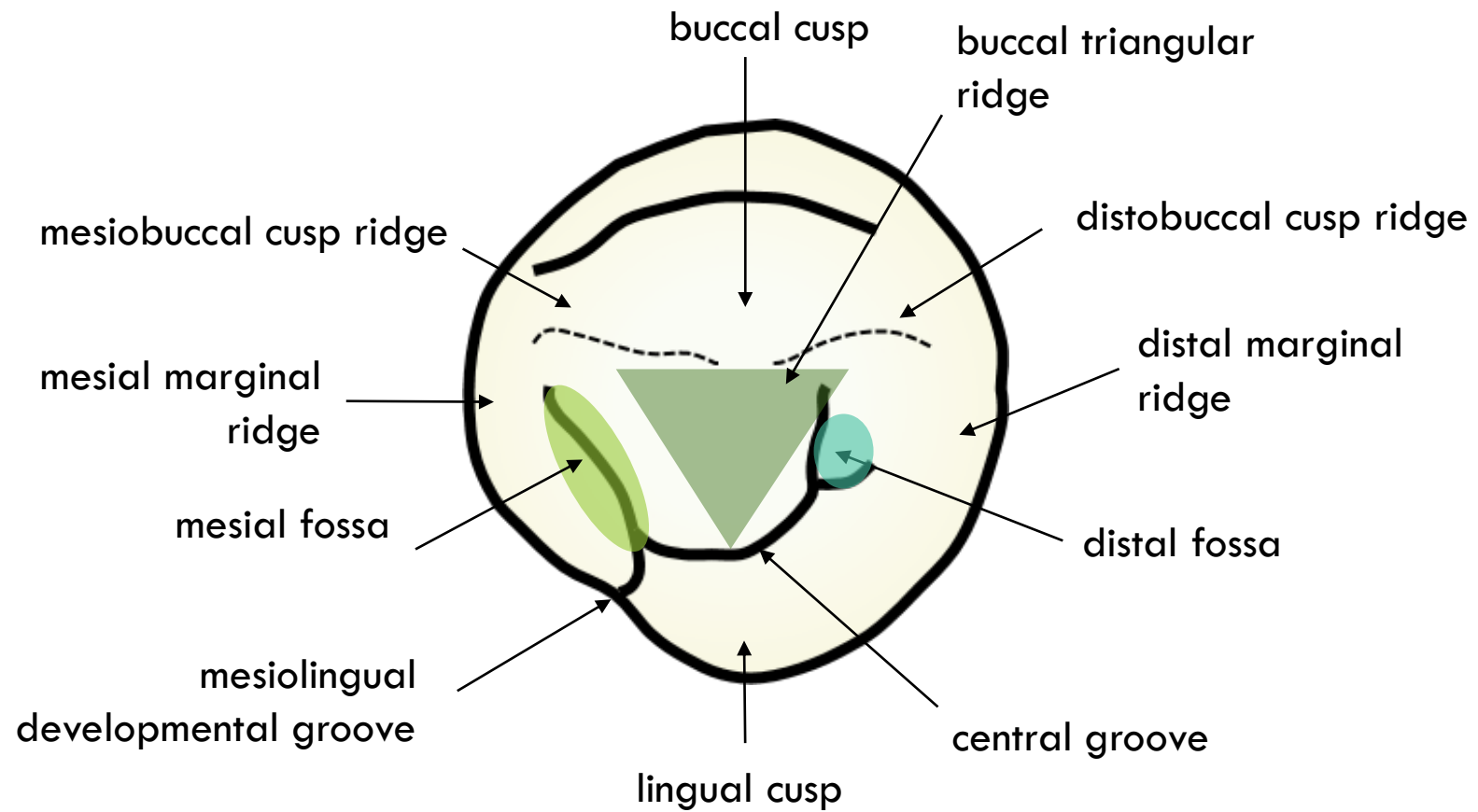
MANDIBULAR FIRST PREMOLAR

GENERAL FEATURES

- ❑ 2 cusps
- ❑ **Small, narrow, non-functional lingual cusp**
- ❑ Transitional morphology between canine and 2nd premolars
- ❑ **“snake-eyes”** appearance
- ❑ **Smaller** than mandibular 2nd premolar

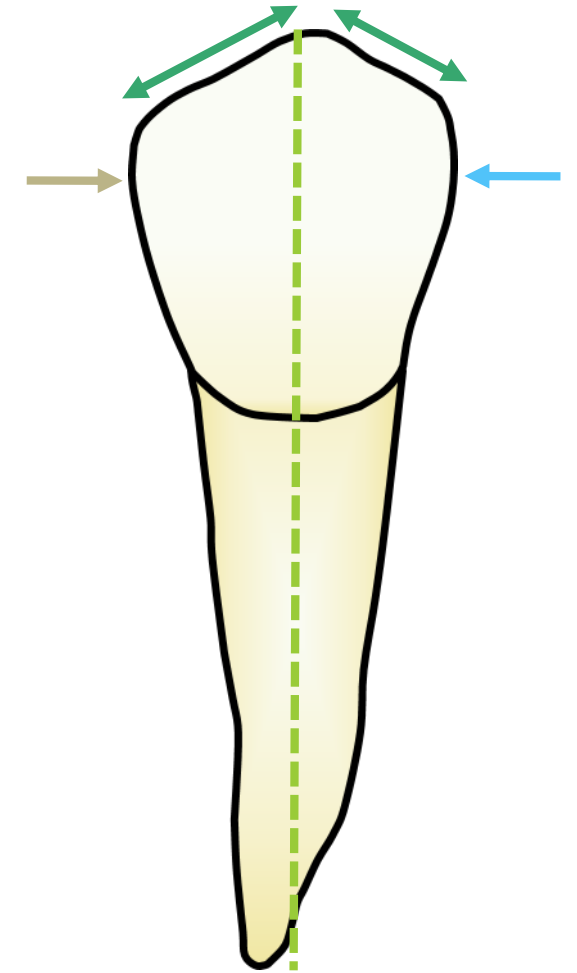


LANDMARKS



BUCCAL

- ❑ Buccal cusp appears **long and sharp**, and near the center of the tooth or a little mesial
- ❑ Some exhibit a *distal tilt* of the crown on the root
- ❑ **Shorter** mesial cusp ridge
- ❑ Broad and nearly level contact areas
 - **Mesial:** junction of occlusal and middle thirds
 - **Distal:** same, sometimes more occlusal



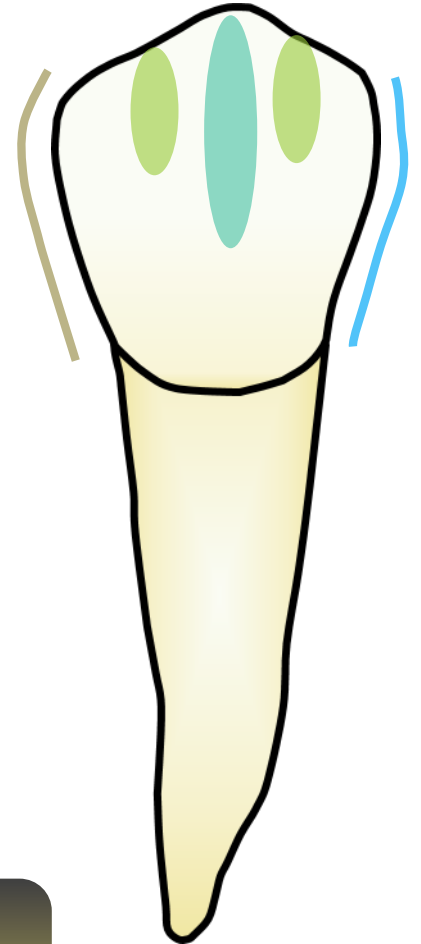
Tooth #44

BUCCAL

□ Outline:

- **Mesial:** straight or slightly concave above the cervical line
- **Distal:** slightly concave, broader contact area

□ **Developmental depressions** are seen proximal to the less prominent **buccal ridge** at the occlusal third

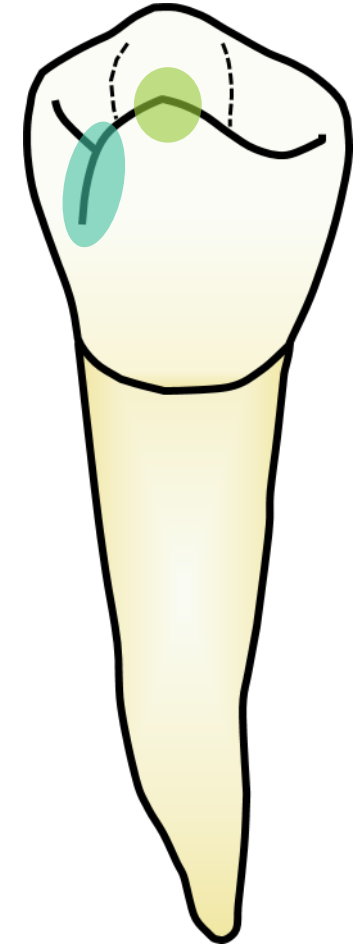


DID YOU KNOW?

The shallow notches on the cusp ridge of mandibular premolars (mesiobuccal on 1st, distobuccal on 2nd) are called **THOMAS NOTCHES**. They serve as spillways for food during mastication.

LINGUAL

- ❑ Tapers to lingual
- ❑ **Diminutive** lingual cusp
- ❑ Occlusal surface can be seen
- ❑ **MESIOLINGUAL DEVELOPMENTAL GROOVE:**
demarcation between the mesiobuccal lobe and
lingual lobe

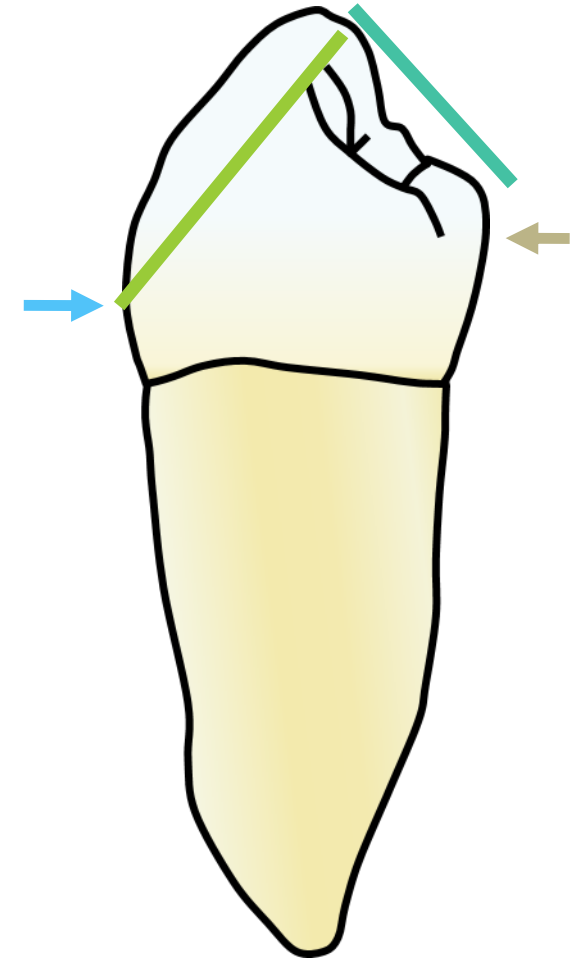


THINK FURTHER...

The lingual cusp could be considered as a transition between canine cingulum and prominent lingual cusp of 2nd premolar

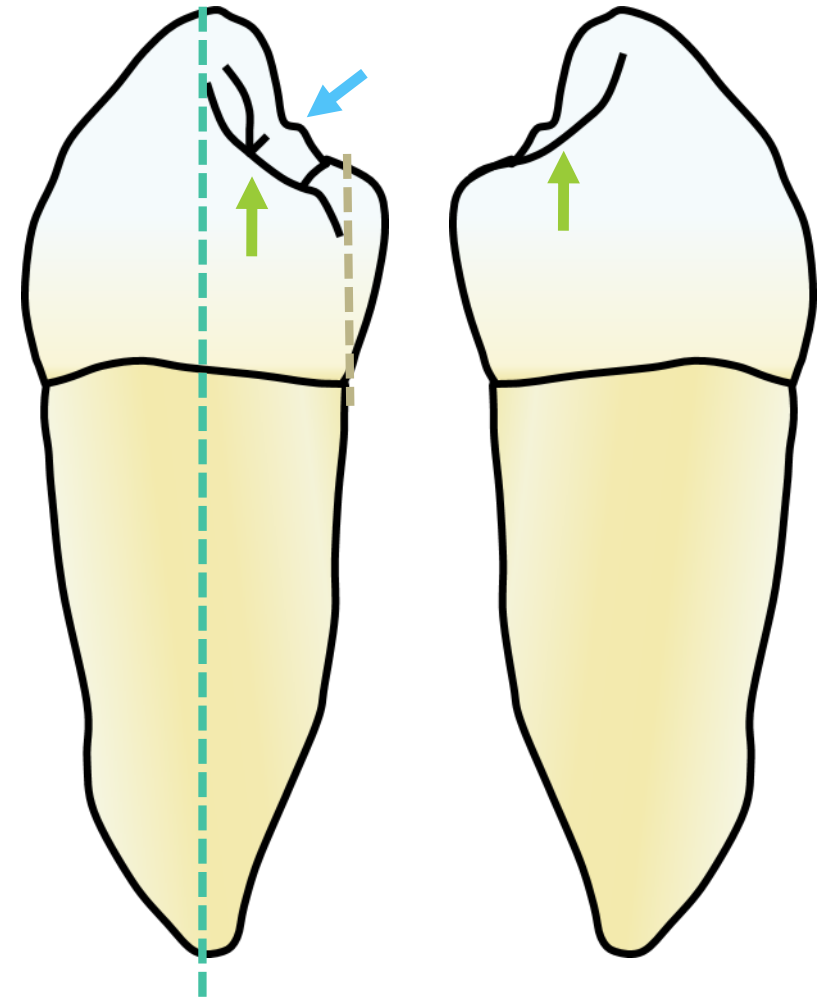
PROXIMALS

- ❑ Exhibits a *lingual tilt*
- ❑ **Occlusal plane tilted lingually** because of cusp height difference
- ❑ Outline:
 - **Buccal:** crest of curvature occlusal to CEJ
 - **Lingual:** crest is in the center of the total crown length



PROXIMALS

- ❑ Heavy or more prominent **transverse ridge**
- ❑ Mesial marginal ridge is **more cervical** than distal marginal ridge
- ❑ **Buccal cusp tip** is in line with or sometimes more buccal to the long axis of the tooth
- ❑ **Lingual cusp tip** is in line with the cervical portion of the root



REMEMBER THIS:

The mandibular first premolar is the ONLY posterior tooth with a more cervical MMR than DMR.

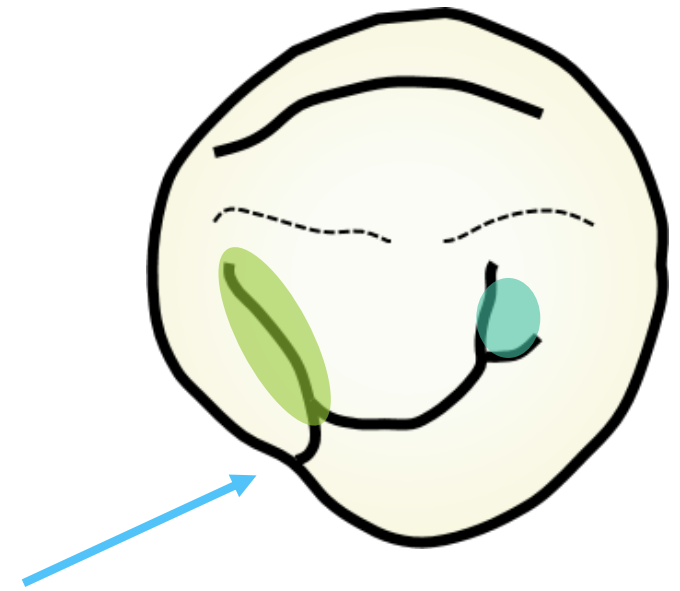
OCCLUSAL

- **Outline:** asymmetrical, almost diamond, some circular
 - **Mesial:** flat or slightly curved
 - **Distal:** broad and more convex (bulkier)
- **Heavy** buccal triangular ridge and **small** lingual triangular ridge



OCCLUSAL

- ❑ **MESIAL** and **DISTAL** fossae
 - Mesial: more linear
 - Distal: more circular
- ❑ Mesial and distal developmental grooves with small pits and fissures – “**snake-eyes appearance**”
- ❑ **MESIOLINGUAL DEVELOPMENTAL GROOVE**



OBSERVE...

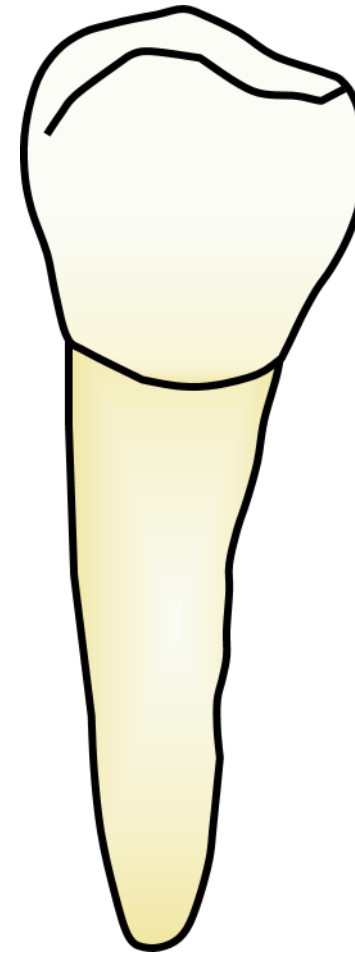
The MLDG constricts the mesial surface of the crown and creates a smaller mesial contact area.

MANDIBULAR SECOND PREMOLAR

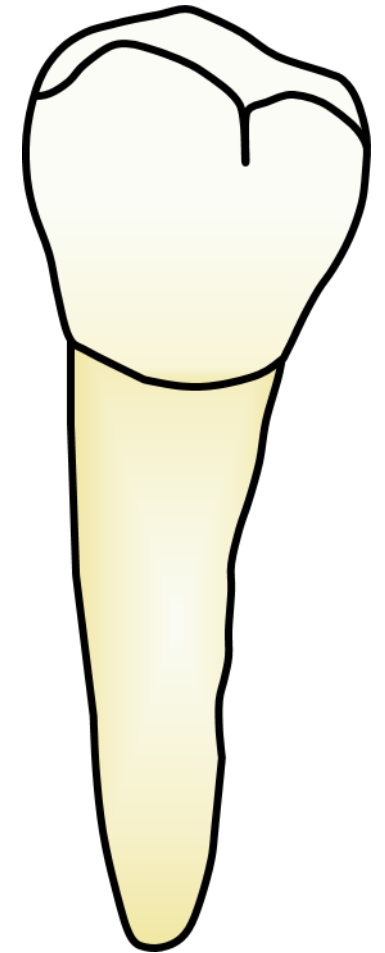


GENERAL FEATURES

- ❑ Resembles 1st premolar from the buccal aspect only
- ❑ Larger than 1st premolars
- ❑ Lingual surface is more developed
- ❑ 2 variations:
 - Two-cusp type
 - Three-cusp type – more common



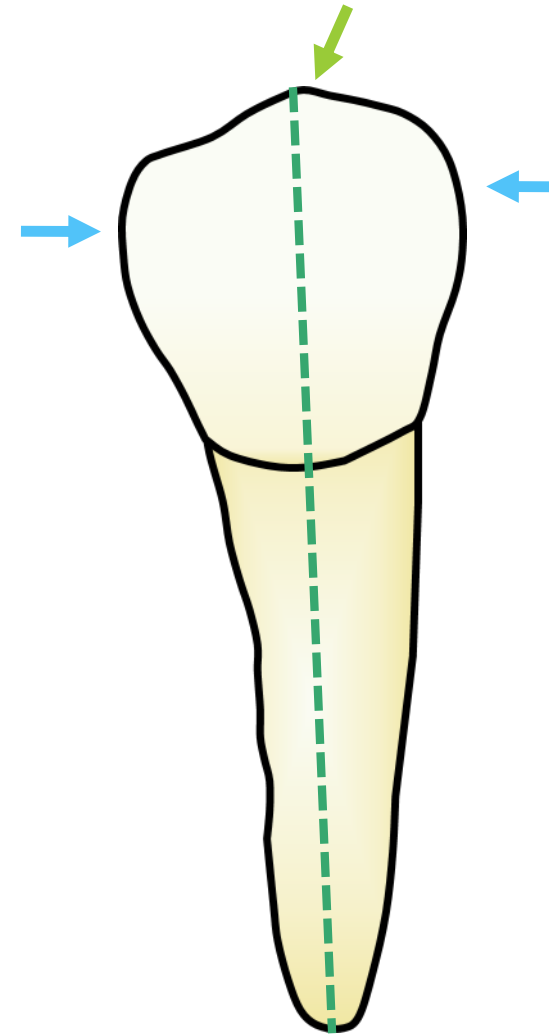
2-cusp type



3-cusp type

BUCCAL

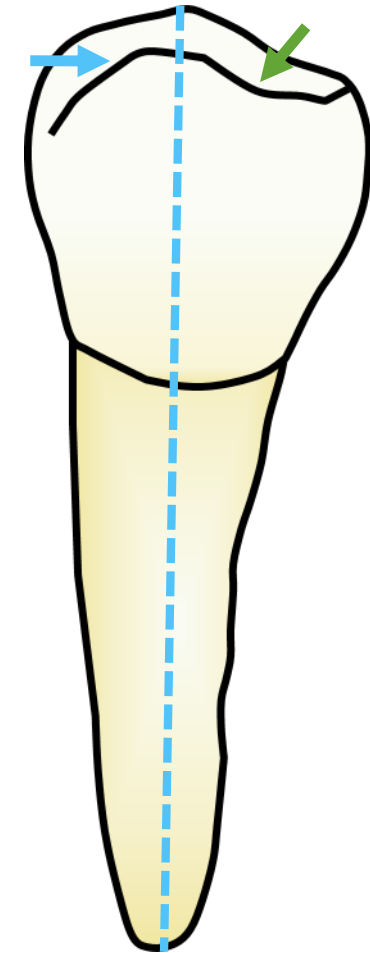
- ❑ Shorter and **more blunt** cusp tip
- ❑ **Bilateral symmetry** of the tooth
- ❑ Contact areas are **more occlusal**



Tooth #45

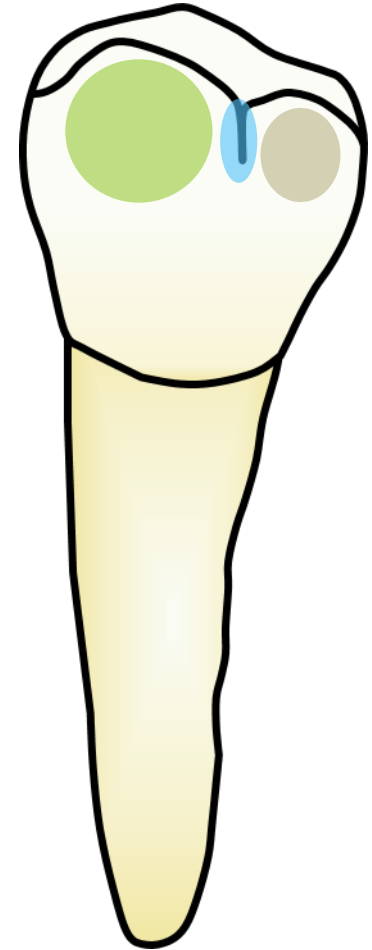
LINGUAL

- Lingual lobes are more developed
- 2-cusp type
 - No groove
 - Cusp either **mesial or on the center** line of the root
 - **Slight depression** where the distal cusp slope joins the distal marginal ridge



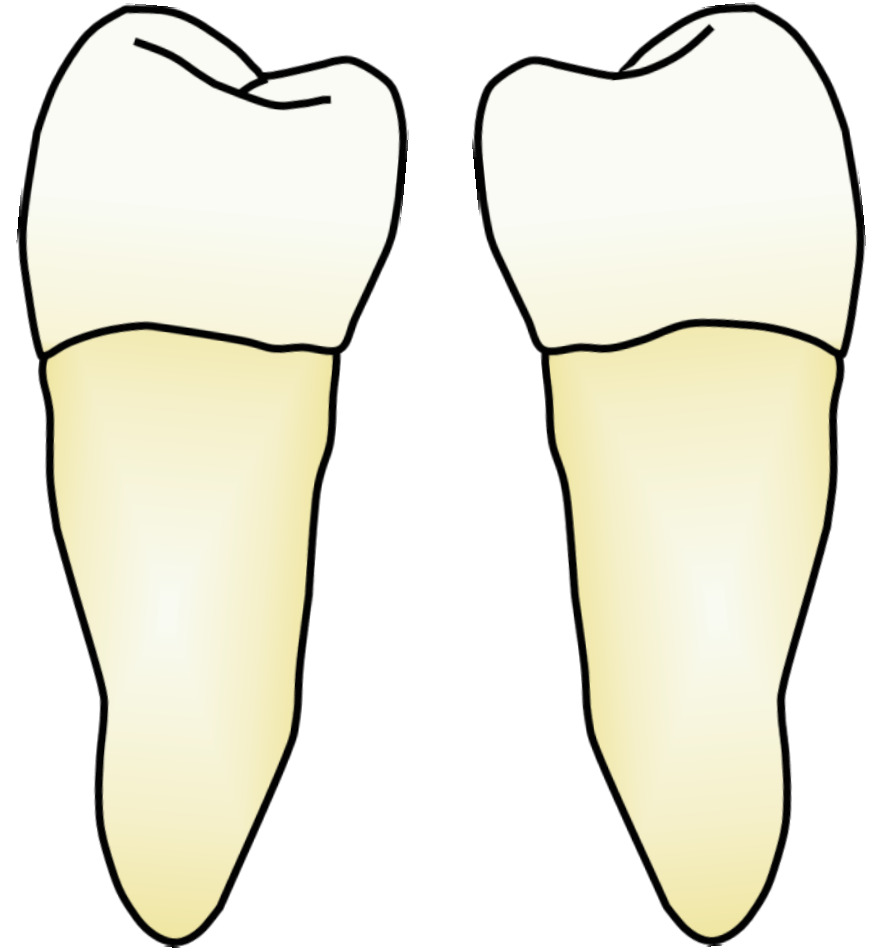
LINGUAL

- 3-cusp type
 - Lingual surface same width as buccal surface
 - **LINGUAL GROOVE:** divides the 2 lingual cusps
 - **MLC** > **DLC**



PROXIMALS

- ❑ Crown is tilted lingually
- ❑ Distal marginal ridge is more cervical than mesial marginal ridge

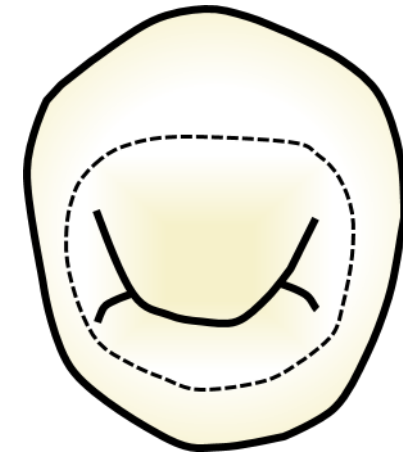


Distal

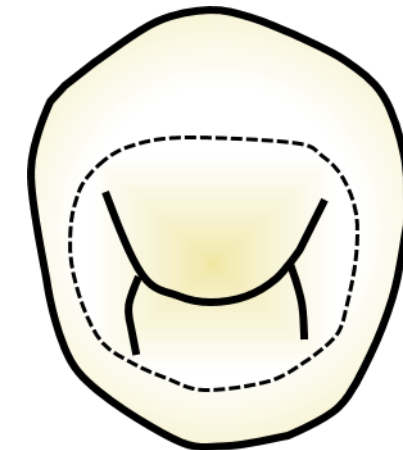
Mesial

OCCLUSAL

- 2-cusp type
 - Outline: round or oval
 - Groove pattern: U or H-type
 - Mesial and distal fossae with corresponding developmental pits
 - Developmental depression traverses distolingual cusp ridge



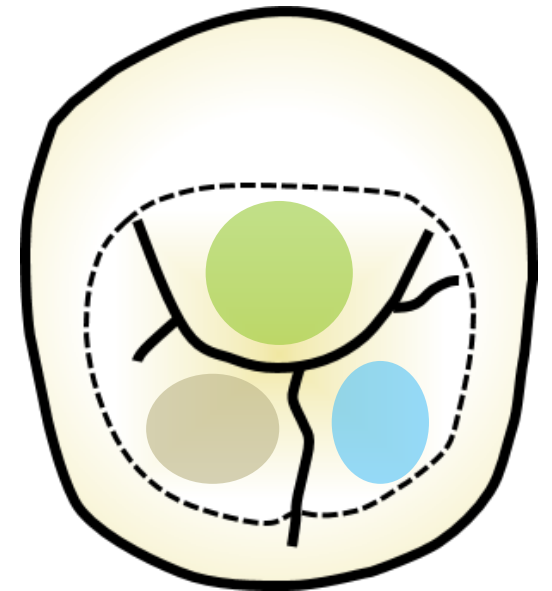
U-type



H-type

OCCLUSAL

- 3-cusp type
 - Outline: square
 - Groove pattern: Y-type
 - Central fossa is distal to the center of the occlusal surface
 - No central groove
 - Lingual groove
 - Cusp width: **B** > **MLC** > **DLC**

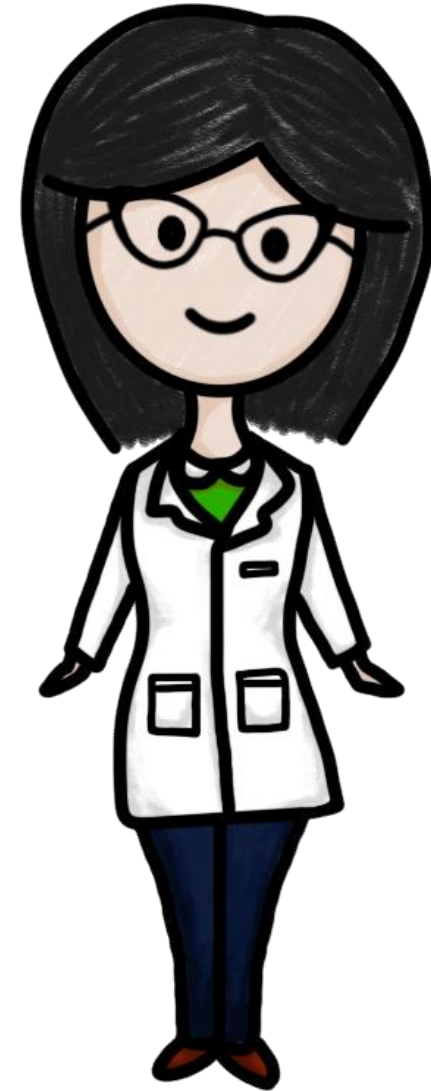


WHEW!

That was A LOT, wasn't it?

There's so much more to remember than the anterior teeth, right? Don't worry, you'll get the hang of it eventually.

For now, move on to the next slide for some practice instructions.





TRY THIS...

Get all your premolar teeth models and gather them all in your palm or in a container. Mix them all together and then try to identify them one by one. How will you go about it? Try these steps:

1. Classify the maxillary vs the mandibular teeth. If the tooth is maxillary, lay them down with the root pointing up. If the tooth is mandibular, lay them down with the root pointing down.
2. Then go about it according to arch. You can start with the maxillary premolars. Determine the labial surface so you're looking at it as if in a person's mouth. Review the different features of maxillary incisors.
3. Identify the mesial surface while you're looking at it from the labial. Remember that the mesial surface is the surface that is nearer the midline. Once you've identified it, position the model as if you have an imaginary midline. Never rely on just one characteristic or feature so you won't be confused. Also, focus your attention to the crown features rather than the root. Remember, on a patient, for you to identify a tooth in the oral cavity, you'll only see the crown most of the time.

REFERENCES

- ❑ Wheeler's Dental Anatomy, Physiology and Occlusion 10th Edition
- ❑ Dental Anatomy: Its Relevance to Dentistry 5th Edition by JB Woelfel and RC Scheid
- ❑ Interactive Guide to Oral Anatomy by Sunico