



# The Academy of Dental Learning & OSHA Training

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## Review of Basic Anatomy: Treatment of TMJ

April 2013

2 credit hours (2 CEs)

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Publication Date: April 2013

Expiration Date: March 2016

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## COURSE AND EXAMINATION INSTRUCTIONS

Click here to take  
the online test.

### 1. Review the Objectives

Objectives provide an overview of the entire course and each chapter. Read the Course Description and focus on the Learning Objectives listed.

### 2. Study the Chapters in Order

Each chapter contains information essential to understanding subsequent sections. Keep your learning 'programmed' by reviewing the materials in order.

### 3. Complete the Post-Examination Online or by Fax

After studying the course take the test. You can access the exam by clicking on the **red exam box** which is located in the upper right corner of this page and at the end of the last chapter.

Answer each question by clicking on the button corresponding to the correct answer. All questions must be answered before the test can be graded. There is no time limit on the test. You may refer back to the course at any time with the back arrow on your browser.

You may also choose to print the exam and complete it manually. If you choose this option, please FAX your answer sheet to (703) 935-2190.

### 4. Grade the Test

If you completed the test online, click on 'Grade Test'. You will then have the option to Register your name and license number or Login if you have previously registered. Finally, you will be required to provide a credit card number for secure transmission to pay the exam processing fee.

If you completed the test manually and faxed it to us, someone from our office will grade it and contact you with the results and your certificate.

A score of 70% or more is required to pass the test. If your score is less than 70%, you may try again.

### 5. Fill out the Evaluation Form

Your opinion matters! After you pass the online test our evaluation form will be displayed on-screen. Please answer the questions, enter the amount of time spent completing the entire course and post-examination, and submit the form.

### 6. CE Certificate

Your CE Certificate will be displayed for you to print for your records.

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# Head and Neck Anatomy Review in Preparation for the Diagnosis and Treatment of TMD

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## Introduction

The purpose of this course is not to dazzle you with knowledge of anatomy or to test you according to origins and insertions of muscles; rather it is to impart to you the basic information necessary for a clinician to diagnose and treat the malady of Temporomandibular Dysfunction (Myofascial Pain Dysfunction; TMJ Pathology; Occlusal disharmony; Fibromyalgia, etc.) This course is the introductory module for a discussion of TMJ pathology, and is also a stand alone course for a basic review of anatomic structures of the head and neck.

## Learning Objectives

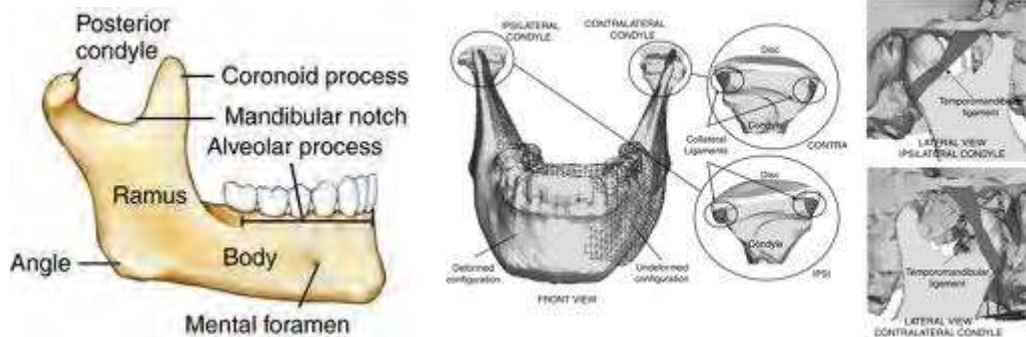
Upon completion of the course, the student will:

- Understand the basic anatomy of the head and neck
- Identify the major muscles of the head and neck
- Know the role of ligaments in head and neck anatomy.
- Identify major nerves and their pathways
- Know the implications of the anatomical structures for TMJ disease discussions in additional modules

## Osteology

### Mandible

The *Mandible* is a horseshoe like bone with a bilateral paired joint called the Temporomandibular Joints; its angles (body of the mandible) house the insertion of both the masseter muscles and Internal Pterygoid Muscles (see individual muscles below):



The mandible houses both the mandibular teeth as well as the Third Division of the Trigeminal Nerve as it enters the mandibular canal via the foramen called the lingulae.

This unique bone has a forward process dubbed the coronoid process, which tucks under the zygomatic process (temporal bone/cheek bone). The process is home to the insertion of the temporalis muscle.

### Maxillae

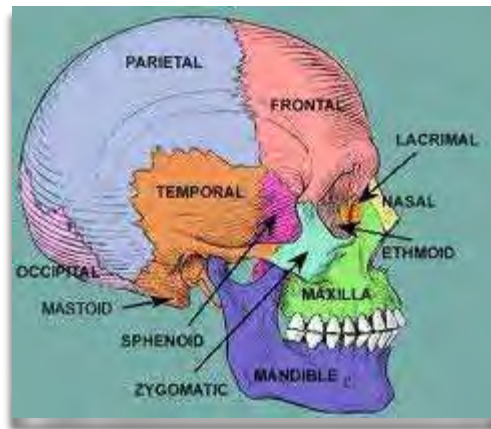
The *Maxillae* houses the maxillary teeth and the major sinus (maxillary sinus) of the head as well as the floor of the orbit.



## Temporal Bone

The *Temporal Bone* is a major bone of the skull. It resides on the side of the skull and has as its most inferior process the Styloid process. Just above and in front of this process (anterior to the ear (auditory) canal) is the glenoid fossa which in turn houses the mandibular condyle and makes up one half of the Temporomandibular Joint (TMJ).

Just in front and above this joint is a process known as the zygomatic arch (cheek bone).

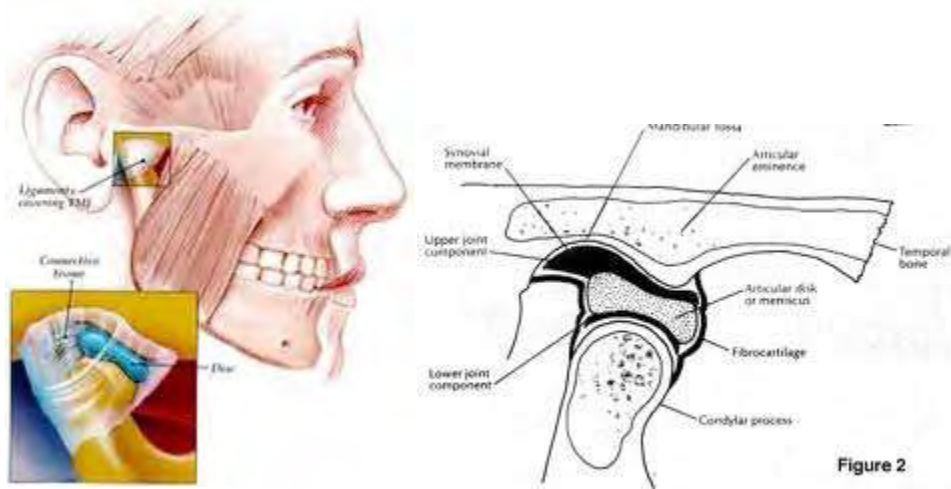


## Hyoid Bone

The hyoid bone is located in the mid-throat. It is unique in that it is the only bone in the body which does not articulate with another bone. It literally floats in the throat and acts as bracing anchor enabling the weaker opening muscles of the mandible to perform their duty (as well as aid in the swallowing process).



## Temporomandibular Joints

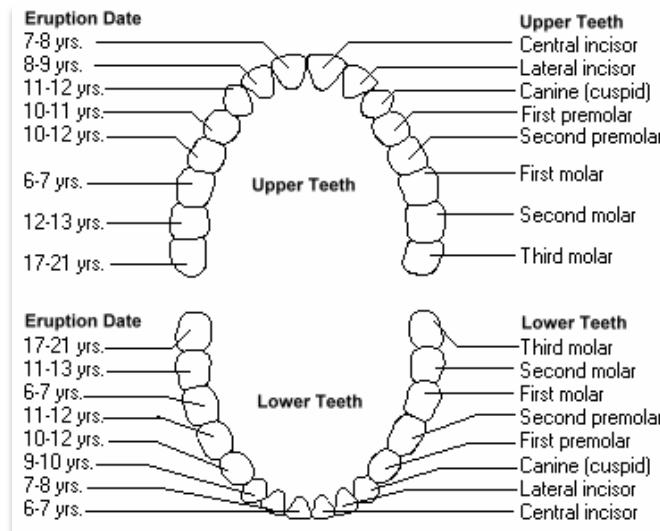


The joints are paired and oblong. They are suspended to the skull via ligaments, tendons, and muscles.

For ease of discussion we will speak of the joint as individual. It articulates with the temporal bone via a capsular ligament and is cushioned (separated) by a fibro cartilaginous disc as it articulates with the glenoid fossae of the temporal bone.

### Teeth

Teeth articulate (and thus are categorized as a joint) when the mandible closes. Their major function is to chew food, breaking it into small enough pieces to swallow and aid in digestion. The way in which the teeth articulate may enhance or be causative in Temporomandibular Joint Disease.



### Cartilage

The joint itself (glenoid fossae and head of the mandibular condyles as well as the disc) is composed mainly of tough fibrous tissue rather than elastic and smooth cartilaginous tissue found in most joints, hence the name, fibro cartilaginous joint rather than the more elastic cartilaginous (hyaline cartilage) joint.

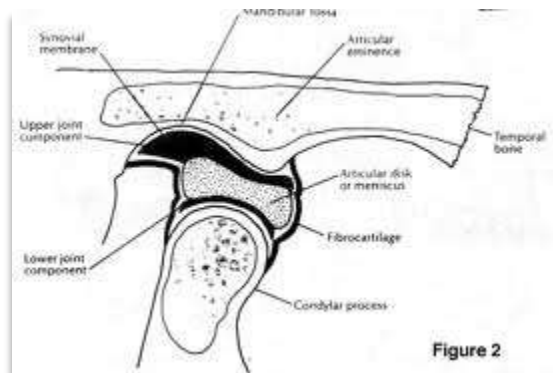
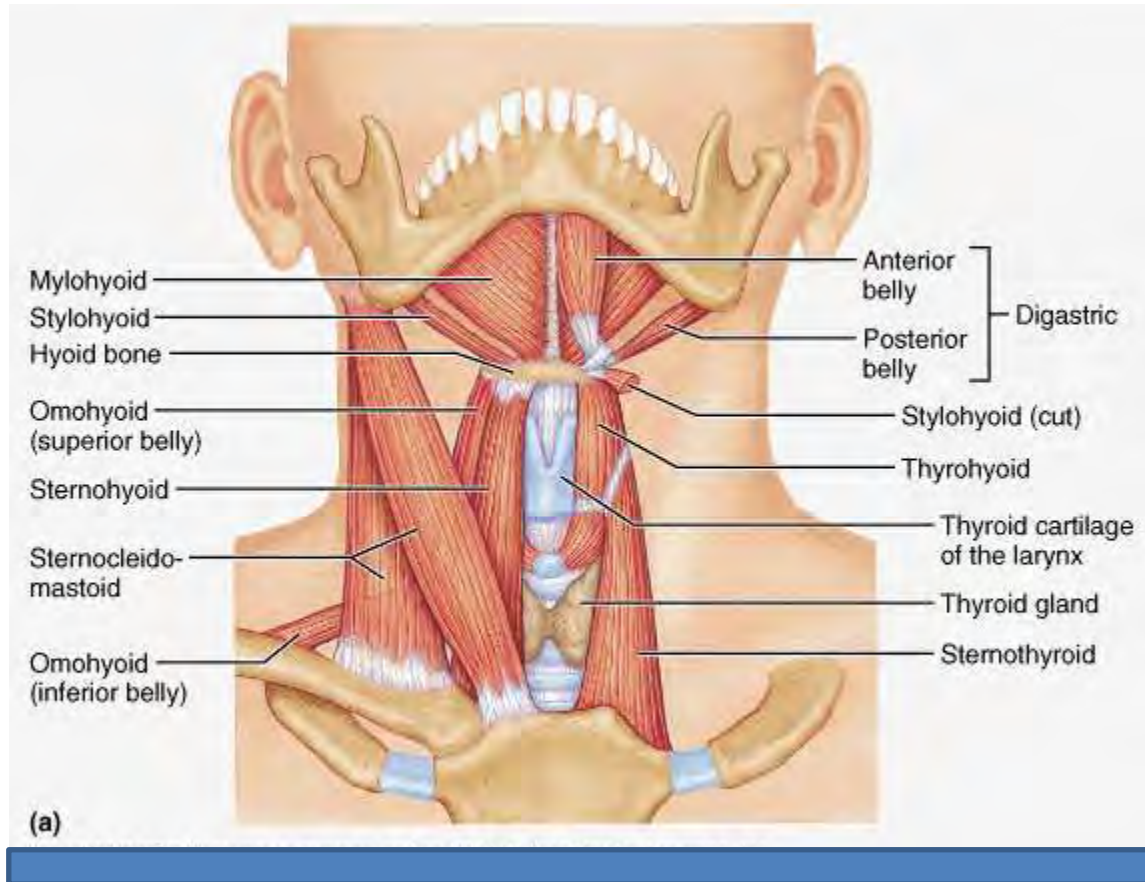


Figure 2



## Opening Muscles of the Mandible



Two muscles which originate at the lower interior portion of the mandible and insert on this bone (hyoid) are the mylohyoid & digastric. Together with the stylohyoid muscle they make up the major components of the floor of the mouth.

The shoulder gets involved with these muscles via the omoxyoid which takes a circuitous route from the hyoid to the shoulder. The thyrohyoid muscle originates at the thyroid cartilage and aids in moving the larynx as well as bracing, while the sternum gets involved with the sternohyoid originating from the sternum and inserting into the hyoid.



These muscles are much weaker than the closing musculature of the mandible.

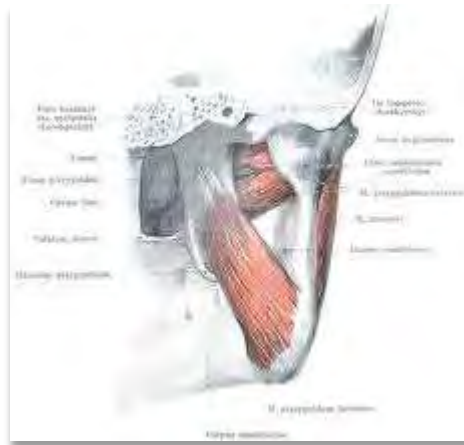
## Closing Muscles of the Mandible

### Masseter

One of the 'sling' muscle, it is the strongest of the group and functions in a straight closing action. It originates at angle of the mandible and inserts on the zygomatic process.



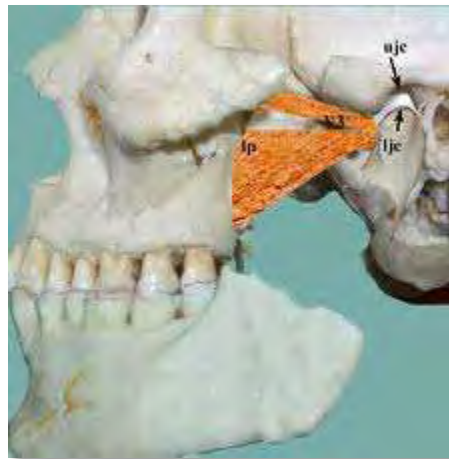
Internal Pterygoid resides opposite the masseter and completes the sling. It too functions in a straight closing action. The Internal Pterygoid originates at the internal aspect of the angle of the mandible and inserts on the Pterygoid process of the sphenoid bone.



Masseter

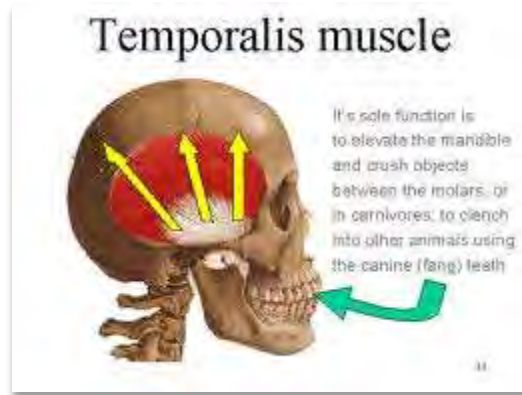
### External Pterygoid

Assists the disc and mandible to pull forward when mandible closes and moves laterally during chewing (deglutition). It originates on the pterygoid process of the sphenoid bone and inserts onto the disc (may be via a ligament) and head of the condyle. It has two bellies (superior and inferior (see above)).



### Temporalis

Assists in closing mandible; it is a powerful muscle that virtually covers the temporalis bone of the skull. As it descends it ducks under the zygomatic process and inserts onto the coronoid process of the mandible.



The long tendon insertion onto the coronoid process of the mandible is often associated with pathology.

### Sternocleidomastoid

Acts as a bracing muscle for the opening and closing of the mandible. It is a unique muscle in that it is a muscle of mastication (bracing, opening mandible), side bending (head), rotating (neck), and flexing (neck) muscle and as such is associated with more individual aspects of movement than any other muscle. It also covers and is in close proximity to the jugular vein, carotid artery, and stellate ganglion... all vital to life.

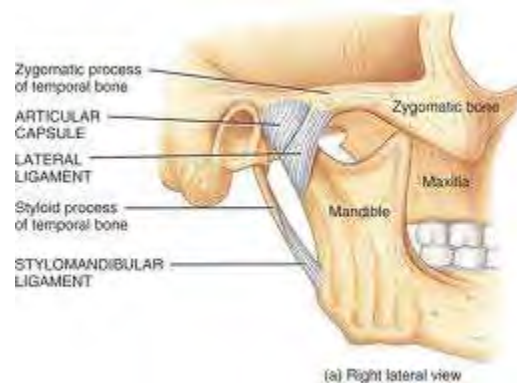


### Sternocleidomastoid

## Ligaments

Ligaments attach bone to bone and act as breaks for excessive movements. There are three ligaments which attach the mandible to the skull. They are: *stylomandibular ligament*, *spenomandibular* ligament; and the *articular or capsular ligament*.

The other major ligament residing in the area is *the stylohyoid ligament*.

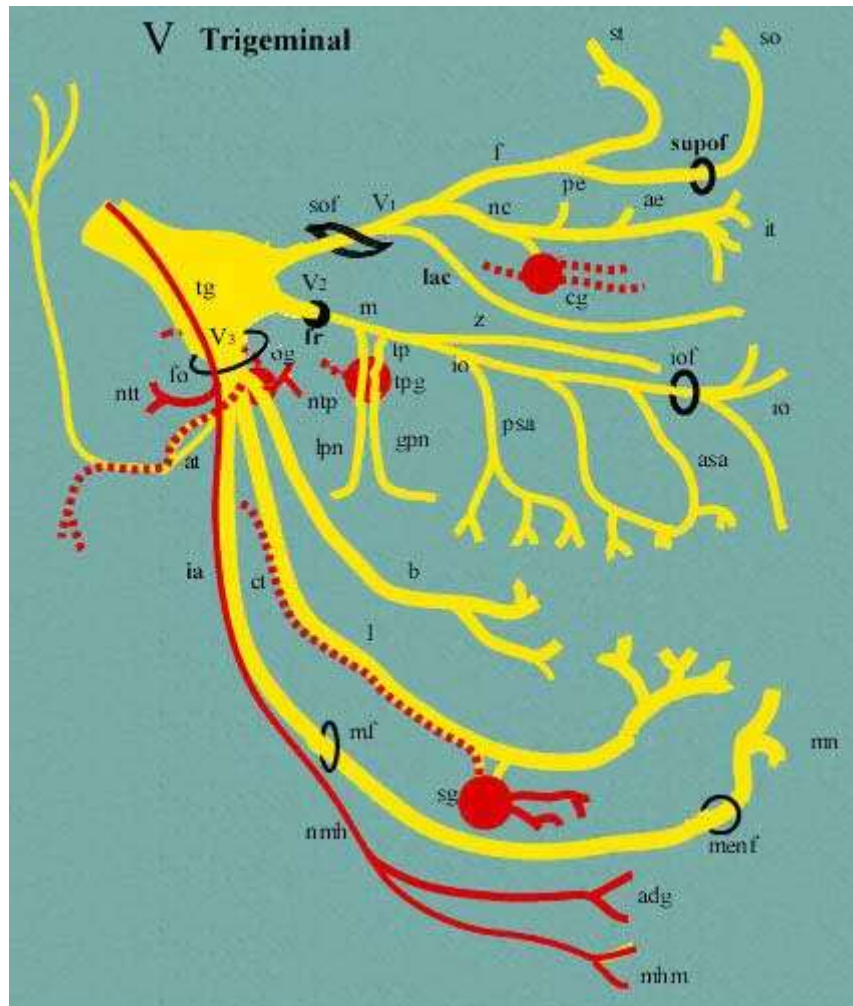
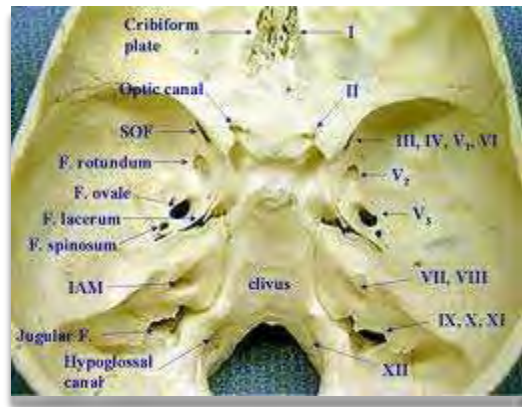


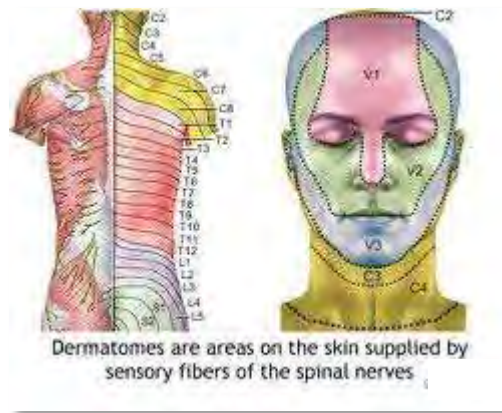
## Neurology

The Trigeminal Nerve is the fifth cranial nerve (nerve which originates in the brain instead of first synapsing in the spinal cord). It is a sensory nerve (carries message from stimulus to the brain).

After it exits the base of the brain it separates and leaves the skull via the foramen (see below). The three major branches of the Trigeminal Nerve are: the Ophthalmic V1 (upper face; superior orbital fissure), the Maxillary V2 (mid face, foramen rotundum), and the Mandibular V3 (lower face, foramen ovale).

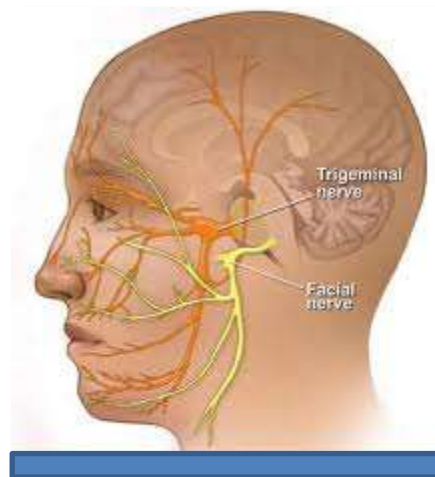
The first major nerve to branch from the V3 is the Auriculo-temporal nerve. It innervates the TMJ as well as the other structures in the area (pterygoid region). As the mandibular branch readies itself to enter the mandible via the lingulae (spot where dentists access to give mandibular block) it sends a separate branch to innervate the tongue (lingual nerve).





### Facial Nerve (VII)

The Seventh Cranial Nerve is a mainly a motor nerve (carries the impulse from the brain to the muscle) and is responsible for all facial movement and expression. It exits the brain behind the ear (internal acoustic meatus) and after two tight turns within the skull (facial canal) it exits via the stylomastoid foramen. After it passes through the parotid salivary gland (but not innervating it) it divides into five branches: Temporal; Zygomatic; Buccal; Masseter; Cervical.



### Conclusion

There you have it... dental anatomy in its most basic form, broken up as to its structures: bone, cartilage, joints, etc. This is no way is this meant to be a comprehensive course, but one meaningful and practical to the clinician as a review of the major anatomical features of the head and neck—to prepare for a discussion of TMJ / Disease in other study modules.

## Examination – Basic Anatomy Review for TMJ Treatment

1. The major bones involved with the TMJ are:
  - a. temporal
  - b. mandible
  - c. hyoid
  - d. Maxillae
  - e. A, B, C
  
2. The Mandible articulates with:
  - a. the coronoid process
  - b. the maxillae
  - c. the temporal bone
  
3. The Temporal Muscle inserts on the Coronoid Process of the Mandible via a:
  - a. tendon
  - b. ligament
  
4. The mandible is articulated with the skull via:
  - a. ligaments
  - b. tendons
  - c. A & B
  
5. The Hyoid Bone is unique in that it:
  - a. does not articulate with any other bone
  - b. is made mostly of fibrous tissue
  - c. stabilizes the sternocleidomastoid muscle
  - d. is mainly involved with closing the mandible



6. The TMJ is separated from the skull via cartilagino-fibrous disc
  - a. True
  - b. False
  
7. The only other joint with the make-up of the TMJ Disc is the
  - a. Knee
  - b. Glenoid Fossae
  - c. Shoulder
  - d. Sternoclavicular joint
  
8. The muscle which boasts the most individual movements is:
  - a. Masseter
  - b. Temporalis
  - c. External Pterygoid
  - d. Sternocleidomastoid
  
9. The closing muscles of the mandible are:
  - a. Internal Pterygoid and Temporalis
  - b. Masseter and External Pterygoid
  - c. All of the Above
  
10. Teeth cannot affect the wellbeing of the TMJ.
  - a. True
  - b. False
  
11. The main purpose of teeth is to aid in the closing of the mandible.
  - a. True
  - b. False
  
12. The main function of the External Pterygoid Muscle is to:
  - a. Close the mandible
  - b. Guide the disc over the Hyoid Bone
  - c. Guide the disc over the glenoid fossae

13. Ligaments attach bone to muscle.
  - a. True
  - b. False
  
14. There are three major ligaments attaching the mandible to the skull.
  - a. True
  - b. False
  
15. The Capsular ligament attaches the mandible to:
  - a. Hyoid Bone
  - b. Temporal Bone
  - c. Maxillae
  
16. A sensory nerve carries stimuli away from the CNS.
  - a. True
  - b. False
  
17. The Facial Nerve is a Sensory Nerve.
  - a. True
  - b. False
  
18. The Trigeminal Nerve has five major branches.
  - a. True
  - b. False
  
19. The mandibular branch of the Trigeminal Nerve breaks into three branches before it enters the mandible.
  - a. True
  - b. False



20. The \_\_\_\_\_ nerve innervates the TMJ.
- a. Temporal Nerve
  - b. Lingual Nerve
  - c. Maxillary Nerve
  - d. Auriculo-temporal Nerve

## FAX ANSWER SHEET (703) 935-2190

### Basic Anatomy Review: Treatment of TMJ

Please complete and **fax this form only** to (703) 935-2190. Be sure to include the name of the course you are submitting answers for. Please print your answers clearly.

**Name:** \_\_\_\_\_ **Profession:** \_\_\_\_\_

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Please print the corresponding letter for each answer below:

- |          |           |           |           |       |       |
|----------|-----------|-----------|-----------|-------|-------|
| 1. _____ | 6. _____  | 11. _____ | 16. _____ |       |       |
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| 5. _____ | 10. _____ | 15. _____ | 20. _____ | _____ | _____ |

**Please help us improve by circling the appropriate answer.**

Ordering experience was convenient. Yes No

I received my workbook or file in a timely manner. Yes No

Course text and test is clear and understandable. Yes No

I will use the course information in my daily practice. Yes No

Overall, I would give this course a grade of \_\_\_\_\_.

Comments:

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**Fax completed exam to: 703-935-2190**