Musculoskeletal Workbook



Introduction

**This workbook is designed to guide your learning in understanding the basics of the musculoskeletal system and prepare you for the PHYM003 module in Semester 1.**

**The resources provided in your learning set will support completion of the workbook as well as the recommended reading list text. These resources are a starting point and there is an expectation that you will find your own resources to support completion of the workbook.**

**Online resources to help guide you through this workbook:**

* **Gray’s Anatomy online, free resource:** [**https://www.bartleby.com/107/**](https://www.bartleby.com/107/)
* **Anatomy online resources,** **videos, and descriptions:** [**https://teachmemedicine.org/musculoskeletal-system**](https://teachmemedicine.org/musculoskeletal-system)
* **Physiopedia: a lot of online free resources to immerse yourself in:** [**https://physio-pedia.com/home/**](https://physio-pedia.com/home/)

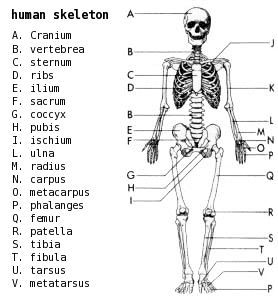
Anatomy and Physiology of the Skeleton

See videos on ***Introduction to the Bones and Skeleton***

[Video of: Introduction to the Bones and Skeleton
https://www.youtube.com/watch?v=2vESqp8mL5I](https://www.youtube.com/watch?v=2vESqp8mL5I)

[Video - On bone structures
https://www.youtube.com/watch?v=f-FF7Qigd3U](https://www.youtube.com/watch?v=f-FF7Qigd3U)

1. Label the below diagram



|  |  |
| --- | --- |
| a) | l) |
| b) | m) |
| c) | n) |
| d) | o) |
| e) | p) |
| f) | q) |
| g) | r) |
| h) | s) |
| i) | t) |
| j) | u) |
| k) | v) |

1. What are the five functions of the skeletal system?

|  |
| --- |
| 1) |
| 2) |
| 3) |
| 4) |
| 5) |

1. Give 3 examples of the following types of bone?

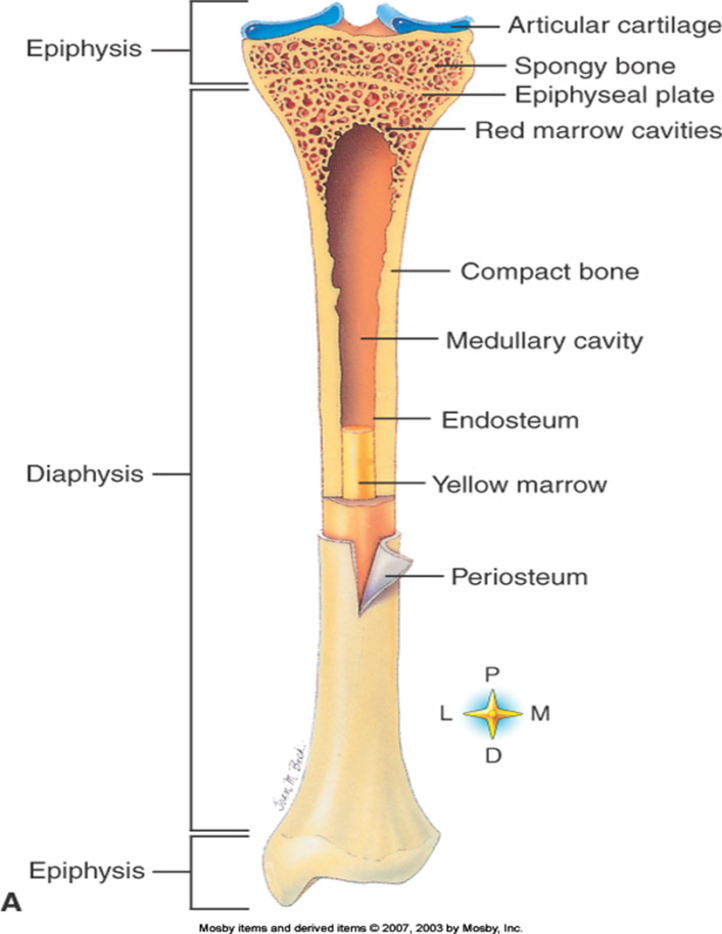
|  |  |
| --- | --- |
| 1. **Long Bone** |  |
| 1. **Short Bone Flat Bone** |  |
| 1. **Irregular Bone** |  |
| 1. **Sesamoid Bone** |  |

1. Below is a diagram of the Haversian System. diagram of the Haversian System

Describe what the Haversian System is and what are its functions:

1. Below is an example of a long bone.

****

Provide an explanation for each part.

|  |  |
| --- | --- |
| 1. Epiphysis |  |
| 1. Diaphysis |  |
| 1. Periosteum |  |
| 1. Spongy bone |  |
| 1. Epiphyseal plate |  |
| 1. Red Marrow |  |
| 1. Compact bone |  |
| 1. Medullary cavity |  |
| 1. Endosteum |  |
| 1. Yellow Marrow |  |

Bone Development and Aging:

1. Define the following terms

|  |  |
| --- | --- |
| 1. Ossification |  |
| 1. Intramembranous Ossification |  |
| 1. Endochondral Ossification |  |
| 1. Osteoclasts |  |
| 1. Osteoblasts |  |

1. Write a short summary of the key changes that occur to our musculoskeletal system as we age.

Fractures

1. Provide a definition of a fracture



1. Symptoms of a fracture include:



1. Define the following types of fractures:

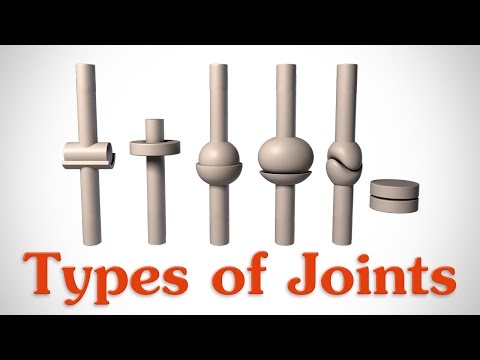
|  |  |
| --- | --- |
| a) Closed/ Simple Fracture |  |
| b) Open/ Compound Fracture |  |
| b) Comminuted Fracture |  |
| d) Impacted Fracture |  |
| e) Greenstick Fracture |  |
| f) Stress Fracture |  |
| g) Avulsion Fracture |  |
| h) Transverse Fracture |  |
| i) Complicated Fracture |  |
| j) Pathological Fracture |  |

1. There are five stages of fracture healing as highlighted below, discuss what occurs in each stage

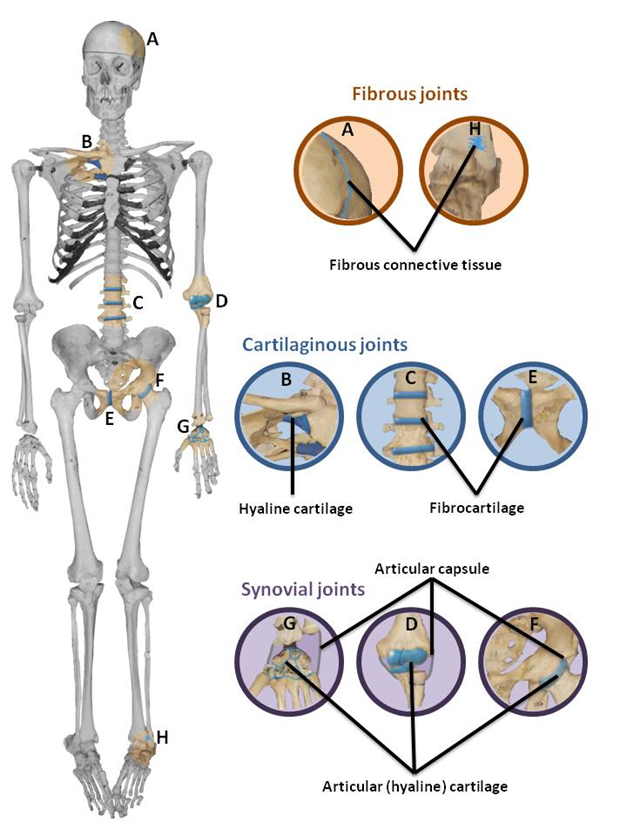
|  |  |
| --- | --- |
| 1. Tissue destruction and haematoma formation |  |
| 1. Inflammation and cellular proliferation |  |
| 1. Callus formation |  |
| 1. Consolidation |  |
| 1. Remodeling |  |

Joints

Watch video on ***Introduction to Joints***

[](https://www.youtube.com/embed/0cYal_hitz4?feature=oembed)

**Joints can be classified by their structure and** **by the way they move.**

1. In the below diagram you can see that the classification of joints in relation to structure can be divided into 3. Define these terms 

|  |  |
| --- | --- |
| **Type of Joint** | Definition |
| **Fibrous joints** |  |
| **Cartilaginous joints** |  |
| **Synovial joints** |  |

1. Below is a diagram of a synovial joint, complete the table

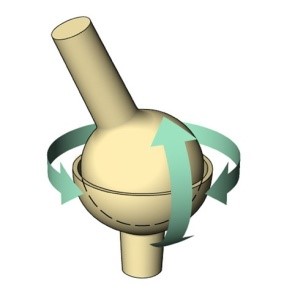


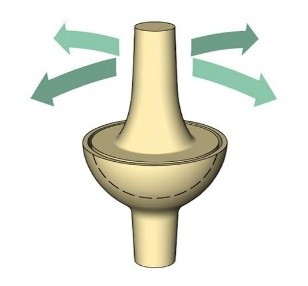
|  |  |
| --- | --- |
| **Structure** | **Function** |
| **Cartilage** |  |
| **Synovial membrane/ lining** |  |
| **Ligaments** |  |
| **Tendons** |  |
| **Bursas** |  |
| **Synovial Fluid** |  |
| **Muscle** |  |
| **Nerves** |  |

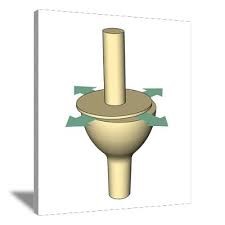
1. The classification of joints in relation to movement can be divided into 3 which are as follows:

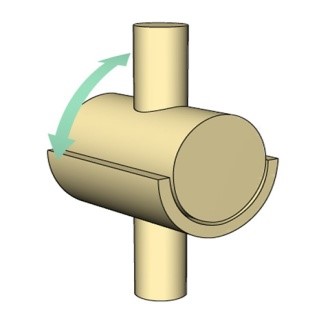
|  |  |
| --- | --- |
| **Type** | **Definition** |
| **Synarthroses** |  |
| **Amphiarthroses** |  |
| **Diarthroses** |  |

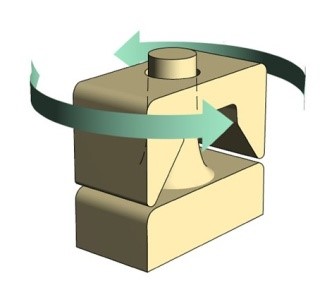
1. The following diagrams represent different types of Synovial (Diarthrosis) Joints:
   1. Identify what type of joint each is
   2. Give an example of such a joint in the human body

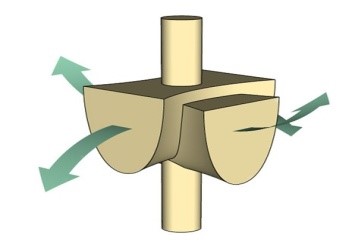
 



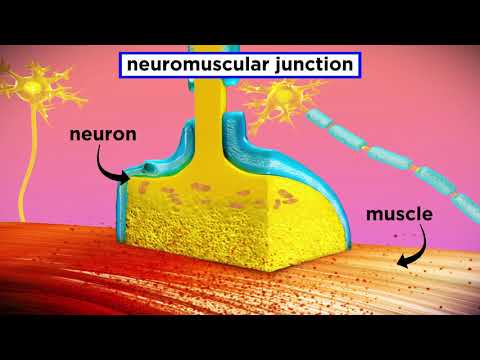
 

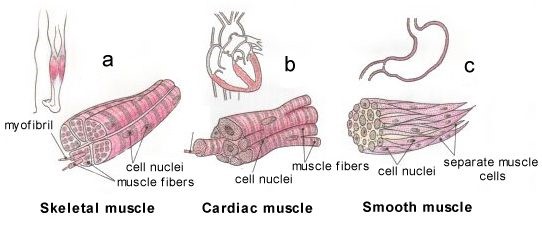
 

Muscles

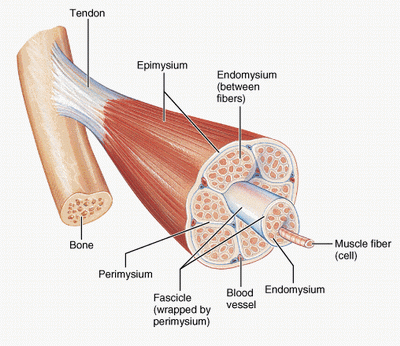
Watch videos on ***Muscular System*** and ***Types of Muscle Contraction***

[](https://www.youtube.com/embed/NfEJUPnqxk0?feature=oembed)

There are 3 types of muscle tissue, skeletal (striated), cardiac and smooth muscle as can be seen in the below diagram. The focus for this section is skeletal muscle.



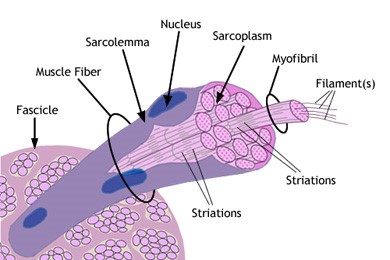
1. The diagram below shows the structure of skeletal muscle.



Define the following terms:

|  |  |
| --- | --- |
| **Structure** | **Definition and Function** |
| **Perimysium** |  |
| **Fascicle** |  |
| **Endomysium** |  |
| **Epimysium** |  |

1. The below diagram shows the structure of a muscle fibre

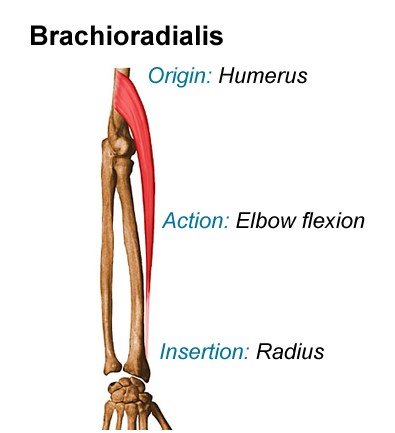


Define the following terms:

|  |  |
| --- | --- |
| **Structure** | **Definition and Function** |
| **Sarcolemma** |  |
| **Sacroplasm** |  |
| **Myofibril** |  |

1. Muscles are often said to have an origin at one end and an insertion at the other. The origin (the one that moves least on contraction) is often proximal, the insertion distal. Often a muscle arises from more than one place: it is then said to have two or more heads (biceps, triceps).

An example of a muscle’s origin and insertion can be seen below.



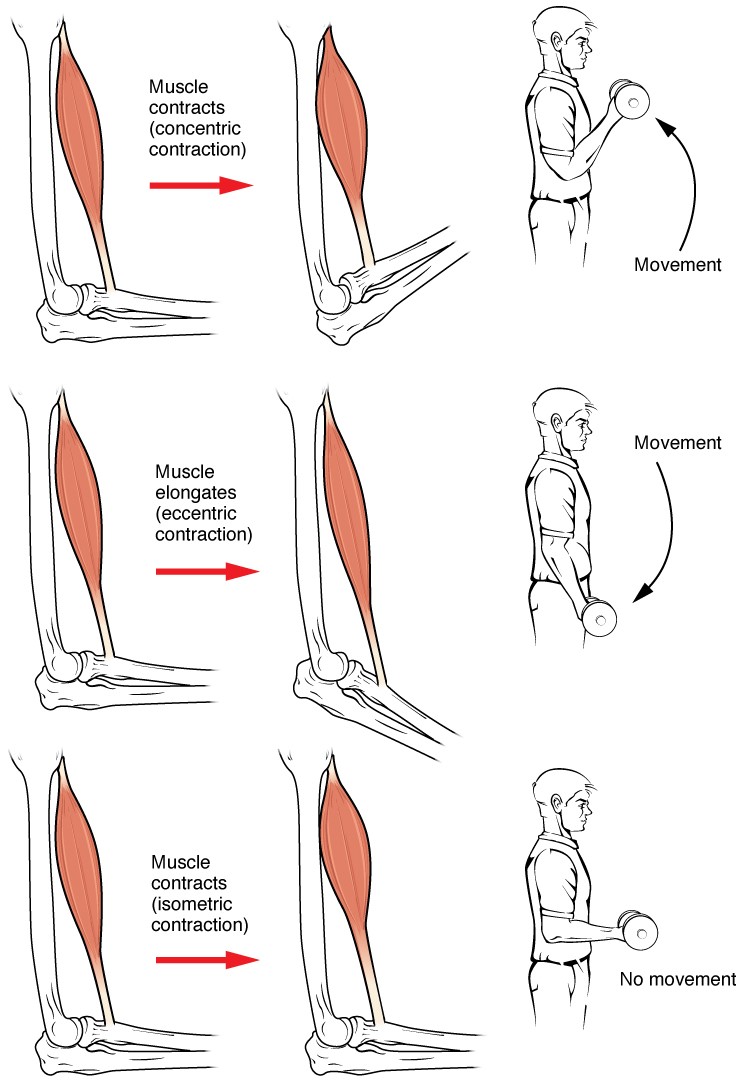
Identify the following muscles' origins, insertions, and the actions they produce:

|  |  |  |  |
| --- | --- | --- | --- |
| **Muscle** | **Origin** | **Insertion** | **Action** |
| **Rectus Femoris** |  |  |  |
| **Soleus** |  |  |  |
| **Pronator teres** |  |  |  |
| **Palmaris longus** |  |  |  |
| **Gluteus Medius** |  |  |  |
| **Infraspinatus** |  |  |  |
| **Piriformis** |  |  |  |
| **Biceps femoris** |  |  |  |
| **Brachioradialis** |  |  |  |
| **Internal Oblique** |  |  |  |
| **Quadratus lumborum** |  |  |  |

1. The following diagram represents different types of muscle contraction.

In the table:

1. Define the types of muscle contraction
2. Find one scientific publication discussing the role of each type of contraction
3. Summarise the findings of the above reference



|  |  |  |  |
| --- | --- | --- | --- |
| **Type** | **Definition** | **Reference** | **Summary** |
| **Isotonic** |  |  |  |
| **Concentric** |  |  |  |
| **Eccentric** |  |  |  |