

Prosthodontics

1. Arrange the following provisional materials from most desirable to least desirable in terms of temperature increase during setting reaction:

- a. Trim, Jet, Firmit**
- b. Jet, Firmit, Trim**
- c. Firmit, Jet, Trim**
- d. Firmit, Trim, Jet**

A: The answer is: d. Firmit, Trim, Jet. In general, the greater the size of the monomer molecule, the less is the exothermic heat of reaction on setting and mechanical properties is accomplished mainly through the filler. An increase in filler content reduces the relative amounts of exothermic heat and contraction while increasing the strength of the set material.

For light-activated systems the amount of filler is determined by the manufacturer; for the other systems it is desirable to incorporate as much filler as possible without interfering in the handling or manipulation characteristics of the material.

Contemporary Fixed Prosthodontics, 2nd ed. Rosenstiel et al

2. You are selecting a shade for a PFM crown to restore tooth #8. The patient is a 49 year old actress with an exacting personality and she said the most important result for her would be to have the new tooth “blend in” so as to be undetectable. Which order should the following parameters be selected in order to best achieve this goal?
- a. hue, value, chroma
 - b. chroma, value, hue
 - c. hue, chroma, value
 - d. chroma, hue, value

The answer is C. hue, chroma, value. You would probably also choose supplemental colors and characterization to give the tooth a natural appearance.

It is very important to remember what each of these terms describe:

Hue = the *variety* of a color, shade, or tint. The hue of an object can be red, green, yellow, and so on and is determined by the wavelength of light reflected and/or light observed. In the Vita Lumin shade guide, A1, A2, A3, A4 are said to be similar hue as are the B,C, and D shades. The region with the highest chroma (i.e., the cervical region of the canines) should be used for the initial hue selection

Chroma = the *intensity* of a hue. The terms saturation and Chroma are sometimes use interchangeably. Imagine a bucket of water to which 1 pint of latex paint is added. The saturation or Chroma is low. Adding a second pint of paint increases the Chroma, and so on, until the solution is almost all paint and a High chrome results.

Value = the relative lightness or darkness of a color or the brightness of an object. The brightness of any object is a direct consequence of the amount of light energy that the object reflects or transmits. The value for a given tooth can be determined WITH A SECOND COMMERCIAL SHADE GUIDE whose samples are arranged in order of increasing lightness.

Contemporary Fixed Prosthodontics, Rosenstiel, et al. pp 489-494

3. Which of the following statements regarding custom trays is, (are) true?
- a. There is a primary sources of error which is eliminated: stresses during removal.
 - b. Although reducing the bulk of an elastomeric impression material increases its accuracy, the opposite is true for reversible hydrocolloid impression materials.
 - c. Light-polymerized materials, when used for custom trays offer the advantage of convenience because a storage period of 24 hours is not needed to allow for the completion of poloymerization.
 - d. Even slight flexing of the custom tray will lead to a distorted impression which is usually undetectable until one attempts to seat the restoration.
 - e. All of the above

Answer: e. all the above

4. When do you reline a distal extension RPD?

- 1. When the indirect retainer lifts from its rest seat upon digital pressure to the distal Extension**
- 2. When a wash of alginate appears on the buccal shelf area more than .5mm thick.**
- 3. If the natural dentition fails to pierce 2 pieces of 28 gauge soft green wax placed over the denture teeth while the remaining natural teeth in opposition are making firm contact.**
- 4. If rotation and settling of the distal extension base or bases is obvious when alternate finger pressure is applied on either side of the fulcrum line.**
 - a. 1,3**
 - b. 1,4**
 - c. all of the above**
 - d. 1,2,3**

The answer is: C

A wash of alginate with 1 scoop of alginate to 2 measures of hot water will provide a mix that is thin enough to not displace soft tissues and yet set quickly. When applying pressure to the most posterior aspect of the denture base, the amount of space under the indirect retainer is an indicator of the amount of space to be found under the denture base. Some clinical judgment is essential here because the length of the distal extension base affects the amount of movement, as does the distance from the indirect retainer to the fulcrum line.

Clinical Removable Partial Prosthodontics, Third ed, Phoenix et al pp 463-464
McCracken's Removable Partial Prosthodontics ninth ed. Pp 449.

5. Which of the following features regarding mutually protected occlusion are true?

- 1. The anterior maxillary teeth and anterior mandibular teeth together guide excursive movements of the mandible.**
 - 2. No posterior occlusal contacts occur during lateral or protrusive excursions.**
 - 3. The posterior teeth come into contact only at the end of each chewing stroke acting as stops for vertical closure when the mandible returns to it's intercuspal position.**
- a. 1**
 - b. 1,2**
 - c. 1,3**
 - d. all the above**

The answer is: D

The study of occlusion can historically be broadly categorized into three categories:

- Bilaterally Balanced
- Group Function
- Mutually Protected

Recently, the emphasis in teaching fixed prosthodontics and restorative dentistry has been placed on the concept of mutually protected occlusion. More recent investigations that focus on the neuromuscular physiology of the masticatory apparatus are supportive of the advantages associated with a mutually protected occlusal scheme. A subset of this scheme would be canine guidance or cuspid rise.

Contemporary Fixed Prosthodontics, 2nd Ed. Rosenstiel et al

6. Which of the following are true concerning casting metals?

- 1. Patients cannot develop a nickel allergy from Jelenko's "Genesis II".**
- 2. Nickel allergies are more common in males.**
- 3. Rexalloy, and Rexillium II, are examples of nickel free alloy.**
- 4. Nickel is a noble metal.**

- a. all the above are true**
- b. none are true**
- c. 1,2,3 are true**
- d. 3,4,5 are true**
- e. 1 only**

The answer is E, only 1 is true.

Jelenko's "Genesis II" is a metal alloy without nickel in it-thus no chance for a nickel allergy. Females are said to have Nickel allergies 9%, and males .9%. (CAPT Beatty lecture). He stated that you can't give them a nickel allergy, you just may get a reaction to an alloy with nickel in it if they are already sensitive. The Nickel replaces gold in some base metal alloys. It is a base metal. It increases the CTE-Coefficient of thermal expansion, it also has an anti-corrosion characteristic, and may be carcinogenic. (page 117 of Fixed Pros Syllabus). Rexalloy and Rexillium II, are examples of nickel alloys, with Rexalloy being 67% Ni, 14% Chromium, Rexillium=76% Ni, 14% Cr. (page 127 of Fixed Pros Syllabus).

7. Which of the following are true concerning A-P strap facts?

- 1. The A/P palatal strap has limited applications in maxillary partial denture designs.**
- 2. The posterior strap should be slightly round and 6 mm. wide.**
- 3. The strap should never be placed on moving tissue. And should cross the midline at a right angle not on a diagonal.**
- 4. A maxillary torus is a contraindication to the A-P palatal strap design.**
- 5. Flexure is almost non-existent in the A-P design.**
- 6. It is usually used for Kennedy class II and IV's.**
 - a. all the above are true**
 - b. none are true**
 - c. 1,2,3 are true**
 - d. 2,4,6 are true**
 - e. 3,5,6 are true**

The answer is F

The A/P palatal strap design can be used in almost any maxillary partial denture design. Thus 1. is false. The posterior strap should be flat and a minimum of 8-12 mm wide. Thus 2 is false. They should be located as far posterior as possible but NEVER on moveable tissues. And they should cross the midline at a right angle; the tongue will not appreciate an asymmetric appliance as readily. So #3 is true. An inoperable maxillary torus may not allow one to use an A-P design but some tori are negotiable. So #4 is false. Flexure is practically nonexistent as each component braces the others against possible torque and flexure. So #5 is true. And finally the A-P strap design is most often used for Class II and IV Kennedy classes. With the single wide palatal strap used for the Kennedy Class III's.
SOURCE: McCRACKEN'S REMOVABLE PARTIAL DENTURES page 52-54.

8. Which of the following is/are a likely cause of sore spots on the ridges from both dentures after delivery?

- a. Inaccurate denture base**
- b. Malocclusion**
- c. Excessive peripheral seal**
- d. Overextension of the borders**
- e. Excessive vertical dimension**

The answers are a,b,e.

A localized sore spot on the ridges can be caused by faulty occlusion, a resin spicule or an inaccurate denture base. If a malocclusion exists then a patient remount will be needed. For excessive vertical dimension, treatment= patient remount to lower VDO, or make new Complete Dentures. For inaccurate denture bases you can relin or rebase or make new dentures. I don't think you can ever have too much peripheral seal, and an overextension of the borders will give you sore spots in the vestibule not on the ridges.

Ref. CAPT Van der Creek Complete Denture Syllabus. p. 113-Troubleshooting.

9. What percentage and type of patient's have clicking and what percentage have crepitus?

- 1. Generally about 40-75% of the population have one sign of joint dysfunction. It is possible that joint sounds can be found in 50% of the non-patient population**
- 2. Several studies report that progression of intracapsular disorders as determined by joint sounds only occurs in 7-9% of patients.**
- 3. de Leeuw study showed that sounds persisted in 54% of patients who had nonsurgical management of intracapsular disorders-yet none had any discomfort or dysfunction.**
- 4. Men usually have more symptoms such as headaches, clicking, TMD tenderness and muscle tenderness.**
- 5. Signs and symptoms in kids' increases in frequency with age, joint sounds can be heard 17.5% of the time. The clicking can come and go over a five year period.**
 - A. 1,2,3 are true**
 - B. All are true**
 - C. 1,2,3,5 are true**
 - D. 3,4,5 are true**

The answer is C. All are true except 4

Women usually have more symptoms such as headaches, clicking, TMD tenderness and muscle tenderness.

Crepitus is defined as multiple, rough, gravel-like sound and described as grating and complicated. Joint sounds of a single event of short duration are known as clicks. If the joint sound is loud it is referred to as a pop. Pain in the TMJ is referred to as Arthralgia-the pain originates from the nociceptors located in the soft tissue surrounding the joint. . Joint sounds appear to be much more resistant to therapy and do not always indicate a progressive disorder.

REFERENCE: Okeson Orofacial Pain p. 116-118.

- 10. Which of the following is/are true concerning Kennedy's/Applegates rules?**
- 1. Kennedy class 1 involves bilateral edentulous areas posterior to the natural teeth while a Class II has a unilateral edentulous area posterior to the natural teeth.**
 - 2. Kennedy Class 3 always has one unilateral edentulous area with teeth posterior to it. A Class 4 has a single edentulous area crossing the midline and anterior to natural teeth.**
 - 3. You may have up to 2 mods only in a Kennedy Class 4 case.**
 - 4. If a second or third molar is missing and is not to be replaced it is not considered in Applegate's rules. If to be replaced it will determine the class.**
 - 5. Modifications are those areas other than the those that determine the classification and are designated by their number.**
- A. All the above are true**
 - B. None are true**
 - C. 1,2,3 are true**
 - D. 1,4,5 are true**
 - E. 3,4,5 are true**
 - F. 1,4 are true.**

The answer is D.

Kennedy class 1 does involve bilateral edentulous areas posterior to the natural teeth while a Class II has a unilateral edentulous area posterior to the natural teeth. So 1 is true. A Kennedy Class 3 has a unilateral edentulous area with teeth **Anterior and Posterior** to it. A Class 4 does have a single edentulous area crossing the midline and anterior to natural teeth. Thus only the second part is true so the answer is false. You can not have **ANY** mod spaces in a Kennedy Class 4 case. So #3 is false. If a second or third molar is missing and is not to be replaced it is not considered in Applegate's rules. If to be replaced it will determine the class. Thus #4 is true. Modifications are those areas other than those that determine the classification and are designated by their number. Thus #5 is true.

SOURCE: McCracken's REMOVABLE PARTIAL DENTURES page 20-21.

11. Which of the following are true concerning resin-bonded bridge designs?

1. Contraindications would be mutually protected occlusion (with a canine guidance), more than one pontic, and bruxism.

2. A cingulum rest or an occlusal rest is needed to provide a vertical stop.

3. A single path of insertion, with parallel grooves.

4. 120° of encirclement with a centric occlusal contact only.

5. Resistance form, a shallow chamfer at a depth of .25 to .5 mm.

a. 1,2,3 are true.

b. 3,4,5 are true.

c. All are true.

d. 2,3,5 are true.

e. 1,3,5 are true.

The answer is D.

Mutually protected occlusion is not a contraindication, the notes state that it is more desirable than group function, and is only a relative contraindication. A cingulum rest or an occlusal rest is needed to provide a vertical stop, a single path of insertion with parallel grooves is also necessary. 180° of encirclement is needed with a centric occlusal contact only. And finally resistance form is needed with shallow chamfer at a depth of .25 to .5 mm.

SOURCE: CAPT Joe Rusz's lecture 13 FEB 02

12. After surveying your diagnostic casts you determine your RPD design and the necessary alterations. The design is then drawn on the cast and you are now ready to make tooth modifications. In what sequence will you follow?

- a. Heights of contour / guiding planes / rest seats / diagnostic impression**
- b. Guiding planes/ diagnostic impression / heights of contour / rest seats**
- c. Guiding planes / heights of contour / rest seats / diagnostic impression**
- d. Guiding planes/ heights of contour / diagnostic impression / rest seats**

The correct sequence for preparing teeth to serve as RPD abutments is **D. Guiding planes/ heights of contour / diagnostic impression / rest seats**

- 1.) Proximal surfaces parallel to the path of placement should be prepared to provide guiding planes.
- 2.) Axial tooth contours should be modified lowering the height of contour so that the *origin* circumferential clasps may be placed below the occlusal surface; and the retentive clasp *terminus* is located below the junction of the middle and gingival third (better esthetics and mechanical advantage); reciprocal clasps can be placed above HOC at the junction of the middle and occlusal thirds.
- 3.) Diagnostic/verification impression in irreversible hydrocolloid poured in fast set stone to re-survey and confirm adequacy of preparations. If further adjustments need to be made you will not disturb your rest seat preps
- 4.) Occlusal rest seats are always last and should be prepared in a manner that they will direct occlusal forces along the long axes of the abutment tooth

McGivney, G.P., Castleberry, D.J., *McCracken's Removable Partial Prosthodontics* 9th Edition, Mosby 1994, pages 281, 287-288.

13. The signs of Ellsworth / Kelly Combination Syndrome are:

- 1. Papillary hyperplasia**
 - 2. Maxillary tuberosity growth**
 - 3. Ridge resorption of mandibular posterior**
 - 4. Ridge resorption of anterior maxilla**
 - 5. Hyper-eruption of mandibular anterior teeth**
- A. 1, 2, 4, 5**
 - B. 2, 4, 5**
 - C. 2, 3, 4, 5**
 - D. All of the above**

Correct answer is D. All of the above

The Glossary of Prosthodontic Terms¹ defines combination syndrome as “the characteristic features that occur when an edentulous maxilla is opposed by natural mandibular anterior teeth, including loss of bone from the anterior portion of the maxillary ridge, overgrowth of the tuberosities, papillary hyperplasia of the hard palatal mucosa, extrusion of mandibular anterior teeth, and loss of alveolar bone and ridge height beneath the mandibular removable partial denture bases, *also called anterior hyperfunction syndrome.*”

In addition the following have been added as a subset to the classic signs listed above: loss of vertical dimension of occlusion, occlusal plane discrepancy, anterior spatial repositioning of the mandible, poor adaptation of the prostheses, epulis fissuratum, and periodontal changes. However, these changes are not generally associated with combination syndrome.

Palmqvist S, Carlsson GE, Owall B. The combination syndrome: a literature review. *J Prosthet Dent.* 2003 Sep;90(3):270-5.

14. When replacing a missing cuspid with an FPD, occlusion should be shared with the first bicuspid (i.e. Group function). When replacing a missing cuspid with an FPD, occlusion should remain only on the cuspid (i.e. Canine guidance)

- a. Both statements are true**
- b. Both statements are false**
- c. First statement is true, second statement is false**
- d. First statement is false, second statement is true**

Answer is C. First statement is true, second statement is false

Group function, also termed unilaterally balanced articulation, is defined as excursive contacts that occur distal to the cuspid (can include or exclude the cuspid) on the working side in laterotrusive movements without contacts on the non-working, mediotrusive side. This can be advantageous if the periodontal support of the cuspid is compromised, or non-existent in this case. Then the load is distributed and shared by directing it over an occlusal surface that has sufficient periodontal support.

Canine guidance of laterotrusive movements of the mandible results in complete disclusion of all posterior teeth. This is expanded to the “scheme” of a Mutually Protected Occlusion in which the six maxillary anterior teeth together with the six mandibular anterior teeth guide excursive movements and allow no posterior contacts to occur during lateral or protrusive movements.

Rosenstiel, Land, Fujimoto. Contemporary Fixed Prosthodontics 3rd Edition, Mosby 2001, Pages 94-97, 105

15. Post denture insertion pain – everything is sore – Why?

- 1. Over extended borders**
 - 2. Acrylic monomer allergy**
 - 2. Excessive vertical dimension of occlusion**
 - 3. Insufficient vertical dimension of occlusion**
 - 4. Occlusal prematurity**
- A. 1, 2, 3, 4**
 - B. 1, 3, 4,**
 - C. 1, 2, 3, 5**
 - D. 1, 3, 5**
 - E. 1, 3, 4, 5**

Answers: E. 1, 3, 4, 5 Over extended borders, excessive vertical dimension, insufficient vertical dimension, occlusal prematurity.

1- Over extended borders can cause: Soreness in the vestibules, sore spots from a deep posterior palatal seal, trouble swallowing, immediate gagging upon swallowing, and denture instability when out of occlusion.

2- Acrylic monomer allergy can cause: Generalized burning sensation.

3- Excessive vertical dimension of occlusion can cause: Generalized ridge soreness, immediate gagging, muscle soreness, TMJ symptoms, trouble swallowing, clicking during speech, and excessive display of teeth.

4- Insufficient vertical dimension of occlusion can cause: Angular cheilitis, muscle soreness, TMJ Symptoms, and tongue or cheek biting.

5- Occlusal prematurity can cause: Sore spots in the vestibule or on the ridges, delayed gagging upon swallowing, muscle soreness, TMJ symptoms, denture instability when in CR occlusion.

Naval Post Graduate Dental School, Complete Denture Syllabus, NDS Course #252, Troubleshooting, Pages 113-116

16. When restoring two edentulous spaces on either side of a pier abutment it is beneficial to employ a stress breaker. If you intend to restore a missing #7 and #9 with a 5 unit FPD abutted on #'s 6, 8, and 10, where would you employ the components of the stress breaker

- a. Key on distal of #9 pontic, keyway on mesial of #10 abutment
- b. Key on mesial of #7 pontic, keyway on distal of #8 abutment
- c. Key on mesial of #9 pontic, keyway on mesial of #8 abutment
- d. Key on distal of #8 abutment, keyway on mesial of #7 pontic
- e. Key on mesial of #8 abutment, keyway on mesial of #9 pontic
- f. Key on distal of #10 abutment, keyway on mesial of #9 pontic

Answer is B. Key on mesial of #7 pontic, keyway on distal of #8 abutment

A stress breaker, now referred to as a stress director, is a device or system that relieves specific dental structures of part or all of the occlusal forces and redirects those forces to other bearing structures. These can be utilized in fixed partial dentures of long spans, while spanning multiple edentulous spaces when pier abutments are used, for periodontally involved teeth.

The director is placed on the mesial of the distal pontic, behind the pier abutment. The key component of the director is always placed on the pontic so that forces of occlusion direct it to seat in the keyway component placed on the pier abutment. If the reverse were done occlusal forces would un-seat the components sliding the keyway out of the key thus making the pontic a lever arm that exerts torque on the abutment to which it is attached.

Rosenstiel, Land, Fujimoto. Contemporary Fixed Prosthodontics 3rd Edition, Mosby 2001, Page 81

Shillingburg, Hobo, Whitsett. Fundamental of Fixed Prosthodontics 2nd Edition, Quintessence Books 1981, Page 414-416

17. In respects to pontic design, order the following according to decreasing esthetics?

- a. Modified Ridge-lap, Conical, Ovate, Saddle, Sanitary**
- b. Saddle, Modified Ridge-lap, Conical, Sanitary, Ovate**
- c. Modified Ridge-lap, Ovate, Conical, Saddle, Sanitary**
- d. Ovate, Modified Ridge-lap, Saddle, Conical, Sanitary**
- e. Ovate, Modified Ridge-lap, Conical, Saddle, Sanitary**

The answer is D. Ovate, Modified Ridge-lap, Saddle, Conical, Sanitary

Sanitary or Hygienic. Recommended Location: posterior mandible. Advantage: good access for oral hygiene. Disadvantage: poor esthetics (2mm clearance between ridge and pontic). Indications: non-esthetic zones, impaired oral hygiene. Contraindications: esthetic zone, minimal VDO.

Saddle-ridge-lap. Recommended Location: none. Advantages: esthetics. Disadvantages: not amenable to oral hygiene. Indications: not recommended. Contraindications: all.

Conical. Recommended Location: molars without esthetics requirements. Advantages: good access for oral hygiene. Disadvantages: poor esthetics. Indications: posterior areas where esthetics is of minimal concern. Contraindications: poor oral hygiene.

Modified ridge-lap. Recommended Location: High esthetic requirements. Advantages: good esthetics. Disadvantages: moderately easy to clean. Indications: most areas with esthetic concerns. Contraindications: areas with minimal esthetic concern.

Ovate. Recommended Location: Maxillary incisor, cuspids, and bicuspid. Advantages: superior esthetics, negligible food entrapment, ease of cleaning. Disadvantages: requires surgical preparation. Indications: desire for optimal esthetics, high smile line.

Contraindications: unwillingness for surgery, mandibular posterior.

Rosenstiel, Land, Fujimoto. Contemporary Fixed Prosthodontics 3rd Edition, Mosby 2001, Page 520-525

18. What muscles are involved with border molding for a complete denture mandibular final impression?

- a. Buccinator, masseter, mylohyoid, palatoglossal, medial pterygoid and the superior constrictor muscle**
- b. Buccinator, masseter, mylohyoid, palatoglossal, and the genioglossus muscle**
- c. Buccinator, masseter, mylohyoid, hyoglossus and the superior constrictor muscle**
- d. Buccinator and masseter**

The answer is A

The borders of the final denture impression are determined by several muscles.

The buccal vestibule is influenced by the buccinator muscle.

The distobuccal border is determined by the actions of the masseter. The masseter contracts forcing the buccinator muscle in and decreases the space available for the denture. This action can cause it to dislodge.

The buccinator, superior constrictor, and the tendon of the temporalis influence the retromolar pad placement of the denture.

The posterior lingual border position is controlled by the mylohyoid muscle. During swallowing the muscle contracts and raises the floor of the mouth.

The superior constrictor, mylohyoid and palatoglossal, and medial pterygoid muscle can all influence the border molding in the retromylohyoid region.

The obicularis oris shapes the labial vestibule.

The maxillary denture borders are affected by the obicularis ori, buccinator, levator anguli, and the masseter..

Boucher's Prosthodontic Treatment for Edentulous Patients, Eleventh Edition. Pg 166-172

19. The only universally flexible clasp shape is the round form. Half round will flex away from the tooth.

- a. Both statements are true**
- b. Both statements are false**
- c. Statement one is true and two is false**
- d. Statement two is true and one is false**

The answer is A.

Full round clasps are able to flex in any direction. Half round is flexible in only the direction away from the tooth. The type of material the clasp is made from determines flexibility as well. Cast chromium alloys are less flexible than wrought wire. The bulk or thickness of the clasp is a factor. Gold clasps must be thicker to obtain strength so they are not as flexible as a thinner chromium clasp. A retentive arm that is tapered length wise and width wise is more flexible than one that is not. The longer the retentive arm (I-bar) the more flexible it becomes. The least flexible clasp would be a short, no taper, half round, bulky clasp.

McCracken's Removable Partial Prosthodontics, Ninth Edition, 91-93.

20. Centric relation is defined as:

- a. The position in which the condyle is in the most superior anterior position in the articular fossa with the thinnest portion of the disk between the condyle and the fossa.**
- b. The position in which the condyle is in the most superior retruded position in the articular fossa with the thinnest portion of the disk between the condyle and the fossa.**
- c. The position in which the condyle is in the most superior retruded position in the articular fossa with the thickest portion of the disk between the condyle and the fossa.**
- d. The position in which the condyle is in the most inferior retruded position in the articular fossa with the thickest portion of the disk between the condyle and the fossa.**

The answer is A.

Centric relation is the most physiologic stable and repeatable position of the condyle. This position is helpful in restoring patients that do not have a stable maximum intercuspation or no repeatable jaw relationship. The disk must be situated with the thinnest part between the condyle and the fossa.

The Academy of Prosthodontics defines it as the maxillomandibular relationship in which the condyles articulate with the thinnest avascular portion of their respective disk with the complex in the anterior-superior position against the shapes of the articular eminence. This position is independent of tooth contact. The mandible is restricted to purely rotary movement about the transverse axis.

Management of Temporomandibular disorders and occlusion, Fifth edition. Pg. 111-113.

The Academy of Prosthodontics. Glossary of Prosthodontic Terms, Journal of Prosthetic Dentistry;71:1, 1994.

21. Double abutments can be used as a means of overcoming problems created by unfavorable crown to root ratios. Since there are two abutments acting together it is not necessary for additional abutment to have as much root surface as the first abutment.

- a. Both statements are true**
- b. Both statements are false**
- c. Statement one is true and two is false**
- d. Statement two is true and one is false**

The answer is C.

Antes law indicates that the surface area of roots in bone of the abutment teeth should be equal to or greater than the teeth they are replacing with a FPD. If inadequate root surface area is present it is possible to use double abutments to compensate for this. The secondary abutment must have as much root surface area as the primary abutment tooth. The retainer of the secondary abutment tooth must be as retentive as the primary abutment. There must be sufficient space to allow for soft tissue under the connector between the primary and secondary abutment. Double abutments also help resist the lever arm that can be produced if an FPD spans around the arch; such as a FPD that replaces the four anterior teeth.

Shillingburg, Fundamentals of Fixed Prosthodontics, Third Edition, Page 93

22. Electrosurgery units will work without a grounding plate. Grounding plates are only necessary if a metal restoration might be contacted.

- a. Both statements are true**
- b. Both statements are false**
- c. Statement one is true and two is false**
- d. Statement two is true and one is false**

The answer is C.

The grounding plate also known as the indifferent plate, neutral electrode, dispersive electrode or patient return is necessary for using the unit. Electrosurgery units will work without the grounding plate but the patient is at risk of receiving a burn. Proper grounding is the single most important safety issue. It is acceptable to attach the metallic mesh grounding antenna under the upholstery insulated from all metal parts.

Fundamentals of Fixed Prosthodontics, Third Edition, 269-271

23. Lingualized occlusion uses anatomic maxillary teeth opposing mandibular monoplane teeth. Lingualized occlusion can be indicated for skeletal Class II and III patients.

- a. Both statements are true**
- b. Both statements are false**
- c. Statement one is true and two is false**
- d. Statement two is true and one is false**

The answer is A.

Lingualized occlusion is useful for patients that are difficult to reproduce an accurate CR position. This scheme gives freedom of movement and reduces interferences to protrusive movements. It is esthetic using maxillary anatomical teeth and is easy to set the teeth and develop a cross arch balanced occlusion.

1. Becker CM, Swoope CC, Guckes AD. Lingualized occlusion for removable prosthodontics. *J Prosthet Dent* 1977;38(6):601-8.
2. Clough HE, Knodle JM, Leeper SH, Pudwill ML, Taylor DT. A comparison of lingualized occlusion and monoplane occlusion in complete dentures. *J Prosthet Dent* 1983;50(2):176-9.
3. Lang BR, Razzoog ME. Lingualized integration: tooth molds and an occlusal scheme for edentulous implant patients. *Implant Dent* 1992;1(3):204-11.
4. Ohguri T, Kawano F, Ichikawa T, Matsumoto N. Influence of occlusal scheme on the pressure distribution under a complete denture. *Int J Prosthodont* 1999;12(4):353-8.

24. Which are advantages of polyether impression materials?

- a. Fast setting and good for undercuts**
- b. Fast setting, good shelf life (two years), multiple pours**
- c. Very flexible and good for deep undercuts**
- d. Slow setting with prolonged working time**

The answer is B.

Polyether is a very stiff material that is not good for undercuts. Undercuts must be blocked out. The material is rigid and dimensional stability is good. Multiple pours can be done. The shelf life for the material is about two years. It sets fast and has a short working time. Finish lines can be easily read. Polyjel, Impregum F, and Permadyne are all examples.

Polysulfides have good surface detail, flows into deep subgingival crevices, excellent tear strength, and multiple pours are possible. Disadvantages are it is not good for severe undercuts, hydrophobic, and it has a bad odor and color.

Condensation silicones are an older material that has poor dimensional stability, requires immediate pouring, hydrophobic, and produces ethyl alcohol as a by product.

Addition silicones are accurate, good for undercuts, and multiple delays pours are possible. The material is costly, and can release hydrogen gas. Palladium is used as a gas scavenger. Powder from the gloves may inhibit set of the putty.

Hydrocolloids are accurate and inexpensive, however they have low tear strength and are accurate for only one pour.

Zinc oxide eugenol will adhere to compound and acrylic, can build borders with it, hard when set, good working time, accurate, and dimensionally stable. Disadvantages are the bad taste and rigidity is not good in undercuts.

Impression compound has little to no taste, minimal mess, hard when set, and has a good working time. It cannot register fine detail and will displace soft tissue.

Fundamentals of Fixed Prosthodontics, Second edition. Pages 221-225

25. A patient with complete dentures makes tries to make “T” sounds but he makes a sound like “Th”. What is the most likely cause?

- a. Anterior palate too broad.**
- b. Inadequate interocclusal distance.**
- c. Poor retention of dentures.**
- d. Overextended maxillary posterior border.**
- e. Maxillary premolars too far mesially.**

Answer: b) Inadequate interocclusal distance

(Also caused by maxillary teeth too far lingual)

Solution: Remount, increase interocclusal distance by reducing VDO, or make new CD's.

(Or reset teeth)

- a) causes sounds like “sh”
- c) clicking during speech
- d) causes gagging
- e) causes whistling

Phonetics and the linguodental and linguopalatal sounds.

- Linguodental sounds: “Th”

1/3 (3mm) of tip of tongue extends between maxillary and mandibular anterior teeth.

If tongue does not protrude past teeth, maxillary anterior teeth are too far labial or there is excessive overlap.

If more than 6mm of tip of tongue protrudes, maxillary teeth are set too far lingually.

- Linguopalatal sounds: T & D

Tip of tongue contacts anterior part of palate or lingual side of anterior teeth.

Teeth too far lingual, “T” tends to sound like “D”.

Teeth too far labial, “D” sounds like “T”.

Denture base palate – too thick in rugae area.

Phonetics are related to:

- Speaking space.

- Denture base, “S” sounds, Rugae area, Lingual extension of mandibular denture.

- Tooth positioning, “T” and “D” sounds, “F” and “V” sounds, “S”, “J”, and “Ch” sounds.

Reference: Complete Denture Syllabus, Prosthodontic Dept, NPDS, NNDC Bethesda.

Rahn, A.O., Heartwell, C.M., Textbook of Complete Dentures, 5th Ed. 1993 Lea & Febiger. Page 330.

26. Which functions are simple hinge articulators not capable of doing?

- 1. Two dimensional movements**
- 2. Close customization of temporomandibular joint anatomy**
- 3. Reproduction of side shifts**
- 4. Accept facebow transfer**

- a. 1 only**
- b. 1,2,3**
- c. 2,3,4**
- d. 1,2,3,4**

Answer: c) 2,3,4 The hinge articulator can only perform two dimensional movements.

Articulator Classification:

- I. Simple hinge
- II. Non-adjustable
- III. Semi-adjustable
- IV. Fully-adjustable

Fully adjustable articulator (Class IV)

Refers to the reproducibility of the patient's condylar paths.

Only instruments that can produce all condylar border movements including protrusive-lateral paths can be called fully adjustable.

Accepts facebow transfer.

Simple hinge articulators (Class I)

Accepts single static record.

Barn door hinge.

Vertical motion with very limited lateral movement.

Smaller arc of closure that does not come close to actual.

Simple hinge articulators are limited only to movements a patient cannot make. Dawson also writes that they are a major cause of errors in occlusal contouring and have no value for restorative procedures or occlusal analysis.

Ref: Occlusion, Dawson. Page 206.

27. When using a kinematic facebow one should expect at least a 5mm error in recording the true hinge axis. The arbitrary facebow records an approximation of the true hinge axis by means of average measurements.

- a. First statement is true, second is false.
- b. First statement is false, second is true.
- c. Both statements are true.
- d. Both statements are false.

Answer: b) First statement is false, second is true. Kinematic facebow can determine the hinge axis to within 1mm. Arbitrary facebow uses average measurements as determined by each manufacturer.

Facebow allows for:

- Providing a method of transferring the location of the condylar axis in the skull to the articulator and relating the upper cast to the articulator.
- To record the spatial position of the maxillary arch relative to the opening and closing axis.

Facebow indications:

- Fixed Partial Dentures if posterior vertical stop is included in the FPD.
- With Centric Relation record that increases Vertical Dimension of Occlusion.
- Full mouth rehabilitation.
- When anterior guidance is deficient.
- Remount procedures.
- When VDO is changed on the articulator.

Two types of facebows:

Arbitrary and Kinematic.

- *Arbitrary facebows* are less accurate but are adequate for many routine dental procedures.
 - Relies on determination by the manufacturer of the average relationship between the true hinge axis and an easily identifiable landmark, usually the external auditory meatus.
 - Alignment may be achieved through the use of earpieces.
 - A minimum error of 5mm from the axis can be expected. This error can be worsened by the use of a thick interocclusal record.
 - The use of an anterior reference point enables the clinician to duplicate measurements made on the articulator at subsequent appointments.
 - *Kinematic facebows* are needed when it is critical to reproduce the exact opening and closing movement of the patient on the articulator.
 - When the relationship between the maxillae and the axis of rotation has been reproduced, the mandibular cast can be accurately positioned through the use of an interocclusal record.
 - The hinge axis of the mandible can be determined to within 1mm by observing the movement of kinematic facebow styluses positioned immediately lateral to the TMJ in close proximity to the skin.
 - The kinematic facebow technique is time-consuming, thus limited to extensive prosthodontics. Change in vertical dimension of occlusion may be included in this group.
- Contemporary Fixed Prosthodontics, 2nd Ed. Rosenstiel, S.F., Land, M.F., Fujimoto, J. 1995 Mosby

- 28. What is the main purpose of a cast distal extension posterior metal stop?**
- a. Provides for a more rigid RPD framework.**
 - b. Increases overall retention of the RPD to resist displacement.**
 - c. Provides a positive apical seat (tissue stop) for the RPD in function.**
 - d. Prevents bending of the distal extension framework during acrylic processing.**

Answer: d) Prevents bending of the distal extension framework during acrylic processing.

Without a cast stop the minor connector leading to the distal extension framework of an RPD is supported at only one end, the proximal end. The minor connector may bend when force is applied during packing and processing of the RPD framework.

To prevent bending of the framework, a small area at the free end of the minor connector (or distal extension) should contact the master cast. This portion of the minor connector is called a cast stop.

A cast stop is formed by removing a small square (2x2mm in surface area) from the wax up used to create the refractory cast. It is positioned on the posterior strut of the minor connector as it crosses the center of the ridge.

A thickness of at least 1mm is left between the distal extension struts and the master cast to allow for sufficient bulk of acrylic packing during processing. The cast stop helps preserve this thickness during packing. This thickness of acrylic allows for strength of material as well as room for adjustments.

It is the acrylic denture base that provides for the apical seating of the distal extension, not the cast metal stop.

Stewart's Clinical Removable Partial Prosthodontics 3rd Ed., Phoenix, R.D., Cagna, D.R., DeFreest, C.F. 2003 Quintessence Page 42

29. What all-ceramic porcelain system is strongest (in terms of flexural strength)?

- a. Traditional powder slurry ceramics**
- b. Infiltrated ceramics /slip-cast (In-Ceram)**
- c. Heat pressed ceramics (Empress)**
- d. Castable glass ceramics (Dicor)**
- e. Machinable ceramics (Cerec)**

Answer: b) Infiltrated ceramics (slip-cast)

Approximate flexural strength ranges for different ceramic systems (these vary according to tooth type position):

Porcelain fused to metal	300-500+ MPa (for comparison purposes)
Traditional slurry	80-140 MPa
Infiltrated (slip cast)	450-600 MPa
Heat pressed	140-180 MPa
Castable	120 MPa
Machinable	120-230 MPa

Traditional slurry – uses aluminous porcelain formed over platinum foil matrix.

Feldspathic porcelain placed over this core.

Infiltrated (slip cast) – aluminous porcelain, infiltrated with glass for strength. Not etchable.

Heat pressed – 40-50% leucite reinforced ingot heated and physically pressed into lost wax mold. Etchable. Feldspathic porcelain can be placed over this core.

Castable – polycrystalline glass ceramic. Processed like lost wax process.

Machinable – computer aided design and machining (CAD-CAM). Uses blocks of feldspathic or glass based ceramic and milled to fit the prepared tooth.

Adept Report Vol 5 No. 1 Summer 1995 Page 7.

Restorative Dental Materials, 11th Ed. Craig, R.G., Powers, J.M. 2002 Mosby Page 567

30. Which are advantages of screw retained implant prosthesis?

- 1. Corrections can easily be made for angular discrepancies between implant fixture and restoration.**
- 2. Can be more easily retrieved.**
- 3. Easy to obtain path of draw in multiple unit fixed partial dentures.**
- 4. Requires less total vertical space for restoration.**
 - a. 1,2**
 - b. 1,3**
 - c. 2,4**
 - d. all of the above**

Answer : c) 2,4

Cement retained

Advantages:

Simplicity and economy are plus. Angle corrections can be made to compensate for discrepancies between the implant inclination and the facial crown contour. Abutment can include an anti-rotational feature. Best for small tooth replacement. May be more esthetically pleasing and less expensive.

Disadvantages:

Require more chair time, same propensity to loosen as screw retained. If zinc phosphate, glass ionomer, or composite resin cements are used, retrieval may be very difficult. Requires more vertical space due to two part construction (Estheticone needs 6.7mm vertical space. Multi unit abutment needs 4.3mm).

Screw retained

Advantages:

Retrievability. Crown can be more easily removed for repair, soft tissue evaluation, calculus debridement, and modifications to crown. Forces are usually directed down long axis of implant, optimum esthetics more easily achieved. Less vertical space required for restoration.

Disadvantages:

Primary disadvantage is that screw may loosen in function. Screw is tightened to seat implant crown to a clamping or preload force. Screw will loosen if masticatory force is greater than the clamping force. Proximal contacts need to be checked carefully so abutment is seated properly (cement abutment does not have this problem). Access hole through occlusal table of posterior teeth may affect esthetics.

Contemporary Fixed Prosthodontics, 3rd Ed., Rosenstiel, Land, Fujimoto, 2001 Mosby.

Page 344

31. The quality of a preparation that prevents the restoration from being dislodged by the forces parallel to the path of the withdrawal is known as retention. The resistance form of tooth preparation resists the lateral and oblique forces which tend to displace the restoration by causing rotation around the gingival margin.

- a. Both statements are true.
- b. Both statements are false.
- c. The first statement is true, second statement is false.
- d. The first statement is false, second statement is true.

Answer: A

- Adequate retention and resistance depends on the following:
 - Magnitude and direction of the dislodging forces
 - Type of preparation
 - Geometry of the tooth preparation
 - Cylindrical to restrain the movement
 - Near parallel preparation.
 - Increased surface area (axial wall height)
 - Adding grooves or boxes to limit the path of withdrawal and to interfere with the rotational movement
 - Surface roughness
 - Material being cemented
 - Type of luting agent

Contemporary Fixed Prothodontics, Rosenstiel, Land & Fujimoto, 3rd Ed, 2001, p: 151-158

32. A slot is a retention groove whose length is in a horizontal plane and in dentin and a lock is a retention groove whose length is in a vertical plane and in dentin. Gingival slots are placed in 0.5 mm pulpal of the DEJ, and at least 0.5 mm in depth and 1 or more mm in length depending on the distance between vertical walls.

- a. Both statements are true.**
- b. Both statements are false.**
- c. The first statement is true, second statement is false.**
- d. The first statement is false, second statement is true.**

Answer: A

- Slot and lock retentions may be used in conjunction with pins or as an alternative to it. Lock retentions are used more in preparations with vertical walls which allow locks to oppose one another.
- Pin retention is used more in preparations with few or no vertical walls. Pins are to retain the amalgam not to increase the strength of the restorative material.
- Shorter slots provide as much resistance to horizontal forces do longer slots.
- Slots in the gingival floor may be used to provide additional retention in an extensive proximal box that has facial and lingual walls extending beyond the proximal line angles.
- Slot dimension will depend on the size of the proximal box.

REF: Sturdevant's Art and Science of Operative dentistry 4th Edition; p-503

33. Deflection of an FPD is proportional to the cube of its length. If the force on one pontic produced certain amount of deflection, the same force on a three pontics will produce eight times the distance of the deflection.

- a. True**
- b. False**

Answer: B

- According to Law of beams, for 2 Pontics= 8 times the distance, for 3 pontics= 27 times the distance.
- Edentulous span length will influence the prep design, number of abutments and the design of FPD connectors.
- Excessive flexing under occlusal loads may cause failure of a long-span FPD. It can lead to fracture of porcelain, breakage of a connector, loosening of a retainer, and unfavorable soft tissue response. All FPDs flex slightly under load, the longer the span, the greater the flexing.
- When a long-span FPD is fabricated, pontics and connectors should be made as bulky as possible to ensure maximum rigidity without compromise the gingival health. Also, the FPD material should have high strength and rigidity.

NPDS Fixed Prosthodontics Syllabus 2002. Contemporary Fixed Prosthodontics, Rosenstiel, Land & Fujimoto, 3rd Ed, 2001, p: 72-73.

34. Stress-bearing areas are recorded with least amount of pressure and selective pressure is applied to the non-stress-bearing areas.

The places with less space or relief will transmit more pressure during the impression.

- a. Both statements are true.**
- b. Both statements are false.**
- c. The first statement is true, second statement is false.**
- d. The first statement is false, second statement is true.**

Answer: D

- Selective pressure technique combines the principles of both pressure and non-pressure procedures. Non-stress-bearing areas are recorded with least amount of pressure and selective pressure is applied to the stress-bearing areas that are capable of withstand the forces of occlusion.
- The impressions are made in trays that have been selectively relieved, therefore providing more space in some areas while at the same time having areas within the trays that have less space. The places that have less space or relief will transmit more pressure during the impression. This will distribute the greater force during function to a more favorable part of the area.
- Clinical evidence seems to favor the selective pressure technique over functional/physiologic or mucostatic technique.

REF: Complete Denture Syllabus, NDS Course#252.

35. What impression material is most stable 24 hours later?

- a. Polysulfides
- b. Polyethers
- c. Addition silicones
- d. Condensation silicones

Answer: C

- Dimensional change:
Condensation silicones > Polysulfides > Polyethers > Addition silicones
- Addition silicones advantages include: accurate, good for undercut, multiple pours and delay pours. Disadvantages include: costly, some hydrophobic, powder from gloves can inhibit set of putty. Secondary reaction may produce hydrogen gas, and some brands contain Palladium as hydrogen scavenger. Not all addition silicones release hydrogen gas, it is recommended that to wait 30 minutes for the setting reaction to be complete before pouring.

Material	Consistency	Dimensional change at 24 hr (%)
Polysulfides	Low	-0.40
	Med	-0.45
	High	-0.44
Polyethers	Low	-0.23
	Med	-0.24
	High	-0.19
Addition silicones	Low	-0.15
	Med	-0.17
	High	-0.15
	Very High	-0.14
Condensation silicones	Low	-0.60
	Very High	-0.38

NPDS Fixed Prosthodontics Syllabus 2002

Restorative Dental Materials, Craig and Powers, 11th ed. 2002. p: 359

36. Which of the following statement regarding AP Rotational path RPD design are correct?

- 1) In Rotational path, one portion of the RPD is placed first, while with a conventional path of placement all rests are seated more or less simultaneously.
- 2) Adjustment of the rigid retentive component is necessary.
- 3) Minimizes number of clasps.
- 4) Tolerates error well.
- 5) May be used as substitute to a long-span anterior FPD.
- 6) Used in absence of lingual or facial undercuts in anterior abutment teeth in Kennedy class IV anterior abutment teeth.
 - a. 3, 4, 5, 6
 - b. 1, 2, 3, 5
 - c. 2, 3, 5, 6
 - d. 1, 3, 5, 6
 - e. 1, 2, 3, 6

Answer: D

- The rotational path concept cannot be reduced simply to a straight path that deviated marked from the perpendicular. While still fulfilling the requirements of support, stability and retention, proper use of the rotational path permits elimination of clasps. Therefore minimized number of clasp, reduced plaque accumulation and improved aesthetic.
- The rigid retentive components are placed or rotated into undercuts and are maintained in intimate tooth contact by their modified rests and other conventional clasp in the design. Adjustment of the rigid retentive component is difficult and little tolerance for error. Distortion of rigid retentive component is unlikely. Rigid retainer may prevent further tipping of abutment teeth contacted.
- The retentive undercuts are located in mesial and distal interproximal undercuts (0.20”) therefore often used in absence of lingual or facial undercuts.

Rotational path of placement for tooth borne partial dentures, Graziani. Handout, 2002. Removal Partial Denture Design Outline Syllabus, Krol, Jacobson, Finzen, 4th ed, 1990, p: 69-88

37. Researchers have reported that there is little association between the choice of zinc phosphate or glass ionomer cements and increased pulpal sensitivity when manufacturers' recommendations were followed.

- a. True**
- b. False**

Answer: A

- If post-cementation sensitivity is a concern, the dentist should evaluate their technique, especially to *avoid desiccation* of the prepared dentin surface.
- Use ZOE with EBA, Zinc polycarboxylate or resin modified glass ionomer, which have been reported to exhibit less post-cementation sensitivity.
- *Avoid zinc phosphate*, which cavity varnish may be necessary to decrease pulp irritation.

Contemporary Fixed Prothodontics, Rosenstiel, Land & Fujimoto, 3rd Ed, 2001, p:766-71.

Restorative Dental Materials, Craig

38. Which of the following are true regarding die spacers?

- 1. No relief space is necessary when pouring dies with Type IV stone with gypsum hardener due to the percentage of dimensional change caused by hygroscopic expansion.**
- 2. The most common die spacers are epoxy die resin.**
- 3. One may substitute proprietary paint-on liquids, such as model paint, colored nail polish, or thermoplastic polymers dissolved in volatile solvents.**
- 4. Die spacers are placed to within 1.0 mm of the preparation finish line to provide relief for the luting agent.**
 - a. 1, 2, 3**
 - b. 2, 3, 4**
 - c. 1, 3, 4**
 - d. 3, 4**

The correct answer is d. (3 and 4)

1. Is false. To produce relief space for cement, it is common to use a die spacer with a stone die.
2. Is false. Epoxy die materials are used for fabrication of the die, not as a spacer material. They are reliable with respect to dimensional change, but are slightly undersized.
3. Is true. One may substitute proprietary pain-on liquids, such as model paint, colored nail polish, or thermoplastic polymers dissolved in volatile solvents.
4. Is true. Die spacers are placed to within 1.0 mm of the preparation finish line to provide relief for the luting agent and to ensure complete searing of an otherwise precisely fitting casting.

References: Anusavice K: Philips' Science of Dental Materials, 10th Ed. WB Saunders, 1996.

39. Which of the following statements regarding the film thickness of dental luting cements includes are true?

- 1. ADA Specification No. 8 Type I states that film thickness be 100 um (maximum).**
- 2. Zinc phosphate is generally the thickest of the luting agents**
- 3. Polycarboxylate cement has one of the highest compressive strengths, but, does not meet the maximum thickness guidelines.**
- 4. Polycarboxylate cements yields a film thickness of 25 um or less due to the action of spatulation and seating with a vibratory action to reduce the viscosity.**
- 5. Glass ionomer luting cements are a type I cement with a particle size of 15 um or less.**
 - a. 3 only
 - b. 1 and 3
 - c. 1 and 2
 - d. 1, 2, 3
 - e. 4 and 5

The correct answer is e. (4 and 5)

1. is false. ADA Specification No. 8 Type I states that film thickness be 25 um (maximum).
2. is false. Zinc phosphate is generally the thinnest of the luting agents, with a thickness of 20 um.
3. is false. Polycarboxylate cement has one of the lowest compressive strengths, but, does meet the maximum thickness guidelines with a thickness rivaling zinc phosphate (21um).
4. is true. Polycarboxylate cements appear to be much more viscous than is a comparable mix of zinc phosphate cement. As the mix is classified as pseudoplastic, it undergoes thinning at an increased shear rate. Clinically, the cement yields a film thickness of 25 um or less due to the action of spatulation and seating with a vibratory action to reduce the viscosity.
5. is true. Don't confuse particle size with film thickness. GIC film thickness is more viscous than Zinc phosphate polycarboxylate cements; it has a minimum thickness of approximately 24 um.

It is important to know the **thickness of various cements**. Note the following:

Cement type	Setting time (min)	Film thickness (um)	24 hour compressive strength (Mpa)	24 hour tensile strength (Mpa)	Elastic modulus (Gpa)	Solubility in water (Wt%)	Pulp response
ANSI/ADA specification 8 (Type I)	5.0 min.	25 max.	69	na	na	0.2 max	*see note
Zinc phosphate	5.5	20	104	5.5	13.5	0.06	Moderate
ZOE (TYPE I)	4-10	25	6-28	—	—	0.04	Mild

ZOE-EBA (TYPE II)	9.5	25	55	4.1	5.0	0.05	Mild
ZOE PLUS POLYMER (TYPE II)	6-10	32	48	4.1	2.5	.08	Mild
SILICOPHOSPHATE	3.5-4	25	145	7.6	---	.4	Moderate
RESIN	2-4	<25	70-172	---	2.1-3.1	0-0.01	Moderate
POLYCARBOXYLATE	6	21	55	6.2	5.1	.06	Mild
GLASS IONOMER	7	24	86	6.2	7.3	1.25	Mild

*Note-based on comparison with silicate cement, a severe irritant

References: Anusavice K: Philips' Science of Dental Materials, 10th Ed., WB Saunders, 1996.

40. Regarding denture impressions, which of the following are true?

- 1. Definite pressure was advocated by many dentists as the best means for obtaining an ideal impression as it logically applied the same pressure as was being applied during chewing.**
- 2. The mucostatic technique embodies the idea that the interfacial surface tension was the best way to retain dentures**
- 3. The selective pressure concept embodies the principles of both pressure and mucostatic (nonpressure) procedures.**
- 4. In selective pressure technique, the non-stress bearing areas are recorded with the least amount of pressure in certain areas of the maxillae and mandible that are capable of withstanding the forces of occlusion.**
- 5. Low-fusing Impression waxes are not sufficiently accurate for a final impression.**
 - a. 1 and 3**
 - b. 1, 3, 4**
 - c. 1, 2, 3, 4**
 - d. 2 and 4**
 - e. All of the above.**

The correct answer is e. All of the above.

1. Is true. Definite pressure was advocated by many dentists, as it presumed that the occlusal loading during the impression would be the same as occlusal loading during function.
2. Is true. The mucostatic or nonpressure technique embodies the idea that the interfacial surface tension was the best way to retain dentures. Despite many advocates, it became known that the non-pressure technique could only be obtained by sacrificing the important concepts of maximum ridge coverage and border seal.
3. Is true. The selective pressure concept embodies the principles of both pressure and nonpressure procedures.
4. Is true. In selective pressure technique, the non-stress bearing areas are recorded with the least amount of pressure, and selective pressure is applied to certain areas of the maxillae and mandible that are capable of withstanding the forces of occlusion. These impression area made in trays that have been selectively relieved, therefore providing more space in some areas while at the same time having areas within the tray that have less space. The places that have less space or relief will transit more pressure during the impression. Ideally, this will then distribute a greater force during function to a more favorable part of the ridge/bone (such as the buccal shelf) and less pressure to unfavorable parts (such as sharp ridge crests or bony spicules). Clinical evidence favors the selective pressure technique.
5. Is true. Low-fusing Impression waxes are not sufficiently accurate for a final impression for complete dentures, but, are satisfactory as a corrective material for a small area and for border refining for a tray. Iowa wax or Type I ZnOE can both be used to correct minor defects.

References: Complete Denture Syllabus, NPDS, Bethesda
Rahn AL and Heartwell CM: Textbook of Complete Dentures, 5th Ed., Lea and Febiger, 1993.

41. Which one of the following is true regarding components of a removable partial denture?

- a. Major connectors should be flexible so that functional chewing forces are properly transmitted to the teeth and other tissues.**
- b. A minor connector is the unit of the partial denture that connects the parts of the prosthesis located on one side of the arch with those on the other side.**
- c. The linguoplate can in itself serve as an indirect retainer.**
- d. Each direct retainer and each occlusal rest are joined to the major connector by a minor connector.**

CORRECT ANSWER: D. is true

a. is false. Rigidity of the major connector resists flexing and torque that would be otherwise be transmitted to abutment teeth or other structures as destructive forces.

b. is false. A major connector is the unit of the partial denture that connects the parts of the prosthesis located on one side of the arch with those on the other side. It is the unit of the RPD which other all other parts are directly or indirectly attached.

c. is false. The linguoplate should be something that is added to, and not something that replaces the conventional lingual bar. The linguoplate and the continuous bar retainer should ideally have a terminal rest at each end regardless of the need for indirect retention.

Indications for a linguoplate are:

1. when the lingual frenum is high or the space available for a lingual bar is limited.
2. in class I situations in which the residual ridges have undergone excessive vertical resorption.
3. for stabilizing periodontally weakened teeth.
4. when the future replacement of one or more incisor teeth will be facilitated by the addition of retention loops to an existing linguoplate.

There are six types of mandibular major connectors. These include: lingual bar, sublingual bar, lingual bar with cingulum bar (continuous bar) retainer, cingulum bar, Linguoplate and labial bar.

There are four basic types of maxillary major connectors. These include: single palatal bar, single palatal strap (U-shaped palatal connector), anterior-posterior palatal bars, combination anterior and posterior palatal strap-type connector.

Components of a typical removable partial denture include major connector, minor connectors, rests, direct retainers, stabilizing or reciprocal components (these serve as parts of a direct retainer assembly), indirect retainers (if the prosthesis has one or more distal extension bases), and one or more bases (each one supports one or more teeth). Minor connectors arise from the major connector, and unites the major connector with other parts of the denture.

The minor connector may be continuous with some other part of the denture. An occlusal rest at one end of a linguoplate is actually the terminus of a minor connector, even though that minor connector is continuous with the linguoplate.

Also, the portion of a denture base frame that supports the clasp and the occlusal rest is a minor connector, joining the major connector with the clasp.

The portions of the framework by which the denture bases are attached are minor connectors. The minor connector serves two purposes, which are diametric in function. The first is to transfer functional stress to the abutment teeth.

Occlusal forces applied to the artificial teeth are transmitted through the base to the underlying ridge tissues if that base is primarily tissue supported.

Occlusal forces applied to the artificial teeth are also applied to the abutment teeth through occlusal rests.

This is called prosthesis-to-abutment function of the minor connector.

The second is to transfer the effect of the retainers, rests, and stabilizing components to the rest of the denture. This is abutment-to-prosthesis function of the minor connector.

References:

McGivney and Castleberry: Mc Cracken's Removable Partial Prosthodontics, 9th Ed., Mosby 1995.

42. Which of the following factors concerning retention and resistance for single unit crowns are false?

- a. Over tapering of the opposing axial walls can be corrected if a band of several millimeters of tooth structure can be prepared circumferentially with a restricted taper of approximately 6 degrees.**
- b. As taper increases, the free movement of the restoration will do so likewise, and reduce the retention.**
- c. Molar crowns are more retentive than premolar crowns of similar taper.**
- d. Typical placement for grooves in a single unit are mesial and distal.**
- e. A 7/8 crown with grooves has more retention than a complete crown with no grooves.**

E is the correct answer. It is false statement

- a. Is a true statement. Over tapering of the opposing axial walls can be corrected if a band of several millimeters of tooth structure can be prepared circumferentially with a restricted taper of approximately 6 degrees. It is probably unnecessary to further modify the preparation to compensate for the areas of excessive reduction in the occlusal third. If this is not the case, one can use an approach slightly less conservative of tooth structure such as uprighting overtapered axial walls to obtain the mechanical advantage of increased retention or using grooves, boxes, or pinholes as needed.
- b. Is a true statement. Theoretically, maximum retention is obtained if a tooth preparation has parallel walls, but, a slight convergence, or taper, is necessary in the completed preparation. As long as this taper is small, the movement of the cemented restoration will be effectively retained by the preparation and will have what is known as a limited path of withdrawal. As taper increases, the free movement of the restoration will do so likewise, and reduce the retention.
- c. Is a true statement. Crowns with long axial walls are more retentive than those with short axial walls. Molar crowns are more retentive than premolar crowns of similar taper.
Additional information: The factors influencing the resistance of cemented restorations include luting agents of the following in order of decreasing resistance: adhesive resin, glass ionomer, zinc phosphate, polycarboxylate, zinc oxide-eugenol
- d. Is a true statement. In a short or excessively tapered complete crown, resistance form is minimal because most of the buccal wall is missing. A mesiodistal groove should be placed to increase resistance form.
A 7/8 crown with grooves has less retention than a complete crown with no grooves. According to a study by Potts RG et al: J Pros Dent 43:303, 1980. The removal force for a complete crown with no grooves was 1080 N versus the 7/8 crown with grooves which required only 507 N of removal force.

References: Rosenthiel, Land and Fujimoto: Contemporary Fixed Prosthodontics, Third Ed., Mosby, 2001.

Potts RG et al: J Pros Dent 43:303, 1980.

43. Which of the following are incorrect for gypsum products?

- 1. The smaller the water: powder ratio of the original investment water mixture, the less the hygroscopic setting expansion.**
- 2. As the mixing time is reduced, the hygroscopic expansion is decreased.**
- 3. The greatest amount of hygroscopic setting expansion is observed if the immersion takes place after the initial set.**
- 4. The longer the immersion of the investment in the water bath is delayed beyond the time of the initial set of the investment; the lower is the hygroscopic expansion.**
- 5. A mixture of silica and gypsum hemihydrate results in setting expansion greater than that of the gypsum product when it is used alone.**
 - a. 1 only**
 - b. 1 and 2**
 - c. 1 and 3**
 - d. 3 and 4**
 - e. 5 only**

The correct answer is c. 1 and 3.

1. Is false. The smaller the water: powder ratio of the original investment water mixture, the greater the hygroscopic setting expansion.
2. Is true. In general, the less the W:P ratio and the longer the mixing time within practical limits, the greater is the setting expansion.
3. Is false. The greatest amount of hygroscopic setting expansion is observed if the immersion takes place before the initial set.
4. Is true. The longer the immersion of the investment in the water bath is delayed beyond the time of the initial set of the investment, the lower is the hygroscopic expansion.
5. Is true.

References:

Anusavice K: Philips' Science of Dental Materials, 10th Ed., WB Saunders, 1996.