Unit 1

THE MUSCULOSKELETAL SYSTEM

A. Warm-up

A. In pairs or small groups answer the questions below.

1. What do we need the musculoskeletal system for?
2. What structural elements of the musculoskeletal system help us to do it?
3. What other systems does the musculoskeletal system cooperate with, how and what for?

B. Compare and discuss your answers with other pairs in your group to sum up your "shared knowledge".

Vocabulary

musculoskeletal system układ mięśniowo-szkieletowy

B. Reading and Vocabulary Building

Task 1

Study the musculoskeletal system anatomy related vocabulary. For each fragment complete the text with the words given in the boxes and then answer the question(s).

PART ONE

blood • shape • locomotor • internal organs • stability • form • minerals • movement

The musculoskeletal system (also referred to as the .... system) is an organ system which performs a number of important functions. The latter include giving .... and .... to the human body, supporting and protecting .... and tissues, providing for .... and .... of the human body, producing .... for the body and storing ....

What are the five functions of the locomotor system?

PART TWO

bones • ligaments • cartilage • musculoskeletal • muscles • structure • site • tendons • tissue • firm • allow • joints

The .... system is made up of bones, ..., cartilage, ..., ligaments and joints accompanied by other connective .... Bones are connected to other .... and muscles by means of tendons and .... While bones provide a .... and concrete .... to the body, muscles keep bones in place and .... for their movement. The latter is possible thanks to the fact that individual bones are connected by .... while friction on the .... of bone junction is prevented, among others, by a layer of ....

1. What holds bones to one another? What holds bones to muscles?
2. What is the difference in the function between bones and muscles?

PART THREE

trunk • extremities • skeletal • axial • skeleton • complex

Vocabulary

referred to nazywany
shape kształt
give shape to sth nadać czemuś kształt
perform spełniać, wykonywać
support wspierać, podtrzymywać
protect chronić
tissue tkanka
provide for sth zapewnić coś
movement ruch
store magazynować, przechowywać
be made up of sth składać się, być zbudowanym z czegoś
muscle mięsień
ligament więzadło
tendon ścięgno
cartilage chrząstka
be connected to sth być połączonym z czymś
by means of sth za pomocą (czegoś)
provide zapewniać, dawać, zabezpieczać
thanks to the fact that ... dzięki temu, że ...
while natomiast, podczas gdy
friction tarcie
on the site of sth na miejscu czegoś
prevent zapobiec, powstrzymać
layer warstwa

The .... system of the human body is a .... structure divided for practical purposes into the .... skeleton and the appendicular .... The former comprises the bones of the head and the .... while the latter – the bones of the limbs or ....

What is the structure of the appendicular and axial skeleton?

PART FOUR

intercostal • cartilage • fused • smooth • voluntary • joints • digestive • tendons • respiration • conscious • skeletal • cardiac

There are five types of **bones:** long bones, short bones, flat bones, irregular bones and sesamoid bones. Both individual bones and .... bones are supported by ligaments, ..., muscles and ....

There are three types of **muscles**: cardiac, skeletal and smooth. Some of them are ...., i.e. controlled by our will, whereas others involuntary, i.e. we have no .... control over them. .... muscles are involuntary muscles found solely in the heart. They are responsible for the circulation of blood. .... muscles are in their majority voluntary. They are attached to bones and arranged in opposing groups around .... Involuntary skeletal muscles are the muscles responsible for .... – the diaphragm and the .... muscles. .... muscles form the lining of many organs, including the organs of the .... tract and the respiratory tract.

1. How many types of bones and muscles do you remember? How do the location and function of smooth, cardiac and skeletal muscles compare?
2. What is the typical structure of a skeletal muscle?
3. What organs in the body contain smooth muscle tissue?
4. Can you give an example of a skeletal muscle that is involuntary?

PART FIVE

heads • bones • muscle • surfaces • joints • movement • cavity • origin • mobility • skull • bands • spine • stretch • connective • fluid

Tendons are tough, flexible .... of fibrous .... tissue that connect muscles to .... They bind to the periosteum of individual bones at the .... and insertion of the .... Tendons can .... substantially and can thus act as a sort of spring at the time of ....

Joints (also referred to as **articulations**) are complex structures that connect bones and allow them to move against each other thus making movement possible. There are two types of joints: *diarthroses* that provide for extensive .... of articular .... and *synarthroses* or false .... (mostly fibrous), also referred to as sutures (found in the ....) that allow little or no movement. Intervertebral disks of the .... are typical slightly movable joints. The joints found in places where a great deal of movement is required are *synovial joints* equipped with a synovial .... filled with synovial .... and cartilage covered .... to make movement smoother.

1. What are the functions of different types of muscles?
2. What connective tissue structure connects bones to muscles?
3. What terms are used to designate the less and more movable attachment of a muscle?
4. What is the name of the membrane that covers a bone?
5. What is the role of tendons?
6. What is another name for a joint? What are the three types of joints? How do synovial joints differ from the other two kinds of joints?
7. What is the function of synovial fluid?
8. Can you give an example of an immovable and slightly movable joint?
9. Can you give an example of a structure more flexible than a bone?

PART SIX

filled • surround • provide • limits • cause • let • connect • prevent • lined

Ligaments are small bands of dense, white, fibrous, elastic tissue that .... the ends of bones together to .... them form a joint. Their elasticity........ dislocation by preventing certain movements which may .... fractures. They also .... to some extent movements involving hyperextension and hyperflexion.

A bursa is a small sac made of white fibrous tissue, ... with a synovial membrane and .... with synovial fluid. Its function is to .... a buffer between bones, tendons and muscles around a joint. **Bursae** .... almost all major joints of the body.

What connective tissue structure connects one bone to another?
What is the role of ligaments in prevention of some musculoskeletal injuries?
Where in the body can you find bursae and what is their major function?

Task 2

Decide whether the following statements are true (T) or false (F). Correct the false ones and expand on the correct ones. In a conversation with your neighbour justify your choice in the context of the text read.

1. The musculoskeletal system has one major function.
2. The musculoskeletal system is integrated with other systems.
3. All the components of the musculoskeletal system are necessary to ensure body movement.
4. The division of the human skeleton into two parts is well justified.
5. All bones are the same for obvious reasons.
6. All vitally important muscles are controlled by our will.
7. All joints must be and are fully mobile.

8. Movement and elasticity are important but within certain limits.
9. Where there is movement, there must be friction.
10. Blood cells are formed in red bone marrow.

C. More Vocabulary Work

Study the musculoskeletal system physiology related vocabulary given on the margin.

Task 3

Complete the text with the vocabulary given below and answer the questions after each part of the text.

PART ONE

arranged • differ • made • called • lies • give • found • composed • looks • contains (2) • is

Bones are .... primarily of bone tissue that is .... of bone cells known as osteocytes embedded in a hard substance called matrix. The matrix .... calcium salts and collagen fibres, the former .... bone its strength while the latter are responsible for its flexibility. In compact bone the tissue are .... in circular layers around a blood vessel whereas in spongy bone it .... like a sponge with blood vessels located in its holes. Both types of bone can be .... in every bone of the human body but their arrangement can .... In a flat bone a layer of spongy bone .... between two layers of compact bone. In a long bone the compact bone ...... on the outside surrounding the spongy bone which is on the inside. In addition, a long bone .... in its innermost part a hollow cavity .... the marrow cavity.

1. What is the relation between osteocytes and matrix?
2. What properties do collagen fibres and calcium salts give to the bone matrix?
3. What is the difference between compact bone and spongy bone?
4. Is the arrangement of compact and spongy bone the same in all types of bones?
5. Where can a marrow cavity be found?

PART TWO

removed • secreted (2) • get • making • becomes • release • mature • covered • move • controlled • storing • stored

There are two types of bone marrow: red bone marrow responsible for .... red blood cells and yellow bone marrow responsible for .... fat. From red bone marrow immature blood cells .... into the blood vessels to .... in other parts of the body. The fat stored in yellow bone marrow is one of the two reserve sources of energy, the other being the bone matrix with its storage of calcium. Basically, muscles and nerves .... calcium from the blood-stream but if there is not enough calcium in the blood, its shortage can be .... by calcium released from bones. The homeostasis of calcium is .... by two hormones – calcitonin, ... by the thyroid gland in response to an excessive amount of calcium in the blood and causing extra calcium to be .... from the bloodstream and .... in the matrix and parathyroid hormone (PTH) .... by the parathyroid gland when the level of calcium in the blood .... too low and causing bone to .... calcium into the bloodstream.

1. What is the function of red bone marrow?
2. What is the function of yellow bone marrow?

3. What is the relation between calcium and bones?
4. What is the relation between the homeostasis of calcium and the endocrine system?

PART THREE

comprised • sent • makes (2) • made • composed • breaking • conducted • move • shortens • reaching • contracts • supplied • produced • produce

Muscles are .... of fascicles or bundles of muscle fibres, each muscle fibre being .... of myofibrils which are bundles of myofilaments. Every myofilament is .... of either actin or protein molecules. The movement of actin and myosin in response to a message sent from the brain .... the muscle move. Messages from the brain are .... along motor neurons to muscle fibres. There is no direct connection between the end of the motor neuron and the muscle fibre, the message being .... by different types of neurotransmitters which on .... the end of the muscle fibre .... it .... an electrical signal which causes the actin and myosin of the myofilaments to .... The myosin pushes the actin toward the centre of the sarcomere. As the sarcomere ...., the muscle fibre .... In order to return to a relaxed state after the contraction energy must be .... to the myosin from a molecule called ATP (adenosine tri-phosphate). ATP is .... by mitochondria present in muscle fibres by .... down molecules of sugar, fats, carbohydrates and proteins.

1. How are muscles built?
2. How does the brain communicate with muscles?
3. What are neurotransmitters?
4. Where does the energy needed for muscles to contract come from?

5. Can you explain how muscles work together to produce movement?

Task 4

Recap the contents of the passage.

Task 5

Complete the text with the vocabulary given in the boxes.

PART ONE

structures • bones • organs • system • injuries • vessels • accidents

Musculoskeletal .... injuries can involve muscles, ..., tendons and ligaments. They are mainly due to minor or major .... which may affect not only musculoskeletal .... but also neighbouring ...., blood .... and nerves and thus the function of body systems and the organism as a whole. Musculoskeletal .... include fractures, dislocations, ruptures, sprains and strains.

PART TWO

threat • ability • blood (2) • affected • life-threatening • damaged • constitute • impairment • supply • broken • injury • loss

A **fracture** is a broken bone. Most fractures are not .... in themselves but they can .... a danger to the .... patient's life when nearby organs, ... vessels and/or nerves get injured or .... An injury or damage to an organ can generate an immediate or delayed .... to the patient's life, for instance, when the bones of the skull or the ribs are .... An injury to or rupture of a blood vessel can result in a severe .... of .... (haemorrhage) or a reduced, insufficient blood .... to some area (ischaemia) while an .... to or rupture of a nerve can lead to a more or less severe .... of the body function, including the .... to speak or move.

PART THREE

severe • flow • capsule • partial • extensive • result • head • move • associated • socket • dislocation • occurs

A **dislocation** .... when a bone or bones .... out of their normal position in a joint, with the .... of the bone being as a result completely out of the .... When the head of the bone has moved only partly out of the socket, we speak of a .... dislocation or **subluxation.** In more .... cases, ligaments may be torn, the joint .... damaged. Damage to the .... nerves may lead to more or less ...., loss of sensation and paralysis. Shoulder .... belongs to the most common.

A **rupture** occurs when a tendon, a ligament, a blood vessel or a nerve are ruptured or torn which may .... in an impairment of movement, blood .... or communication.

PART FOUR

area • twisted • pain • susceptible • damage • include • sudden • muscle • inability • pulled • lifting

A **strain** occurs when a ......, ligament or tendon is modestly ..... or outstretched due to a .... movement or .... of something heavy.

A **sprain** occurs when a joint is forcibly .... which usually entails .... to muscles, tendons, nerves and/or blood vessels in the .... The ankle joint, the wrist joint and the lower back are most .... to sprains.

Symptoms of injuries or damage to the musculoskeletal system ...., swelling, stiffness or rigidity, bruising, deformity, discoloration, pain on movement and .... to move.

Vocabulary

capsule torebka
subluxation podwichnięcie, nadwichnięcie

Task 6

Decide whether the following statements are true or false. Correct the false ones and expand on the correct ones. In a conversation with your neighbour justify your choice in the context of the text read.

1. Injuries to the musculoskeletal system do not usually affect other organ systems.
2. Blood vessels are too well protected to be torn as a result of a bone fracture.
3. A fracture may lead to a neurological deficit.
4. Dislocation is merely a painful experience.
5. We should take care not to make rapid movements or overexert ourselves.
6. Symptoms of injuries to the musculoskeletal systems are easy to recognize and diagnosis easy to make.
7. Subluxation is a complete separation of bones within a joint.
8. Sprains and strains require immediate medical assistance.
9. Rupture of a blood vessel frequently leads to a haemorrhage.
10. Damage of nerves may result in paralysis.

Task 7

Answer the questions concerning musculoskeletal system injuries.

1. Can you mention the main disorders/emergencies that may affect the skeleton, joints and muscles?
2. What are the common methods used to recognize disorders of the skeleton and the muscles?
3. What major and associated organs of the musculoskeletal system may be affected due to accidents?
4. Can you think of at least five musculoskeletal system injuries?
5. How would you define a fracture?

6. In what circumstances may an injury prove life-threatening?
7. What is the difference between a dislocation and a subluxation?
8. What is the most common joint dislocation?
9. How may the victim be affected in more severe cases?
10. What is rupture and what may it result in?
11. What causes a strain?
12. What is a sprain and what parts of the body are most susceptible to sprains?
13. What are the common symptoms of musculoskeletal injuries?

D. Vocabulary Practice

Task 8

Report on the circumstances of the accident as given by the victim.

1. 'I tripped on the stairs when running to open the door.'

The patient **reports** tripping on the stairs when running to open the door.

2. 'I slipped and fell on an outstretched hand.'

The patient **reports** ....

3. 'I tried to lift an armchair and then I felt an excruciating pain in the back.'

The patient **reports** ....

4. 'I sort of bounced back when I hit the car in front of me and I felt something sort of crunch in my neck.'

The patient **reports** ....

5. 'The last thing I remember is my head spinning. Then I came round and I had no feeling in my legs.'

The patient **reports** ....

6. 'I fell and then I felt this simply agonising pain in the hip.'

The patient reports ....

7. 'I cut my finger on a sharp piece of metal at work.'

The patient reports ....

8. 'I have hurt my right knee while playing football.'

The patient reports ....

9. 'I twisted my elbow awkwardly while playing hockey last Tuesday. The pain was so bad that I couldn't straighten it properly.'

The patient reports ....

10. 'I've got pain in my left buttock and the pain seems to go down the back of my left leg. Moreover, I've got a sensation like "pins and needles" on the outside of my left foot.'

The patient reports ....

Task 9

Report on how the patient describes his/her problem.

1. 'I feel terrible pain in the ankle.'

The patient complains of (feeling) terrible pain in the ankle.

2. 'I feel pain in the small of the back, particularly on movement.'

The patient complains of ....

3. 'My right knee is stiff and painful.'

The patient complains of ....

4. 'I have no feeling in my left foot.'

The patient complains of ....

5. 'I feel piercing pain when I try to shift my leg.'

The patient complains of ....

6. 'I feel burning pain in the back.'

The patient complains of ....

7. 'Since I fell to the ground this morning I've had a severe pain in my right groin.'

The patient complains of ....

8. 'My left arm feels cold and it is starting to go numb.'

The patient complains of ....

9. 'Since I fell face down onto the floor, I've felt sort of groggy and my head started to spin.'

The patient complains of ....

10. 'My right shoulder aches severely and feels like it "came out".'

The patient complains of ....

Task 10

Use the vocabulary given below and make statements about the patient's condition following the examples given.

A.

ankle • knee • shoulder • elbow • forearm • wrist • hip • thigh • leg • pelvis • arm • foot • back • disc neck • spine • skull

B.

swollen • reddened • twisted • deformed • bruised • painful • sprained • contused • crushed • smashed • covered with blood • broken • sprained • strained • dislocated • slipped • tender • stiff • fractured

1. The victim's **ankle** is **twisted** and **swollen.**
2. The victim's ....
3. The victim's ....
4. The victim's ....
5. The victim's ....

6. ....

Consciousness? No, I didn't lose it. At least I don't think so. But I did feel sort of dizzy.

7. ....

I was at the gym doing inclined bench presses. After finishing I was about to put the bar back in place and missed. The bar fell and I felt the snapping sound of a broken bone in my right shoulder.

8. ....

I was bitten on my left hand by the family dog. Later on my hand became red, slightly swollen, and warm to touch.

9. ....

While I was rollerskating, I suddenly slipped and fell over on my left flank. Then I heard a snap and felt excruciating pain in my left wrist.

10. ....

The patient reports numbness in her index and middle fingers.

Task 13

Following the example give your presumptive diagnosis using the professional terms given below.

Colles' fracture • multiple fracture • intra-articular fracture • open (compound) fracture • crush (comminuted) fracture • simple (closed) fracture • dislocated fracture • a sprained ankle • spinal injury *or* spinal cord damage

1. The humerus seems to be broken but it doesn't show on the surface.

I suspect a *simple (closed) fracture* of the humerus.

2. The victim says he has fallen on an outstretched hand.

I suspect ....

3. The bones of the joint seem to be broken.

I suspect ....

4. The bones of the leg seem to be broken in a few places.

I suspect ....

5. A broken bone can be seen on the surface of the forearm.

I suspect ....

6. The pelvis seems to be broken into many pieces, simply crushed.

I suspect ....

7. The leg is obviously broken but there is no bone visible on the surface.

I suspect ....

8. The victim's leg is lying in a distorted position. The bones seem to be shifted out of place.

I suspect ....

9. The victim's foot is twisted onto its outside edge.

I suspect ....

10. The casualty says he has fallen awkwardly while trampolining and his limbs feel "clumsy" and "stiff".

I suspect ....

E. Listening Practice & Dialogue Completion

Task 14

Listen and complete the dialogues between the caller (C) and the dispatcher (D).

Recap the information for the ambulance crew to be sent to the site of the accident.

Dialogue 1

2

C: Emergency? My husband has .... off a ladder. He must have .... his leg. He's moaning with .... He can't .... I can't move him.

D: Can I have your name, please?

C: ....

D: What's your address?

C: ....

Dialogue 2

3

C: Please, send an ambulance. There's been an accident.

D: Who's calling? Can I have your name, please?

C: I'm ....

D: And where are you calling from?

C: From my mobile.

D: I mean the address of the accident.

C: Oh ....

D: And what has happened? A road accident? How many people are injured?

C: Two cars .... One drove into a lamp post. There's .... people in one car and just the .... in the other. They are .... and there's a lot of .... They must be ....

Task 15

Complete the dialogue. Decide whether the statements which follow are true (T) or false (F).

C: Emergency? Can you help me? I'm alone at home and I can't move.

D: .... your name, please.

C: Grace Smith.

D: ...., Ms Smith?

C: 34 Willow Crescent. Can you send an ambulance?

D: Now tell me.....................?

C: I don't know. I was in the kitchen and the next moment I was on the floor and I just couldn't get up.

D: .... move your limbs?

C: It's my left leg and hip I can't shift them to get up. It's too painful.

D: .... you, Grace?

C: Seventy five. You'll send someone to my house, won't you?

D: Yes. Just relax. Don't even try to .... We'll be with you ....

True or false?

1. It's a call from the victim's neighbour.
2. The victim says she slipped and fell.
3. The victim may have a broken limb.
4. The victim can get up.
5. The victim is an elderly person.
6. The victim does not need emergency assistance.