Wired for Learning - Orthodontic Basics

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Continuing Education Units: 3 hours


Disclaimer: Participants must always be aware of the hazards of using limited knowledge in integrating new techniques or procedures into their practice. Only sound evidence-based dentistry should be used in patient therapy.

This program will introduce the reader to the fascinating world of orthodontics. Orthodontics is a technical and scientific area of dentistry that not only focuses on functional occlusion, but also can dramatically improve the quality of people’s lives by creating an esthetic, pleasing smile, which can increase self-esteem and self-confidence. Whether the patient is a child or adult, orthodontics is a relatively short-term investment for a lifetime of results.

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Overview
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Learning Objectives
Upon the completion of this course, the dental professional should be able to:
• Know the requirements for becoming an orthodontist.
• Recognize normal occlusion.
• Explain the three Angle classifications.
• Identify the five additional discrepancies.
• Understand why malocclusions occur.
• Know when the American Association of Orthodontists recommends a child first be seen by an orthodontist.
• Understand the basic mechanics of tooth movement.
• Explain the types of orthodontic movement.
• Identify the parts of standard orthodontic appliances.
• Identify three sample auxiliary types.
• Define three types of functional appliances.
• Define five removable appliances.
• Define four types of headgear.
• Identify three types of expansion appliances.
• Identify one fixed distalization appliance.
• Identify one combination expansion and distalization appliance.
• Summarize the purpose of holding arches.
• Recognize and understand the purpose of retainers.
• Name four types of retainers.
• Identify typical orthodontic records and their purpose.
• Differentiate the Palmer tooth numbering system from the Universal tooth numbering system.
• Be familiar with careers in orthodontics.

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Glossary

anterior – towards the front; incisors and canines

articulate – to bring the teeth in one arch together with the teeth in the opposite arch

avulse – tooth loss due to trauma

bilateral – on both sides of the mouth

bruxism – habitual grinding of the teeth together

buccal – surface of teeth towards the cheek

congenitally missing – born without

crepitus – crackling sound in the jaw joint

deciduous – primary (baby) teeth

distalize – movement posteriorally - away from the dental midline

esthetic – pertaining to facial beauty, symmetry, balance and proportion

extrusion – tooth movement directed occlusally and parallel to the long axis

intrusive – tooth movement directed apically and parallel to the long axis

labial – surface of anterior teeth closest to the lips

lateral – towards the side

inguinal – surfaces and directions toward the tongue

mandibular – referring to the lower jaw

mandible – the lower jaw

maxillary – referring to the upper jaw

maxilla – the upper jaw

mixed dentition – combination of primary and permanent teeth

occlusal – chewing surface of posterior teeth

orthognathic surgery – surgery performed to align the jaws

osteoblast – a cell from which bone develops

osteoclast – a cell that resorbs bony tissue

palate – the roof of the mouth

periodontium – referring to tissues surrounding the teeth

posterior – toward the back; premolars and molars

root resorption – shortening of the roots

sagittal – pertaining to the suture joining the two parietal bones of the skull

supernumerary teeth – teeth in excess of the normal number

tongue thrust – thrusting of the tongue between the anterior teeth

vertical – up and down

Orthodontics

Orthodontics is a branch of dentistry that specializes in the diagnosis, prevention and treatment of dental and facial irregularities. Many technical terms and names of biological structures are formed from Greek and Latin roots. “Ortho” means straight and “odont” means tooth.

The technical term for orthodontic problems is referred to as “malocclusion,” which means “bad bite.” The practice of orthodontics requires professional skill in the design, application and control of corrective appliances to bring teeth, lips and jaws into proper alignment and achieve facial balance. Orthodontic treatment achieves not only a correct bite, but also beautiful smiles, improved dental health and increased self-esteem and self-confidence.

What is an Orthodontist

An orthodontist is a dental specialist who after dental school completes an American Dental Association accredited post-doctoral course
of at least two academic years in the area of orthodontics. Only dentists who have successfully completed an advanced specialty program may call themselves orthodontists. All orthodontists are dentists, but only about six percent of dentists are orthodontists.

**History of Orthodontics**

Although the beginning of orthodontics can be traced back to the ancient Phoenicians and Egyptians, Dr. Edward Angle is considered “The Father of Modern Orthodontics” and was one of the first to emphasize occlusion in the natural dentition. His interest in creating proper occlusion in the late 1890’s and early 1900’s created the specialty of orthodontics. Dr. Angle also designed the classifications of malocclusion of the teeth, based on the first molar as the key to occlusion, which is still commonly used today.

**Occlusion**

**Normal Occlusion**

In normal occlusion, the mesiobuccal cusp of the maxillary first molar occludes with the buccal groove of the mandibular first molar.

**Types of Malocclusion**

**Angle Classifications**

**Class I**

**Class I** malocclusion has a normal molar relationship. Although the molars may be in ideal position, the other teeth may be crowded, rotated or have excess spacing.

**Class II**

The maxillary first molar is *forward* of the normal molar relationship in **Class II**. The mesiobuccal cusp of the maxillary first molar is mesial to the buccal groove of the mandibular first molar.

**Class III**

The maxillary first molar is *distal* of the normal molar relationship. The mesiobuccal cusp of the maxillary first molar is distal to the buccal groove of the mandibular first molar.
Overjet refers to the distance between the facial surfaces of the maxillary incisors and the facial surfaces of the mandibular incisors.

Subdivision
There can be classification of unilateral (one side) maloccluded positions. One side is Class I and the other side is either Class II or Class III.

Discrepancies
In a deep bite (overbite), the maxillary incisors vertically overlap the mandibular incisors excessively. (In severe cases, mandibular incisors may contact the palate or maxillary incisor may strike mandibular gingiva.)

In an open bite, there are areas where the maxillary and mandibular teeth do not touch. A patient can have an anterior or posterior open bite. (An anterior open bite can sometimes be attributed to thumb sucking or a tongue thrust. Other times the condition is a skeletal problem.)

In an anterior crossbite, the maxillary incisors are lingual (behind) the mandibular incisors, usually with a Class III occlusion.
Space between two teeth is called a **diastema**. This is most common between the maxillary central incisors.

**Figure 14. Diastema**

**Other Conditions**

**Impacted teeth** are prohibited from normal eruption due to their position in the bone or surrounding teeth.

**Figure 15. Impacted Central Incisor**

**Ankylosed teeth** occur when two hard tissues are fused together, preventing movement. When this happens to a tooth and the alveolar bone, the tooth partially erupts. In a growing child, an ankylosed tooth appears to be ‘submerged’ as adjacent unaffected teeth and alveolar bone continue their normal pattern of eruption.

**Factors in Dental and Facial Problems**

**Heredity**

Most orthodontic problems are hereditary. Inherited problems include crowding or spacing of teeth, missing or supernumerary teeth, cleft palate and a wide variety of other irregularities of the jaws and face. For example, a patient may inherit their mother’s small mandible, and their father’s large teeth; if this were the case, the child’s teeth would be too large to fit their mandible and result in malocclusion.

**Missing and Supernumerary (extra) Teeth**

Congenitally missing teeth are not uncommon. The maxillary permanent lateral incisors, mandibular second premolars and third molars are the teeth most commonly absent, either on one side or bilaterally. This can result in spacing, asymmetry (off-centeredness) and movement of other teeth. Supernumerary or extra teeth seldom erupt into the mouth. They may prevent normal teeth from erupting or cause abnormal eruption.

**Acquired**

Some orthodontic problems are acquired. Acquired malocclusions can be caused by thumb or finger sucking habits, tongue thrusting, mouth breathing, airway restriction from tonsils and adenoids, dental disease, malnutrition, trauma, or premature loss or prolonged retention of primary teeth. Whether inherited or acquired, many of these problems affect not only alignment of the teeth but facial appearance and self-esteem as well.

**Habits**

Thumb sucking and finger sucking can shift the teeth out of alignment, creating an open bite, protrusive maxillary incisors, overjet and Class II occlusion.

**Tongue Thrust and Tongue Posturing**

The tongue pressing forward instead of into the roof of the mouth during speech and swallowing can also force the teeth out of alignment, sometimes causing an open bite.

**Mouth Breathing**

People with severe respiratory problems such as chronic nasal congestion, asthma and bronchitis primarily breathe through their mouth. They often develop narrow maxillary arches, buccal crossbite, high palates and increased gingival display.

**Disease**

One can lose a tooth early due to dental caries or periodontal disease; leaving a space that allows other teeth to drift towards and into the space.

**Malnutrition**

Nutritional deficiencies can alter the growth of the jaws and teeth. Early childhood caries, also known as baby bottle caries, promotes early loss of primary teeth.
Investment with long-term benefits. Many products such as whiteners or bonding treatments fade and need replaced. Straight teeth and a pleasant smile offer lifetime benefits.

Dental, General Health and Function
Teeth in malocclusion are hard to clean and maintain and may lead to periodontal disease, tooth decay, and tooth loss. Other orthodontic problems can cause abnormal wear of tooth surfaces, speech problems, difficulty in chewing, or undesirable wear of the temporomandibular joints. Some malocclusions, such as maxillary teeth that protrude, can increase the possibility of fracture due to trauma.

When Should Treatment Begin
Because every child is different, there is not a standard answer to this question. The American Association of Orthodontics recommends that every child get an orthodontic checkup by age 7 -- or earlier if an orthodontic problem is detected by parents, the family dentist or the child’s physician. In some cases, early intervention utilizing the patient’s growth can often make corrective treatment faster and easier.

Adult Treatment
Orthodontic treatment for individuals who have healthy teeth, gingiva and supporting bone can be successful at any age. Many adults are choosing orthodontic treatment to improve their smile, and/or increase function to support good oral health.

Tooth Movement
Orthodontic tooth movement occurs due to the pressure applied to the teeth by orthodontic appliances. This pressure is transmitted to the clinical crown of the tooth, down to the root, and ultimately to the periodontal ligament (the tissue that attaches the tooth to the bone) and alveolar bone surrounding the root.

Generally speaking, slow, continuous force provides the most efficient tooth movement. Excessive force destroys the periodontium. On the surface of the tooth in the direction where the tooth is being moved, the periodontal membrane is squeezed, resulting in compression of the periodontal fibers within the membrane. The bone surface contacting the periodontal membrane begins to resorb due to the activation of cells called osteoclasts.

Figure 16. Before and After
On the surface of the root from which the tooth moves, the periodontal membrane becomes stretched. This activates cells called osteoblasts. These cells regenerate new alveolar bone in the area where the tooth was once located. That is why teeth may be slightly loose during orthodontic treatment. Once the movement has stopped, the ligaments are no longer stretched or squeezed and the bone regenerates and fills in around the periodontal ligament, causing the tooth to be more secure in the bone. Even though the tooth is more secure in the bone, retainers are required to hold the teeth in their new position once appliances are removed.

**Types of Orthodontic Movement**

Types of orthodontic movement include the following.

- **Orthopedic forces** – forces used to affect the shape and growth of the facial bones
- **Orthodontic forces** – forces used to move teeth within the arches
- **Extrude** – to move a tooth in the direction away from the gingiva
- **Intrude** – to move a tooth in the direction toward the gingiva
- **Rotate** – to move a tooth by spinning the tooth on its axis
- **Torque** – force causing movement of a root either buccally or lingually
- **Tip** – movement of a tooth/root mesially or distally
- **Retraction** – moving teeth distally to close space
- **Advancing** – moving teeth forward

**Length of Treatment**

In general, active treatment time with orthodontic appliances ranges from one to three years. The actual time depends on the growth of the patient’s mouth and face, the cooperation of the patient, and the severity of the problem. Mild problems may require less time, and some individuals respond to treatment faster than others.

In some cases, patients are treated in two-phase treatment. The first phase of orthodontics occurs before all the permanent teeth have erupted. One goal of early treatment is to manipulate the current condition of the patient to allow for teeth to erupt into Class I position. According to Dr. William Proffit, this phase can be loosely described as preventive (preventing problems from occurring), or interceptive (reducing the severity of the problem). However, it is very rare for early orthodontic treatment to fully correct malocclusion on its own. Most children will require Phase II comprehensive orthodontic treatment after all their permanent teeth erupt.

After active treatment is completed, a patient will have to wear retainers to keep the teeth in their new positions. The need for a retainer and the length of time it will be worn are determined by the orthodontist.

**The Patient’s Role in Orthodontics**

Successful orthodontic treatment is a partnership of effort among the orthodontic team, family dentist and patient (and parent if applicable).

The orthodontist provides the expertise, the treatment plan and the appliances to straighten teeth. The clinical staff provides the instructions and encouragement. The patient must follow the orthodontic team’s instructions carefully so that the teeth move in the appropriate manner.

Patients who brush thoroughly and use floss and flossing aids properly greatly reduce possible decay. Also, those patients that avoid hard or sticky foods, wear their elastics and/or other removable appliances as instructed, and keep their scheduled appointments usually finish treatment on time with good results.

Regular visits to the family dentist for prophylaxis and exams are very important during orthodontic treatment. Also, proper nutrition and keeping sugars and sodas to a minimum are essential for successful treatment.

**Orthodontic Appliances**

Orthodontic appliances are designed according to the problem being treated. They may be removable or fixed (cemented and/or bonded). They may be made of metal, ceramic or plastic. They can be placed on the labial or lingual surfaces of the teeth (or in some situations, both). All orthodontic appliances have one goal -- to use gentle pressure to move teeth into their proper positions. The body then builds new bone to support the new positions of the teeth.
New techniques and materials contribute to fewer office visits and reduced treatment time in addition to reducing the discomfort of orthodontic treatment. Advancements in technology have made brackets smaller and stronger than before. NASA developed one of the late 20th century’s most dramatic orthodontic breakthroughs, heat-activated nickel-titanium alloy wires. At room temperature, heat-activated nickel-titanium wires are very flexible. As they warm to body temperature they become active and gradually move the teeth to the shape of the archwire. These wires retain their shape, making them more effective for a longer period of time.

Types of Orthodontic Braces

Brackets
Brackets are the small squares that are bonded directly to each tooth with a special dental bonding agent or are attached to orthodontic bands. Brackets act like handles, holding the arch wires that move the teeth. Brackets can be metal or clear, designed for the labial or lingual surface of the teeth.

Separators
Separators, also known as spacers, are elastic rings or metal springs that fit between teeth to create a small space prior to placement of orthodontic bands.

Archwires
Archwires are wires of various dimensions and materials, such as stainless steel or titanium, which are held into the brackets and act as tracks to guide the movement of the teeth.
Springs may be placed on the arch wires between brackets to push, pull, open or close the spaces between teeth.

Elastic Tie
The elastic tie is a tiny rubber ring that holds the archwire in place. These come in a variety of colors, offering fun choices for patients. (Some brackets are “self-ligating,” which means that they do not need the elastics to hold the arch-wire onto the brackets.)

Ligature Tie
The ligature tie or lig. tie (also called steel tie or metal tie) is a fine wire that holds the archwire in place.

Examples of Other Auxiliaries

Power Chain or C Chain
The power chain is a continuous elastic chain used to close space.

Elastics
Elastics, or rubber bands, attach to hooks on brackets and are worn between the maxillary and mandibular teeth in various ways. They apply pressure to move the maxillary teeth against the mandibular teeth to achieve a perfect fit of individual teeth.
Orthodontic Appliances Other than Brackets/ Bands
There are many appliances available in the orthodontist’s repertoire. The following are other types of common orthodontic appliances.

Functional Appliances
Functional appliances are designed to stimulate growth of one arch and slow down the growth of another.

The Herbst is a fixed appliance used in treating a growing patient with Class II malocclusions and underdeveloped lower mandible. It is designed to hold the mandible in a forward position to stimulate faster growth of the mandible than the maxilla, therefore reducing overjet and enhancing the patient’s profile.

The sagittal appliance expands the arch and distalizes the buccal segments using three screws (one in the front and one on each side).

The twin block is used to stimulate the forward growth of the mandible while restraining the forward growth of the maxilla.

Other Removable Appliances
A bite plate is an acrylic appliance that reduces a deep bite by preventing the posterior teeth from touching.

A lip bumper is a .036” size buccal wire that fits into the tubes on the mandibular molar bands. Pressure from the lips creates space along the dental arch.

A splint is used for the treatment of TMD and facial pain. They may be designed for either arch depending on the treatment objectives.
A **tooth positioner** is worn after the braces are removed to achieve minor tooth movement and set the occlusion.

**Invisalign** is an orthodontic treatment system that works to straighten teeth through the use of a series of clear plastic aligners. Invisalign eliminates the brackets and archwires that is characteristic of traditional orthodontic braces. The orthodontist uses three-dimensional computer imaging system to design a treatment plan and order a series of clear retainers. Each aligner uses gentle pressure to move the teeth to their target alignments.

The number of Invisalign trays used will depend on each individual case but the average is between 18 and 30. Each clear Invisalign retainer is removable and worn for two weeks (24 hours a day, except during meals) and then the next aligner is used. This process is repeated until the teeth are in the desired position.

Invisalign was traditionally used only for adults. Invisalign for teens is now available. Features include an aligner wear indicator to help gauge patient compliance and specially engineered aligner features to address the natural eruption of key teeth and root control issues common in patients age 13 to 19.

**Headgear** is an apparatus that is used to deliver force to the teeth from outside the oral cavity. A headgear consists of three parts: a facebow, a headgear force module and a neck strap or headcap. Two bands on the maxillary teeth have headgear tubes on them for insertion of the facebow of the headgear. Examples of headgear include:

**Cervical Headgear** pulls from the back of the neck (cervical) to provide a low angle force either to move the maxillary first molars posteriorly to create more space or to anchor the first molars during treatment. This type of headgear has a slight extrusive force on the molars.

**Hi-pull Headgear** pulls from the top of the head to give a high angle force to move the maxillary first molars up and posteriorly using the headcap as anchorage. It holds the growth of the maxilla. This type of headgear has a slight intrusive force on the molars.
membrane) in the center of the maxillary arch. Once the palate has been expanded, new bone fills the space. The widening of the palate usually causes a diastema to develop between the anterior teeth. (The space closes later.) This appliance can be designed to be banded or bonded to the teeth.

The quad helix is an appliance using bands with a lingual wire and 4 loops (hence, its name). This appliance is designed to expand the maxillary arch to gain the space needed to correct a cross-bite.

Expansion or Distalization Appliances
A rapid palatal expander is used to widen the maxillary arch to align the maxillary and mandibular arches or make room for crowded teeth. The expanding action of the appliance gently separates the palatal suture (elastic membrane) in the center of the maxillary arch.

The Pendulum is an appliance that moves the maxillary molars posteriorly. The advantage of this appliance is that it replaces the need for headgear by rapidly distalizing the maxillary first molars. The appliance fits into the lingual tubes of the maxillary first molars and is bonded to the occlusal of the upper first premolars. Once the molars are moved posteriorly, a holding appliance is used (such as a Nance) to prevent the teeth from drifting forward.
The **transpalatal arch** is a lingual wire, either soldered or removable, that crosses from the first molar on one side directly across the palate to the other first molar to hold the molars in position. This appliance can also be adjusted to expand or rotate the maxillary molars.

The **space maintainer** is an appliance that utilizes a band and open loop. This loop maintains the space between teeth so a permanent tooth has room to erupt.

**Holding Arches**

The **lingual arch** is a wire bar bonded with bands on the lingual surface of an arch and is designed to prevent forward drifting of the molars.

The **Nance** is a lingual wire with an acrylic pad on the anterior part of the palate. This is used to hold position of maxillary first molars.
Retainers

Teeth are never completely stable and always have a tendency to move. After orthodontic treatment, retainers must be worn to stabilize and hold the teeth in their new positions.

The Hawley retainer is a removable appliance made of acrylic and a labial bow designed to hold the teeth in their present position or to achieve very minor tooth movement.

![Figure 51. Hawley Retainer]

The wrap-around retainer is a removable appliance made of acrylic and a labial bow that goes around the entire arch, designed to hold the teeth in their present position or to achieve very minor tooth movement.

![Figure 52. Wrap-around Retainer]

A clear retainer is a nearly invisible retainer to esthetically hold the teeth in their present position.

![Figure 53. Clear Retainer]

The bonded 3-3 retainer is a wire retainer bonded to the lingual surfaces of the canines or sometimes all mandibular anteriors. In some cases, a wire retainer can be bonded to the lingual of the maxillary central and lateral incisors. This is used to esthetically retain teeth in their correct position for an extended period of time. Special oral hygiene instructions must be given for flossing around this type of retainer.

![Figure 54. Bonded 3-3 Retainer A]

![Figure 55. Bonded 3-3 Retainer B]

Diagnosis and Treatment Planning

The patient’s initial visit to an orthodontic office typically consists of an examination and a discussion of possible treatment options and best timing for treatment. Initial orthodontic records are the next step in the process of treatment. The orthodontic assistant is usually delegated the responsibility for obtaining the various records the orthodontist must have to make the diagnosis. Make sure the state dental practice act allows for the duties to be delegated. The laws regarding the delegation of duties vary from state to state. Once all records have been completed the orthodontist analyzes the records to confirm or make a diagnosis for the best treatment options.

The following explains the individual records commonly taken and their purpose.

Photographs or Digital Imaging

A series of frontal and side facial photographs in addition to intra-oral photographs or digital images make up the initial photography record. The facial
pictures serve as visual aids for bony and soft tissue analysis so that the facial aspects of treatment can be thoroughly evaluated. Intra-oral photos offer a color record of the patient’s initial condition.

**Panoramic Radiograph**

The panoramic radiograph is a composite radiograph of the teeth and jaws to look for the normal number of teeth, third molars, missing teeth, impacted teeth or supernumerary teeth. This radiographic image also shows bone support and root length.

**Cephalometric (Lateral Skull) Radiograph**

A lateral view of the skull, the cephalometric radiograph is used to study the relationship of the bones, teeth and jaws to the face and skull. The orthodontist obtains measurements then compares them to a standard reference group.

Cephalometric radiographic images taken before, during, and after treatment can be superimposed to study changes in jaw and tooth position.

Although the main purpose of taking radiographic images is not for pathology screening, they can sometimes reveal changes or anomalies in the cervical spine, skull, jaws, or cranial base.

**Study Models**

Maxillary and Mandibular impressions are obtained from every patient to make a study model used during pre-treatment planning and for reference of the dental problems as they existed at the beginning of treatment.

**Surgical Intervention in Orthodontic Problems**

Some malocclusions require surgical intervention to achieve a high-quality result. The following outlines the techniques available in maxillofacial surgery to aid the orthodontist. Depending on the procedure, these can be accomplished in
Orthodontic Tooth Numbering
The Palmer Notation Method is the most common numbering system in orthodontics.

Permanent Dentition
In this system, the mouth is divided into four quadrants. The numbers 1 through 8 and a unique symbol are used to identify the tooth type in each quadrant. The numbering starts at the midline (central incisor) and continues to the most posterior tooth (third molar). Each tooth type has the same number no matter which quadrant it is located.
1. Central Incisor
2. Lateral Incisor
3. Canine
4. First Premolar

Orthognathic Surgery
The purpose of orthognathic surgery is to correct functional and esthetic problems that are due to underlying skeletal deformities. Orthognathic surgery is often the treatment solution in cases where the bite abnormality is so severe that braces alone cannot correct the problem, or where orthodontics alone would compromise facial appearance. Surgery may be avoided in some adolescents through growth modification and orthodontic appliances that correct the growth pattern during the remaining growth period.

Extraction of Teeth
In some cases, extractions are necessary to create space for proper alignment and tooth movement. The following sections explain the different extraction scenarios.

<table>
<thead>
<tr>
<th>Extraction of:</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deciduous Teeth (Serial Extraction)</td>
<td>In some cases, the planned extraction of deciduous teeth will assist the eruption of permanent teeth in the correct sequence.</td>
</tr>
<tr>
<td>Permanent Teeth</td>
<td>Sometimes there is not enough room in the mouth or necessary bone support for all of the patient’s teeth once treatment has been completed. The most common teeth chosen for extraction are first premolars.</td>
</tr>
<tr>
<td>Supernumerary Teeth</td>
<td>In some cases there are erupted supernumerary teeth that may hinder successful orthodontic treatment and will need to be removed.</td>
</tr>
<tr>
<td>Impacted Teeth</td>
<td>The orthodontist primarily decides on the removal of impacted teeth as an adjunct to the orthodontic treatment. The teeth usually removed are the third molars (wisdom teeth) or impacted supernumeraries. These teeth are often removed to prevent future complications or re-malalignment of the teeth.</td>
</tr>
</tbody>
</table>
5. Second Premolar
6. First Molar
7. Second Molar
8. Third Molar

**Permanent Dentition Tooth Numbers in Palmer Notation Method**
Each quadrant is also given a unique symbol depending on its location in the oral cavity.

The symbol is based on the visualizing lines that separate the arches and the midline = [image]

Maxillary left - [image]
Maxillary right - [image]
Mandibular left - [image]
Mandibular right - [image]

For example, a maxillary left first premolar would be noted as UL4 or 14

To understand the notation, picture the operator looking at the patient; the right side is the left side of the patient’s dentition.

**Primary Dentition**
In the primary dentition, the Palmer Notation System uses uppercase letters instead of numbers. Following the same order as for adult teeth, children’s 20 primary teeth are lettered “A” through “E” in each quadrant.
A. Central Incisor
B. Lateral Incisor
C. Canine
D. First Molar
E. Second Molar

The same symbols are used to identify the quadrants as in the permanent dentition.

It is important that the orthodontic assistant also understanding the Universal Numbering System used in general practices. Both systems must be understood to communication between orthodontic and general dental practices.

**Career Opportunities in Orthodontics**
The orthodontic field is full of opportunities. A career choice in orthodontics means you are a member of a special team that helps to produce better oral health, enhanced self-esteem and beautiful smiles.

The following are examples of duties that are typically preformed by orthodontic assistants. Depending on the size of your practice these responsibilities may be performed by separate assistants or all the duties may be performed by one assistant.

**Orthodontic Clinical Assistant**
**Typical Responsibilities**: actively assists the orthodontist with treatment by preparing teeth for the placement of brackets and bands, prepares and secures orthodontic wires. (Responsibility varies by state.)

The clinical orthodontic assistant also educates patients on oral hygiene and appliance care and motivates patients in order to achieve the very best results from orthodontic treatment. The clinical orthodontic assistant also serves as a key communication link between the patient and the orthodontist.

**Requirements**: communication skills, excellent eye-hand coordination, organizational skills, basic computer skills, attention to detail, time management skills and being a team player while often working independently.

**Orthodontic Radiography Technician**
**Typical Responsibilities**: takes orthodontic records including radiographic images, photographs and study models.

The dental radiography technician is often the first clinical assistant a new patient will encounter. This individual sets the tone of the patient’s orthodontic experience.

**Requirements**: a dental radiography license required in most states (check with your state dental practice act), communication skills, organizational skills, and attention to detail.

**Orthodontic Laboratory Technician**
**Typical Responsibilities**: creates retainers and other orthodontic appliances, and prepares orthodontic study models.
Financial arrangements and payments, files and coordinates insurance payments, obtains computer statistical reports.

**Requirements:** excellent verbal and written communication ability, computer skills, basic understanding of insurance filing, and ability to obtain accounts receivables information.

This is just a sample of orthodontic careers. Some practices have a marketing coordinator, a sterilization technician, office manager and or business assistant.

**Summary**

Basic knowledge of malocclusion and tooth movement must be understood when being a part of an orthodontic dental practice. Becoming a member of the orthodontic team requires a unique combination of skills, a steadfast commitment to long-term goals and a desire to excel. All positions require individuals who thrive on delivering an excellent patient experience and a quality result. If you like to help people and if you would enjoy the respect that comes with being a member of a highly regarded health-care profession that has the capacity to change people’s lives, then, consider a career in orthodontics!
Course Test Preview
To receive Continuing Education credit for this course, you must complete the online test. Please go to:

1. Dr. Edward Angle, “The Father of Modern Orthodontics” designed the classification of malocclusion of the teeth, based on __________.
   a. the numbers of teeth in the mandible
   b. the relationship between the maxillary and mandibular first molars
   c. the shape of the maxilla
   d. the relationship between the maxillary and mandibular first premolars
   e. none of these, Dr. Angle was not the Father of Orthodontics

2. Class II malocclusion is noted by __________.
   a. the maxillary first molar is in normal position, but the second molar is not
   b. the maxillary first molar is forward of normal relation
   c. the maxillary first molar is distal of normal relation
   d. the mandibular first molar is higher than normal
   e. None of the above.

3. Class III malocclusion is noted by __________.
   a. the maxillary first molar is in normal position, but the second molar is not
   b. the maxillary first molar is forward of normal relation
   c. the maxillary first molar is distal of normal relation
   d. the mandibular first molar is higher than normal
   e. None of the above.

4. Class I occlusion is noted by __________.
   a. the maxillary first molar is in normal position, but the second molar is not
   b. the maxillary first molar is forward of normal relation
   c. the maxillary first molar is distal of normal relation
   d. the mandibular first molar is higher than normal
   e. None of the above.

5. Class II, Division 2 is noted by __________.
   a. occlusion, except for the anteriors
   b. the maxillary first molars are forward of normal position
   c. the maxillary first molars are forward of normal position, the maxillary centrals are lingually inclined
   d. the maxillary first molars are forward of normal position, the maxillary centrals are lingually inclined, and the maxillary laterals are forward
   e. None of the above.
6. The occlusion in the following diagram is a __________.

   ![Diagram of teeth]

   a. Class I  
b. Class II  
c. Class III  
d. Class IV  
e. Class V  

7. This photo is an example of a/an __________.

   ![Photo of teeth]

   a. Deep bite  
b. Diastema  
c. Overjet  
d. Open bite  
e. Crossbite  

8. This photo is an example of a/an __________.

   ![Photo of teeth]

   a. Deep bite  
b. Diastema  
c. Overjet  
d. Open bite  
e. Crossbite
9. **This photo is an example of a/an __________.**

   a. Deep bite
   b. Diastema
   c. Overjet
   d. Open bite
   e. Crossbite

10. **This photo is an example of a/an __________.**

    a. Deep bite
    b. Diastema
    c. Overjet
    d. Open bite
    e. Crossbite

11. **Most orthodontic problems are caused by __________.**

    a. crowding
    b. supernumerary teeth
    c. cleft palate
    d. irregularities of the jaws and face
    e. All of the above.

12. **The American Association of Orthodontics recommends that every child get a checkup by an orthodontist by age _______.**

    a. 6
    b. 7
    c. 8
    d. 9
    e. 12
13. **Cells that produce bone are called __________.**
   a. osteoblasts
   b. fibrocytes
   c. osteocytes
   d. osteoclasts
   e. None of the above.

14. **Orthodontic __________ are stainless steel rings that are cemented to the teeth.**
   a. brackets
   b. bands
   c. elastic ties
   d. archwires
   e. steel ties

15. **__________ are the small squares that are bonded directly to each tooth with a special dental bonding agent or are attached to orthodontic bands. They act like handles.**
   a. Brackets
   b. Bands
   c. Elastic ties
   d. Archwires
   e. Steel ties

16. **__________ are available in various dimensions and grades made of stainless steel or precious metal. They are attached to the brackets and act as tracks to guide the movement of the teeth.**
   a. Brackets
   b. Bands
   c. Elastic ties
   d. Archwires
   e. Steel ties

17. **A/an __________ is a tiny rubber ring that holds the archwire in place.**
   a. bracket
   b. band
   c. elastic tie
   d. archwire
   e. steel tie

18. **The best definition of intrude is __________.**
   a. forces to move teeth within the jaws
   b. movement of a root buccally or lingually
   c. movement of the tooth toward the gingiva
   d. forces used to affect growth
   e. movement of the tooth away from the gingiva

19. **The best definition of extrude is __________.**
   a. forces to move teeth within the jaws
   b. movement of a root buccally or lingually
   c. movement of the tooth toward the gingiva
   d. forces used to affect growth
   e. movement of the tooth away from the gingiva
20. **The best definition of torque is __________.**
   a. forces to move teeth within the jaws  
   b. movement of a root buccally or lingually  
   c. movement of the tooth toward the gingiva  
   d. forces used to affect growth  
   e. movement of the tooth away from the gingiva

21. **The best definition of orthodontic forces is __________.**
   a. forces to move teeth within the jaws  
   b. movement of a root buccally or lingually  
   c. movement of the tooth toward the gingiva  
   d. forces used to affect growth  
   e. movement of the tooth away from the gingiva

22. **The best definition of orthopedic forces is __________.**
   a. forces to move teeth within the jaws  
   b. movement of a root buccally or lingually  
   c. movement of the tooth toward the gingiva  
   d. forces used to affect growth  
   e. movement of the tooth away from the gingiva

23. **A removable retainer with a labial wire is a __________.**
   a. rapid palatal expander  
   b. tooth positioner  
   c. cervical headgear  
   d. lingual arch  
   e. Hawley retainer

24. **A lingual archwire that can be used in either arch that prevents drifting is a __________.**
   a. rapid palatal expander  
   b. tooth positioner  
   c. cervical headgear  
   d. lingual arch  
   e. Hawley retainer

25. **An appliance made from reset teeth on the model that is worn after the braces are removed to achieve minor tooth movement is a __________.**
   a. rapid palatal expander  
   b. tooth positioner  
   c. cervical headgear  
   d. lingual arch  
   e. Hawley retainer

26. **An appliance designed to distalize the maxillary molars using the cervical region of the neck for anchorage is a __________.**
   a. rapid palatal expander  
   b. tooth positioner  
   c. cervical headgear  
   d. lingual arch  
   e. Hawley retainer
27. An appliance designed to widen the palate by allowing the palatal suture between the two sides of the maxilla to separate is a __________.
   a. rapid palatal expander
   b. tooth positioner
   c. cervical headgear
   d. lingual arch
   e. Hawley retainer

28. The best definition of articulate is ____________________.
   a. habitual grinding or clenching of the teeth
   b. shortening of the roots
   c. bringing the arches together
   d. to remove the tissue over a tooth that has not yet erupted

29. The best definition of bruxism is ________________________.
   a. habitual grinding or clenching of the teeth
   b. shortening of the roots
   c. bringing the arches together
   d. to remove the tissue over a tooth that has not yet erupted

30. The best definition of resorption is ________________________.
   a. habitual grinding or clenching of the teeth
   b. shortening of the roots
   c. bringing the arches together
   d. to remove the tissue over a tooth that has not yet erupted

31. The best definition of exposure is ___________________________.
   a. habitual grinding or clenching of the teeth
   b. shortening of the roots
   c. bringing the arches together
   d. to remove the tissue over a tooth that has not yet erupted

32. In the Palmer Notation Method, for the permanent dentition, each tooth type has a different number, starting with the __________.
   a. third molars
   b. lateral incisors
   c. first molars
   d. central incisors
   e. None of the above.

33. The Palmer Notation Method __________.
   a. divides the oral cavity into arches
   b. has no specific division
   c. divides the oral cavity into quadrants
   d. treats the oral cavity as a whole
   e. is the same as the International Numbering System
34. **A cephalometric radiographic image is a ____________.**
   a. photo taken of the inside of the patient’s mouth
   b. series of three photos of the head
   c. lateral view of the skull to characterize dental and skeletal relationships
   d. single radiograph that encompasses the teeth and jaws to look for the normal number of teeth, third molars, missing teeth, impacted teeth or supernumerary teeth

35. **Orthodontic appliances can be placed on the ____________.**
   a. occlusal surfaces only
   b. labial surfaces only
   c. lingual surfaces only
   d. labial and lingual surfaces
   e. occlusal and lingual surfaces only
References
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5. The Orthodontic CYBERjournal. High Intensity Curing Lights.
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About the Author

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Lori Garland Parker is a clinical consultant and co-founder of Consulting Network, a leading orthodontic management and training organization. She coaches orthodontic practices on maximizing the talents of the clinical team, implementing systems to enhance clinical efficiency and productivity along with continuity of care, and teaches communication skills and patient motivation. She also designed and teaches the “Train the Trainer” program, lectures extensively in the U.S. and abroad, and has written a line of customizable procedure manuals to support successful new employee integration into the practice. Lori holds Bachelors in Business and a Masters in Organizational Management. She is also a CDA, COA and is an RDAEF in California.

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