

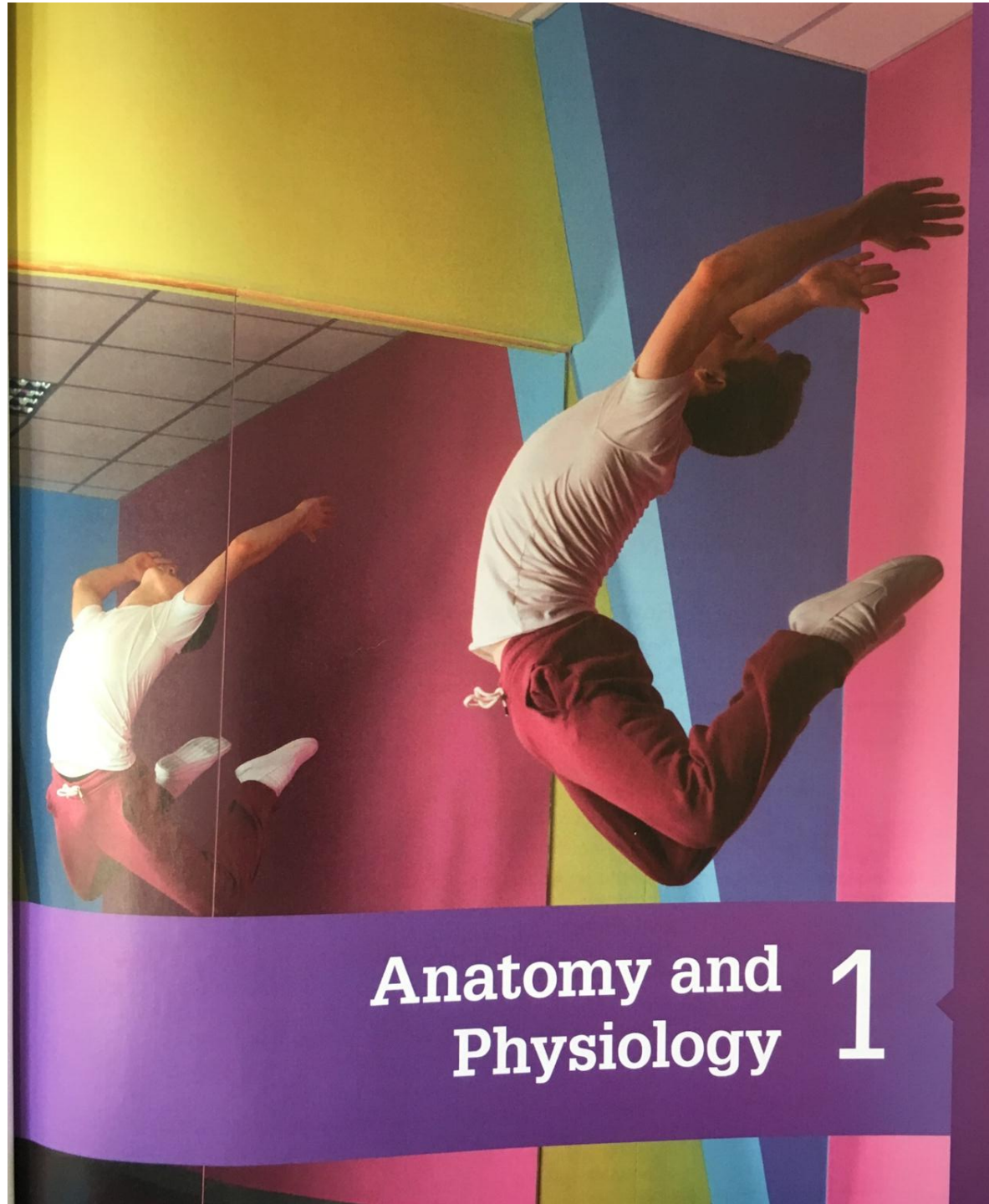


Pearson BTEC National Sport

Diploma/Extended Diploma



 **BTEC**



Anatomy and Physiology 1

Unit 1 – Anatomy & Physiology

Assessment

This unit is assessed by an examination that is set and marked by Pearson.

To understand what happens during sport and exercise, you must know about body systems. This unit explains how the body is made up of a number of different systems, how these systems interact and work together, and why they are important to sports performance. You will:

- ▶ be introduced to the structures and functions of the five key systems and the effects that sport and exercise has on them
- ▶ investigate the structure and function of the skeletal and muscular systems and their role in causing movement in sport and exercise
- ▶ examine the structure and functions of the cardiovascular and respiratory systems
- ▶ understand why the heart works as it does and how it works with the lungs to allow sportspeople to cope with the demands of sport
- ▶ look at the three different energy systems and the sports in which they are predominantly used.

This is a mandatory unit and introduces knowledge that will link with all other units in the course.



Unit 1 – Anatomy & Physiology

How you will be assessed

This unit will be assessed by an examination set by Pearson. The examination will last 1 hour 30 minutes and will contain a number of short answer and long answer questions. There will be a total of 90 marks available in the examination. You will be assessed for your understanding of the following topics in relations to sports performance:

- The skeletal system
- The muscular system
- The respiratory system
- The cardiovascular system
- The energy system



Unit 1 – Anatomy & Physiology

Unit Assessment Outcomes:

AO1: Demonstrate knowledge of body systems, structures, functions, characteristics, definitions and other additional factors affecting each body system

AO2: Demonstrate understanding of each body system, the short and long term effects of sport and exercise on each system, and additional factors that can affect body systems in relation to exercise and sporting performance

AO3: Analyse exercise and sports movements, how the body responds to short term and long term exercise, and other additional factors affecting each body system

AO4: Evaluate how body systems are used and how they interrelate in order to carry out exercise and sporting movements

AO5: Make connections between body systems in response to short term and long term exercise and sport participation. Make connections between muscular and all other systems, cardiovascular and respiratory systems, energy and cardiovascular systems.





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Anatomy and Physiology

A: The effects of exercise and sports performance on the skeletal system

- 
- 
- Structure of the skeletal system – Bones and types of bone
 - Structure of the skeletal system – Areas of the skeleton
 - Function of the skeletal system – function of skeleton and bones
 - Function of the skeletal system – Joints
 - Function of the skeletal system – Synovial joints
 - Responses and adaptations of the skeletal system to sport and exercise
 - Additional factors affecting the skeletal system



A: The effects of exercise and sports performance on the skeletal system

Structure of the skeletal system – Bones and types of bone

Learning Objectives

- All: To identify and locate the main bones
- Most: To understand the terms used to describe the location of bones
- Some: To describe and explain the 5 main types of bone





Memory Board

You will have 30 seconds!

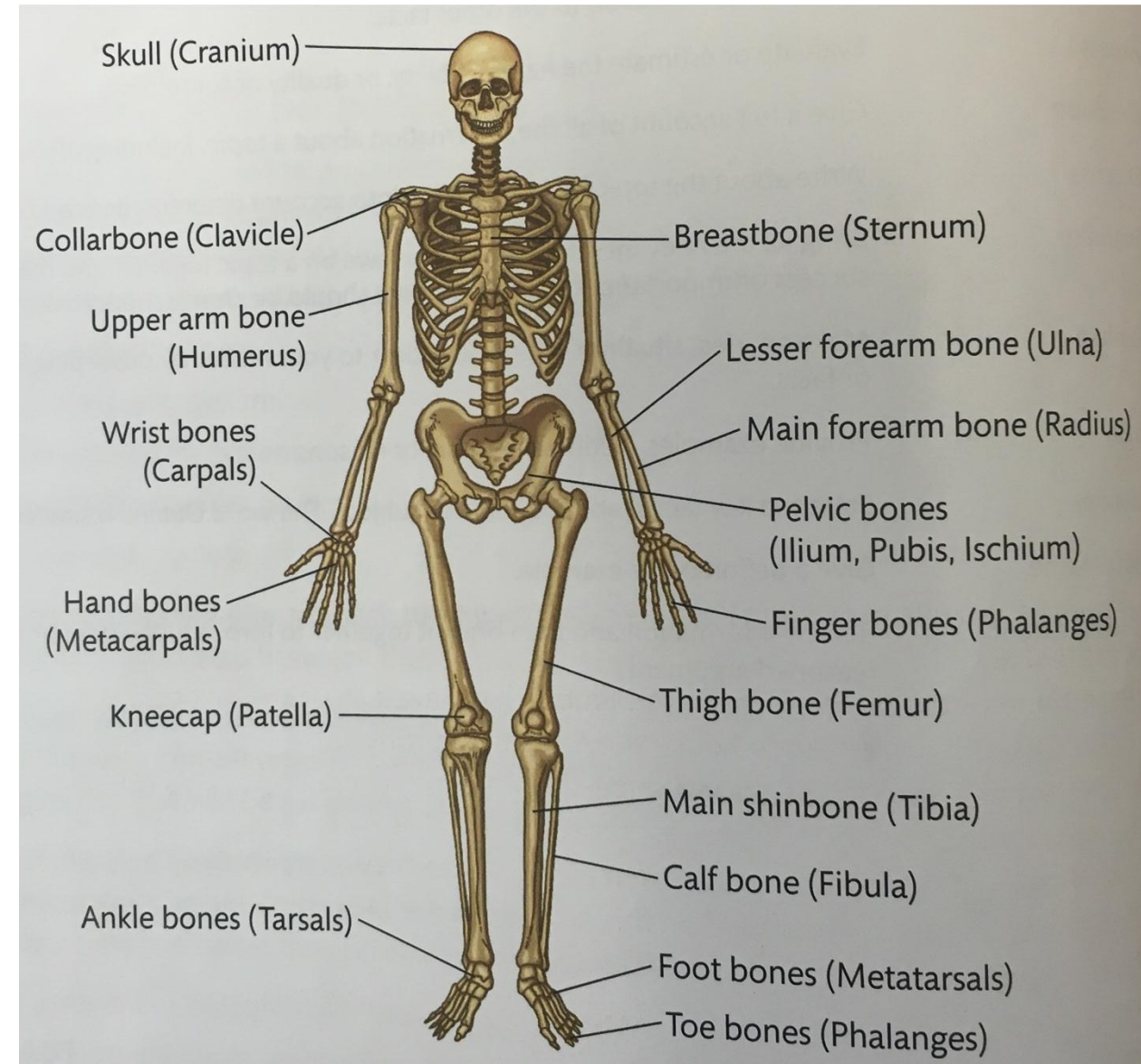
How many bones can you remember?

You will be given a skeleton outline – try and fill in as many gaps as you can!



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All: To identify and locate the main bones

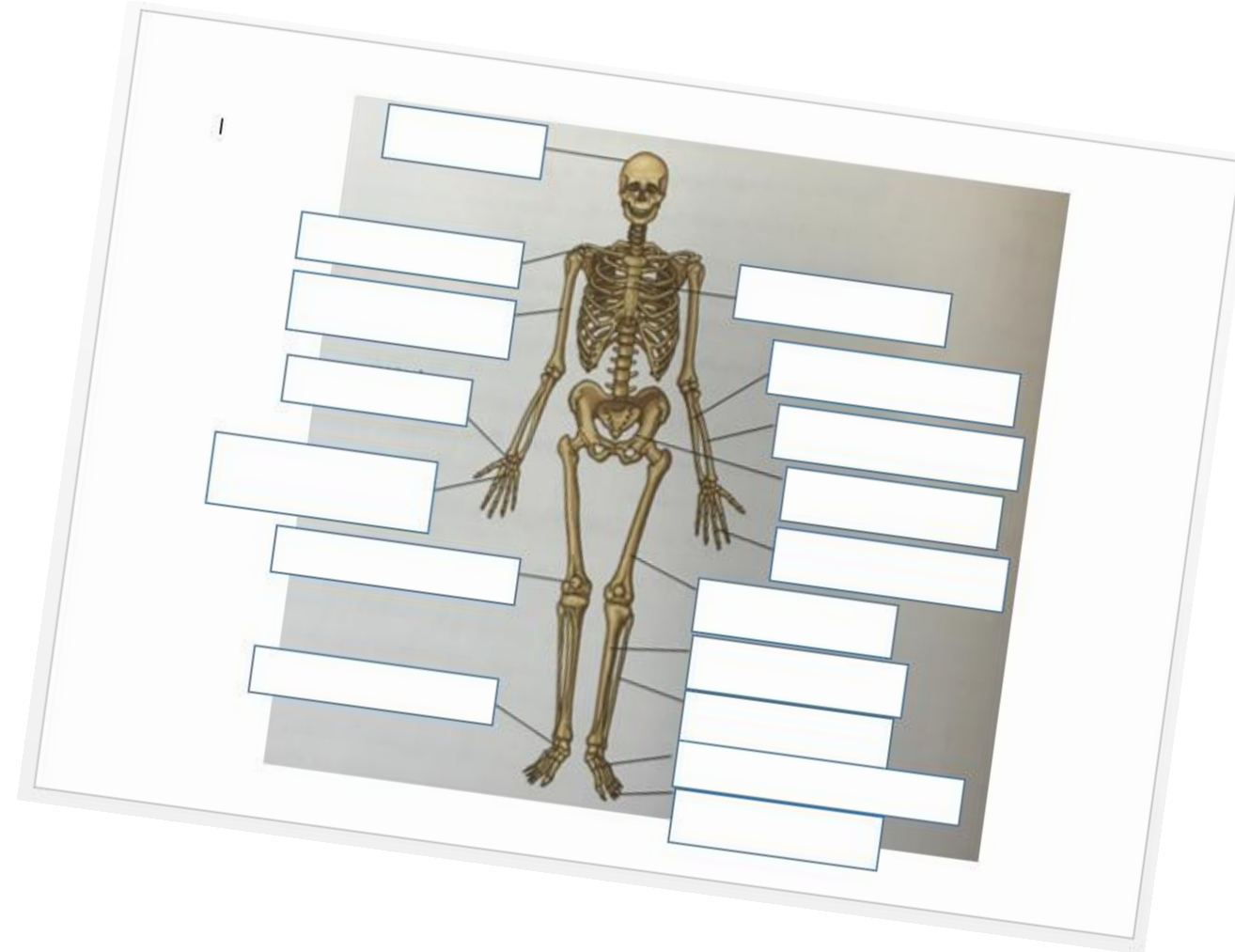


Memory Board

You will have 30 seconds!

How many bones can you remember?

You will be given a skeleton outline – try and fill in as many gaps as you can!



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All: To identify and locate the main bones



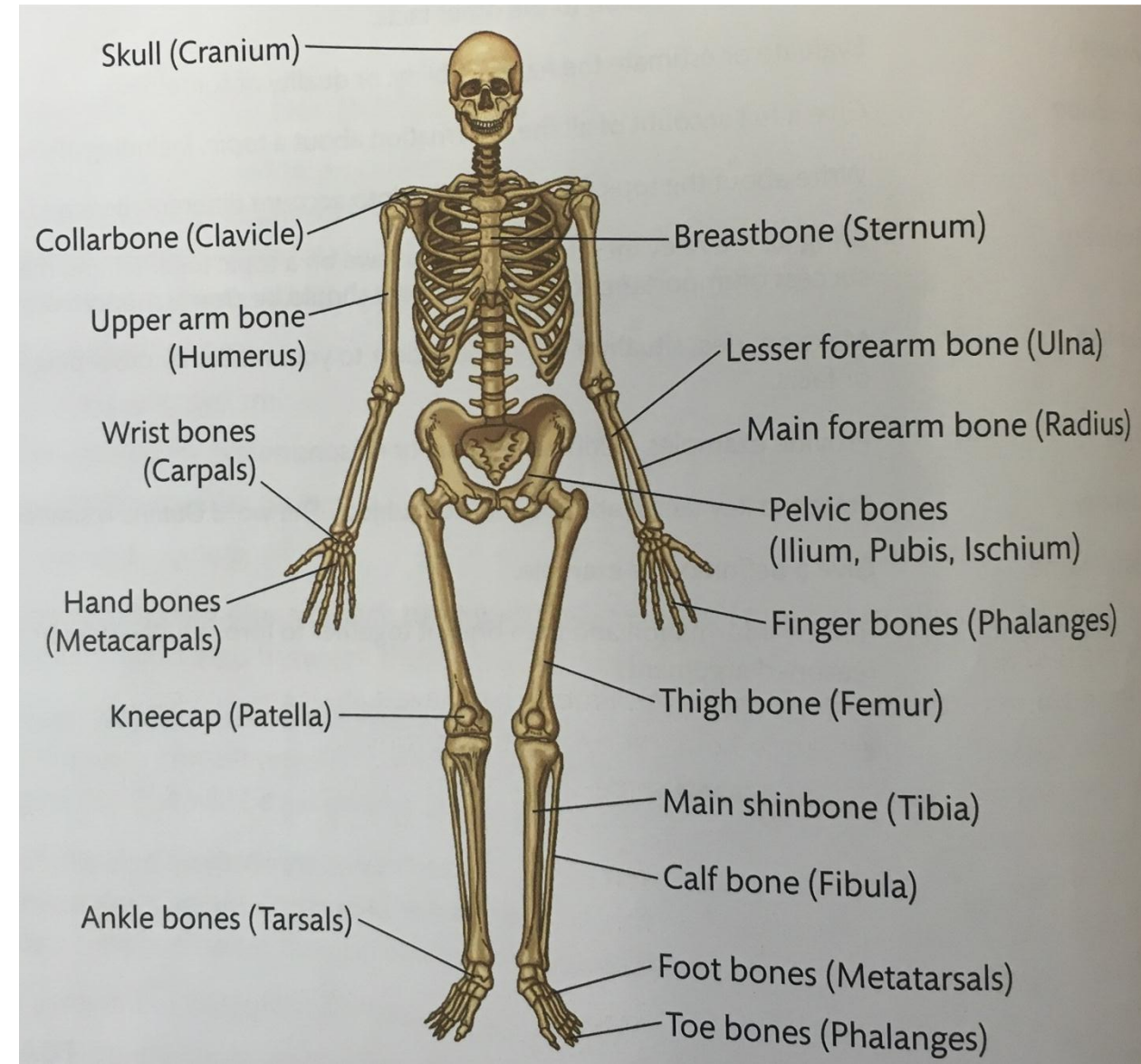
Memory Board

ANSWERS –
how many did
you get right?



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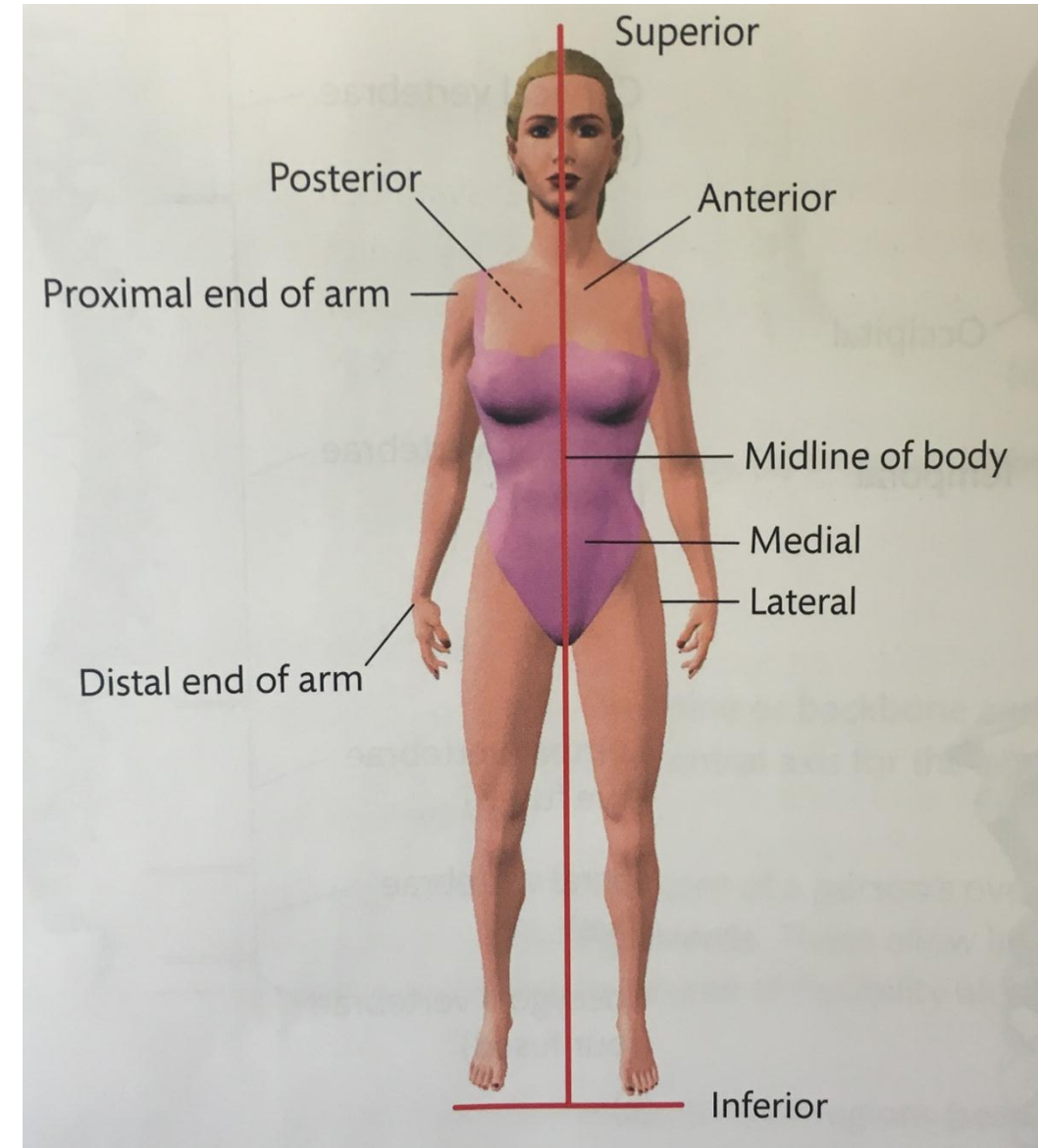
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All: To identify and locate the main bones

► **Table 1.2:** Terms used to describe the location of bones

Term	Meaning
Anterior	To the front or in front
Posterior	To the rear or behind
Medial	Towards the midline or axis, an imaginary line down the centre of the body
Lateral	Away from the midline or axis
Proximal	Near to the root or origin (the proximal of the arm is towards the shoulder)
Distal	Away from the root or origin (the distal of the arm is towards the hand)
Superior	Above
Inferior	Below





Write down one statement for each of the anatomical positions relating it to the bones of the body

E.g. The cranium is superior to the Metatarsals



Types of Bones

Flat Bones – thin, flattened and slightly curved, with a large surface area. Examples include the scapulae, sternum and cranium.

Long bones – the bones found in the limbs. They have a shaft known as the diaphysis and two expanded ends known as the epiphysis.

Short bones – small, light, strong, cube-shaped bones consisting of cancellous bone surrounded by a thin layer of compact bone. The carpals and tarsals of the wrists and ankles are examples of short bones.

Irregular bones – have complex shapes that fit none of the categories above. The bones of the spinal column are a good example.

Sesamoid bones – have a specialised function and are usually found within a tendon. These bones provide a smooth surface for the tendon to slide over



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Some: To describe and explain the 5 main types of bone

**Name the
bone! and
which type
of bone is
this?**



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Some: To describe and explain the 5 main
types of bone

**Name the
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which type
of bone is
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BTEC

Pearson BTEC National Sport – Extended Certificate

Some: To describe and explain the 5 main
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**Name the
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this?**



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Some: To describe and explain the 5 main
types of bone

PLENARY
SESSION

With a partner (use 1 of you as the model) using the post it notes can you correctly identify and locate the main bones of the body?



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All: To identify and locate the main bones

Learning Objectives

- All: To identify and locate the main bones
- Most: To understand the terms used to describe the location of bones
- Some: To describe and explain the 5 main types of bone





A: The effects of exercise and sports performance on the skeletal system

Structure of the skeletal system – Areas of the skeleton

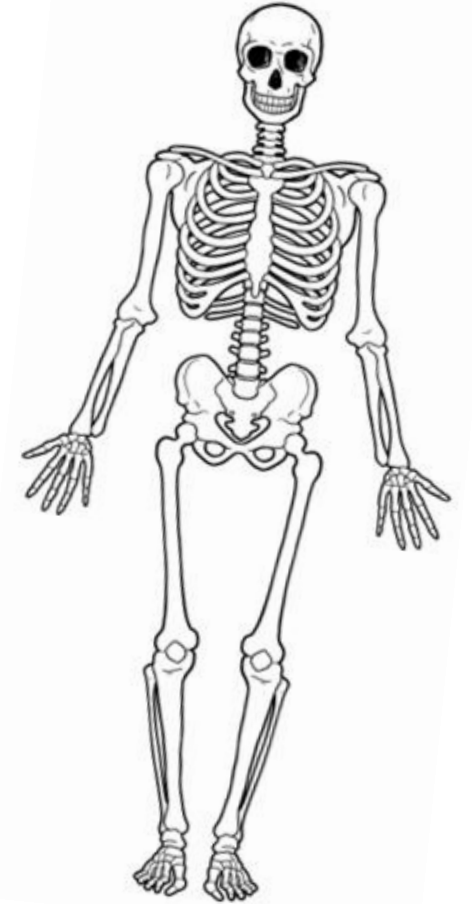
Learning Objectives

- All: To identify the two parts of the skeleton
- Most: To describe and explain the vertebral column
- Some: To describe and explain the major bones of the skeleton





Consider a sport of your choice and identify the bones that are used in the main actions involved in that sport



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The skeleton can be divided into two parts: 80 bones form your axial skeleton and the other 126 bones form your appendicular skeleton!

Axial Skeleton

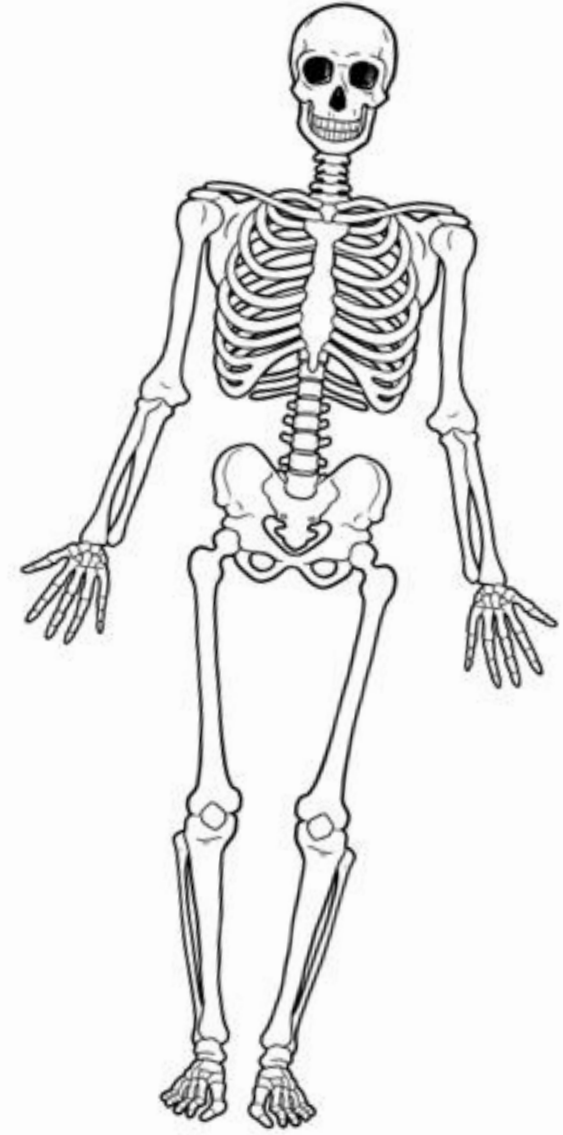
This is the main core of your skeleton and consists of:

- The skull (cranium and facial bones)
- The thoracic cage (sternum and ribs)
- The vertebral column

Appendicular Skeleton

Consists of the bones that are attached to the axial skeleton:

- Upper limbs (Humerus, radius, ulna, carpals, metacarpals and phalanges)
- Lower limbs (Femur, tibia, fibula, patella, tarsals, metatarsal and phalanges)
 - Shoulder girdle (clavicle and scapula)
 - Pelvic girdle (ilium, pubis and ischium)



BTEC

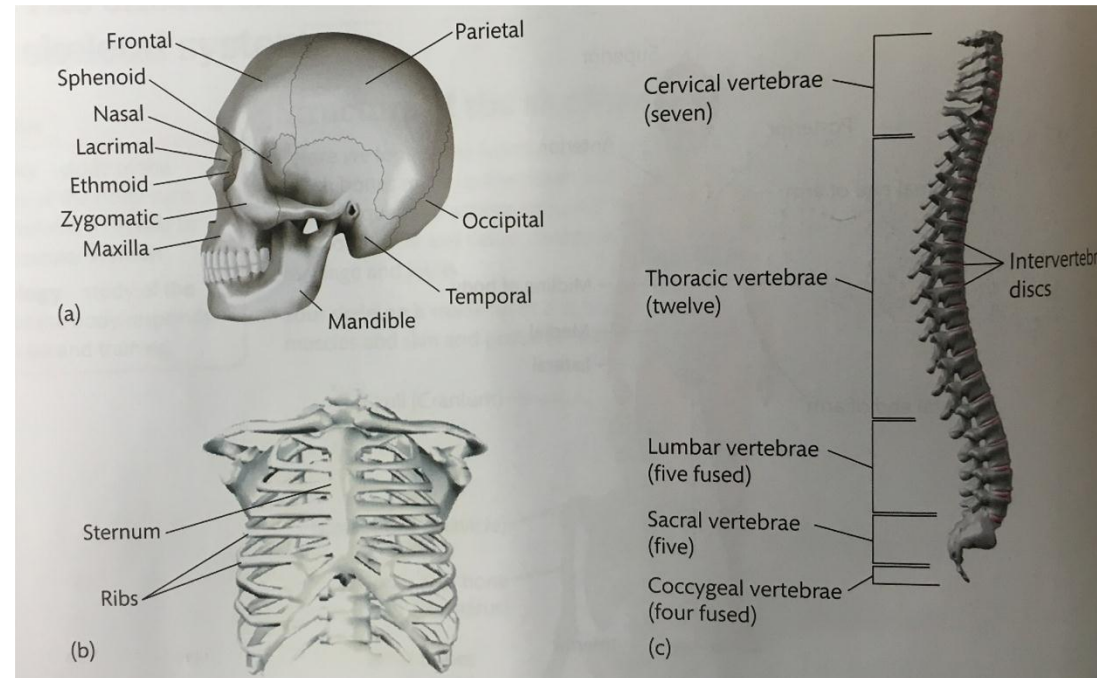
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All: To identify the two parts of the skeleton

Axial Skeleton

This is the main core of your skeleton and consists of:

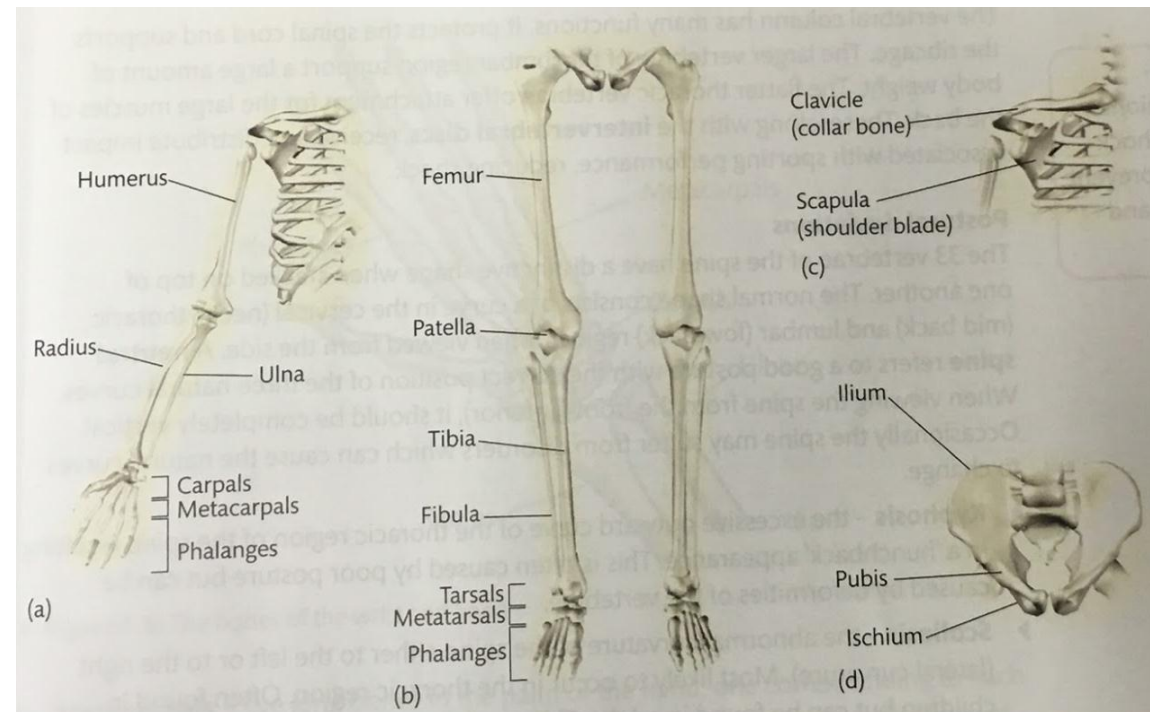
- The skull (cranium and facial bones)
- The thoracic cage (sternum and ribs)
- The vertebral column



Appendicular Skeleton

Consists of the bones that are attached to the axial skeleton:

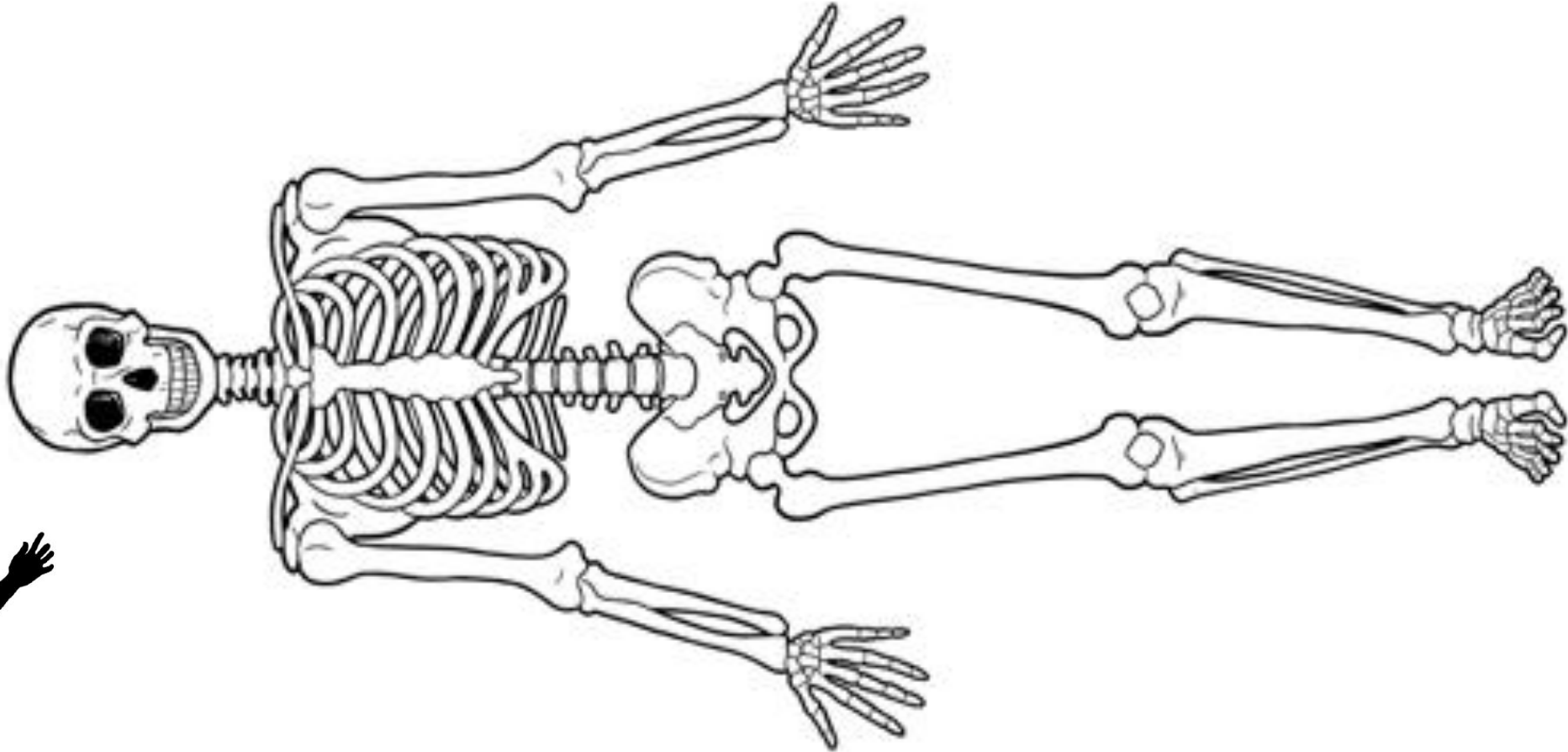
- Upper limbs (Humerus, radius, ulna, carpals, metacarpals and phalanges)
- Lower limbs (Femur, tibia, fibula, patella, tarsals, metatarsal and phalanges)
 - Shoulder girdle (clavicle and scapula)
 - Pelvic girdle (ilium, pubis and ischium)





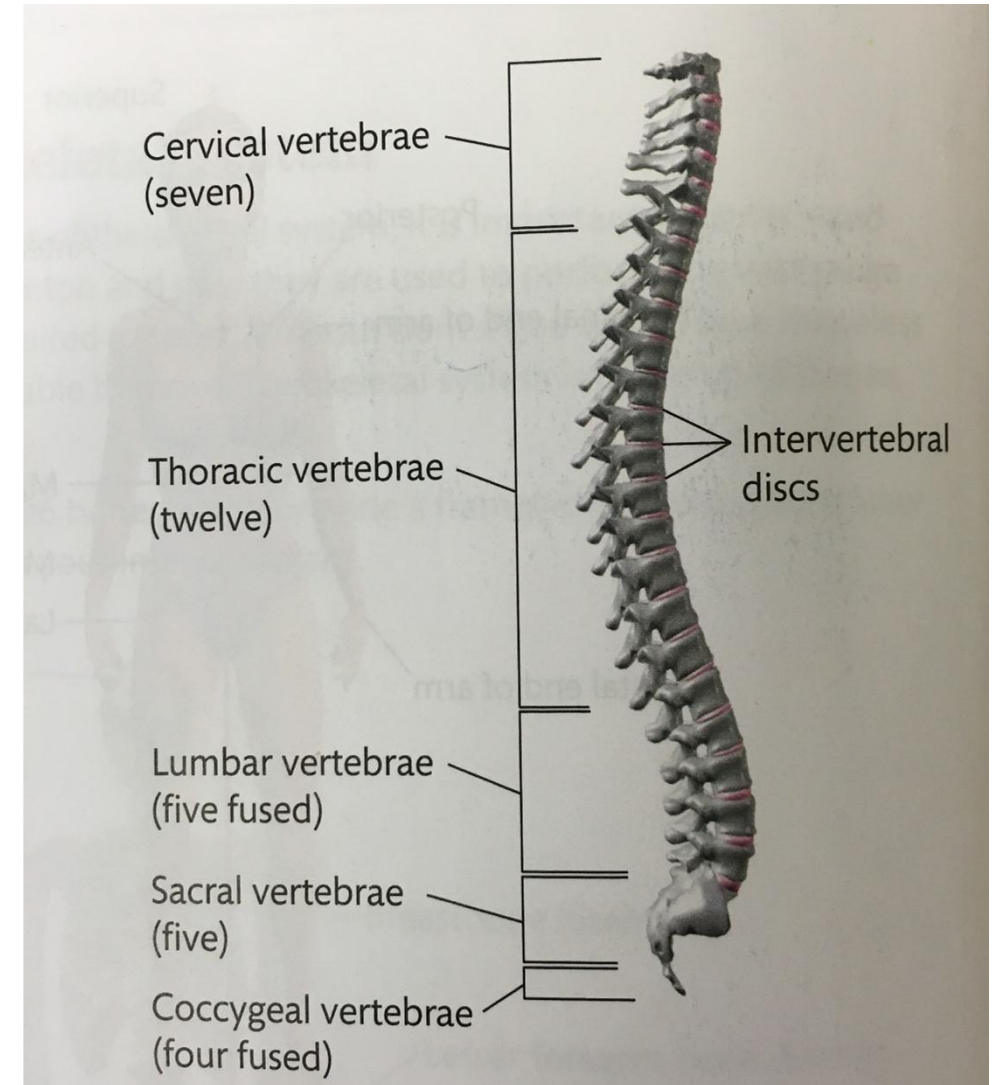
Task:

Using the skeleton outline below – shade in 2 different colours the axial skeleton and the appendicular skeleton



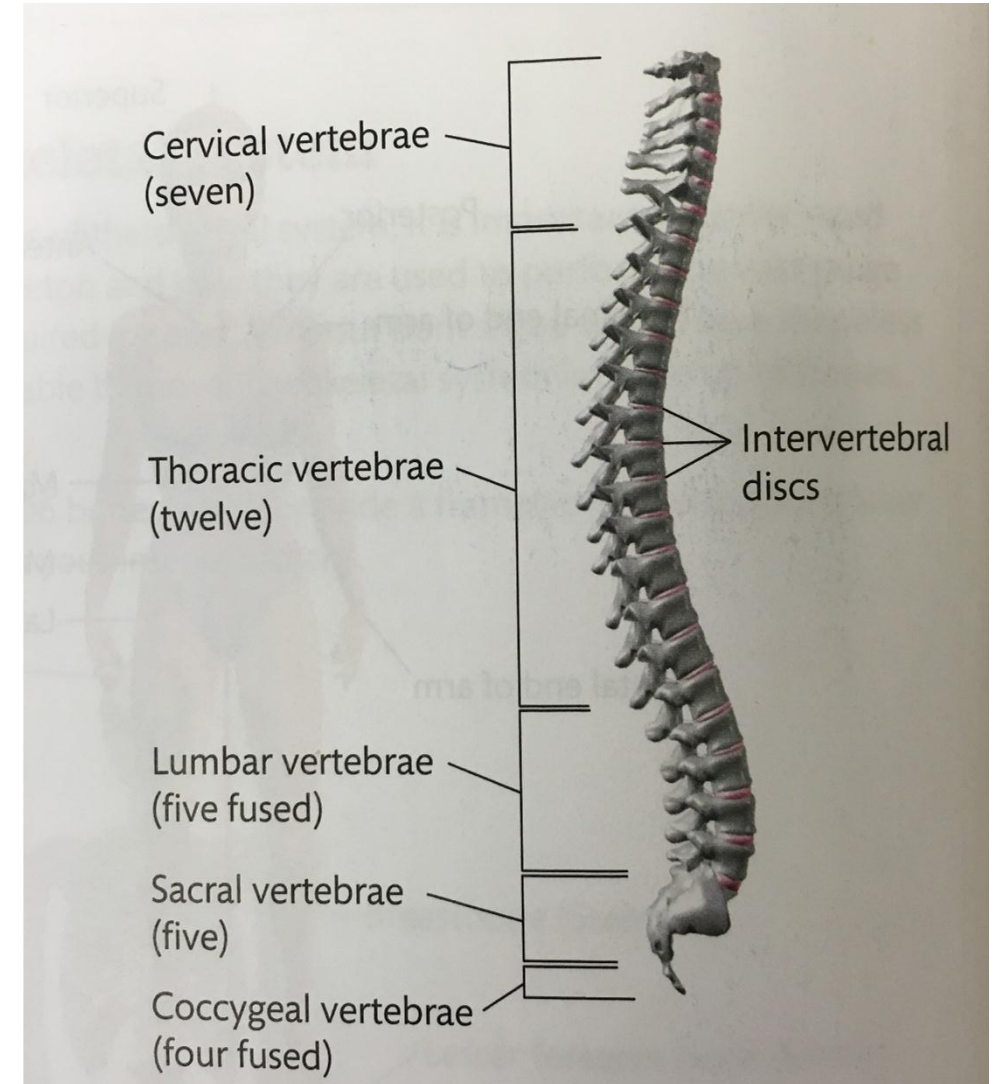
The spine or vertebral column

- Provides a central axis for the body and is made up of 33 irregular bones called vertebrae
- The vertebrae are held together by powerful ligaments
- It is divided into 5 sections/regions





Use Page 7 to write in notes below about each section of the vertebrae column

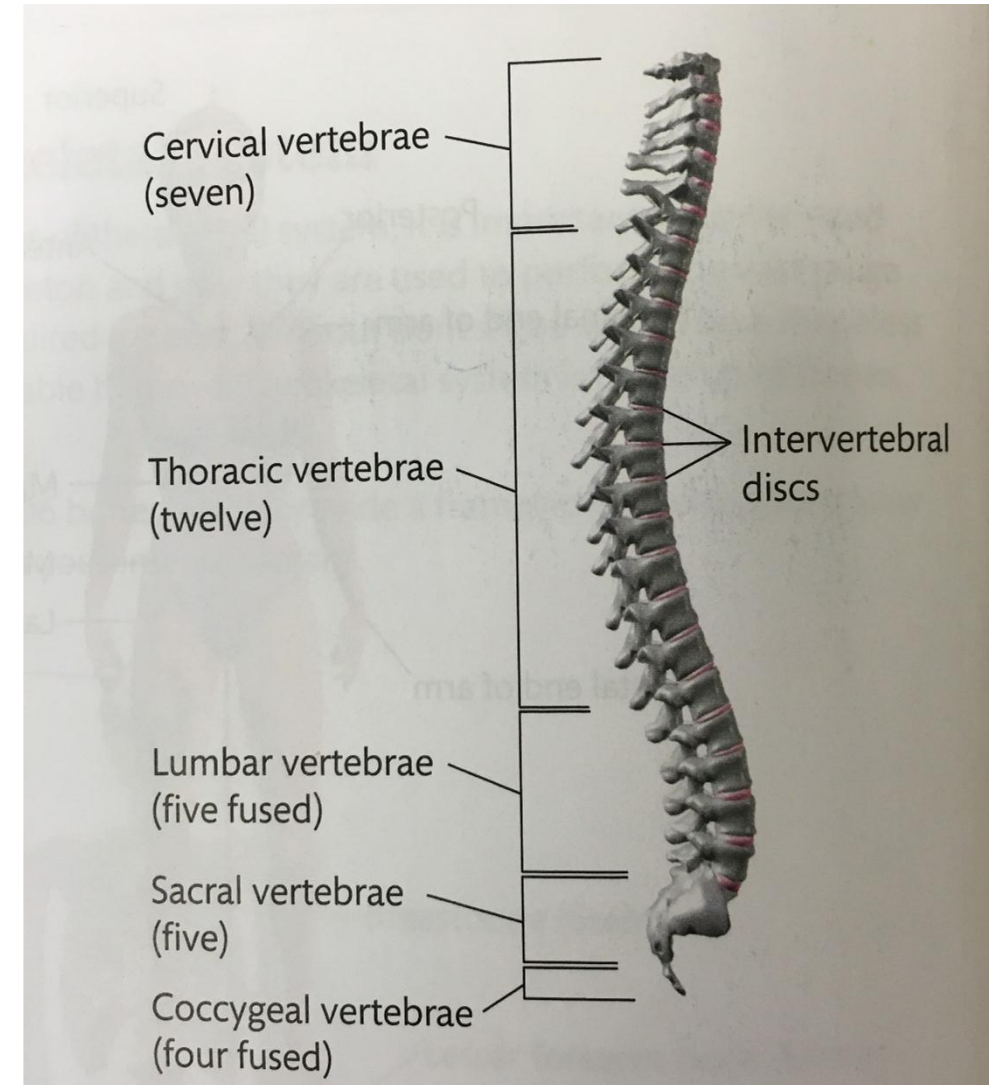




Use Page 8 to
answer these
questions

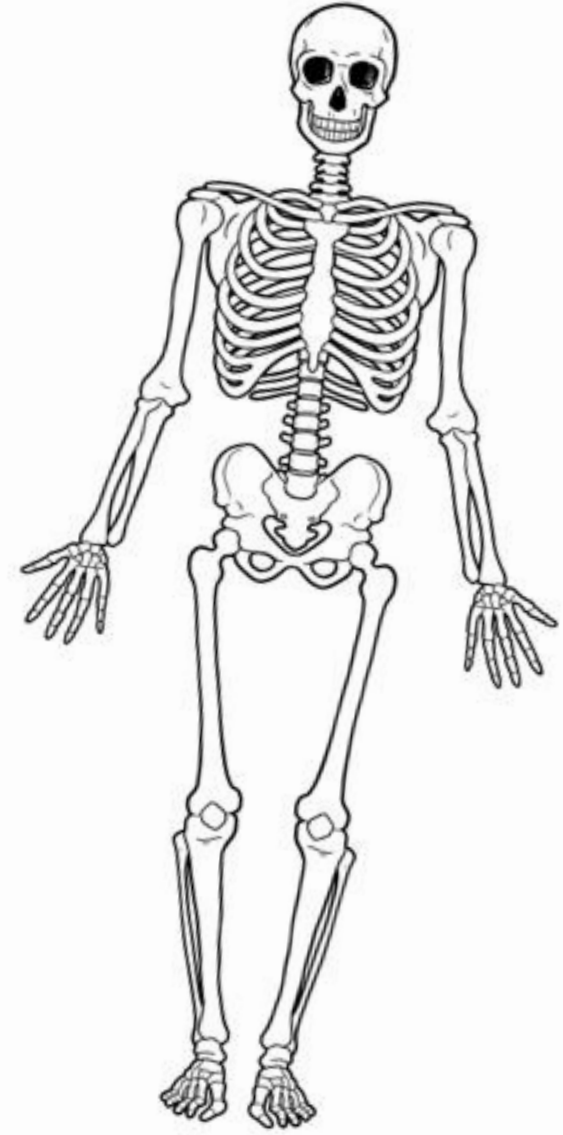
Functions of the vertebral column?

Postural deviations?



PLENARY
SESSION

Using your skeleton
worksheets, use
pages 8 and 9 to give
each bone a short
description!



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Some: To describe and explain the major
bones of the skeleton

Learning Objectives

- All: To identify the two parts of the skeleton
- Most: To describe and explain the vertebral column
- Some: To describe and explain the major bones of the skeleton





A: The effects of exercise and sports performance on the skeletal system

Function of the skeletal system – function of skeleton and bones

Learning Objectives

- All: Understand the process of bone growth
- Most: To identify the 8 main functions of the skeletal system
- Some: To know the function of different bone types





What is the highest value word you can make from the scrabble card?

The word MUST be to do with the Skeletal System

SCRABBLE

Using the 'topic' on the board see if you can make 8 key words linked to the topic with the aim of getting the highest score in the class once you total up all 8 of your words!

Good Luck

A ₁	B ₃	C ₃	D ₂		
E ₁	F ₄	G ₂	H ₄	I ₁	J ₈
K ₅	L ₁	M ₃	N ₁	O ₁	P ₃
Q ₁₀	R ₁	S ₁	T ₁	U ₁	V ₄
W ₄	X ₈	Y ₄	Z ₁₀		

Scrabble Challenge:

Key Word: _____ Score: _____

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

Use this space to work out your score:

TOTAL



Process of Bone Growth



_____ is the process in which bones are formed. Throughout this process parts of the bone are reabsorbed so that unnecessary _____ is removed via cells called osteoclasts, while new layers of bone tissue are created. The cells that bring the calcium to your bones are known as _____ and are responsible for creating bone matter. Osteoblast activity increases when you exercise so your bones will become _____ the more exercise you do. The ends of each long bone contain growing areas – or plates – which allow the bone to grow longer. These areas are called _____ plates and allow long bone to extend. Once a bone is fully formed, the head/end of each bone fuses with the _____ shaft to create the epiphyseal line.

Osteoblasts
diaphysis
Stronger
Ossification
Epiphyseal
Calcium



Table Text

You will be divided into 8 groups

Each group will be given a key term

Research the key term and write as much information as you can about the key term onto the tables in the time limit given

You will then rotate round your tables to fill in gaps on your lesson outline sheet



Key Terms

Support
Protection
Attachment for skeletal muscle
Source of blood cell production
Store of minerals
Leverage
Weight bearing
Reducing friction across joints



SUPPORT



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Most: To identify the 8 main functions
of the skeletal system

PROTECTION



ATTACHMENT FOR SKELETAL MUSCLE



SOURCE OF BLOOD CELL PRODUCTION



STORE OF MINERALS



LEVERAGE



WEIGHT BEARING



REDUCING FRICTION ACROSS JOINTS



PLENARY
SESSION

Main function of different bone types

Type of bone	Function	Examples



Learning Objectives

- All: Understand the process of bone growth
- Most: To identify the 8 main functions of the skeletal system
- Some: To know the function of different bone types





A: The effects of exercise and sports performance on the skeletal system

Function of the skeletal system – Joints

Learning Objectives

- All: To understand what a joint is
- Most: To identify the 3 main classifications of joints
- Some: To explain the 3 main classifications of joints





The 5 W's

Articulation

Create a question that you would like to know about the key term using

Who, What, Why, Where and When?





Fixed Joints
Slightly Moveable Joints
Synovial Joints
Synovial Joint Structure



You will be divided into 4 teams
Each team will focus on 1 type of feedback given to you by the teacher

You have 15 minutes to research that type of feedback and create a presentation which must follow the below structure:

Verbal information about your topic
Visual representation of your topic
Create a mini quiz for your class mates to test that they have been listening to you!

All: To understand what a joint is
Most: To identify the 3 main classifications of joints
Some: To explain the 3 main classifications of joints

PLENARY
SESSION

The 5 W's

Can you now answer your original questions?

Articulation

Create a question that you would like to know about the key term using

Who, What, Why, Where and When?



Learning Objectives

- All: To understand what a joint is
- Most: To identify the 3 main classifications of joints
- Some: To explain the 3 main classifications of joints





A: The effects of exercise and sports performance on the skeletal system

Function of the skeletal system – Synovial Joints

Learning Objectives

- All: To identify the types of synovial joint
- Most: To explain the types of synovial joint
- Some: To explain the range of movement at synovial joints





1.



2.



+



3.



Lloyds TSB

4.



5.



6.



Hinge Joint

Ball and Socket Joint

Condylloid Joint

Gliding Joint

Pivot Joint

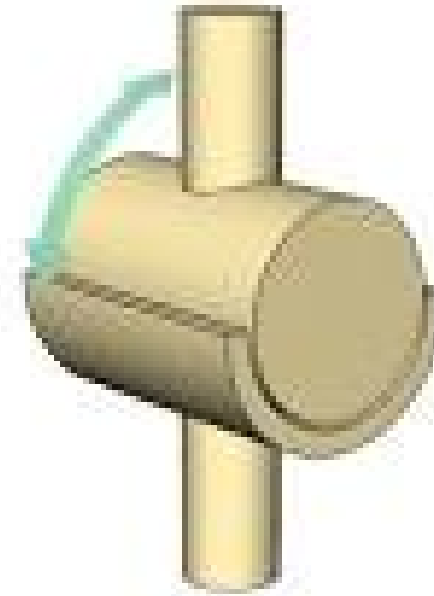
Saddle Joint



Ball and Socket Joint



Hinge Joint



Condyloid Joint



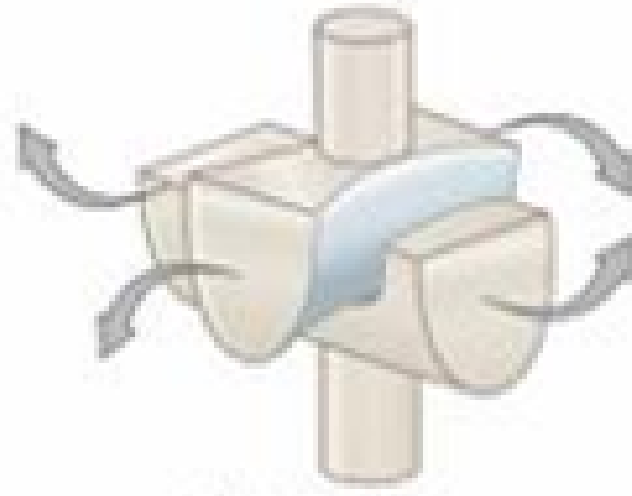
Gliding Joint



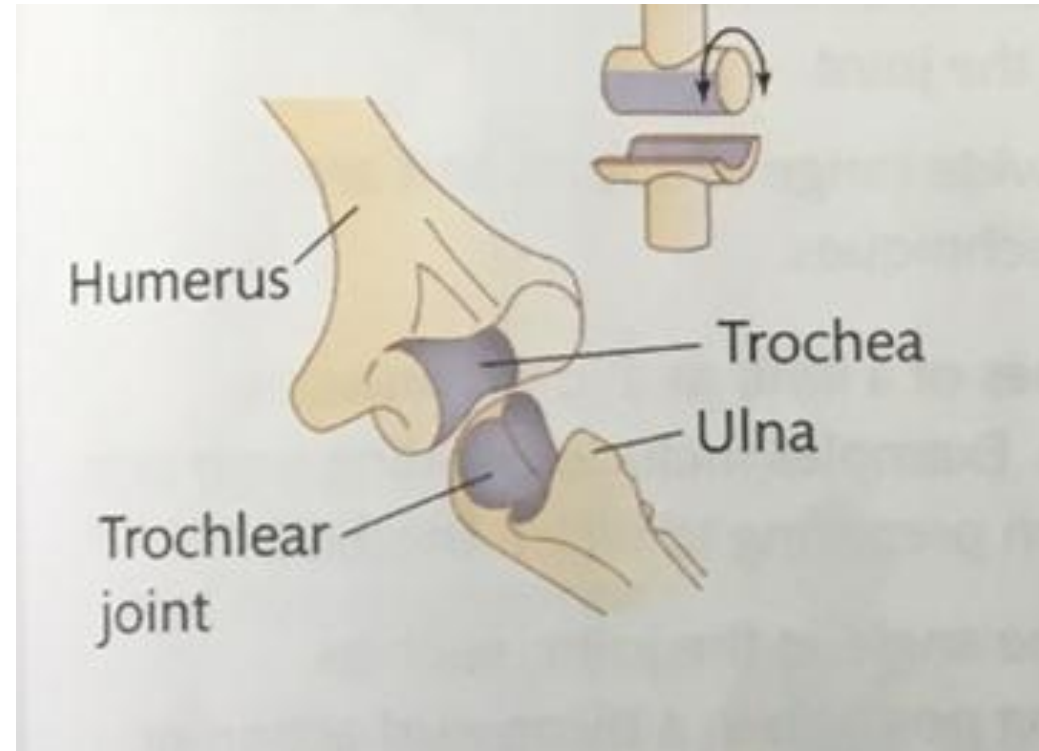
Pivot Joint



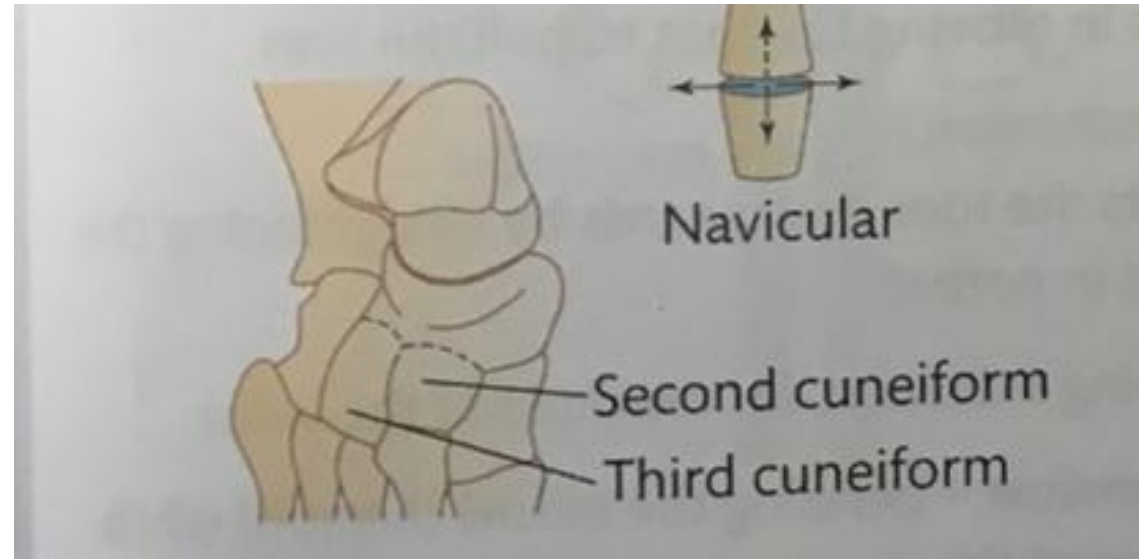
Saddle Joint



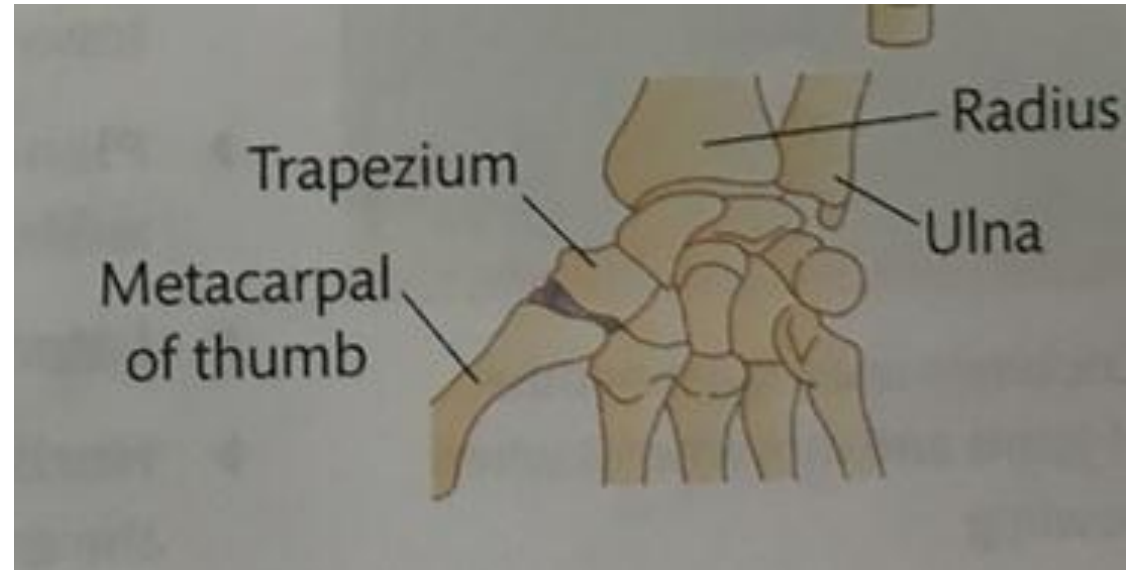
**Name the
joint! and
which type
of joint is
this?**



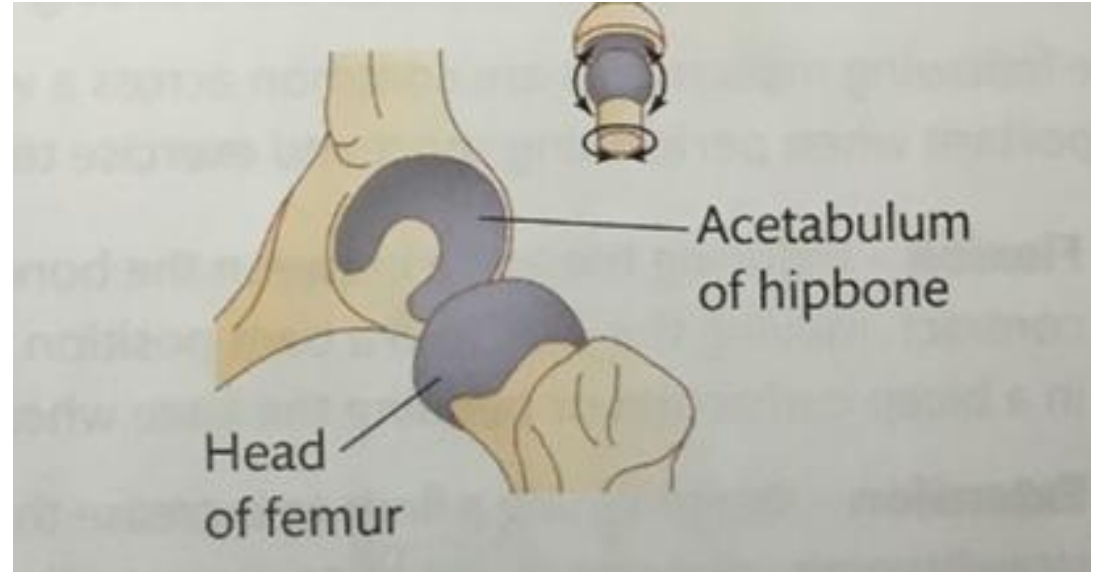
**Name the
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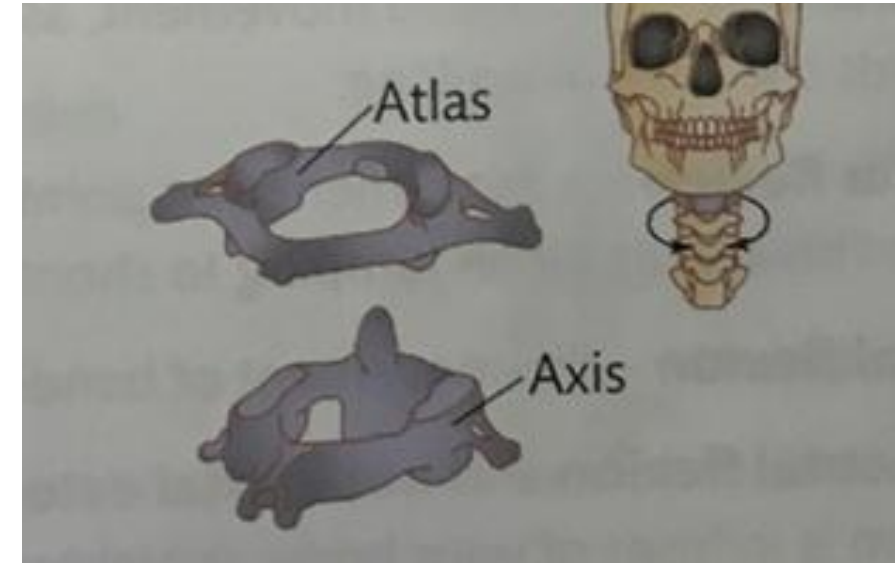
**Name the
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**Name the
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**Name the
joint! and
which type
of joint is
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**Name the
joint! and
which type
of joint is
this?**



Basic Movements

Flexion

Extension

Dorsiflexion

Plantar Flexion

Lateral Flexion

Horizontal Flexion and Extension

Hyper-extension

Abduction

Adduction

Horizontal abduction and adduction

Circumduction

Rotation





Using the text books find the definitions for the 12 basic movements

Under the diagram column sketch a diagram of what that type of movement would look like!



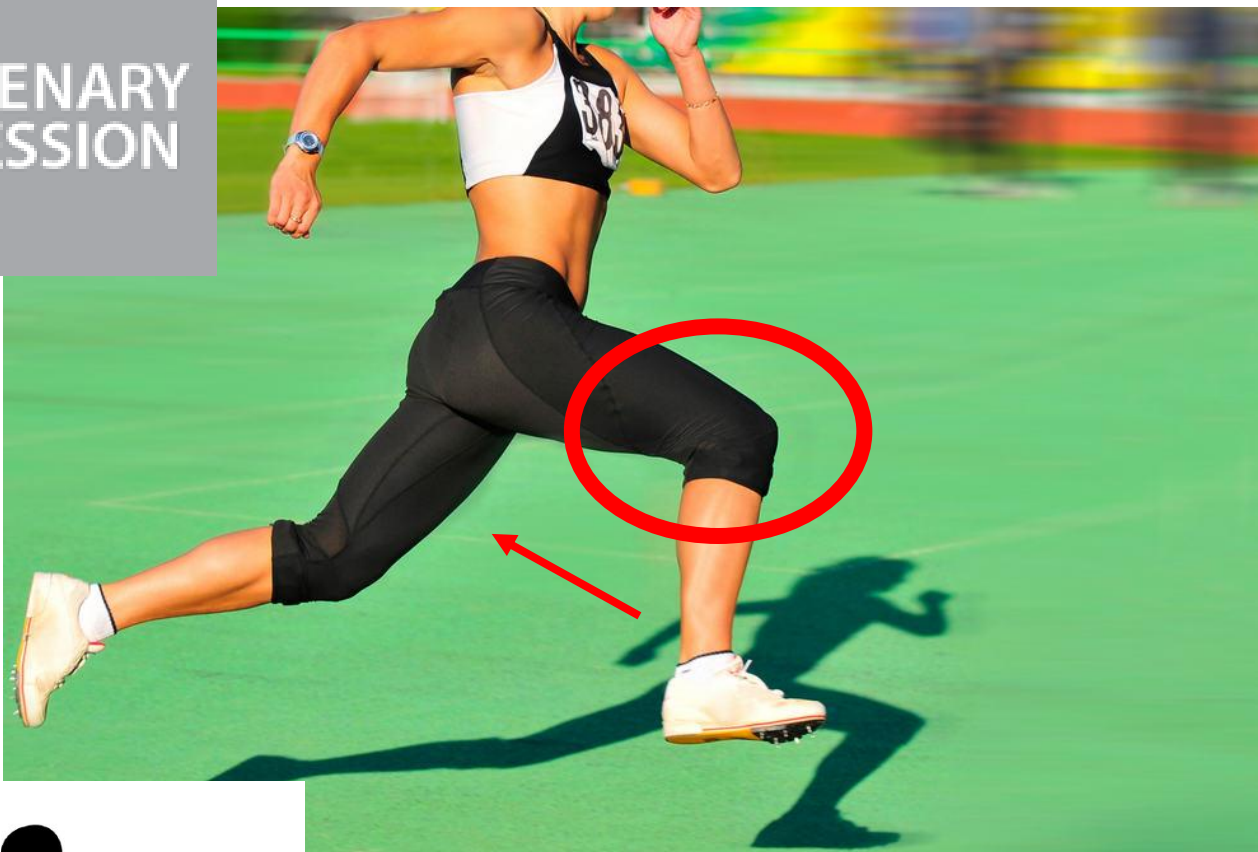
2.1 Basic Movements

Fill in the definitions of each basic movement by using pages 14-15 in the text books

Basic Movement	Definition	Diagram
Flexion →	<input type="text"/>	<input type="text"/>
Extension →	<input type="text"/>	<input type="text"/>
Abduction →	<input type="text"/>	<input type="text"/>
Adduction →	<input type="text"/>	<input type="text"/>
Dorsiflexion →	<input type="text"/>	<input type="text"/>
Plantar flexion →	<input type="text"/>	<input type="text"/>
Rotation →	<input type="text"/>	<input type="text"/>

Basic Movement	Definition	Diagram
Lateral Flexion →	<input type="text"/>	<input type="text"/>
Horizontal Flexion and Extension →	<input type="text"/>	<input type="text"/>
Hyper extension →	<input type="text"/>	<input type="text"/>
Horizontal Abduction and Adduction →	<input type="text"/>	<input type="text"/>
Circumduction →	<input type="text"/>	<input type="text"/>

PLENARY
SESSION



Name the movement and where it's taking place...

This is

_____ of the _____ joint.



PLENARY
SESSION

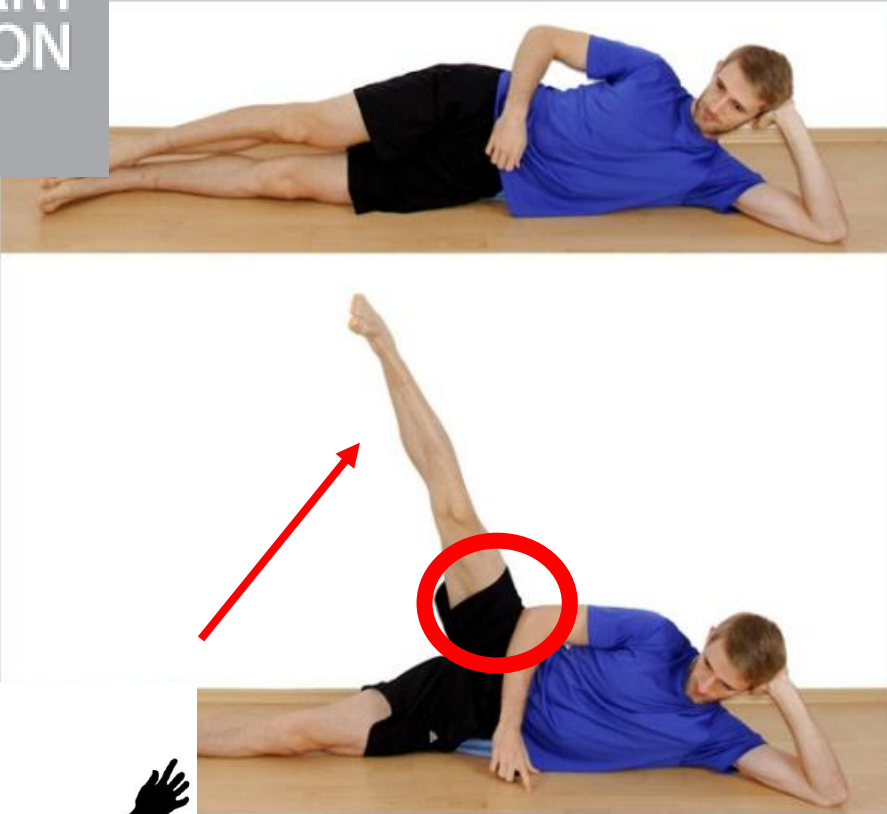


Name the movement and where it's taking place...

This is

_____ of the _____ joint.

PLENARY
SESSION



Name the movement and where it's taking place...

This is

_____ of the _____ joint.



PLENARY
SESSION



Name the movement and where it's taking place...

This is

_____ of the _____ joint.



PLENARY
SESSION



Name the movement and where it's taking place...

This is

_____ of the _____ joint.



PLENARY
SESSION



Name the movement and where it's taking place...

This is

_____ of the _____ joint.



PLENARY
SESSION



Name the movement and where it's taking place...

This is

_____ of the _____ joint.



Learning Objectives

- All: To identify the types of synovial joint
- Most: To explain the types of synovial joint
- Some: To explain the range of movement at synovial joints



A: The effects of exercise and sports performance on the skeletal system

Responses and adaptations of the skeletal system to sport and exercise



Learning Objectives

- All:** To know the responses of the skeletal system to a single sport or exercise session
- Most:** To explain the responses of the skeletal system to a single sport or exercise session
- Some:** To explain the adaptations of the skeletal system to exercise



A: The effects of exercise and sports performance on the skeletal system - Responses and adaptations of the skeletal system to sport and exercise



Case study

Many sporting movements look complex but in reality they can be viewed and analysed as separate, smaller movements. It is commonplace for modern coaches to use video equipment to film specific techniques so that the series of movements can be analysed and discussed with the athlete.

Consider the action of throwing a ball. You will use a number of different joints including the ball and socket joint of the shoulder, the hinge joint of the elbow and the gliding joints of the wrist (carpals). In combination with the skeletal muscles, you will be able to use the long bones as levers to produce a large powerful movement in order to throw the ball.

Now consider a tennis serve and the joint actions used. How are these similar to the action of throwing a ball? Many different sporting techniques will use similar joint actions and muscles that are refined to meet the needs of the specific sporting technique.

Check your knowledge

- 1 Can you think of any other sporting techniques that are similar?
- 2 What sports share the same movements?
- 3 How would a PE teacher or coach benefit from being able to identify different and identical sporting movements?

A: The effects of exercise and sports performance on the skeletal system - Responses and adaptations of the skeletal system to sport and exercise



Your aim as BTEC Sport Investigators is to read through pages 16 and 17 under 'Responses of the skeletal system to a single sport or exercise session' and 'Adaptations of the skeletal system to exercise'.

Using the following questions to shape your investigation you must produce a 5 minute presentation which you present to your class mates

- 1) When you exercise, what are the immediate responses your body makes?
- 2) Think about your warm-up before exercise. What happens to your body and why?
- 3) Research and draw up a list of the changes that occur in the skeletal system and explain why they happen during exercise?



All: To know the responses of the skeletal system to a single sport or exercise session

Most: To explain the responses of the skeletal system to a single sport or exercise session

Some: To explain the adaptations of the skeletal system to exercise

PLENARY
SESSION

In the space below define the term 'Acute Responses'



All: To know the responses of the skeletal system to a single sport or exercise session
Most: To explain the responses of the skeletal system to a single sport or exercise session
Some: To explain the adaptations of the skeletal system to exercise

Learning Objectives

- All:** To know the responses of the skeletal system to a single sport or exercise session
- Most:** To explain the responses of the skeletal system to a single sport or exercise session
- Some:** To explain the adaptations of the skeletal system to exercise



A: The effects of exercise and sports performance on the skeletal system

Additional factors
affecting the skeletal
system



Learning Objectives

- All: To identify additional factors affecting the skeletal system
- Most: To explain additional factors affecting the skeletal system





The 5 W's

Additional factors affecting the skeletal system

Create a question that you would like to know about the key term using

Who, What, Why, Where and When?



Arthritis



All: To identify additional factors affecting the skeletal system

Most: To explain additional factors affecting the skeletal system

Osteoporosis



All: To identify additional factors affecting the skeletal system

Most: To explain additional factors affecting the skeletal system

Age



All: To identify additional factors affecting the skeletal system

Most: To explain additional factors affecting the skeletal system

PLENARY
SESSION

The 5 W's

Additional factors affecting the skeletal system

Now answer the questions you created about the key term using

Who, What, Why, Where and When?



Learning Objectives

- All: To identify additional factors affecting the skeletal system
- Most: To explain additional factors affecting the skeletal system



**A: The effects of
exercise and sports
performance on the
skeletal system**



ASSESSMENT POINT 1



BTEC

Anatomy and Physiology

B: The effects of exercise and sports performance on the muscular system

- 
- 
- Characteristics and functions of different types of muscle
 - Major skeletal muscles of the muscular system
 - Antagonistic muscle pairs
 - Types of skeletal muscle contraction
 - Fibre types
 - Responses and adaptations of the muscular system to sport and exercise
 - Additional factors affecting the muscular system



BTEC



B: The effects of exercise and sports performance on the muscular system

Characteristics and functions of different types of muscle

Learning Objectives

- All: To identify the 3 main types of muscle
- Most: To know the characteristics of the different types of muscle
- Some: To know the function of the different types of muscle





Wordles

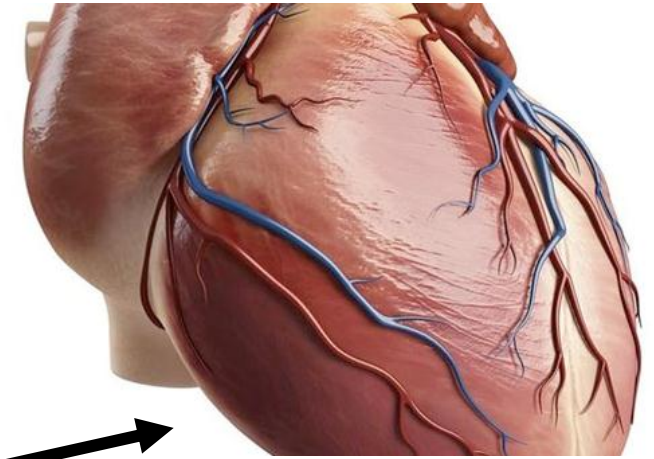
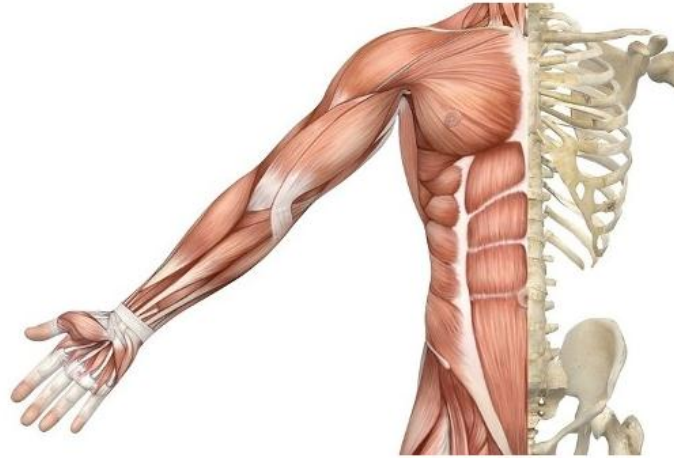
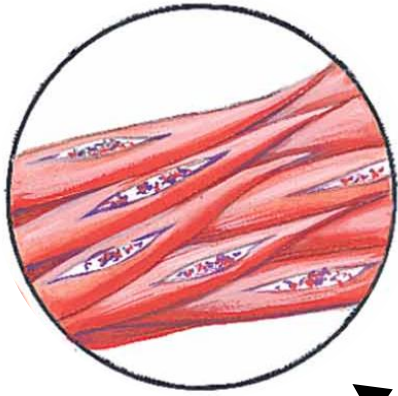
kaSleelt uescMI

dCriaac Mesclu

hSomot sMeclu



B: The effects of exercise and sports performance on the muscular system - Characteristics and functions of different types of muscle



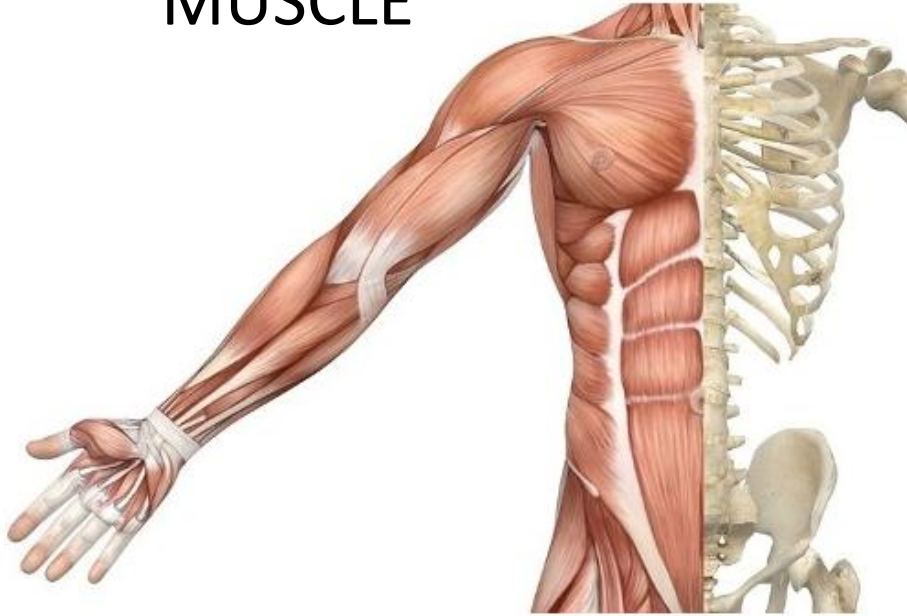
CARDIAC MUSCLE

SMOOTH MUSCLE

SKELETAL
MUSCLE



SKELETAL MUSCLE

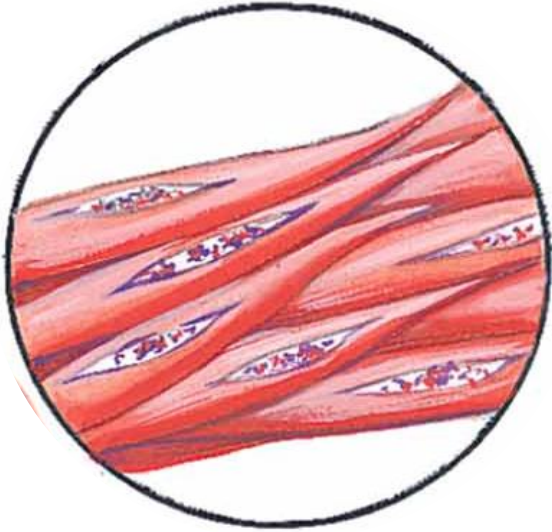


Read through pages 18-19 to identify the characteristics and functions



Read through pages 18-19 to identify the characteristics and functions

SMOOTH MUSCLE

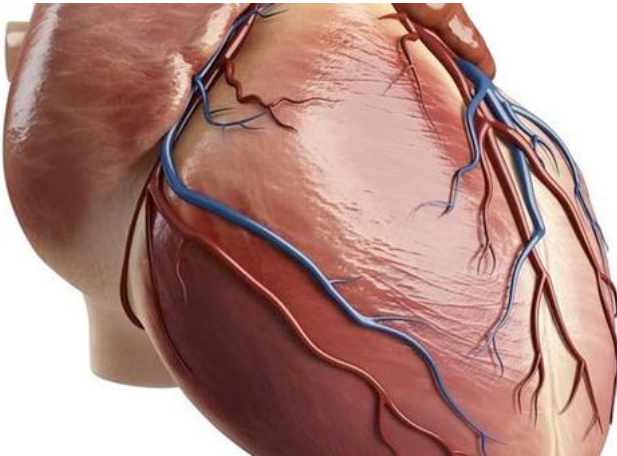


Most: To know the characteristics of the different types of muscle

Some: To know the function of the different types of muscle

Read through pages 18-19 to identify the characteristics and functions

CARDIAC MUSCLE



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Most: To know the characteristics of the different types of muscle

Some: To know the function of the different types of muscle



In pairs, compare the different types of muscle tissue and their function. Discuss the importance of each function in relation to the characteristics of the muscle



THINK
PAIR
SHARE



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Most: To know the characteristics of the different types of muscle

Some: To know the function of the different types of muscle

PLENARY
SESSION

Identify	Describe	Explain
Skeletal Muscle		
Cardiac Muscle		
Smooth Muscle		



Learning Objectives

- All: To identify the 3 main types of muscle
- Most: To know the characteristics of the different types of muscle
- Some: To know the function of the different types of muscle





B: The effects of exercise and sports performance on the muscular system

Major skeletal muscles of the muscular system

Learning Objectives

- All: To identify the main muscles of the body
- Most: To locate and describe the function of each muscle
- Some: To give a sport/exercise example of when each muscle is used



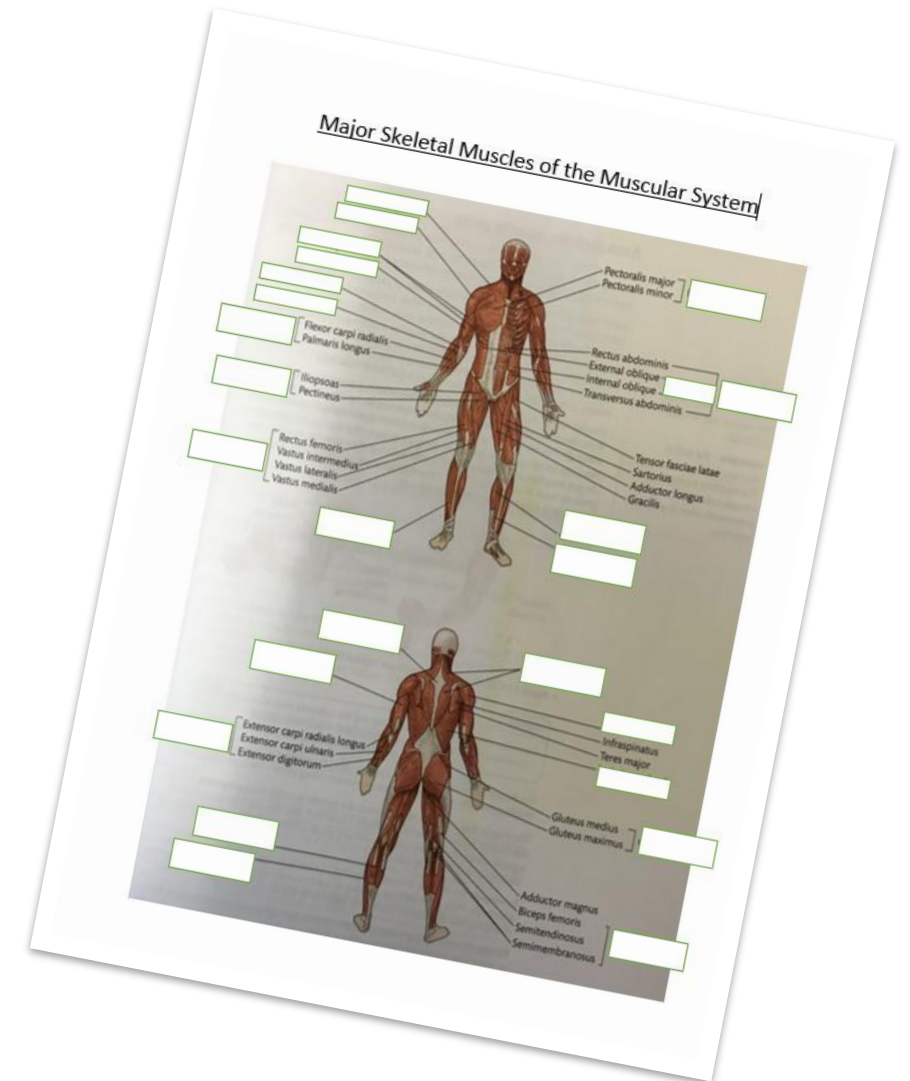


How many gaps can you fill in?

<https://www.youtube.com/watch?v=s-uXNgpcakU>



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All: To identify the main muscles of the body

Most: To locate and describe the function of each muscle



You will each get a card with a statement on. You must rotate around the room to try and find out all the statements which enables you to fill in the 'Major Skeletal Muscles and their Function' table!

Good luck!



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Four identical blank tables arranged in a 2x2 grid. Each table is titled 'Major Skeletal Muscles and their function' and contains a grid of 6 columns and 10 rows. The columns are labeled: Muscle, Function, Location, Origin, Insertion, and Exercise/Activity.

All: To identify the main muscles of the body

Most: To locate and describe the function of each muscle

PLENARY
SESSION



Join up in the below groups and as a group think of an exercise/sport example which goes with each muscle your group has – be prepared to share your ideas!

Remember to fill in the last column of the table with these examples!

Triceps
Deltoids
Pectorals
Biceps

Wrist flexors
Wrist extensors
Supinators
Pronators

Abdominals
Latissimus Dorsi
Teres Major
Obliques

Quadriceps
Hamstrings
Gastrocnemius
Soleus
Tibialis anterior

Erector spinae
Trapezius
Hip flexors
Gluteals



Learning Objectives

- All: To identify the main muscles of the body
- Most: To locate and describe the function of each muscle
- Some: To give a sport/exercise example of when each muscle is used





B: The effects of exercise and sports performance on the muscular system

Antagonistic muscle pairs

Learning Objectives

- All:** Know what antagonistic muscle pairs are
- Most:** Identify the agonist, antagonist, synergist and fixator when muscles work together
- Some:** To give sport examples of when antagonistic pairs are in motion





If this is the definition, what is the key term?



The fixed end of the muscle that remains stationary

The end of the muscle that moves



Antagonistic Muscle Pairs

When a muscle contracts, it exerts a pulling force on the bones to which it is attached, causing them to move together around the joint. Muscles cross the joints that they move. If a muscle did not cross a joint, no movement could occur.

(In the space below continue on from page 22...)



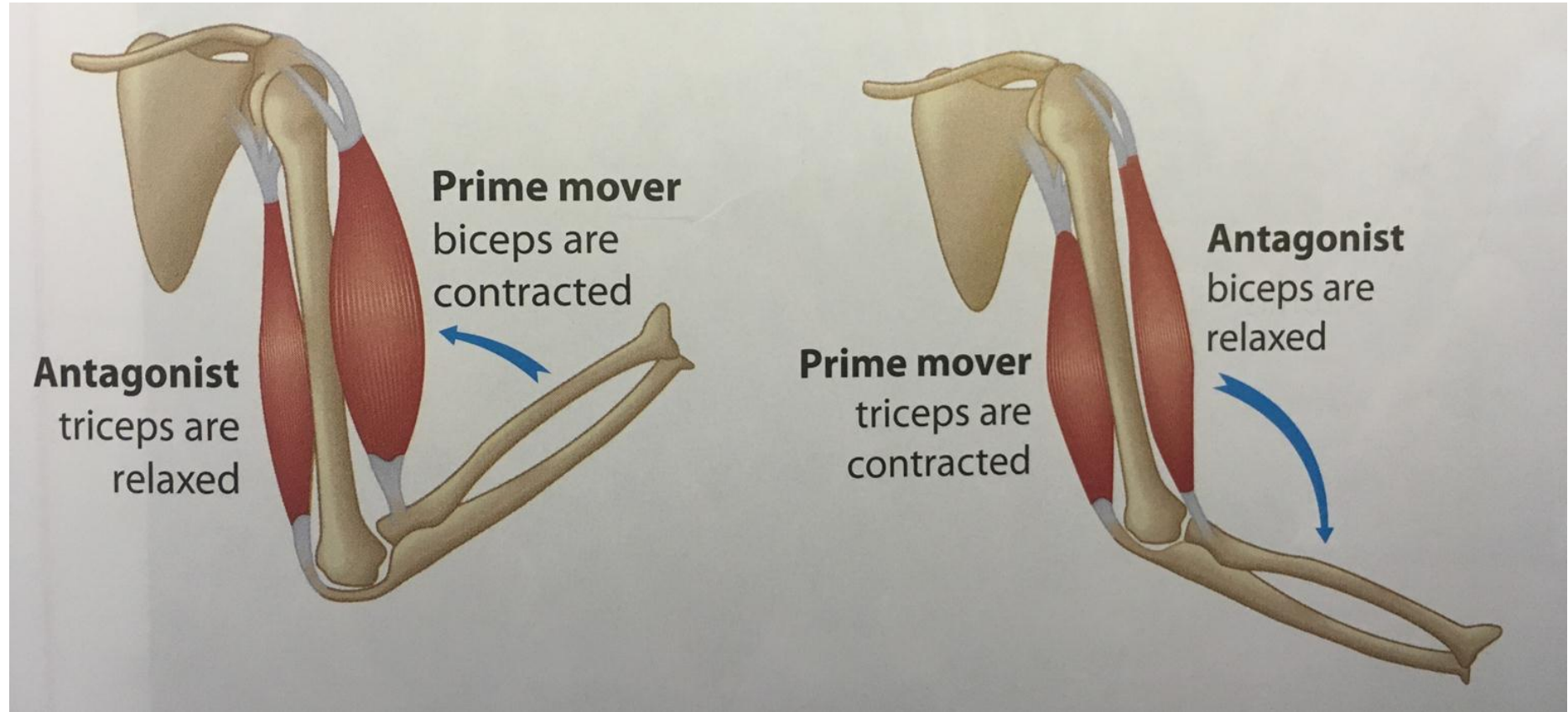
B: The effects of exercise and sports performance on the muscular system - Antagonistic muscle pairs

Muscles can only pull, not push. They are therefore arranged in pairs on either side of joints. One muscle contracts and pulls while the other relaxes, and vice versa.

The muscle that contracts is the **prime mover/agonist**

The muscle that relaxes is called the **antagonist**

This is why we say that muscles work in **ANTAGONISTIC PAIRS**



Agonist –

Antagonist –

Synergists –

Fixator –





Can you think of muscles that make up obvious antagonistic pairs? What joint movement do these antagonistic pairs create?

EXAMPLE:

The biceps and triceps act at the elbow as an antagonistic pair to create flexion and extension

A large, empty rectangular box with a thick purple border, intended for students to write their answers to the task question.

PLENARY
SESSION

Think of a sporting movement and list the pairs of muscles being used for each phase of movement. Can you identify the agonist, antagonist, synergist and fixator?



All: Know what antagonistic muscle pairs are

Most: Identify the agonist, antagonist, synergist and fixator when muscles work together

Some: To give sport examples of when antagonistic pairs are in motion

Learning Objectives

- All: Know what antagonistic muscle pairs are
- Most: Identify the agonist, antagonist, synergist and fixator when muscles work together
- Some: To give sports examples when antagonistic pairs are in motion





B: The effects of exercise and sports performance on the muscular system

Types of skeletal muscle contraction

Learning Objectives

- All: Identify the 3 main types of muscle contraction
- Most: Explain the 3 main types of muscle contraction
- Some: Give a sport example for the 3 main types of muscle contraction





Discussion:

Muscles can only pull on a bone, they can never push. Discuss a rugby scrum where a pushing force is required. Explain how a pushing force is created when muscles can only pull. What muscles are being used to create this movement?



Muscles Contract in two different ways:

ISOTONIC CONTRACTION

Concentric

Eccentric

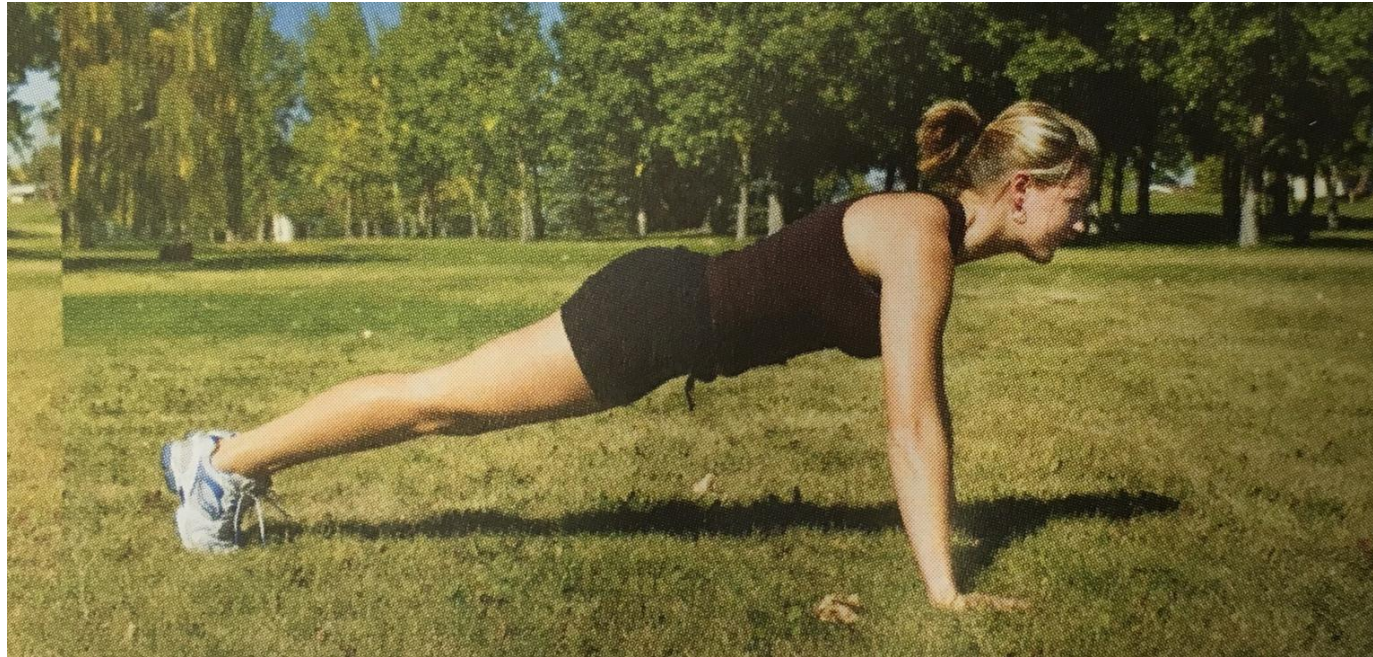
ISOMETRIC CONTRACTION



CONCENTRIC ISOTONIC CONTRACTION? ECCENTRIC ISOTONIC CONTRACTION? ISOMETRIC CONTRACTION?



CONCENTRIC ISOTONIC CONTRACTION? ECCENTRIC ISOTONIC CONTRACTION? ISOMETRIC CONTRACTION?



CONCENTRIC ISOTONIC CONTRACTION? ECCENTRIC ISOTONIC CONTRACTION? ISOMETRIC CONTRACTION?





Choose a sporting technique and write a paragraph relating the antagonistic pairs and types of contraction occurring!

A large, empty rectangular box with a purple border, intended for writing a paragraph.



PLENARY
SESSION

Reconsider the discussion at the beginning of the lesson – have your ideas changed?

Discussion:

Muscles can only pull on a bone, they can never push. Discuss a rugby scrum where a pushing force is required. Explain how a pushing force is created when muscles can only pull. What muscles are being used to create this movement?



Learning Objectives

- All: Identify the 3 main types of muscle contraction
- Most: Explain the 3 main types of muscle contraction
- Some: Give a sport example for the 3 main types of muscle contraction





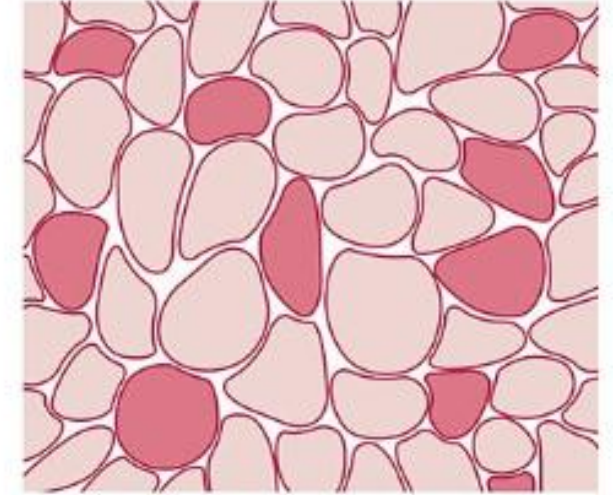
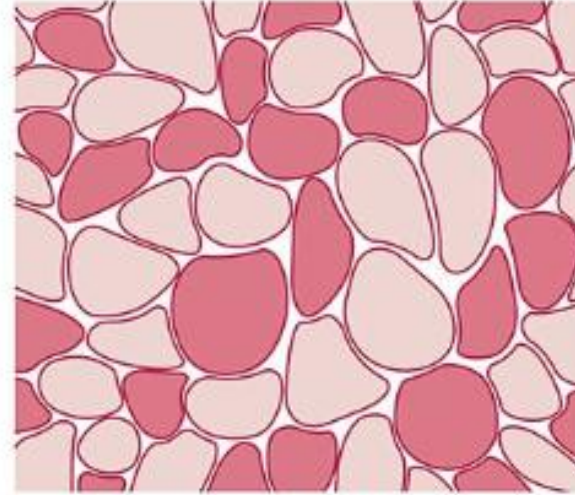
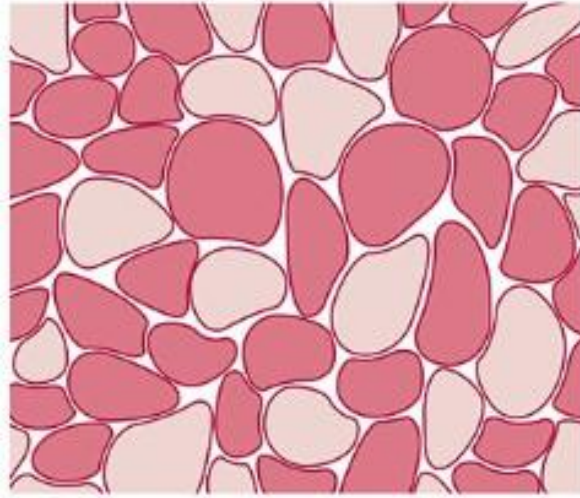
B: The effects of exercise and sports performance on the muscular system

Fibre types

Learning Objectives

- All: Identify the 3 main fibre types
- Most: Explain the 3 main fibre types
- Some: Give a sport example for the 3 main types of muscle contraction





Write a statement about what this image shows...



Fibre Types

All skeletal muscles are made up from muscle fibres. These fibres fall into two main categories depending on their speed of contraction:

Type I – Slow Twitch

Type II – Fast Twitch

The mix of fibres varies from individual to individual, and within the individual from muscle group to muscle group. To a large extent this fibre mix is inherited. However, training can influence the efficiency of the different fibre types.





Use page 24 to
complete the
table



Type I	Type IIa	Type IIx

Type I, Type IIa or Type

IIb



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Some: Give a sport example for the 3 main types of muscle contraction

Type I, Type IIa or Type



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Some: Give a sport example for the 3 main types of muscle contraction

Type I, Type IIa or Type



Type I, Type IIa or Type

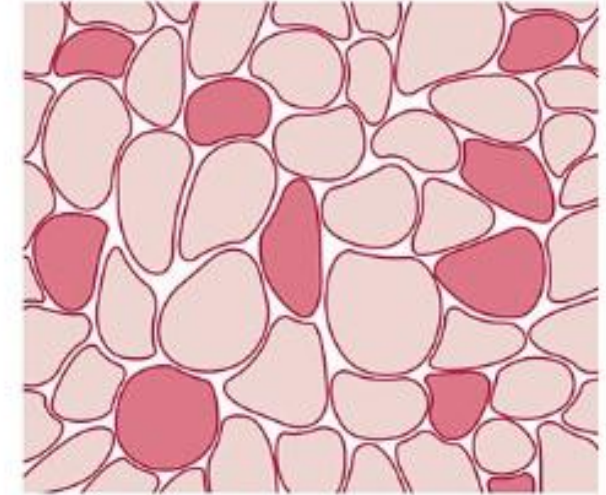
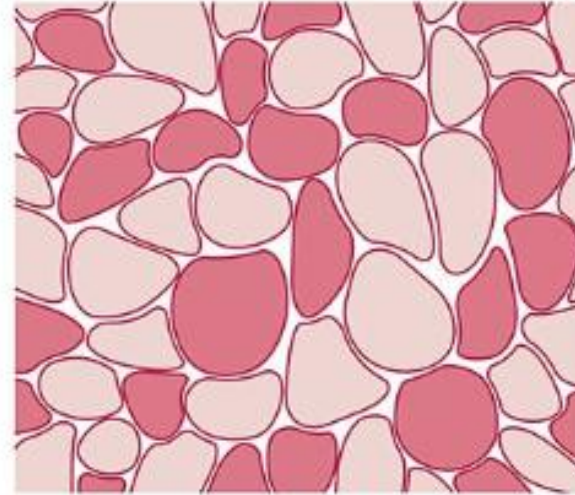
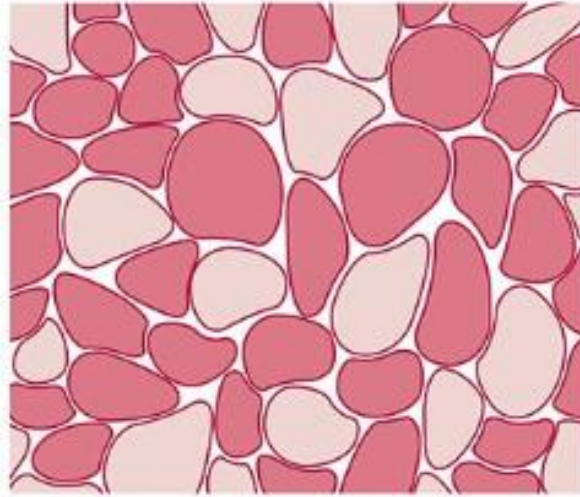
IIb



Pearson BTEC National Sport – Extended Certificate

Some: Give a sport example for the 3 main types of muscle contraction

PLENARY
SESSION



Would you change you original statement you made??

Write a statement about what this image shows...



Learning Objectives

- All: Identify the 3 main fibre types
- Most: Explain the 3 main fibre types
- Some: Give a sport example for the 3 main types of muscle contraction





B: The effects of exercise and sports performance on the muscular system

Responses and adaptations of the muscular system to sport and exercise

Learning Objectives

- All: To know the responses of the muscular system to a single sport or exercise session
- Most: To explain the responses of the muscular system to a single sport or exercise session
- Some: To explain the adaptations of the muscular system to exercise





Answer the following questions...

Can you explain the importance of different muscle contractions in sport?

Can you explain how different muscle fibre types affect sport?





Your aim as BTEC Sport Investigators is to read through pages 25 and 26 under 'Responses of the muscular system to a single sport or exercise session' and 'Adaptations of the muscular system to exercise'.

Using the following questions to shape your investigation you must produce a 5 minute presentation which you present to your class mates

- 1) When you exercise, what are the immediate responses your body makes?
- 2) Why do these changes happen during exercise?
- 3) What aspects of the warm up are used to prevent muscle injury? Why is a warm up before exercise important to your muscles?
- 4) What long term adaptations occur in your muscles when you exercise?



All: To know the responses of the muscular system to a single sport or exercise session

Most: To explain the responses of the muscular system to a single sport or exercise session

Some: To explain the adaptations of the muscular system to exercise

PLENARY
SESSION

In the space below define the term 'Carbohydrate'



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All: To know the responses of the muscular system to a single sport or exercise session

Most: To explain the responses of the muscular system to a single sport or exercise session

Some: To explain the adaptations of the muscular system to exercise

Learning Objectives

- All: To know the responses of the muscular system to a single sport or exercise session
- Most: To explain the responses of the muscular system to a single sport or exercise session
- Some: To explain the adaptations of the muscular system to exercise





B: The effects of exercise and sports performance on the muscular system

Additional factors affecting the muscular system

Learning Objectives

- All: To identify additional factors affecting the muscular system
- Most: To explain additional factors affecting the muscular system





The 5 W's

Additional factors affecting the muscular system

Create a question that you would like to know about the key term using

Who, What, Why, Where and When?



Table Text

You will be divided into 4 groups

Each group will be given a key term

Research the key term and write as much information as you can about the key term onto the tables in the time limit given

You will then rotate round your tables to fill in gaps on your lesson outline sheet



Key Terms

Age

Cramp

All: To identify additional factors affecting the muscular system

Most: To explain additional factors affecting the muscular system



Age



Cramp



PLENARY
SESSION

The 5 W's

Additional factors affecting the muscular system

Now answer the questions you created about the key term using

Who, What, Why, Where and When?



Learning Objectives

- All: To identify additional factors affecting the muscular system
- Most: To explain additional factors affecting the muscular system




**B: The effects of
exercise and sports
performance on the
muscular system**

ASSESSMENT POINT 2



Anatomy and Physiology

C: The effects of exercise and sports performance on the respiratory system

- 
- Structure of the respiratory system
 - Function of the respiratory system
 - Mechanisms and control of breathing
 - Gaseous exchange
 - Lung volumes
 - Responses and adaptations of the respiratory system to sport and exercise
 - Additional factors affecting the skeletal system

 **BTEC**



C: The effects of exercise and sports performance on the respiratory system

Structure of the respiratory system

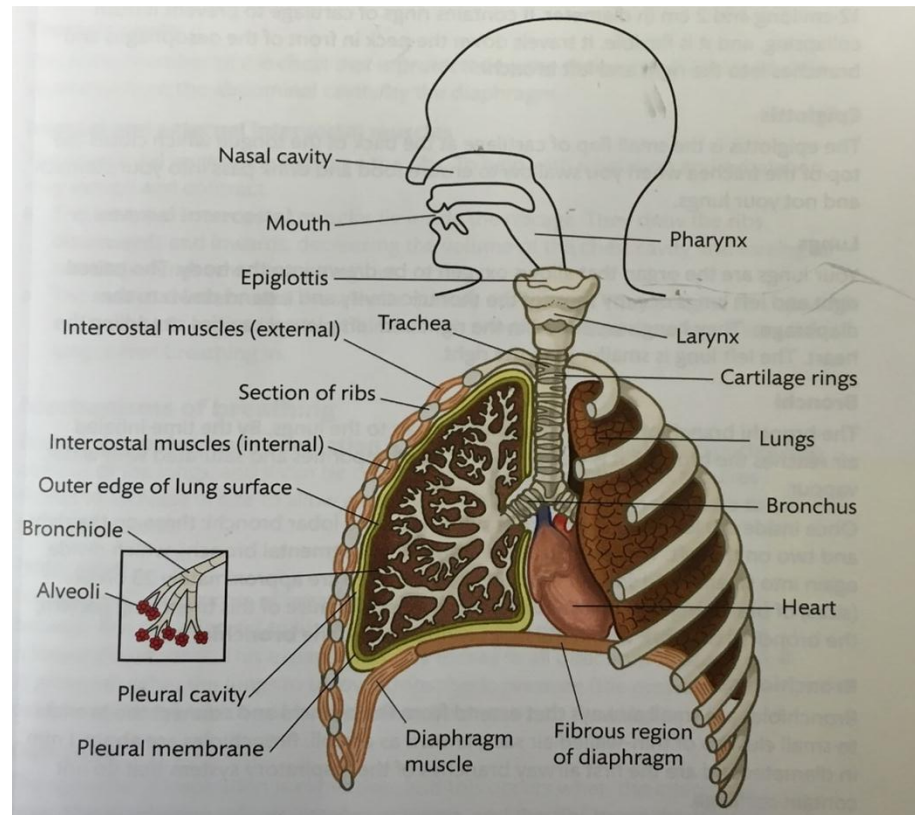
Learning Objectives

- All: To identify the main structures of the respiratory system
- Most: To locate the main structures of the respiratory system
- Some: To understand what the respiratory system is



Your task today will be to draw the respiratory system onto your plain white t-shirt

Use pages 28 – 29 to help you!



All: To identify the main structures of the respiratory system

Most: To locate the main structures of the respiratory system

Some: To understand what the respiratory system is

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Learning Objectives

- All: To identify the main structure of the respiratory system
- Most: To locate the main structure of the respiratory system
- Some: To understand what the respiratory system is





C: The effects of exercise and sports performance on the respiratory system

Function of the respiratory system

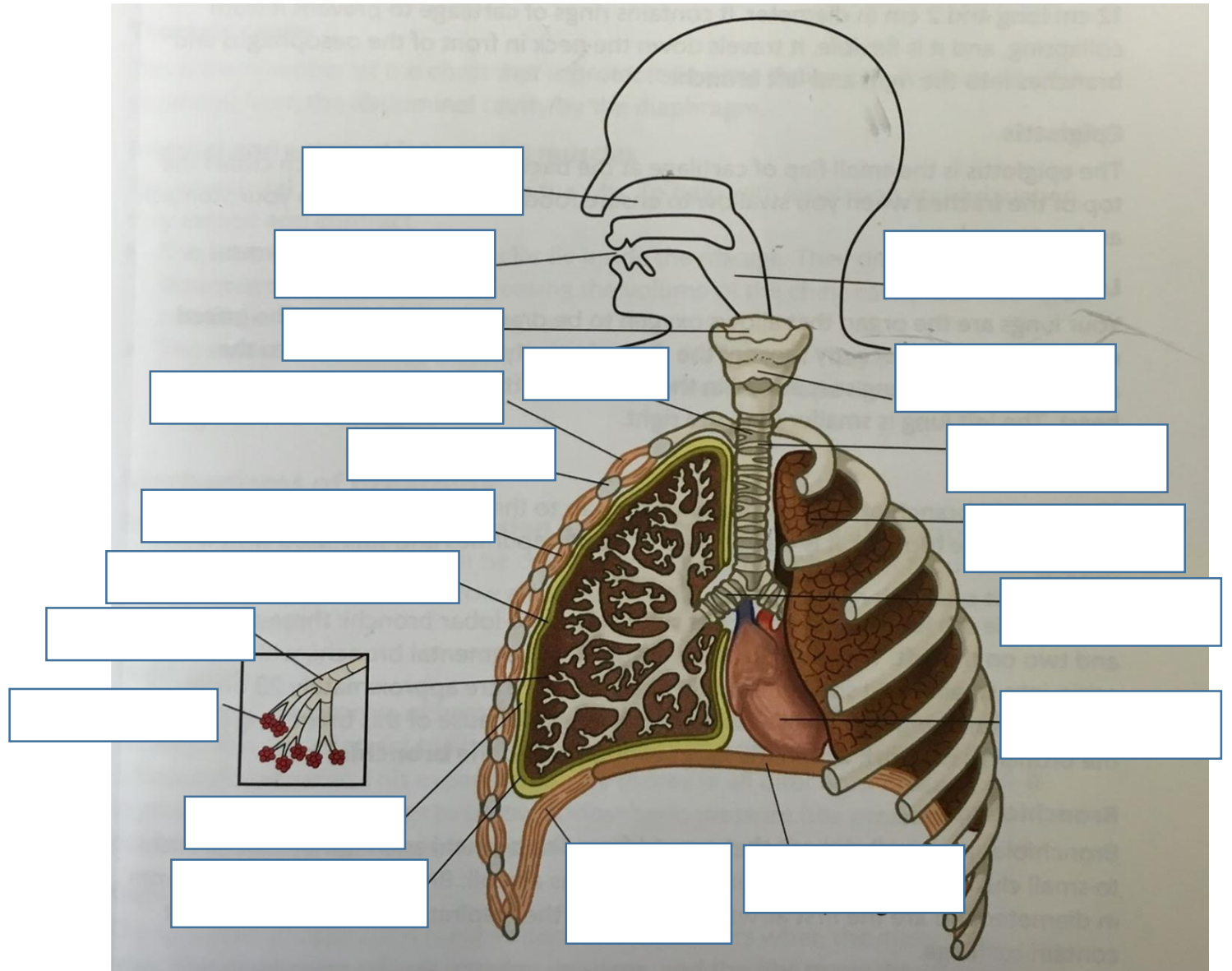
Learning Objectives

- All: To identify the main structures of the respiratory system
- Most: To explain the main structures of the respiratory system
- Some: To understand the function of the respiratory system

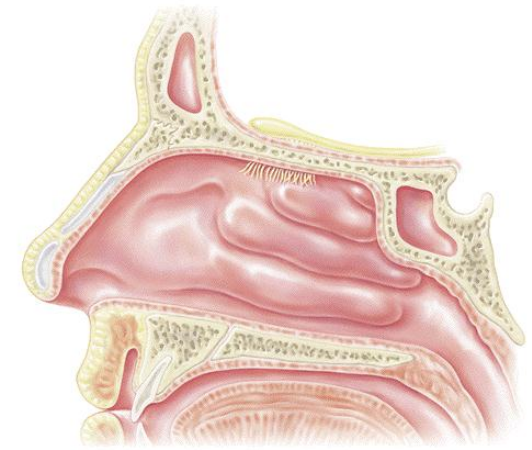




Fill in the blanks!



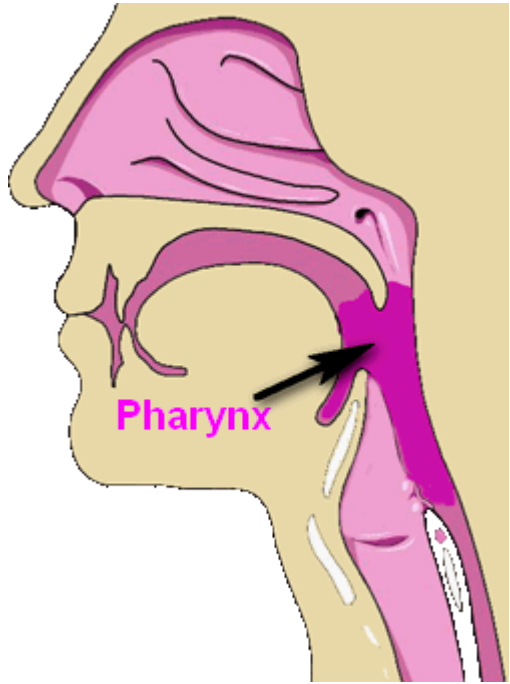
NASAL CAVITY



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Most: To explain the main structures of the respiratory system

Some: To understand the function of the respiratory system



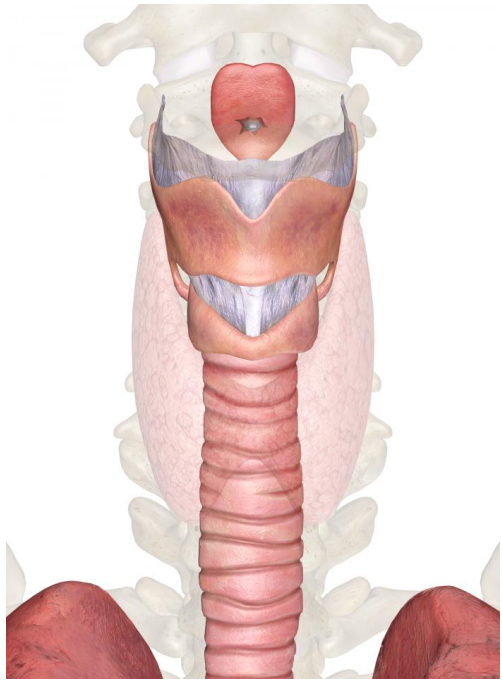
PHARYNX



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Most: To explain the main structures of the respiratory system

Some: To understand the function of the respiratory system



LARYNX



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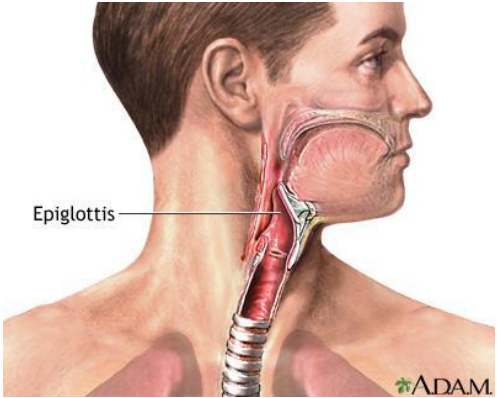
Most: To explain the main structures of the respiratory system

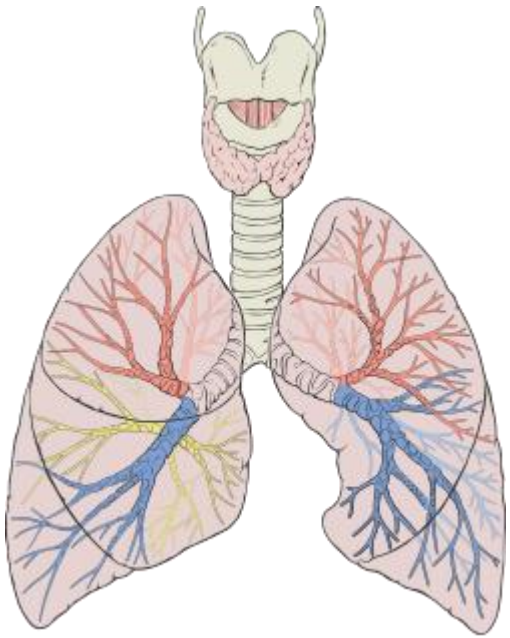
Some: To understand the function of the respiratory system

TRACHEA



EPIGLOTTIS



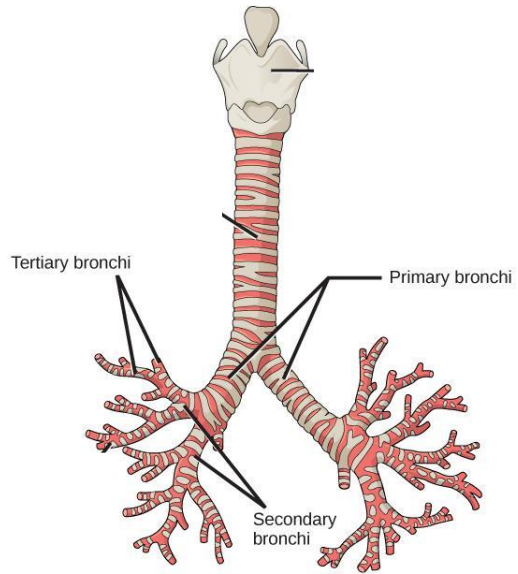


LUNGS

Most: To explain the main structures of the respiratory system

Some: To understand the function of the respiratory system

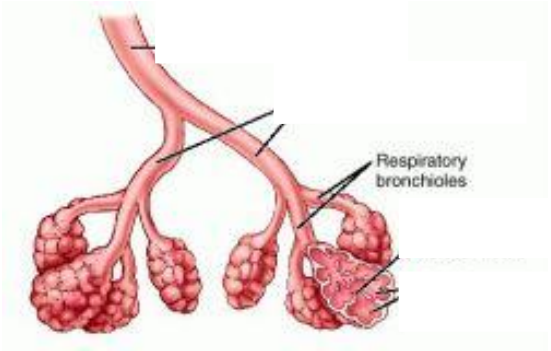
BRONCHI



Most: To explain the main structures of the respiratory system

Some: To understand the function of the respiratory system

BRONCHIOLES

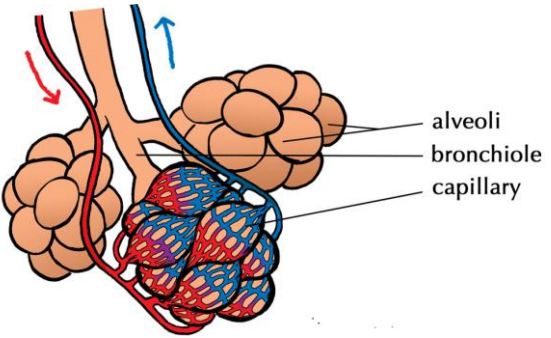


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Most: To explain the main structures of the respiratory system

Some: To understand the function of the respiratory system

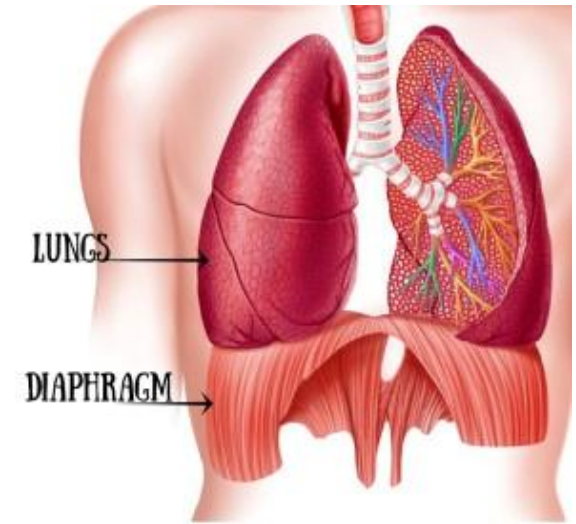
ALVEOLI



Most: To explain the main structures of the respiratory system

Some: To understand the function of the respiratory system

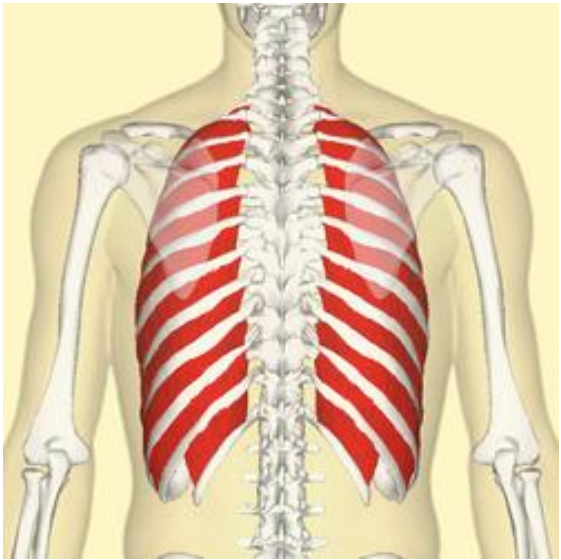
DIAPHRAGM



Most: To explain the main structures of the respiratory system

Some: To understand the function of the respiratory system

THROACIC CAVITY



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Most: To explain the main structures of the respiratory system

Some: To understand the function of the respiratory system

PLENARY
SESSION



Using the information from the lesson and worksheet, can you create a story telling us the pathway air takes through the respiratory system?



Story Time – The Journey of Air

Learning Objectives

- All: To identify the main structure of the respiratory system
- Most: To explain the main structure of the respiratory system
- Some: To understand the function of the respiratory system





C: The effects of exercise and sports performance on the respiratory system

Mechanisms and control of breathing

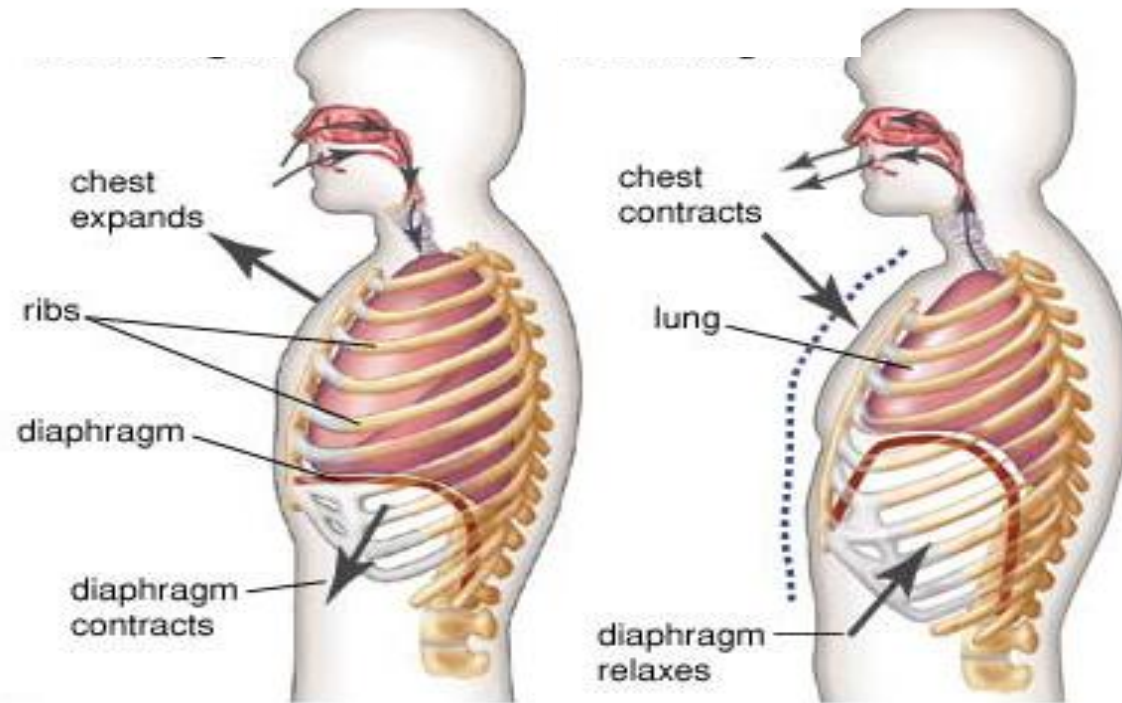
Learning Objectives

- All: To identify the mechanisms and control of breathing
- Most: To describe the mechanisms and control of breathing
- Some: To explain the mechanisms and control of breathing





What does this picture represent?



Jumbles

Can you unjumble the sentences?

Inhalation/Inspiration - Breathing the in of process

Exhalation/Expiration - Process out the breathing of





Make
notes
from
page 31

Write notes here about Inspiration and Expiration:





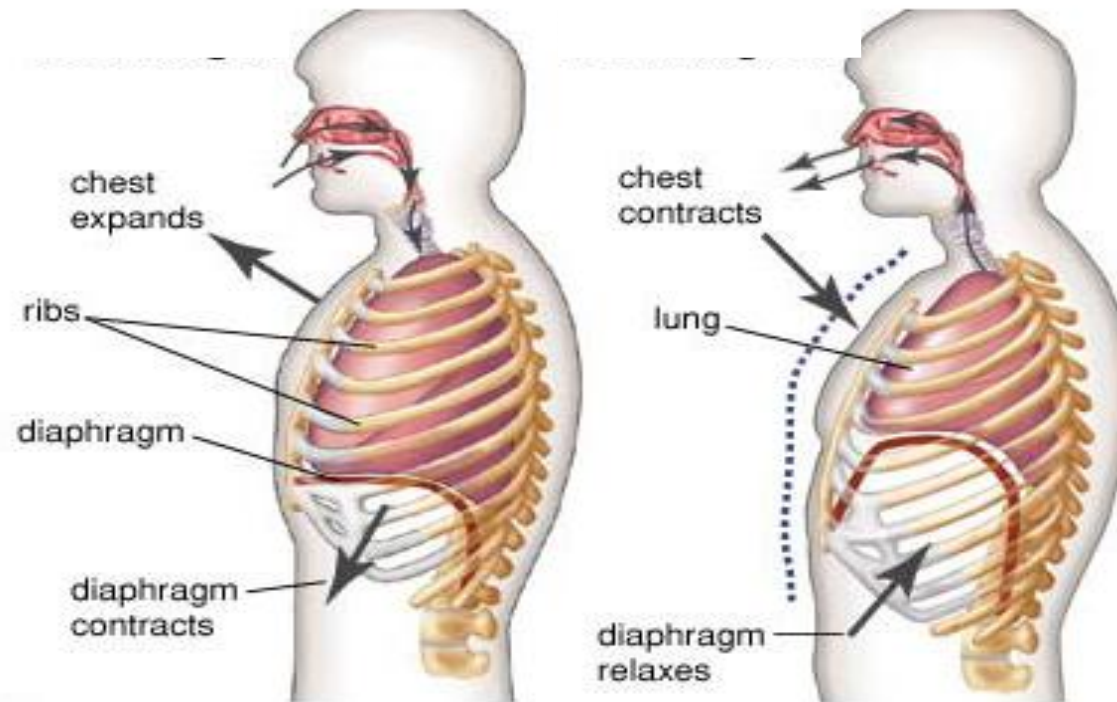
Make
notes
from
page
31-32

Write notes here about Neural Control and Chemical Control:



PLENARY
SESSION

Now tell me...What does this picture represent?



Learning Objectives

- All: To identify the mechanisms and control of breathing
- Most: To describe the mechanisms and control of breathing
- Some: To explain the mechanisms and control of breathing





C: The effects of exercise and sports performance on the respiratory system

Gaseous exchange

Learning Objectives

- All: To know what Gaseous Exchange is
- Most: To describe what Gaseous Exchange is
- Some: To explain what Gaseous Exchange is



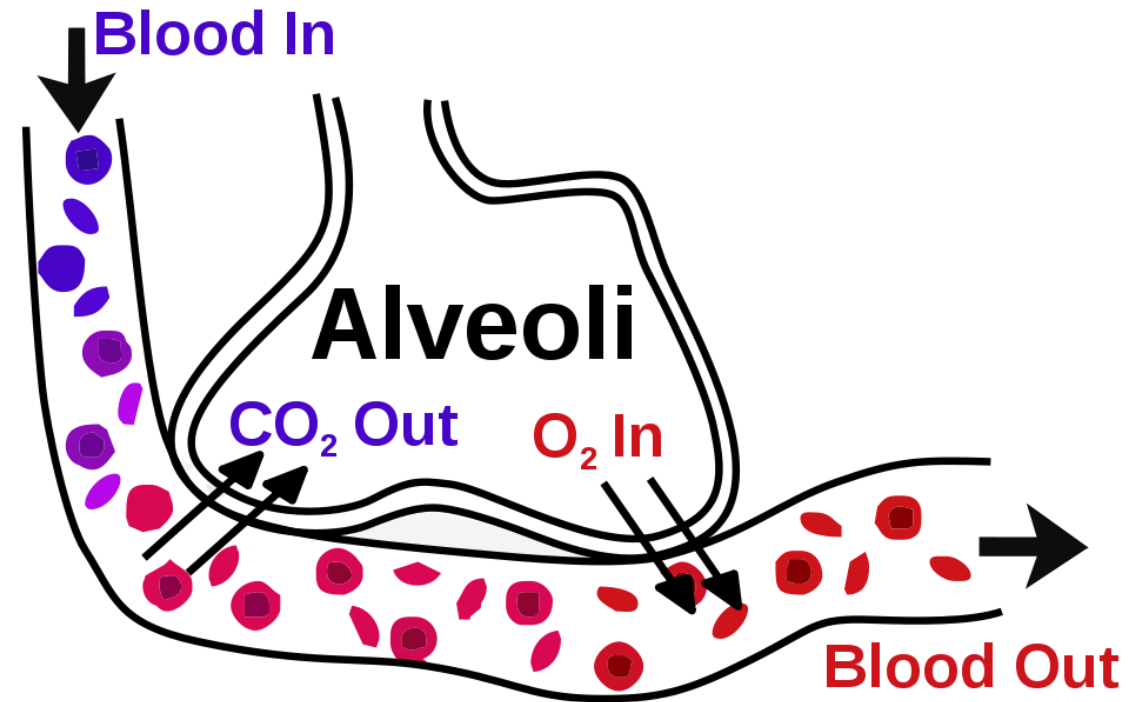
If this is the answer, what is the question?

The process where oxygen from the air in the alveoli moves into the blood in the capillaries, while carbon dioxide moves from the blood in the capillaries into the air in the alveoli



Gaseous Exchange =

The process where oxygen from the air in the alveoli moves into the blood in the capillaries, while carbon dioxide moves from the blood in the capillaries into the air in the alveoli



Alveoli

Capillaries

KEYWORDS



Haemoglobin

Oxyhaemoglobin

Diffusion pathway



All: To know what Gaseous Exchange is

Most: To describe what Gaseous Exchange is

Some: To explain what Gaseous Exchange is

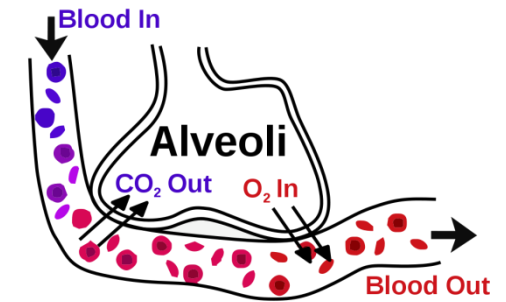
Use page 32 to summarise notes about what Gaseous Exchange is:



PLENARY
SESSION

1. What are the main two gases being exchanged between the lungs and the circulatory system?

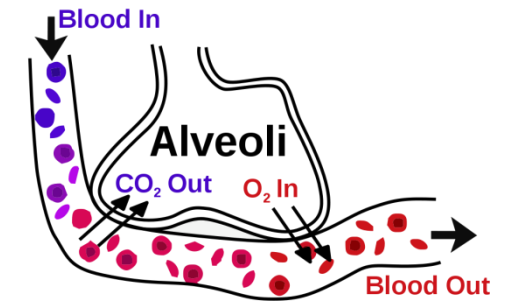
Flip card >



PLENARY
SESSION

2. Explain diffusion

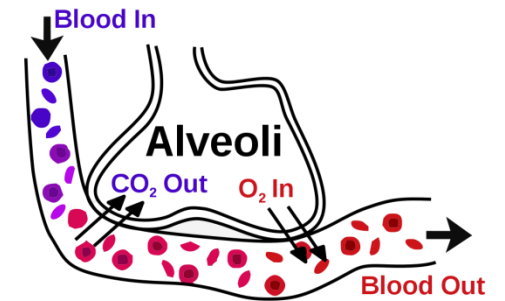
Flip Card ➤



PLENARY
SESSION

3. Which feature do both alveoli and capillaries share which aids gas exchange?

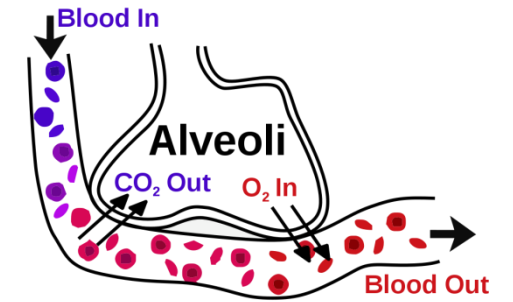
Flip Card ➤



PLENARY
SESSION

4. Why does carbon dioxide pass out of the blood supply when it reaches the alveoli?

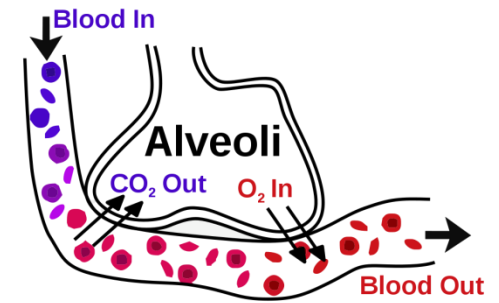
Flip Card ➤



PLENARY
SESSION

5. How much oxygen is in the air we breathe in and the air we breathe out?

Flip Card >



Learning Objectives

- All: To know what Gaseous Exchange is
- Most: To describe what Gaseous Exchange is
- Some: To explain what Gaseous Exchange is





C: The effects of exercise and sports performance on the respiratory system

Lung volumes

Learning Objectives

- All: To know what happens to your breathing during exercise
- Most: To understand your respiratory rate
- Some: To understand about Tidal Volumes





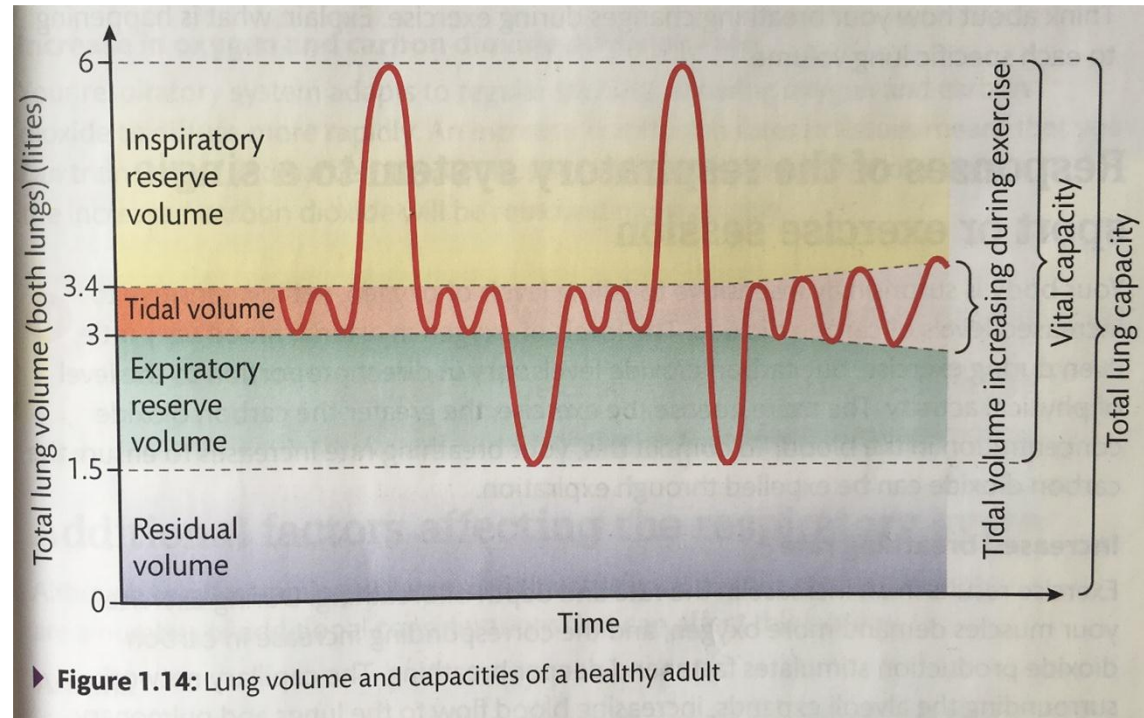
What happens to your breathing when you are exercising or training?

Why do you think this happens?



Respiratory Rate

Your respiratory rate is the amount of air you breathe in one minute. For a typical 18 year old, this represents about 12 breaths per minute at rest, during which time about 6 litres of air passes through the lungs. It can increase significantly during exercise by as much as 30-40 breaths per minute.





Watch the you tube clip and answer the following questions:

<https://www.youtube.com/watch?v=U-g5FvRwnhQ>

What is Tidal Volume?

What is Minute Volume?

What is Residual Volume?

What is Vital Capacity?

What is Inspiratory Reserve Volume?

What is Expiratory Reserve Volume?

What is Total Lung Volume?



PLENARY
SESSION

Write a list of the lung volumes and describe each one

Think about how your breathing changes during exercise. Explain what is happening to each specific lung volume.



Learning Objectives

- All: To know what happens to your breathing during exercise
- Most: To understand your respiratory rate
- Some: To understand about Tidal Volumes





C: The effects of exercise and sports performance on the respiratory system

Responses and adaptations of the respiratory system to sport and exercise

Learning Objectives

- All: To know the responses of the respiratory system to a single sport or exercise session
- Most: To explain the responses of the respiratory system to a single sport or exercise session
- Some: To explain the adaptations of the respiratory system to exercise





Write a list of the lung volumes and describe each one

Think about how your breathing changes during exercise. Explain what is happening to each specific lung volume.



All: To know the responses of the respiratory system to a single sport or exercise session

Most: To explain the responses of the respiratory system to a single sport or exercise session

Some: To explain the adaptations of the respiratory system to exercise



Your aim as BTEC Sport Investigators is to read through pages 34 and 35 under 'Responses of the respiratory system to a single sport or exercise session' and 'Adaptations of the respiratory system to exercise'.

Using the following questions to shape your investigation you must produce a 5 minute presentation which you present to your class mates

- 1) When you exercise, what are the immediate responses your body makes?
- 2) Why do these changes happen during exercise?
- 3) Why is the respiratory system so important to sports performance?
- 4) Describe how the respiratory system adapts to long term exercise?
- 5) Explain why each adaptation can improve sport and exercise performance?



All: To know the responses of the respiratory system to a single sport or exercise session
Most: To explain the responses of the respiratory system to a single sport or exercise session
Some: To explain the adaptations of the respiratory system to exercise

PLENARY
SESSION



How would these the respiratory systems of these two sportsmen differ with response to their sport?

All: To know the responses of the respiratory system to a single sport or exercise session
Most: To explain the responses of the respiratory system to a single sport or exercise session
Some: To explain the adaptations of the respiratory system to exercise



Learning Objectives

- All: To know the responses of the respiratory system to a single sport or exercise session
- Most: To explain the responses of the respiratory system to a single sport or exercise session
- Some: To explain the adaptations of the respiratory system to exercise





C: The effects of exercise and sports performance on the respiratory system

Additional factors affecting the respiratory system

Learning Objectives

- All: To identify additional factors affecting the respiratory system
- Most: To explain additional factors affecting the respiratory system





The 5 W's

Additional factors affecting the
respiratory system

Create a question that you would like to
know about the key term using

Who, What, Why, Where and When?



C: The effects of exercise and sports performance on the respiratory system - Additional factors affecting the respiratory system

Table Text

You will be divided into 8 groups

Each group will be given a key term

Research the key term and write as much information as you can about the key term onto the tables in the time limit given

You will then rotate round your tables to fill in gaps on your lesson outline sheet



Key Terms

Asthma

Altitude/Partial Pressure



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All: To identify additional factors affecting the respiratory system

Most: To explain additional factors affecting the respiratory system

Asthma



Altitude/Partial pressure



PLENARY
SESSION

The 5 W's

Additional factors affecting the
respiratory system

Now answer the questions you created
about the key term using

Who, What, Why, Where and When?



Learning Objectives

- All: To identify additional factors affecting the respiratory system
- Most: To explain additional factors affecting the respiratory system





**C: The effects of
exercise and sports
performance on the
respiratory system**

ASSESSMENT POINT 3

 **BTEC**

Anatomy and Physiology

D: The effects of exercise and sport performance on the cardiovascular system



- Structure of the cardiovascular system
- Structure of blood vessels
- Composition of blood
- Function of the cardiovascular system
- Nervous control of the cardiac cycle
- Responses and adaptations of the cardiovascular system to sport and exercise
- Additional factors affecting the skeletal system



D: The effects of exercise and sports performance on the cardiovascular system

Structure of the cardiovascular
system

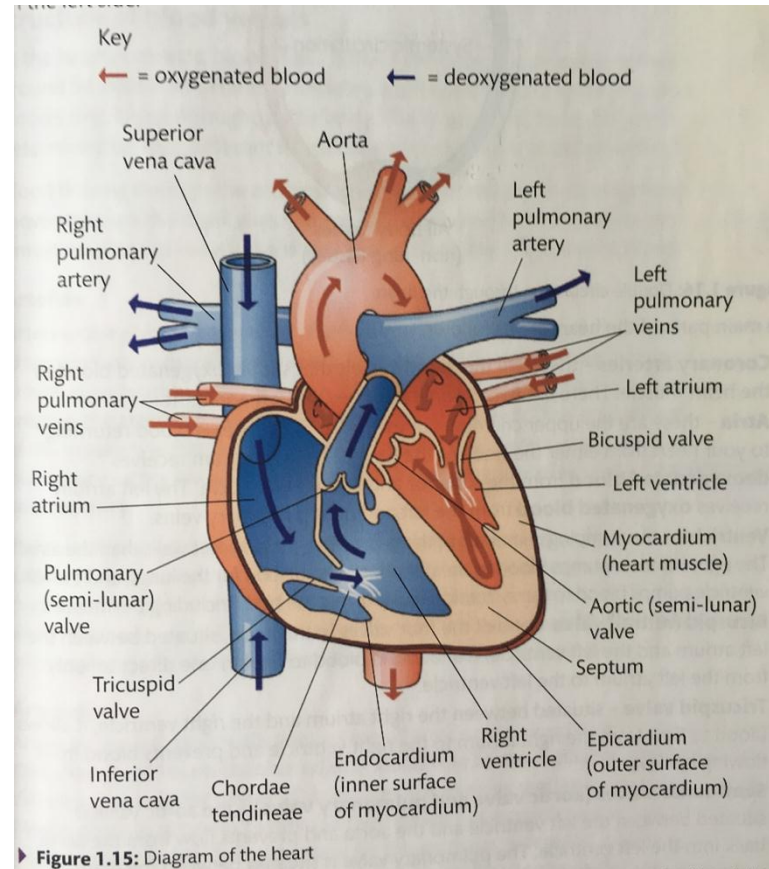
Learning Objectives

- All: To identify the main structures of the cardiovascular system
- Most: To locate the main structures of the cardiovascular system
- Some: To understand what the cardiovascular system is



Your task today will be to draw the
respiratory system onto your plain white t-
shirt

Use pages 36 – 38 to help
you!



All: To identify the main structures of the
cardiovascular system

Most: To locate the main structures of the
cardiovascular system

Some: To understand what the cardiovascular
system is



Learning Objectives

- All: To identify the main structure of the cardiovascular system
- Most: To locate the main structure of the cardiovascular system
- Some: To understand what the cardiovascular system is





D: The effects of exercise and sports performance on the cardiovascular system

Structure of blood vessels

Learning Objectives

- All: To know the 5 main types of blood vessel
- Most: To describe the 5 main types of blood vessel
- Some: To explain the 5 main types of blood vessel





Think and be prepared to discuss and share what you think blood vessels are and why they are important to exercise ?



THINK
PAIR
SHARE



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All: To know the 5 main types of blood vessel

Most: To describe the 5 main types of blood vessel

Some: To explain the 5 main types of blood vessel



You will be divided into 5 teams
Each team will focus on 1 type of blood vessel given to you by the teacher

You have 15 minutes to research that type of feedback and create a presentation which must follow the below structure:

Verbal information about the blood vessel

Visual information about the blood vessel

Create a mini quiz for your class mates to test that they have been listening to you!

Arteries

Arterioles

Capillaries

Veins

Venules



All: To know the 5 main types of blood vessel

Most: To describe the 5 main types of blood vessel

Some: To explain the 5 main types of blood vessel

Arteries



All: To know the 5 main types of blood vessel

Most: To describe the 5 main types of blood vessel

Some: To explain the 5 main types of blood vessel

Arterioles



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All: To know the 5 main types of blood vessel

Most: To describe the 5 main types of blood vessel

Some: To explain the 5 main types of blood vessel

Capillaries



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All: To know the 5 main types of blood vessel

Most: To describe the 5 main types of blood vessel

Some: To explain the 5 main types of blood vessel

Veins



All: To know the 5 main types of blood vessel

Most: To describe the 5 main types of blood vessel

Some: To explain the 5 main types of blood vessel

Venules



All: To know the 5 main types of blood vessel

Most: To describe the 5 main types of blood vessel

Some: To explain the 5 main types of blood vessel

PLENARY
SESSION

Explain the functions of veins, venules, arteries, arterioles and capillaries...



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All: To know the 5 main types of blood vessel

Most: To describe the 5 main types of blood vessel

Some: To explain the 5 main types of blood vessel

Learning Objectives

- All: To know the 5 main types of blood vessel
- Most: To describe the 5 main types of blood vessel
- Some: To explain the 5 main types of blood vessel





D: The effects of exercise and sports performance on the cardiovascular system

Composition of blood

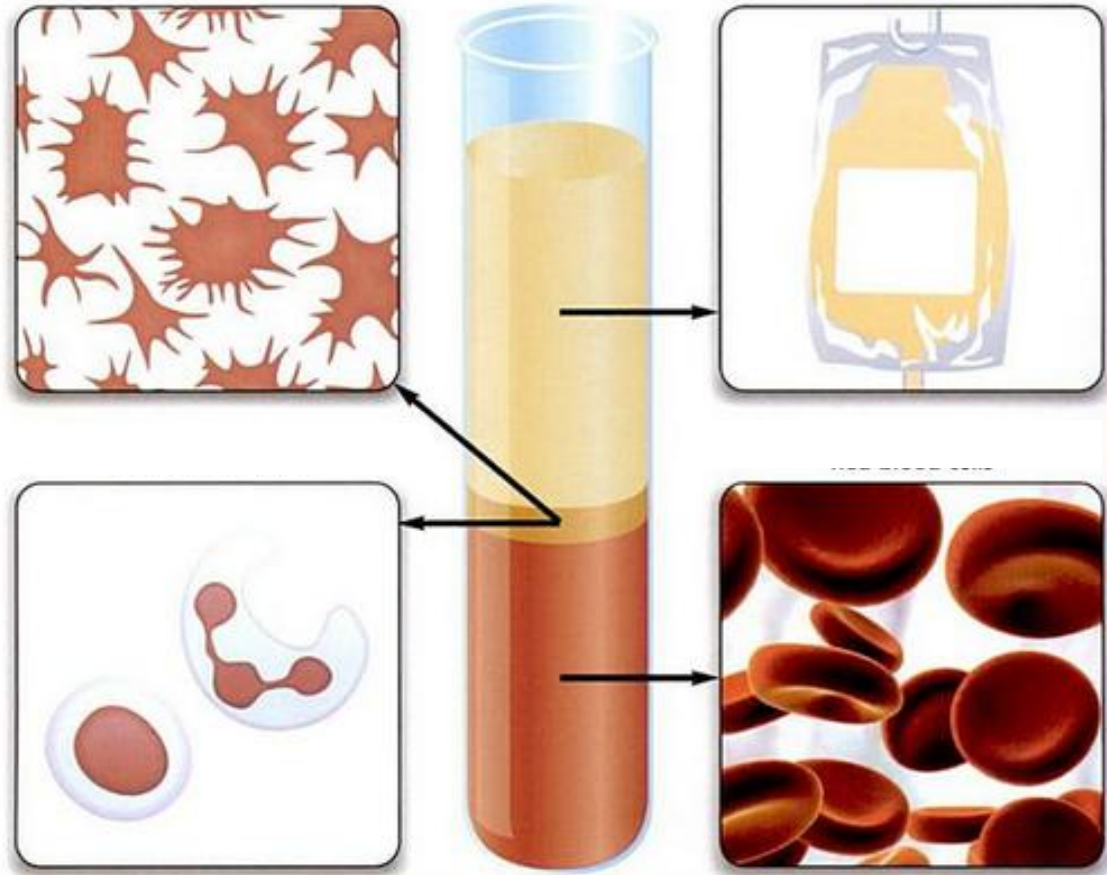
Learning Objectives

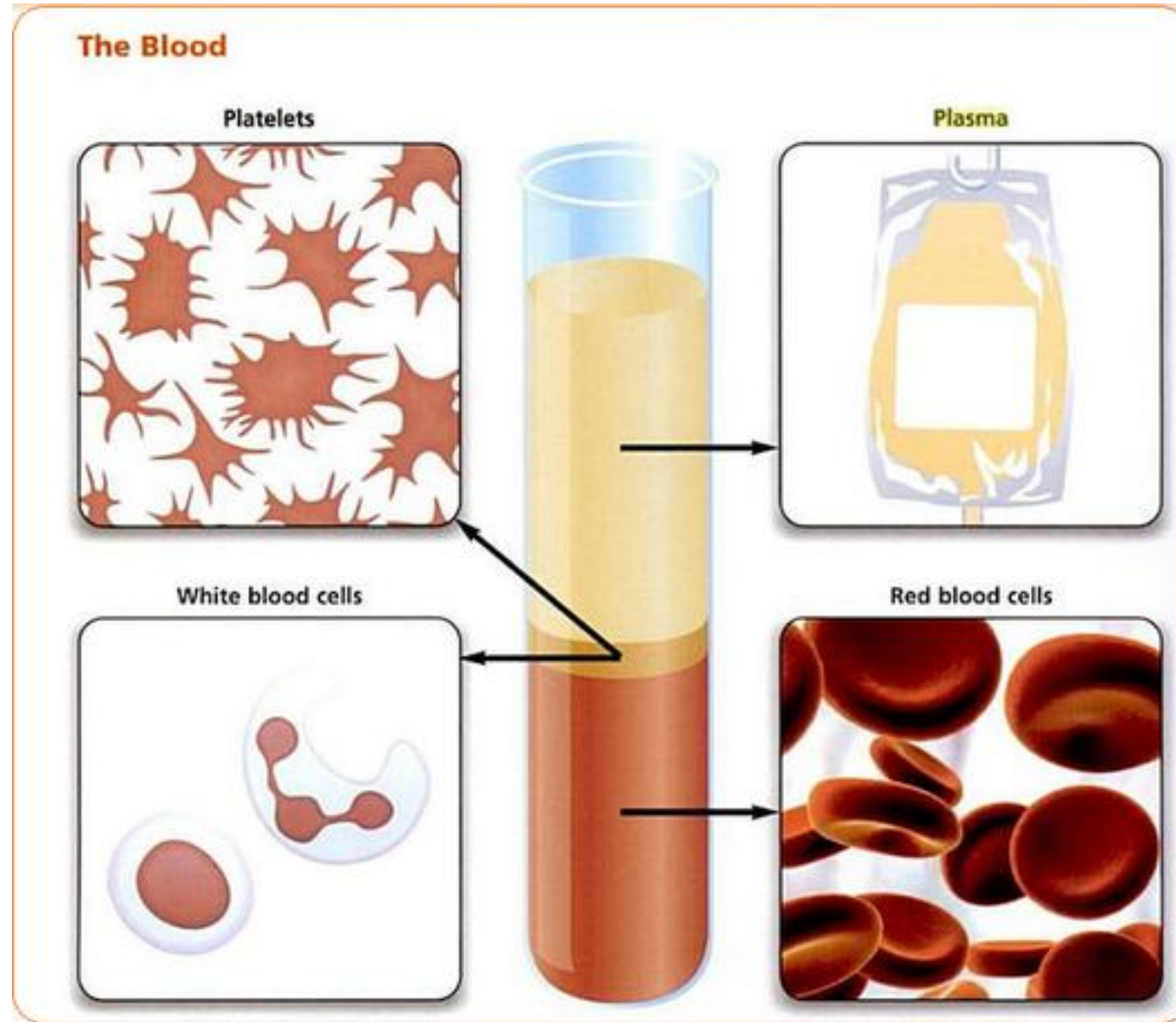
- All: To identify what the blood is composed of
- Most: To describe what the blood is composed of
- Some: To explain what the blood is composed of





What does this image represent?







<https://www.youtube.com/watch?v=YHCIMKZ0zrg>

Watch the you tube video and fill in as much information as you can about:

Red Blood Cells

Plasma

White Blood Cells

Platelets



Red Blood Cells



All: To identify what the blood is composed of
Most: To describe what the blood is composed of
Some: To explain what the blood is composed of

Plasma



White Blood Cells



Platelets



All: To identify what the blood is composed of
Most: To describe what the blood is composed of
Some: To explain what the blood is composed of

PLENARY
SESSION

Now that you have learnt about the blood in more detail...

Give me 10 key words that relate to.....



BLOOD



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All: To identify what the blood is composed of
Most: To describe what the blood is composed of
Some: To explain what the blood is composed of

Learning Objectives

- All: To identify what the blood is composed of
- Most: To describe what the blood is composed of
- Some: To explain what the blood is composed of





D: The effects of exercise and sports performance on the cardiovascular system

Function of the cardiovascular system

Learning Objectives

- All: To know the function of the cardiovascular system
- Most: To describe the function of the cardiovascular system
- Some: To explain the function of the cardiovascular system





[https://www.youtube.com/watch?v= eVG45 iF9U](https://www.youtube.com/watch?v=eVG45_iF9U)

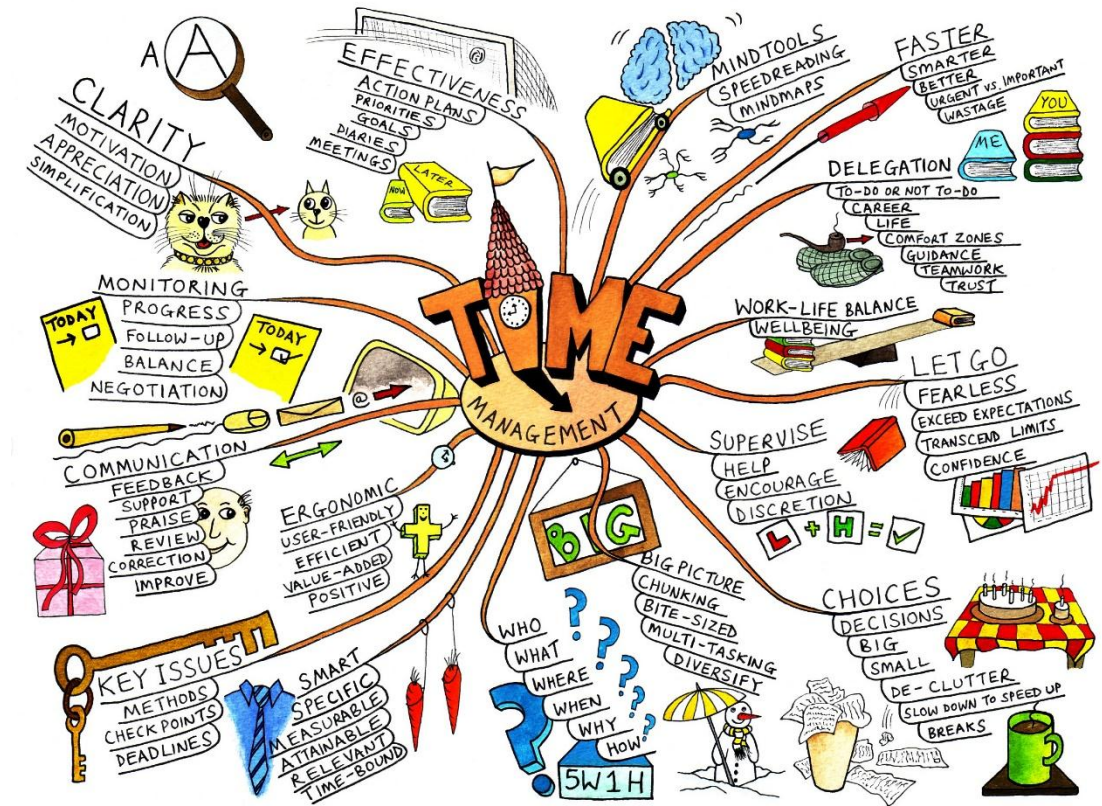
List down what you think the main functions of the cardiovascular system are by watching this you tube clip.

A large, empty rectangular box with a purple border, intended for students to write down the main functions of the cardiovascular system.

CONVERSION

Turn the text on pages 41 and 42 into 1 giant mind map on:

Function of the cardiovascular system



All: To know the function of the cardiovascular system

Most: To describe the function of the cardiovascular system

Some: To explain the function of the cardiovascular system



PLENARY
SESSION

On your whiteboards answer
the following question:
**Why are the functions of the
cardiovascular system so
important to sports
performance?**



Learning Objectives

- All: To know the function of the cardiovascular system
- Most: To describe the function of the cardiovascular system
- Some: To explain the function of the cardiovascular system





D: The effects of exercise and sports performance on the cardiovascular system

Nervous control of the cardiac cycle

Learning Objectives

- All: To know the nervous control of the cardiac cycle
- Most: To describe the nervous control of the cardiac cycle
- Some: To explain the nervous control of the cardiac cycle





If this is the question what is the answer?

The process of the heart filling with blood followed by a contraction where the blood is pumped out is known as what?



Draw out the diagram on page 43 below:



All: To know the nervous control of the cardiac cycle

Most: To describe the nervous control of the cardiac cycle

Some: To explain the nervous control of the cardiac cycle

SA NODE (SAN)

ATRIOVENTRICULAR NODE (AVN)

BUNDLE OF HIS / PURKINJE FIBRES



All: To know the nervous control of the cardiac cycle

Most: To describe the nervous control of the cardiac cycle

Some: To explain the nervous control of the cardiac cycle

SYMPATHETIC NERVOUS
SYSTEM



All: To know the nervous control of the cardiac cycle

Most: To describe the nervous control of the cardiac cycle

Some: To explain the nervous control of the cardiac cycle

PARASYMPATHETIC
NERVOUS
SYSTEM



All: To know the nervous control of the cardiac cycle

Most: To describe the nervous control of the cardiac cycle

Some: To explain the nervous control of the cardiac cycle

PLENARY
SESSION

If this is the answer what is the question?

Nervous control of the cardiac cycle



Learning Objectives

- All: To know the nervous control of the cardiac cycle
- Most: To describe the nervous control of the cardiac cycle
- Some: To explain the nervous control of the cardiac cycle





D: The effects of exercise and sports performance on the cardiovascular system

Responses and adaptations of the cardiovascular system to sport and

Learning Objectives

- All: To know the responses of the cardiovascular system to a single sport or exercise session
- Most: To explain the responses of the cardiovascular system to a single sport or exercise session
- Some: To explain the adaptations of the cardiovascular system to exercise





Summarise remembering to name all the key parts, the nervous control of the cardiac cycle



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All: To know the responses of the respiratory system to a single sport or exercise session

Most: To explain the responses of the respiratory system to a single sport or exercise session

Some: To explain the adaptations of the respiratory system to exercise



Your aim as BTEC Sport Investigators is to read through pages 44 – 46 under 'Responses of the cardiovascular system to a single sport or exercise session' and 'Adaptations of the cardiovascular system to exercise'.

Using the following questions to shape your investigation you must produce a 5 minute presentation which you present to your class mates

- 1) When you exercise, what are the immediate responses your body makes?
- 2) Why do these changes happen during exercise?
- 3) What is meant by cardiac output?
- 4) Describe the two components of cardiac output. What are the long term adaptations affecting your cardiac output due to an exercise programme?



All: To know the responses of the respiratory system to a single sport or exercise session

Most: To explain the responses of the respiratory system to a single sport or exercise session

Some: To explain the adaptations of the respiratory system to exercise

PLENARY
SESSION

During warm ups what changes would occur to your cardiovascular system?

How would your body adapt to control your temperature?

What would happen if you exercised at a higher intensity



All: To know the responses of the respiratory system to a single sport or exercise session

Most: To explain the responses of the respiratory system to a single sport or exercise session

Some: To explain the adaptations of the respiratory system to exercise

Learning Objectives

- All: To know the responses of the cardiovascular system to a single sport or exercise session
- Most: To explain the responses of the cardiovascular system to a single sport or exercise session
- Some: To explain the adaptations of the cardiovascular system to exercise





D: The effects of exercise and sports performance on the cardiovascular system

Additional factors affecting the cardiovascular system

Learning Objectives

- All: To identify additional factors affecting the cardiovascular system
- Most: To explain additional factors affecting the cardiovascular system





The 5 W's

Additional factors affecting the cardiovascular system

Create a question that you would like to know about the key term using

Who, What, Why, Where and When?



Table Text

You will be divided into 8 groups

Each group will be given a key term

Research the key term and write as much information as you can about the key term onto the tables in the time limit given

You will then rotate round your tables to fill in gaps on your lesson outline sheet



Key Terms

SADs

High and low blood pressure

Hyperthermia/hypothermia



SADS



All: To identify additional factors affecting the cardiovascular system

Most: To explain additional factors affecting the cardiovascular system

High and low blood pressure



Hypothermia/Hyperthermia



All: To identify additional factors affecting the cardiovascular system

Most: To explain additional factors affecting the cardiovascular system

PLENARY
SESSION

The 5 W's

Additional factors affecting the
cardiovascular system

Now answer the questions you created
about the key term using

Who, What, Why, Where and When?



Learning Objectives

- All: To identify additional factors affecting the cardiovascular system
- Most: To explain additional factors affecting the cardiovascular system





**D: The effects of
exercise and sports
performance on the
cardiovascular
system**

ASSESSMENT POINT 4

BTEC

Anatomy and Physiology

E: The effects of exercise and sport performance on the energy systems



- The role of ATP in exercise
- The ATP-PC (alactic) system in exercise and sport performance
- The lactate system in exercise and sport performance
- The aerobic system in exercise and sport performance
- The energy systems in combination
- Adaptations of the energy systems to exercise
- Additional factors affecting the energy systems

The BTEC logo, featuring the word "BTEC" in a bold, orange, sans-serif font. To the left of the text is a graphic of several small orange dots arranged in a curved, dotted line.

BTEC



E: The effects of exercise and sports performance on the energy systems

The role of ATP in exercise

Learning Objectives

All:	To define ATP
Most:	To understand the role of ATP in exercise
Some:	To explain the role of ATP in exercise





All movement requires energy – but how does our body generate energy so that we can exercise?

How would energy differ between these two images?



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The method by which your body generates energy is determined by the intensity and duration of the activity being undertaken. Activities that require **short bursts** of effort, such as sprinting or jumping, require the body to **produce large amounts of energy over a short period**. In contrast, **marathon running or cycling** require **continued energy production over a longer period** and at a slower rate.

The body's energy systems facilitate these processes. The energy systems of the body can function **aerobically** (with oxygen) or **anaerobically** (without oxygen). Movements that require sudden bursts of effort are powered by energy systems that do not require oxygen – anaerobic systems – whereas prolonged activities are aerobic and require oxygen.

All energy systems work together, but the type of activity and its intensity will determine which system is predominant.



https://www.youtube.com/watch?v=bbtqF9q_pFw

Complete the diagram of ATP here:



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All: To define ATP

Most: To understand the role of ATP in exercise

Some: To explain the role of ATP in exercise

https://www.youtube.com/watch?v=bbtqF9q_pFw

DEFINE ATP:



All: To define ATP

Most: To understand the role of ATP
in exercise

Some: To explain the role of ATP in
exercise

https://www.youtube.com/watch?v=bbtqF9q_pFw

EXPLAIN ATP:



All: To define ATP

Most: To understand the role of ATP
in exercise

Some: To explain the role of ATP in
exercise



You will be creating a leaflet on the energy systems – using your knowledge from today's lesson complete the introduction of the leaflet to explain the role of ATP in exercise



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All: To define ATP

Most: To understand the role of ATP in exercise

Some: To explain the role of ATP in exercise

PLENARY
SESSION



Would you change any of your original answers?

All movement requires energy – but how does our body generate energy so that we can exercise?

How would energy differ between these two images?



Learning Objectives

- All: To define ATP
- Most: To understand the role of ATP in exercise
- Some: To explain the role of ATP in exercise





E: The effects of exercise and sports performance on the energy systems

The ATP-PC (alactic) system in exercise and sport performance

Learning Objectives

All:	To define the ATP-PC System
Most:	To understand the ATP-PC system during exercise
Some:	To explain the ATP-PC system during exercise





What type of
energy would
Usain Bolt
need to
compete in the
100 metre
sprint?



<https://www.youtube.com/watch?v=b-XTbThJ0lc>

Define ATP-PC :



<https://www.youtube.com/watch?v=b-XTbThJ0lc>

Explain ATP-PC :



Most: To understand the ATP-PC system during exercise

Some: To explain the ATP-PC system during exercise



You will be continuing your leaflet on the energy systems – using your knowledge from today's lesson complete the ATP-PC section.



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All: To define the ATP-PC System

Most: To understand the ATP-PC system during exercise

Some: To explain the ATP-PC system during exercise

PLENARY
SESSION

Now write a paragraph to explain what type of energy Usain Bolt would need to compete in the 100 metre sprint



Learning Objectives

- All: To define the ATP-PC system
- Most: To understand the ATP-PC system during exercise
- Some: To explain the ATP-PC system during exercise





E: The effects of exercise and sports performance on the energy systems

The lactate system in exercise and sport performance

Learning Objectives

All:	To define the Lactate System
Most:	To understand the Lactate system during exercise
Some:	To explain the Lactate system during exercise





What type of energy would Jess Ennis need to compete in the 400 metre race?



<https://www.youtube.com/watch?v=r-OGtNorDf4>

Define the lactate system :



<https://www.youtube.com/watch?v=r-OGtNorDf4>

Explain the lactate system :



Most: To understand the Lactate system during exercise

Some: To explain the Lactate system during exercise



You will be continuing your leaflet on the energy systems – using your knowledge from today's lesson complete the lactate system section.



Pearson BTEC National Sport – Extended Certificate

All: To define the Lactate System

Most: To understand the Lactate system during exercise

Some: To explain the Lactate system during exercise

PLENARY
SESSION

Now write a paragraph to explain the type of energy Jess Ennis would need to compete in the 400 metre race.



Learning Objectives

- All: To define the Lactate system
- Most: To understand the Lactate system during exercise
- Some: To explain the Lactate system during exercise





E: The effects of exercise and sports performance on the energy systems

The aerobic system in exercise and sport performance

Learning Objectives

All:	To define the Aerobic System
Most:	To understand the Aerobic system during exercise
Some:	To explain the Aerobic system during exercise





What type of energy would Paula Radcliffe need to compete in the marathon?



<https://www.youtube.com/watch?v=PQMsJSme780>

Define the aerobic system :



<https://www.youtube.com/watch?v=PQMsJSme780>

Explain the aerobic system :



Most: To understand the Aerobic system during exercise

Some: To explain the Aerobic system during exercise



You will be continuing your leaflet on the energy systems – using your knowledge from today's lesson complete the aerobic system section.



Pearson BTEC National Sport – Extended Certificate

All: To define the Aerobic System

Most: To understand the Aerobic system during exercise

Some: To explain the Aerobic system during exercise

PLENARY
SESSION

What type of
energy would
Paula Radcliffe
need to
compete in the
marathon?



Learning Objectives

- All: To define the Aerobic system
- Most: To understand the Aerobic system during exercise
- Some: To explain the Aerobic system during exercise





E: The effects of exercise and sports performance on the energy systems

The energy systems in combination

Learning Objectives

All:	To know the energy systems in combination
Most:	To explain the energy systems in combination
Some:	To apply the energy systems in combination to sport examples





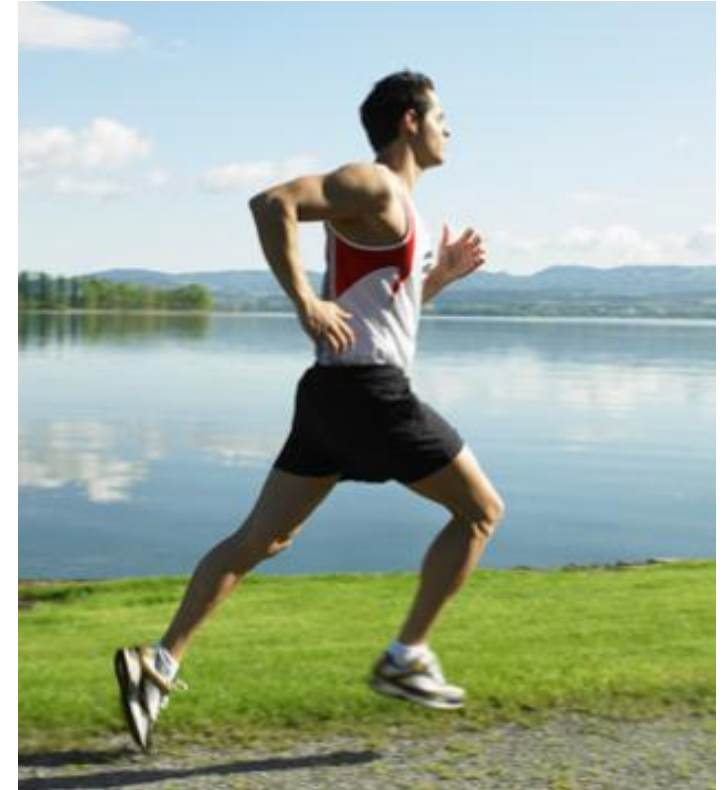
Are there any sports where you think all 3 energy systems might be used?

Make a list...





Use page 52 to bullet point the process that takes place when you start running:



All: To know the energy systems in combination

Most: To explain the energy systems in combination

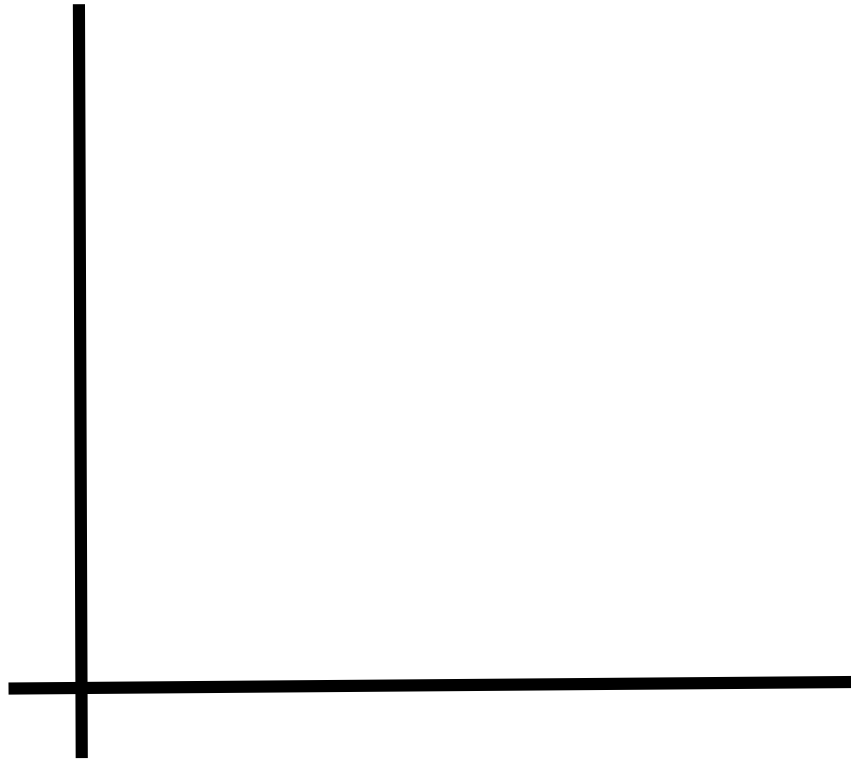
Some: To apply the energy systems in combination to sport examples

Duration	Classification	Energy supplied by	Sport example



All: To know the energy systems in combination
Most: To explain the energy systems in combination
Some: To apply the energy systems in combination to sport examples

Copy out the graph on page 52



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All: To know the energy systems in combination

Most: To explain the energy systems in combination

Some: To apply the energy systems in combination to sport examples

Write a paragraph about a sport and how that sport utilises each of the 3 energy systems:



All: To know the energy systems in combination

Most: To explain the energy systems in combination

Some: To apply the energy systems in combination to sport examples

PLENARY
SESSION

Why do different sports use different energy systems?

Choose a sport. What is the main energy system that is used?

Now consider a team sport and a specific position. Are different energy systems used during a performance? If so, why?



All: To know the energy systems in combination

Most: To explain the energy systems in combination

Some: To apply the energy systems in combination to sport examples

Learning Objectives

- All: To know the energy systems in combination
- Most: To explain the energy systems in combination
- Some: To apply the energy systems in combination to sport

examples





E: The effects of exercise and sports performance on the energy systems

Adaptations of the energy systems to exercise

Learning Objectives

- All: To know the adaptations of the energy system to exercise
- Most: To explain the adaptations of the energy system to exercise
- Some: To explain the adaptations of the energy system to exercise





Case study

Mo Farah versus Usain Bolt

As part of his charity, the Mo Farah Foundation, Mo Farah has challenged the world 100-metre champion, Usain Bolt, to race over a distance that would not suit either runner. Mo Farah is the current Olympic champion over 5000 metres and 10,000 metres, while Usain Bolt is the Olympic champion over 100 metres and 200 metres. Farah has suggested that they race between 600–800 metres.

- 1 Suggest an optimum distance that would be fair for both athletes.
- 2 Why do you think that one athlete is better suited to one distance than another distance?



All: To know the adaptations of the energy system to exercise

Most: To explain the adaptations of the energy system to exercise

Some: To explain the adaptations of the energy system to exercise



Your aim as BTEC Sport Investigators is to read through pages 53 – 54 under 'Adaptations of the energy systems to exercise'

Using the following questions to shape your investigation you must produce a 5 minute presentation which you present to your class mates

- 1) Increased creatine stores
- 2) Increased tolerance to lactic acid
- 3) Aerobic energy system
- 4) Increased use of fats as an energy source
- 5) Increased storage and increased numbers of mitochondria



All: To know the adaptations of the energy system to exercise

Most: To explain the adaptations of the energy system to exercise

Some: To explain the adaptations of the energy system to exercise

PLENARY
SESSION

During warm ups what changes would occur to your energy system?

What would happen if you exercised at a higher intensity



All: To know the adaptations of the energy system to exercise

Most: To explain the adaptations of the energy system to exercise

Some: To explain the adaptations of the energy system to exercise

Learning Objectives

- All: To know the adaptations of the energy system to exercise
- Most: To explain the adaptations of the energy system to exercise
- Some: To explain the adaptation of the energy system to exercise





E: The effects of exercise and sports performance on the energy systems

Additional factors affecting the energy systems

Learning Objectives

All: To identify additional factors affecting the energy system

Most: To explain additional factors affecting the energy system





The 5 W's

Additional factors affecting the energy system

Create a question that you would like to know about the key term using

Who, What, Why, Where and When?



Table Text

You will be divided into 8 groups

Each group will be given a key term

Research the key term and write as much information as you can about the key term onto the tables in the time limit given

You will then rotate round your tables to fill in gaps on your lesson outline sheet



Key Terms

Diabetes and hypoglycaemic attack

Children's lack of lactate system



Diabetes and hypoglycaemic attack



Children's lack of lactate system



PLENARY
SESSION

The 5 W's

Additional factors affecting the energy system

Now answer the questions you created about the key term using

Who, What, Why, Where and When?



Learning Objectives

All: To identify additional factors affecting the energy system

Most: To explain additional factors affecting the energy system





**E: The effects of
exercise and sports
performance on the
energy systems**

ASSESSMENT POINT 5

 **BTEC**

