**Endodontics**

*Endodontic Section Overview*

The Endodontic Section is a three (3) hour exam consisting of two (2) procedures on simulated teeth:

1. **Anterior Tooth Procedure:** Treat one maxillary central incisor, including access, instrumentation, and obturation.
2. **Posterior Tooth Procedure:** Access one mandibular first molar. Access on the posterior tooth must allow Grading Examiners to identify all canal orifices.

You will be given three (3) hours to complete the exam and will be allowed in the simulation lab an additional 30 minutes before the exam to set up. The Endodontic Section is a scheduled time block to which Candidates are randomly assigned. Approximately four (4) weeks prior to the exam, you will receive your schedule with your assigned time block.

WREB examines Candidates with varying educational backgrounds and schools may teach different endodontic procedures. WREB does not look for one standard procedure and scores performance according to the *Endodontic Scoring Criteria Rating Scale* at the end of this section.

**Supplies**

Acadental materials will be used for the Endodontic Section. The teeth to be used on the exam are X2 Endo™ teeth. These teeth are similar to but not exactly the same teeth available from Acadental for practice.

In the simulation lab, you will receive in a ziplock bag:

2. Your assigned teeth, (one maxillary central incisor and one mandibular first molar), mounted with Apex Putty™ and Fixing Gel™ in the appropriate sextants. There will be a secure number printed on the sextants, which will be pre-assigned to your WREB Candidate ID Number.
3. Two preoperative radiographic views for your assigned teeth (one buccal-lingual view and one proximal view).

You will need to provide:

1. The maxillary ModuPRO® Endo arch with magnetic Carrier Tray™ and three removable sextants
2. The mandibular ModuPRO® Endo arch with magnetic Carrier Tray™ and three removable sextants
3. Articulator required at some sites (check your exam site’s information)
You must bring the upper and lower carrier trays with all necessary sextants to complete the arches. Only the supplies listed in the “Site Information” will be provided by the school. You must provide all other supplies and equipment, including special equipment or mechanical files. Before entering the simulation lab, make sure you have all necessary equipment and supplies.

The “Site Information” (available at wreb.org) will have details on compatible equipment and whether you may purchase the arches through the school. Arches may be purchased directly from Acadental at acadental.com/WREB. Acadental carries segmented sextants approved for this exam. Only the supplies listed in the "Site Information" will be provided by the school. Please refer to the “Site Information” (available at wreb.org) for your exam site prior to arrival to be sure your particular typodont is compatible with their manikin setup. All six (6) sextants must be mounted in the arches during treatment.

Exam Procedure

There will be an assigned time for the Endodontic Section. You should review your exam schedule carefully when you receive notification that group assignments have been made (approximately four (4) weeks prior to the exam).

You will report to the designated simulation lab at the appointed time. You must bring your personal handpieces, burs, and anything else needed to complete preparations on simulated teeth in a simulation environment. When entering the simulation lab, make sure you are wearing your Candidate ID Badge and it is visible. As a reminder, all electronic devices, including cell phones and smart watches are prohibited in the simulation lab.

Stations have been pre-assigned and will be marked by a green numbered card. When you enter the simulation lab, see the Proctor who will give you your assigned workstation number. You must sit at the unit assigned to you and may begin setting up your unit. Once you are at your assigned unit, then you may pick up your sextants from the Proctor. It is recommended you do this after you have confirmed that you have all required instruments and materials and will not need to leave the simulation lab. After receiving the sextants, you may not leave the simulation lab without notifying the Floor Examiner. The Floor Examiner must check that the correct sextants are in the arch and mounted in the manikin prior to your leaving the simulation lab. Leaving the simulation lab without notifying the Floor Examiner will result in failure of the Endodontic Section. Do not start treatment until you have setup check approval from the Floor Examiner and you hear the start of the exam announced.

The type of radiographic equipment (conventional and/or digital) may vary site to site. The Lab Maintenance Assistant is available to answer any questions you have on how to use the equipment and should be notified of any equipment problems.

Please remember to place all syringes, files, and other sharps in the Sharps containers.
You will be allowed to enter the simulation lab at your assigned setup time. Again, you must wear your Candidate ID Badge in a visible location or you will not be allowed to enter. You are allowed a thirty (30) minute set up period prior to the start of the Endodontic Section. Use this time to make additional preoperative radiographs (if needed), arrange materials, and become familiar with the manikin setup procedure. Being prepared with all of the necessary materials will allow you to be ready to begin on time.

Remember that after you receive your sextants, if you need to leave the simulation lab, you must notify the Floor Examiner and the two (2) sextants must be mounted in the manikin. Before you leave the simulation lab, check out with the Proctor. If there are mechanical problems with your unit, you must notify the Floor Examiner immediately. **Leaving the simulation lab with sextant(s) will result in an automatic failure of the Endodontic Section.**

Once you receive your sextants, write with permanent black marker your WREB Candidate ID Number on the lingual of each sextant, making sure not to interfere with the manufacturer’s preprinted code. Place the sextants in the carrier tray to complete your arches and mount in the manikin. Complete your *Endodontic Worksheet*.

The Floor Examiner will perform a setup check and initial your *Endodontic Worksheet*. The following should be ready for the Floor Examiner:

1. The *Endodontic Worksheet* (sample pg. 76) is properly completed. Candidate ID Number and the date must be legible in the spaces provided on the worksheet.
2. The Endo arches/articulator are properly mounted in the manikin.
3. The sextants with the Candidate ID Number written on the lingual with permanent black marker.
4. The manikin in correct patient treatment position, with correct vertical dimension
5. Light on.
6. Mirror available.

Once these items are ready, notify the Floor Examiner you are ready for a setup check. The rubber dam need not be in place for the setup check. Both anterior and posterior teeth will receive a setup check at the same time.

**Do not start treatment until you have setup check approval from the Floor Examiner and the Floor Examiner has announced the start of the exam.** The Floor Examiner’s announcement will be similar to “You may now begin treatment.” Starting treatment before being authorized to begin will result in failure of the Endodontic Section. Once the announcement is made, you will have three (3) hours to complete the section.

Rubber dam placement must simulate proper placement on a patient and is required before any treatment of the tooth is begun. It must remain in place throughout the procedure. Rubber dams may be removed only for making radiographs. An identifying mark may be placed on the surface of the tooth to be treated.
Performing the access opening or filing/preparation or condensation of a canal without a rubber dam properly placed is reason for dismissal from the Endodontic Section.

The use of a diamond bur is recommended for access on the simulated teeth. Isopropyl alcohol can be used for removal of simulated pulpal tissue.

You are expected to:

1. Follow universal precautions including radiation safety
2. Work with arches mounted in proper patient head simulation
3. Work with correct placement of a rubber dam during all aspects of treatment

Violation of any of the above is grounds for dismissal and the loss of all points for the Endodontic Section.

Working on the tooth or sextant in your hand and not properly mounted, at any time during the exam, is reason for dismissal from the Endodontic Section with loss of all points for both teeth for the endodontic procedures.

You are allowed to bring this Candidate Guide into the simulation lab and refer to it during the exam. Textbooks or other informational material must not be brought into the simulation lab. No magnification other than loupes is allowed. Candidates may not assist each other; this includes critiquing another Candidate’s radiographs and/or discussion of treatment. Assistants are not permitted for this procedure.

You should inform the Floor Examiner immediately if a problem arises. For example, you should notify a Floor Examiner if there is clinic equipment malfunction/failure. Lost time due to school equipment failure may be compensated if it is more than fifteen (15) minutes from the time it is reported to the Floor Examiner. There is no compensation if time lost is less than 15 minutes or if the problem is your own equipment failure.

**Anterior Tooth Procedure**

You will perform endodontic treatment of one maxillary central incisor including access, instrumentation, and obturation.

Instrumentation technique, either mechanical or manual, is at your discretion.

If a root fractures during treatment, Grading Examiners will score no higher than a 3.00 for condensation.

Any form of gutta-percha filling technique may be used; including any warm gutta-percha or carrier based thermoplasticized gutta-percha techniques, as well as thermoplastic synthetic polymer filling material. Because the X2 Endo™ teeth use 3D printing, warm vertical obturation techniques work best at 175 degrees as opposed to 200+ degrees with natural teeth. There should be no fill coronal to the cemento-enamel junction (CEJ) in the proximal view.
You may make notes concerning treatment on the Endodontic Worksheet which you feel would be beneficial to the Grading Examiners; however, the Floor Examiner will not sign any note about treatment which he/she has not personally observed.

When making radiographs, the sextants should be removed from the arches as necessary. Only the preop and postop radiographs will be turned in. Taking excessive radiographs during the three (3) hour block consumes time and may result in late penalties. Plan accordingly.

**Posterior Tooth Procedure**

You will perform endodontic access on a mandibular first molar, provided in your Endodontic ziplock bag. Be sure that the Grading Examiners can identify the orifices of all canals. You are not required to instrument or obturate any posterior canals. Please refer to the Endodontic Scoring Criteria Rating Scale, which describes all of the criteria that will be used by Grading Examiners to score the access.

**Preoperative Radiographs**

A sphere, measuring 2.0 mm, has been embedded in the tooth sextant by the manufacturer for the exam. This sphere will be visible on the preoperative radiographs provided to you with your sextants. The sphere may be used to assist in determining/measuring the estimated working length and/or final treatment working length. The sphere can also be used to estimate the various dimensions of the pulp chamber.

**Postoperative Radiographs**

When making radiographs, the sextants should be removed from the arches. Place the sextant so the tooth to be radiographed faces the center of the radiograph head. Place the film or sensor under the sextant. If the film does not stay in place, use soft wax to secure the film or the sextant or use the OPTI-X. Further instructions on taking radiographs with either conventional film or digital may be found at acadental.com/checkmateone.

The plastic sextant is less dense than bone; therefore, exposure times may need to be reduced. Postoperative radiographs of the final treatment should be taken with rubber dam and clamp removed. The radiographs should be from the same projection as the preoperative radiographs supplied: one from a buccal projection and one from a proximal projection.

The 2.0 mm sphere must be visible on all digital radiographic images.

Your postoperative digital radiographs may be printed or submitted by saving to a specific folder in the computer, depending on the site. If you are submitting your digital radiographs by computer, the images must be stored to the appropriate template at the capture station so that all required views of each tooth fit on the monitor screen at the same time. Both postoperative images for the anterior tooth should appear on one screen and both images for the posterior tooth should appear on another. The individual images must not exceed three times the size of a conventional #2 film radiograph.
The file name for each tooth should include your Candidate ID Number, tooth number, and either “Anterior” or “Posterior.” A sample file name for an anterior tooth would be: **B160 #8 Anterior**.

Postoperative digital radiographs showing the entire tooth from incisal edge to apex.

You are responsible for submitting high-quality radiographs/images.

Postoperative radiographs validated undiagnostic by the Grading Examiners will result in a deduction from the Endodontic score. (See page 73 for “Endodontic Scoring.”) Radiographs are undiagnostic when they must be retaken to determine adequacy of treatment. If final radiographs are not submitted, there will be a deduction for each tooth.

Be familiar with the “Site Information” provided at wreb.org to determine the type of radiographic equipment that will be available in the simulation lab. Some schools will have only digital facilities, and some will have only conventional. If conventional, schools will provide either automatic or hand developers. Be prepared to use either method of developing film. You must use the developing and fixing machines provided by the school in the simulation lab. You may not leave the simulation lab to develop films or provide your own developing equipment. You may provide your own self-developing film. Neither the school nor WREB can be held responsible for the quality of radiographs. There are often lines for the radiograph machines at the end of the three (3) hour exam. **It is important that you schedule carefully or be prepared with self-developing film.**
**Completing the Section**

The finish deadline for the exam session is fixed. Candidates who report late to their assigned Endodontic session will have less than three (3) hours to complete the procedures. WREB cannot extend the time for individual Candidates.

When turning in your ziplock bag after treatment, be sure it includes:

1. Your completed *Endodontic Worksheet*
2. The two sextants with the treated teeth
3. Candidate ID Number written on the lingual with permanent black marker
4. Preoperative radiographs provided by WREB
5. Postoperative radiographs – one buccal and one proximal for each tooth:
   - If digital site with computer submission, the images must be saved in Candidate folder
   - If digital site with printed radiographs, the printed images must be included in the ziplock bag
   - If conventional site, the films, in a two-hole film mount, must be included in the ziplock bag

It is your responsibility to ensure that all of the materials listed above are turned in to the WREB Proctor. The Proctor will note your checkout time, but is not responsible for checking your materials. *Once you have left the simulation lab, you will be subject to failure of the Endodontic Section for items not turned in.*

The Simulation Floor Examiner will announce and remind Candidates still working of remaining time at intervals of 30 minutes, 15 minutes, 5 minutes, and 1 minute before the deadline; however, completing the exam and appropriately submitting everything required to the Proctor on time remains wholly the Candidate’s responsibility. Late penalties will be assessed to Candidates who exceed the three (3) hours allotted for the exam. You must have your endodontic sextants and radiographs turned in on time to avoid a late penalty. A deduction to the Endodontic score will be assessed for each five (5) minutes beyond the end of the time allowed. After 15 minutes, all points for the Endodontic Section will be lost. (See page 74 for “Late Penalties.”)

A random selection of teeth may be evaluated at the end of each exam. Any alteration or replacement of a tooth will result in failure of the entire exam and appropriate disciplinary action will be taken. Examiners may remove the teeth from the sextants to look for irregularities.

**Definitions**

The following definitions are provided to assist you in more fully understanding scoring criteria and communications with Examiners:

**Apical Perforation**: Creating a new apical foramen.

**Ledging**: An irregularity created in the canal wall during filing.
**Perforation/Major Tissue Trauma:** Any coronal or furcal perforation and/or major tissue trauma defined as gross iatrogenic damage to the simulated gingiva, adjacent teeth, or surrounding tissue resulting in significant injury to the simulated patient.

**Strip Perforation:** A perforation on the lateral side of the root caused by transporting.

**Transporting:** Changing the position of the canal by straightening the walls during filing.

**Unroofed Pulp Chamber:** The dentin that covers the chamber incisally or occlusally, in which no ledges or overhangs are visible.

**Zipping:** Transporting the apical foramen.

**Reference Material**

Other references are:


American Association of Endodontics. (Spring 2010). *Access Opening and Canal Location* Endodontics - Colleagues for Excellence. (Available online at AAE.org)
ENDODONTIC SCORING

The Endodontic Section consists of two (2) procedures on simulated teeth:

1. **Anterior Tooth Procedure**: Treat one maxillary central incisor, including access, instrumentation, and obturation.

2. **Posterior Tooth Procedure**: Access one mandibular first molar. Access on the posterior tooth must allow Grading Examiners to identify all canal orifices.

**Weighting**

Anterior Access is weighted 27%
Anterior Condensation is weighted 46%
Posterior Access is weighted 27%

The Endodontic Section is scored by three independent Grading Examiners. Grading Examiners score according to the *Endodontic Scoring Criteria Rating Scale* on page 75. The recorded score for each category is based on the median (middle) score of the three (3) scores assigned by the Grading Examiners. The median grades are then weighted and summed. The resulting score, minus any applicable score deductions, is the final score for the Endodontic Section. A score of 3.00 or higher is required to pass the Endodontic Section.

**Endodontic Onsite Retakes**

Candidates with a failing result in the Endodontics Section may have the opportunity to retake the section at the same exam site on Clinic Day 3 with no additional fees. This will be dependent on each Candidate’s scheduled sections and individual time constraints. Candidates with a validated critical error will not be allowed to retake the Endodontics Section at the exam site. Candidates attempting an onsite retake for Endodontics on Clinic Day 3 must arrive in the simulation lab no later than 7:45 a.m. Onsite retakes for Endodontics are not available on Clinic Days 1 or 2. Three (3) hours will be allotted for Endodontic retakes on Clinic Day 3. If, for any reason, the section is not retaken onsite, Candidates may retake the Endodontic Section at a different site (retake fees will apply).

<table>
<thead>
<tr>
<th>SCORE DEDUCTIONS</th>
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</thead>
<tbody>
<tr>
<td><strong>Undiagnostic Radiographs – postoperative</strong></td>
</tr>
<tr>
<td>(Validated by two or more Grading Examiners.) Radiographs are undiagnostic if they must be retaken to determine adequacy of treatment.</td>
</tr>
<tr>
<td><strong>Missing Radiographs – postoperative</strong></td>
</tr>
<tr>
<td>(Validated by two or more Grading Examiners.)</td>
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</table>
### LATE PENALTIES

Time is determined by the official WREB clock displayed in the simulation lab.

- 1 to 5 minutes late = 0.2 deduction
- 6 to 10 minutes late = 0.4 deduction
- 11 to 15 minutes late = 0.6 deduction
- 16 or more minutes late = Loss of all points for the Section

### UNUSUAL SITUATIONS

The following unusual situations result in failure of the Endodontic Section:

- Left simulation lab with sextant(s)
- Started without a setup check or before start time announced
- Repeated failure to use universal precautions
- Repeated violation of simulation protocol

### CRITICAL ERRORS

The following critical errors result in failure of the Endodontic Section and preclude an onsite retake:

- Accessed the wrong tooth
- Perforation/Major tissue trauma (validated by two or more Grading Examiners)
<table>
<thead>
<tr>
<th>ACCESS OPENING</th>
<th>5—Optimal</th>
<th>4—Appropriate</th>
<th>3—Acceptable</th>
<th>2—Inadequate</th>
<th>1—Unacceptable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outline</td>
<td>Near ideal shape, size, and location. For anterior esthetics are not affected. If crown is fractured, access is intact or outline and shape can be determined by putting pieces back together.</td>
<td>Some variation in shape, size, and/or location. May be slightly over or under extended. For incisors, minor encroachment on incisal edge, but is acceptable for apical instrumentation. If crown is fractured, access is intact or outline and shape can be determined by putting pieces back together.</td>
<td>Shape, size, and/or location are functional. May be moderately over or under extended. For anterior, minor encroachment on incisal edge is more than necessary for apical instrumentation. If crown is fractured, outline and shape can mostly be determined.</td>
<td>Improper shape, size, and/or location prevents proper instrumentation or too large (crown is compromised by excessive extension). For anterior, severe encroachment on the incisal edge inappropriate for apical instrumentation. If crown is fractured, outline and shape cannot be determined.</td>
<td>Grossly improper shape, size, or location; crown severely compromised by gross extension. For anterior, incisal edge is grossly violated, not necessary for apical instrumentation. If crown is fractured, outline and shape cannot be determined.</td>
</tr>
<tr>
<td>Access</td>
<td>No obstructions to canals. Slight over or under removal of tooth structure. Slight obstruction present.</td>
<td>Moderate over or under removal of tooth structure. Moderate obstruction present.</td>
<td>Excessive over or under removal of tooth structure (prevents proper instrumentation). Filled with gutta percha or other material preventing proper visualization of access.</td>
<td>External crown shape altered. Occlusal surface reduced. Coronal or furcal perforation.</td>
<td></td>
</tr>
<tr>
<td>Fill</td>
<td>Gutta-percha fully within root, less than or equal to 1.0 mm from apical foramen. Less than or equal to 1.0 mm of sealer extruded beyond apical foramen.</td>
<td>Gutta-percha fully within root, less than or equal to 1.5 mm from apical foramen. May have more than 1.0 mm but less than or equal to 3.0 mm of sealer extruded beyond apical foramen.</td>
<td>Gutta-percha less than or equal to 2.0 mm from apical foramen, short or long. Sealer extruded more than 3.0 mm beyond the apical foramen.</td>
<td>Gutta-percha less than or equal to 3.0 mm, short or long, from apical foramen.</td>
<td>Gutta-percha more than 3.0 mm short or long from apical foramen or none present; or an unacceptable material used.</td>
</tr>
<tr>
<td>Shape</td>
<td>Smooth and tapered from CEJ to apical foramen. Smooth and tapered, minor irregularities. Minor under or over instrumentation. Tapered with moderate irregularities. Moderate under or over instrumentation. Apex transported but less than or equal to 1.0 mm.</td>
<td>Tapered with moderate irregularities. Moderate under or over instrumentation. Apex transported greater than 1.0 mm but less than or equal to 3.0 mm.</td>
<td>Tapered with significant irregularities. Excessive over or under instrumentation. Apex transported greater than 1.0 mm or less than or equal to 3.0 mm, creating an artificial canal.</td>
<td>Root perforation due to stripping. Apex transported greater than 3.0 mm creating an artificial canal.</td>
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</tbody>
</table>

A separated file in the canal will be scored based on established WREB criteria. A root fracture can score no higher than a 3.00 for condensation.
# ENDODONTIC WORKSHEET

**Anterior Tooth #:** ____________  **Candidate ID#:** ____________  

**Posterior Tooth #:** ____________  **Date:** ____________  

## Setup Check
- [ ] Completed *Endodontic Worksheet*
- [ ] Endo arches/articulator properly mounted in the manikin
- [ ] Sextants with Candidate ID Number written on the lingual with permanent black marker
- [ ] Manikin in correct patient treatment position with correct vertical dimension
- [ ] Light on
- [ ] Mirror available

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**Floor Examiner**

<table>
<thead>
<tr>
<th>Treatment – Note to Examiners</th>
<th>Grading Examiner Initials</th>
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## Checklist of required items after treatment (in ziplock bag)

- [ ] Completed *Endodontic Worksheet*
- [ ] The two sextants with the treated teeth
- [ ] Candidate ID Number written on the lingual with permanent black marker
- [ ] Preoperative radiographs provided by WREB
- [ ] Postoperative radiographs – one buccal and one proximal for each tooth:  
  - If digital site with computer submission, the images must be saved in Candidate folder  
  - If digital site with printed radiographs, the printed images must be included in the ziplock bag  
  - If conventional site, the films, in a two-hole film mount, must be included in the ziplock bag
- [ ] Deliver ziplock bag to the WREB Proctor before leaving the simulation lab.

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