



 **BTEC**

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.



# 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

 **BTEC**



# **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!

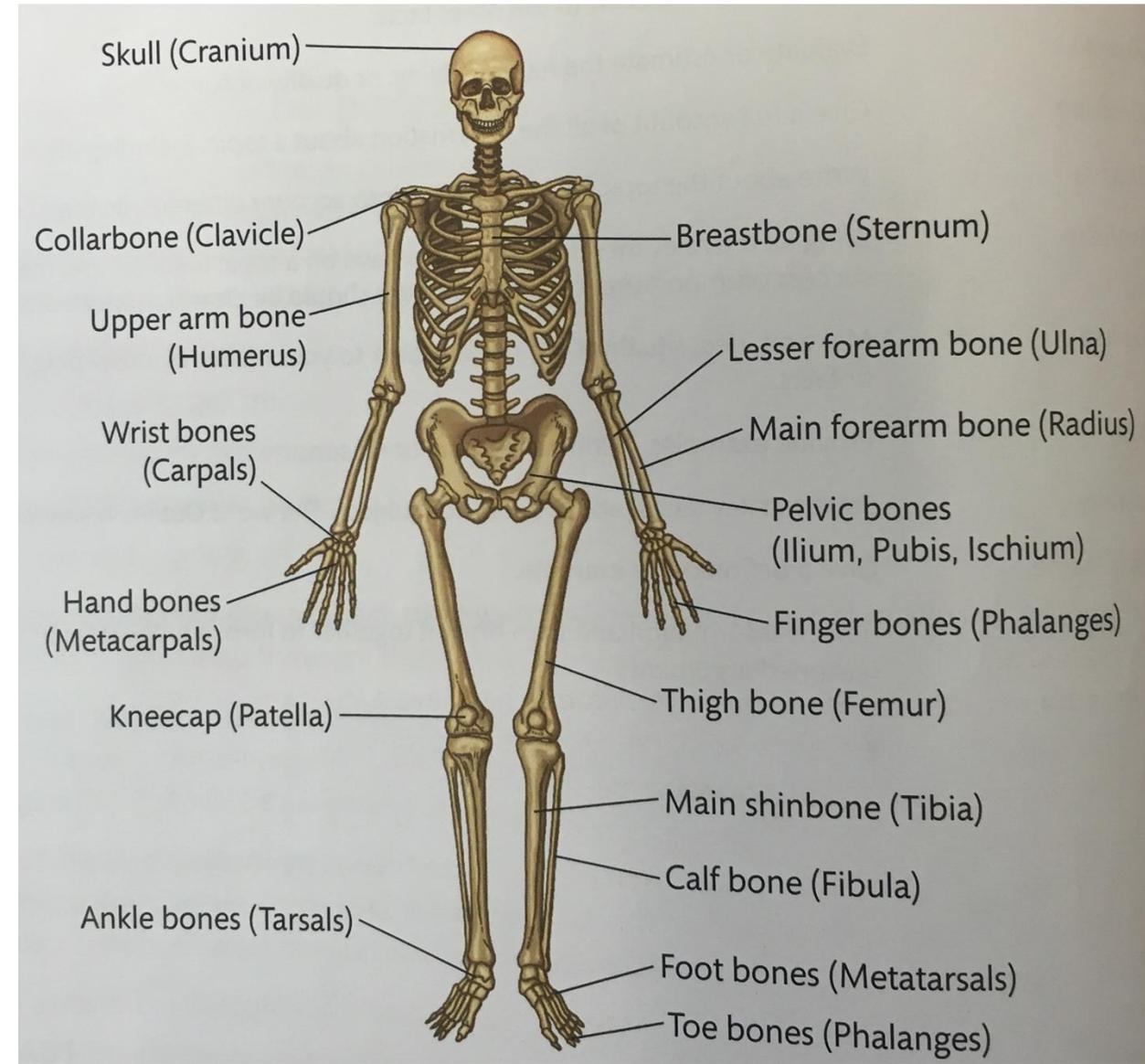
How many bones can you remember?

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



**BTEC**

**Pearson BTEC National Sport – Extended Certificate**



All: To identify and locate the main bones

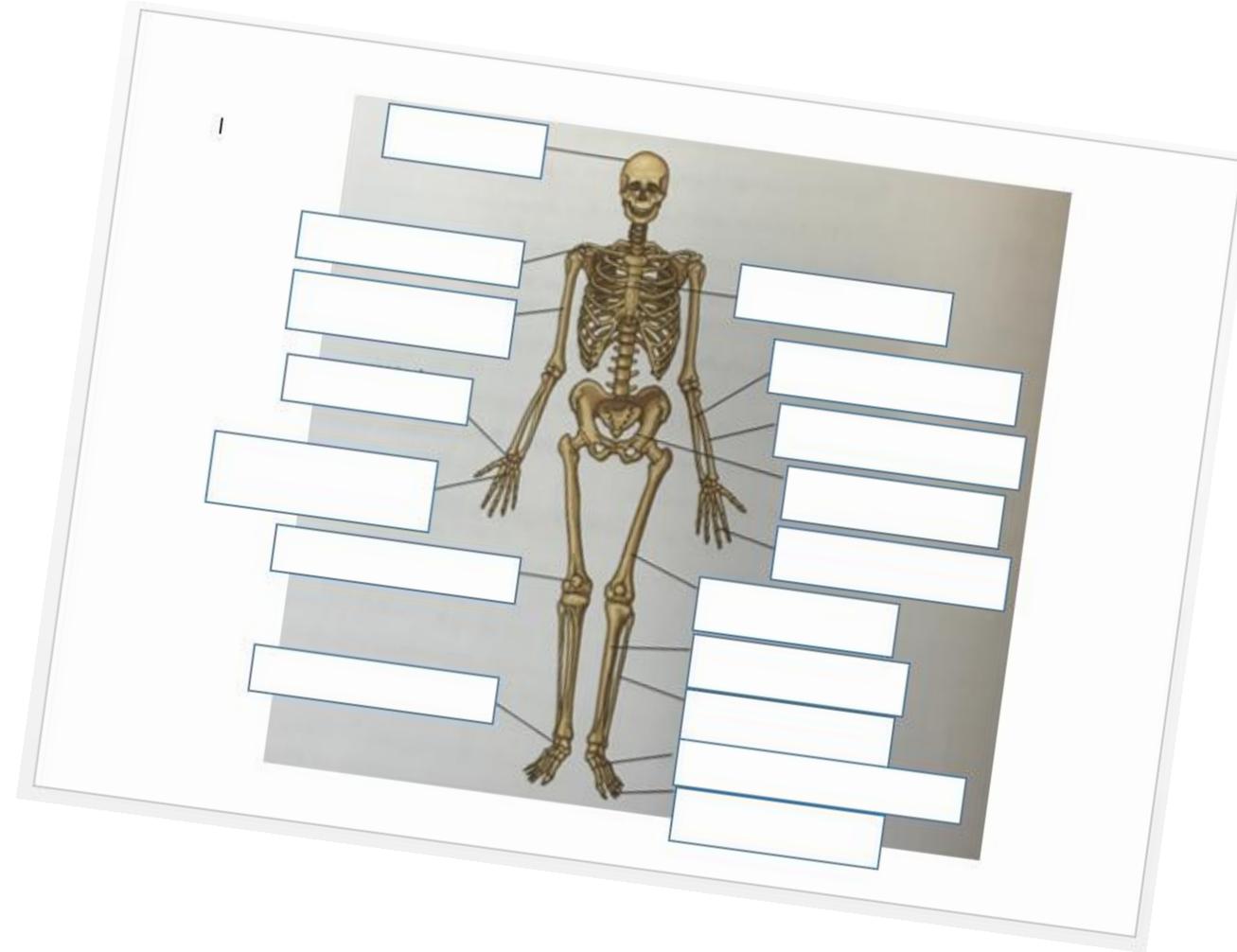


## Memory Board

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!



**BTEC**

**Pearson BTEC National Sport – Extended Certificate**

All: To identify and locate the main bones



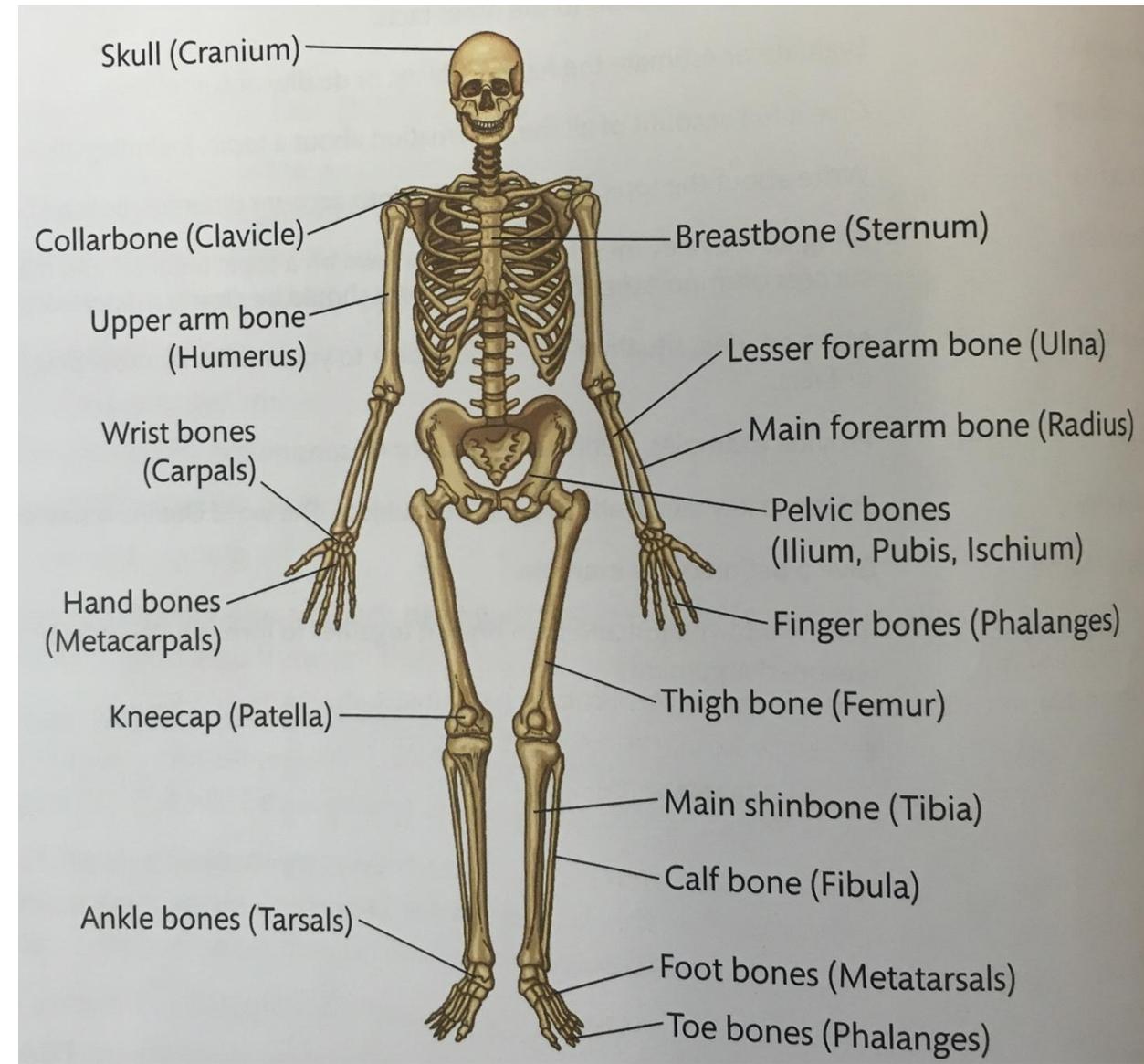
## Memory Board

ANSWERS –  
how many did  
you get right?



**BTEC**

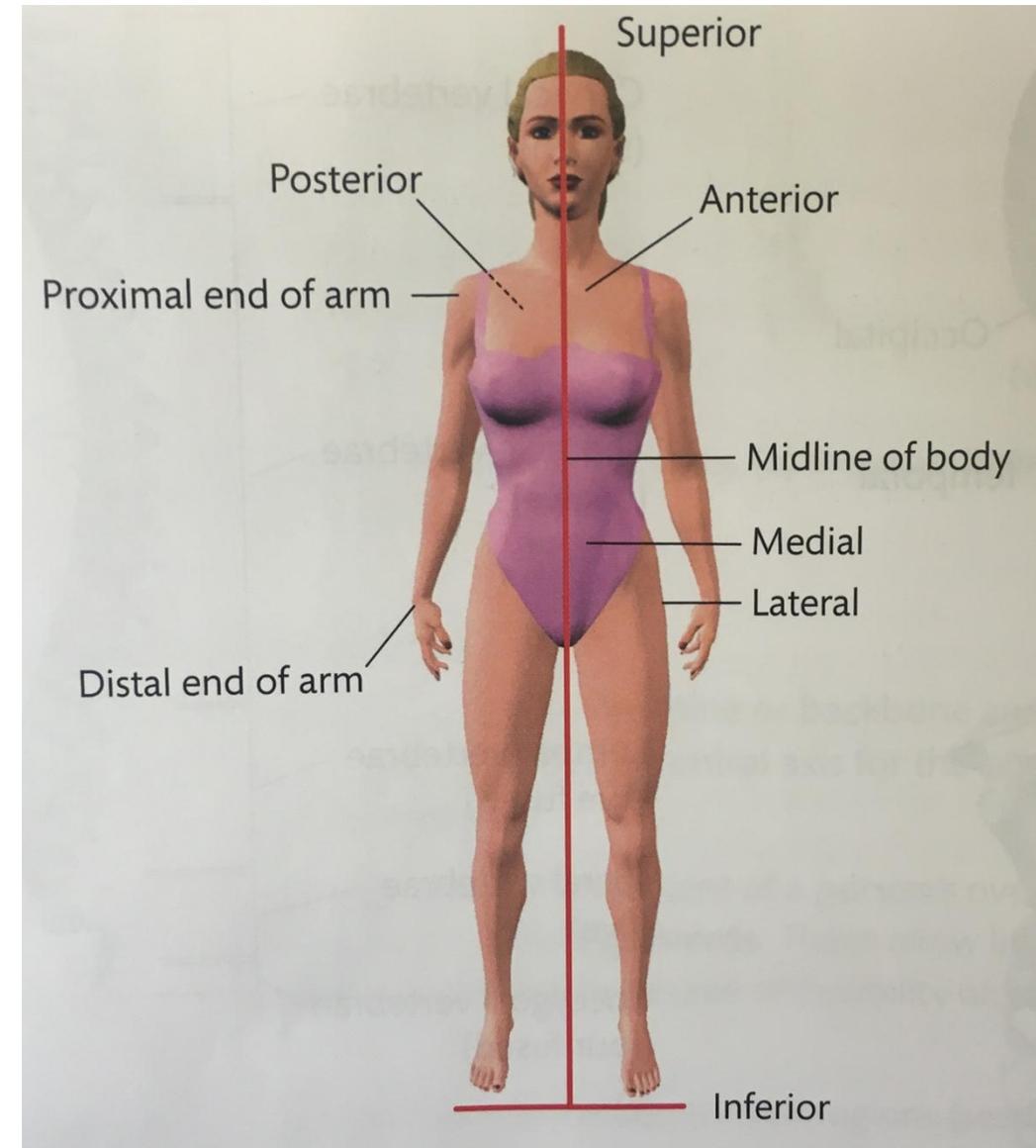
Pearson BTEC National Sport – Extended Certificate



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



**BTEC**

**Pearson BTEC National Sport – Extended Certificate**

Most: To understand the terms used to describe the location of bones

## 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



**BTEC**

**Pearson BTEC National Sport – Extended Certificate**

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

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



**BTEC**

**Pearson BTEC National Sport – Extended Certificate**

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

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



**BTEC**

**Pearson BTEC National Sport – Extended Certificate**

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

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



**BTEC**

Pearson BTEC National Sport – Extended Certificate

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

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



**BTEC**

**Pearson BTEC National Sport – Extended Certificate**

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

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



**BTEC**

**Pearson BTEC National Sport – Extended Certificate**

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?



**BTEC**

Pearson BTEC National Sport – Extended Certificate

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

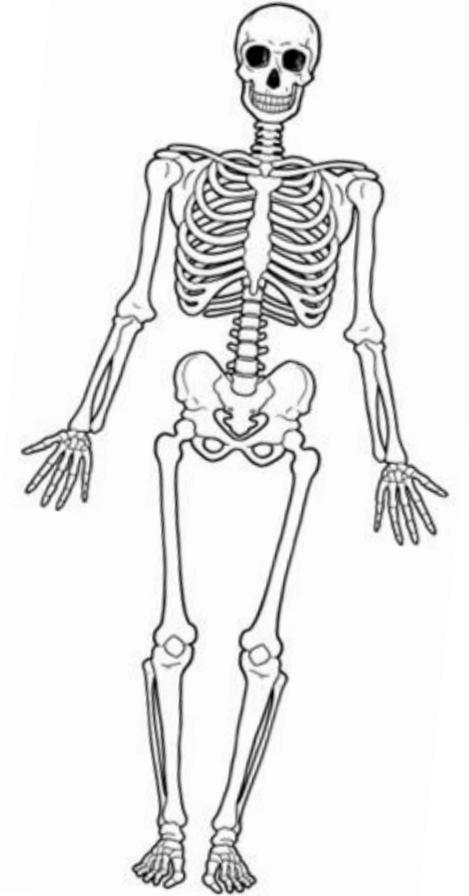
## Learning Objectives

- 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



**BTEC**

Pearson BTEC National Sport – Extended Certificate

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**

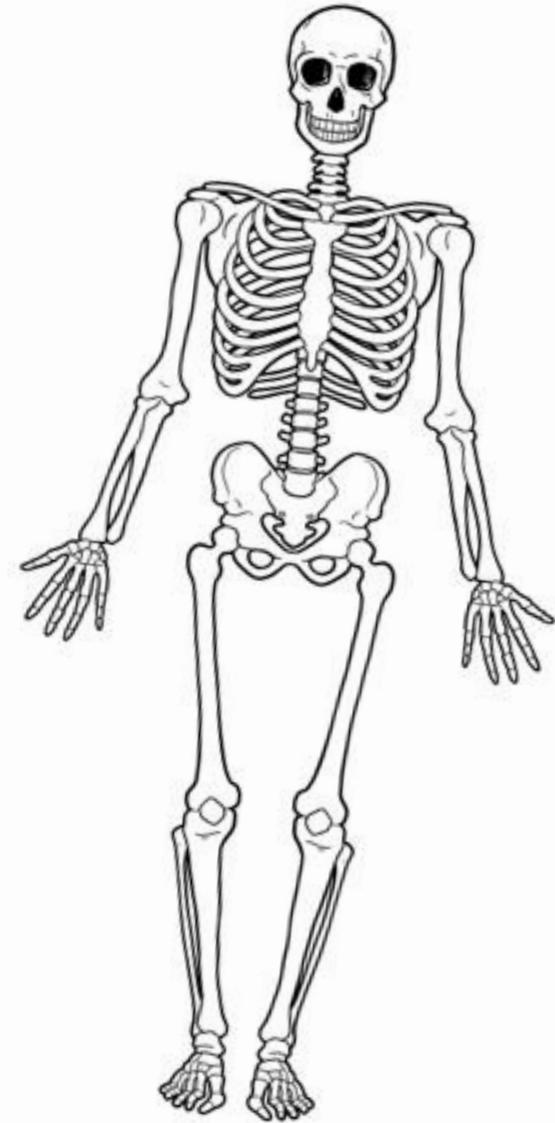
This is the main core of your skeleton and consists of:

- 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:

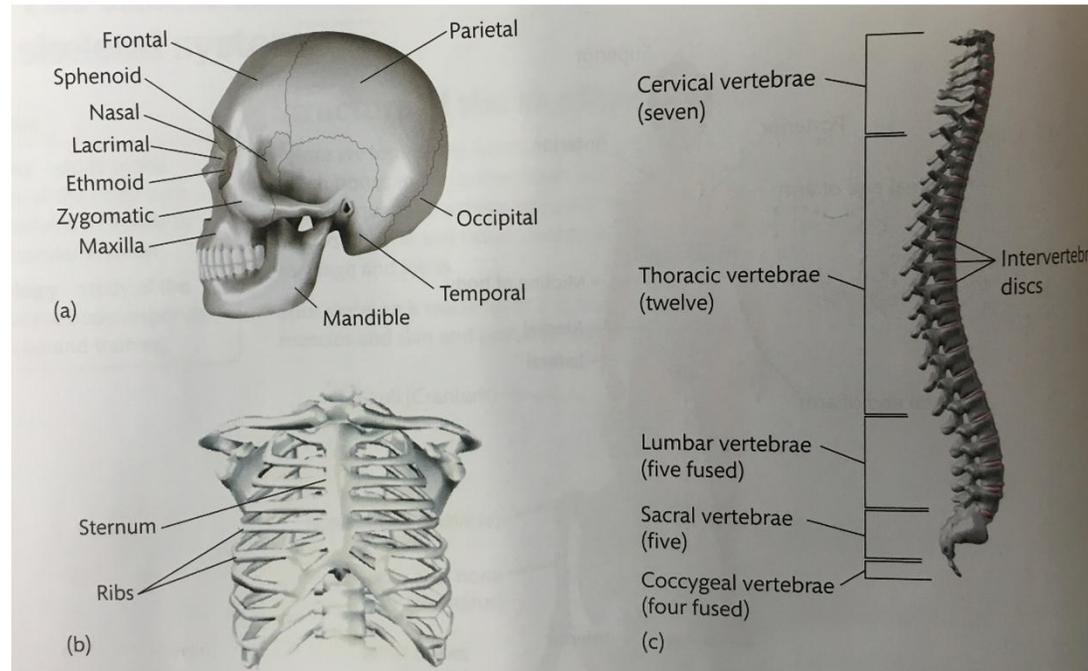
- Upper limbs (Humerus, radius, ulna, carpals, metacarpals and phalanges)
- Lower limbs (Femur, tibia, fibula, patella, tarsals, metatarsals and phalanges)
  - Shoulder girdle (clavicle and scapula)
  - Pelvic girdle (ilium, pubis and ischium)



## 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



**BTEC**

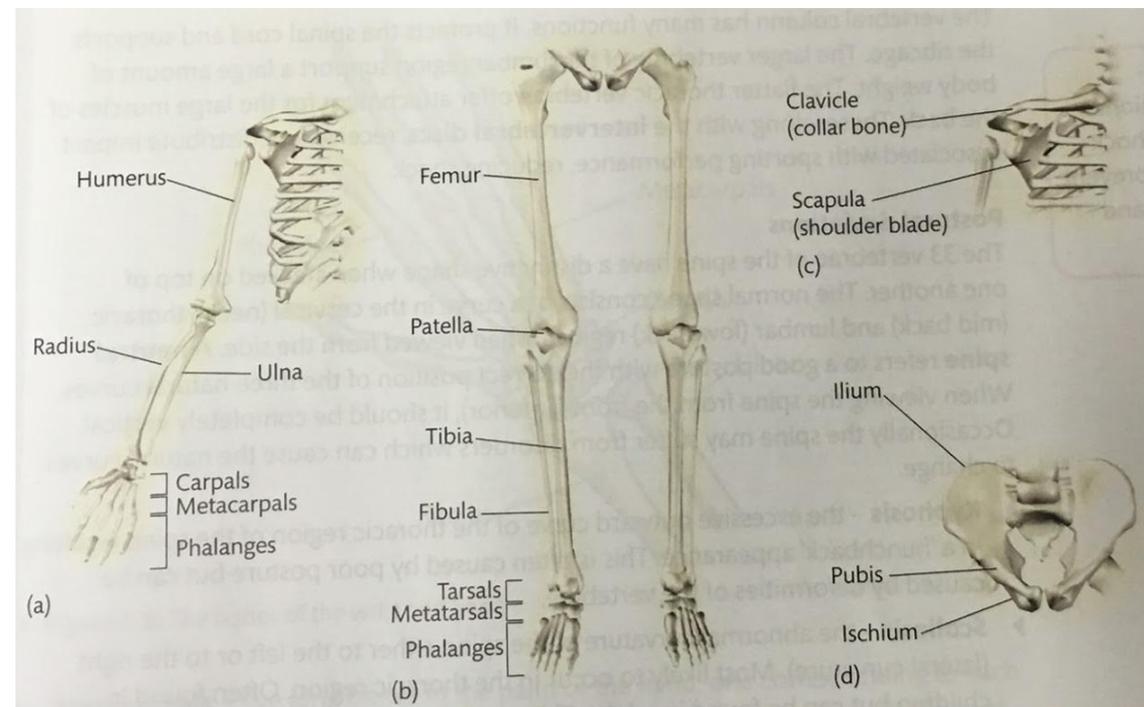
**Pearson BTEC National Sport – Extended Certificate**

All: To identify the two parts of the skeleton

## Appendicular Skeleton

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

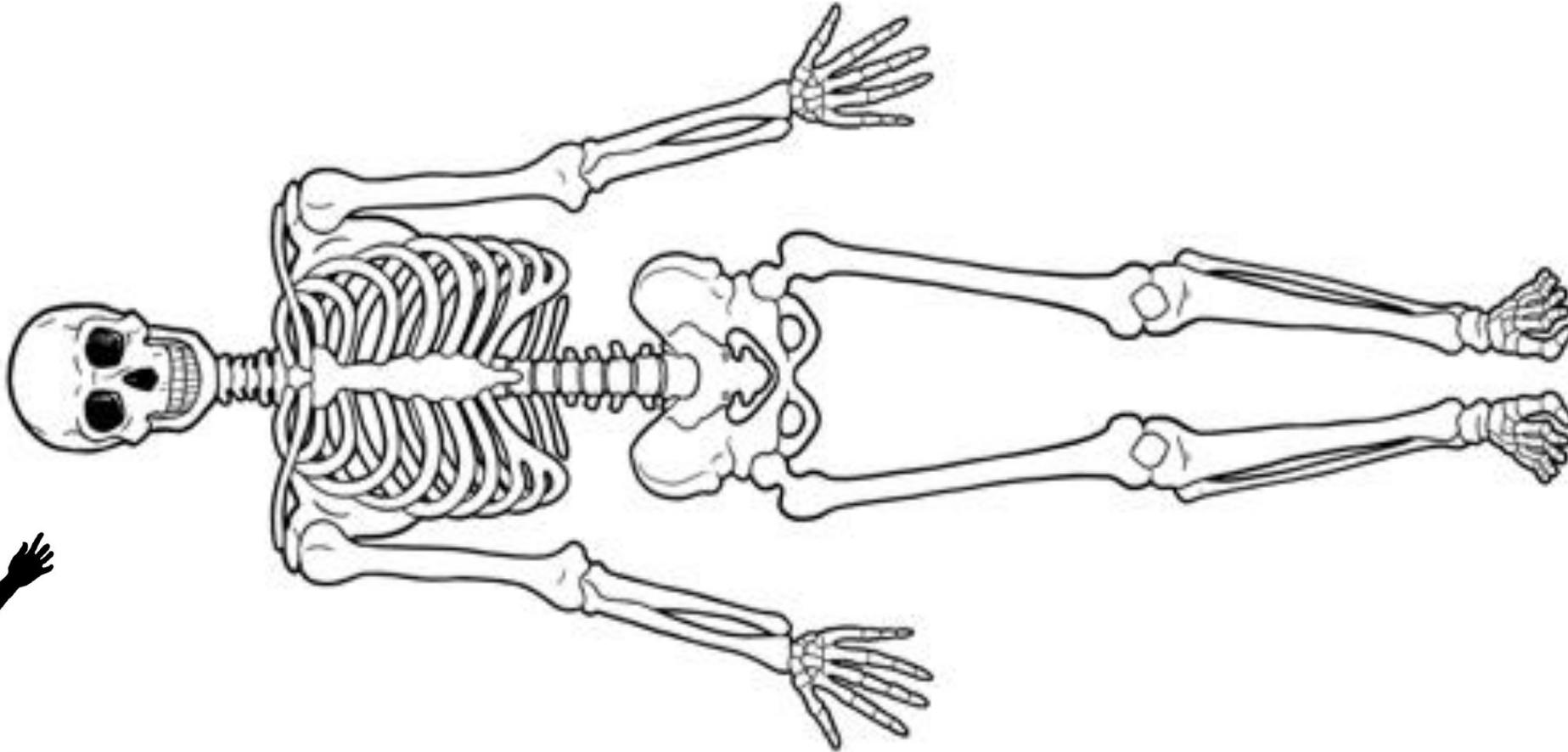
- Upper limbs (Humerus, radius, ulna, carpals, metacarpals and phalanges)
- Lower limbs (Femur, tibia, fibula, patella, tarsals, metatarsal and phalanges)
  - Shoulder girdle (clavicle and scapula)
  - Pelvic girdle ( ilium, pubis and ischium)





**Task:**

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



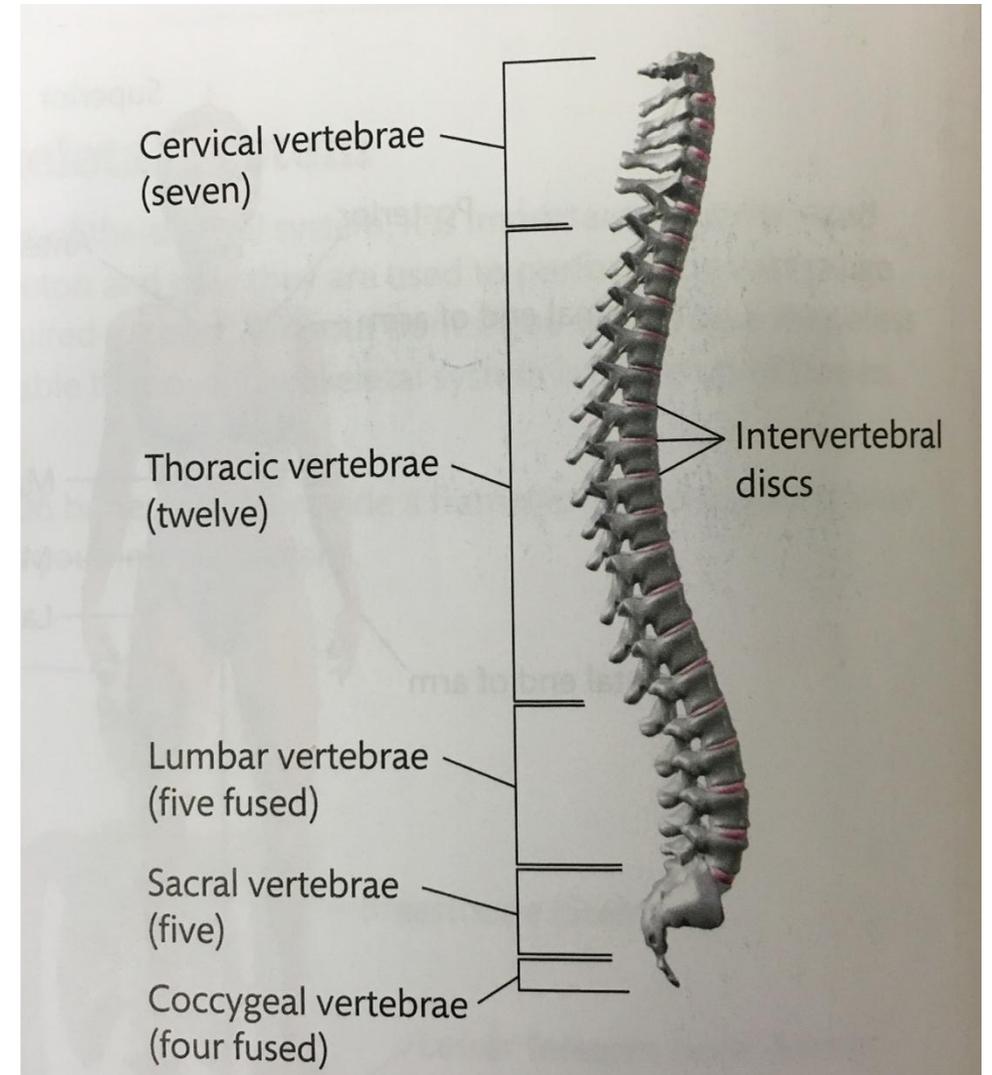
**BTEC**

**Pearson BTEC National Sport – Extended Certificate**

All: To identify the two parts of the 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



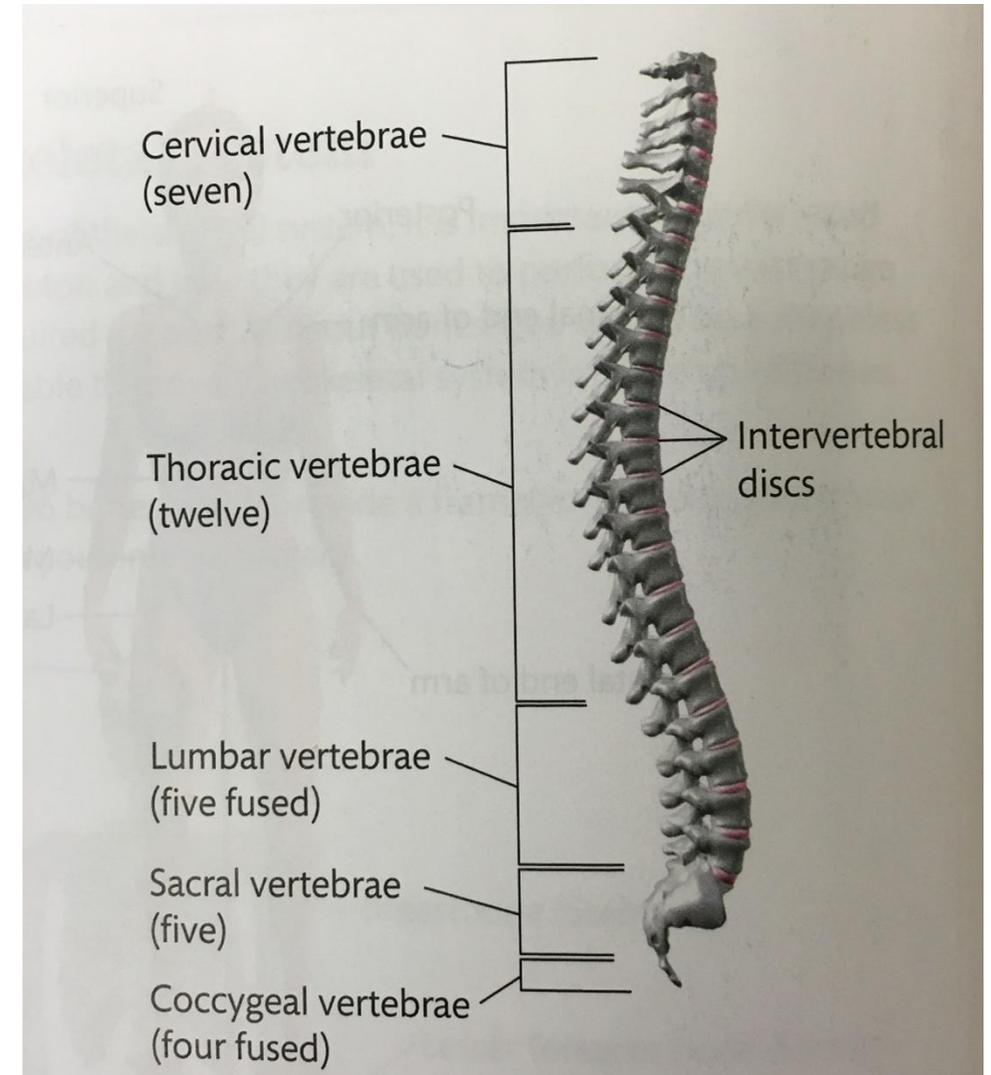
**BTEC**

**Pearson BTEC National Sport – Extended Certificate**

All: To identify the two parts of the skeleton



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



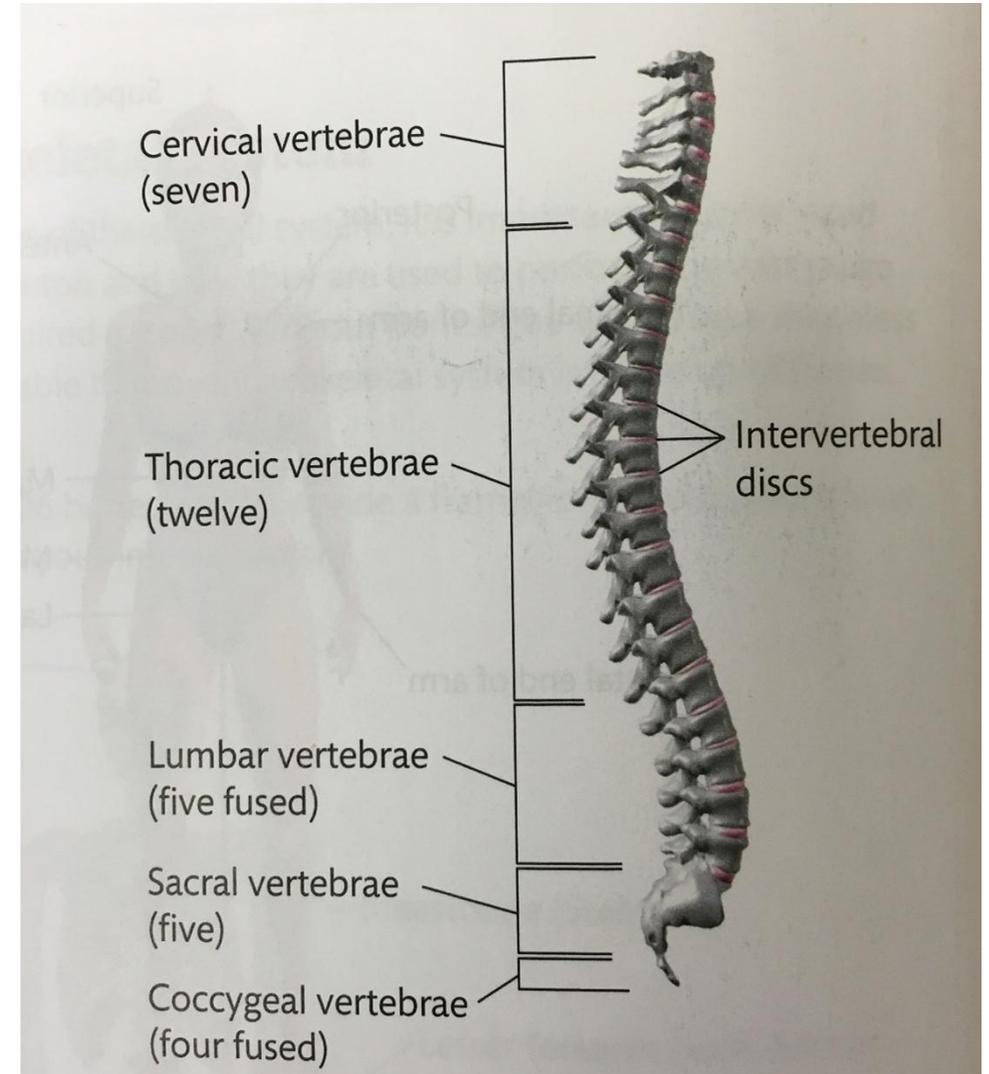
**BTEC**



Use Page 8 to answer these questions

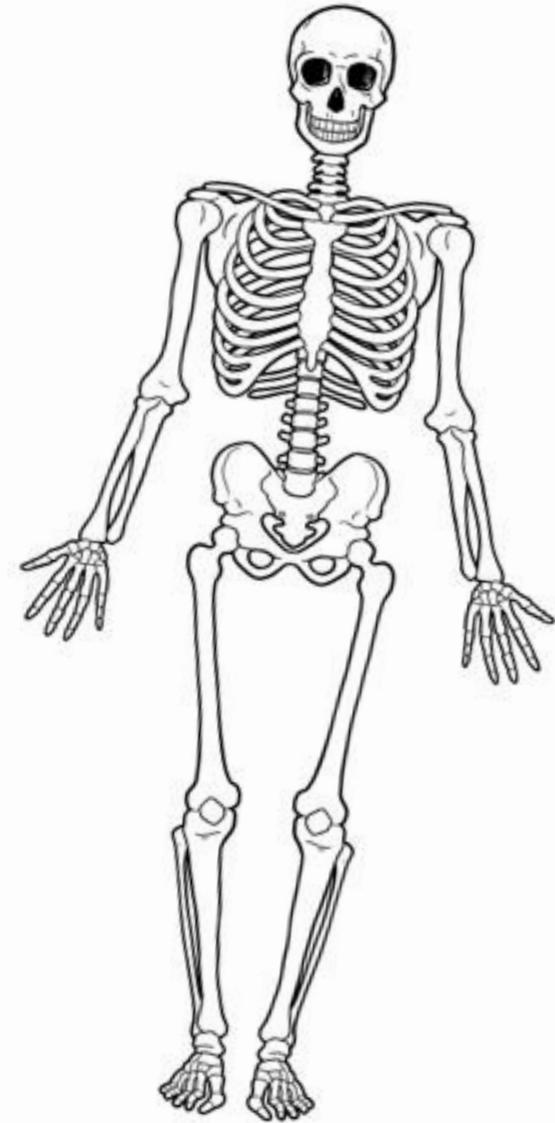
Functions of the vertebral column?

Postural deviations?



PLENARY  
SESSION

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



**BTEC**

Pearson BTEC National Sport – Extended Certificate

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

© 2015

Scrabble Challenge:

Key Word: \_\_\_\_\_ Score: \_\_\_\_\_

1.....

2.....

3.....

4.....

5.....

6.....

7.....

8.....

Use this space to work out your score:

**T O T A L**



## 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



# PROTECTION



# ATTACHMENT FOR SKELETAL MUSCLE



# SOURCE OF BLOOD CELL PRODUCTION



# STORE OF MINERALS



# LEVERAGE



# WEIGHT BEARING



**Pearson BTEC National Sport – Extended Certificate**

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

# 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

**BTEC**

## 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.



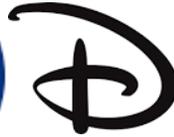
2.



+



3.



Lloyds TSB

4.



5.



6.



Hinge Joint

Ball and Socket Joint

Condyloid Joint

Gliding Joint

Pivot Joint

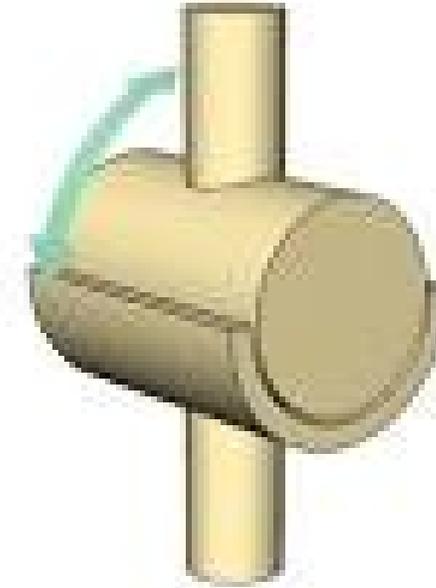
Saddle Joint



# Ball and Socket Joint



# Hinge Joint



# Condyloid Joint



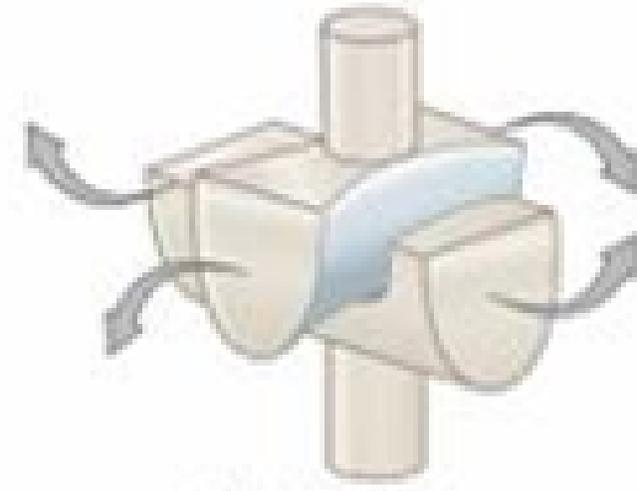
# Gliding Joint



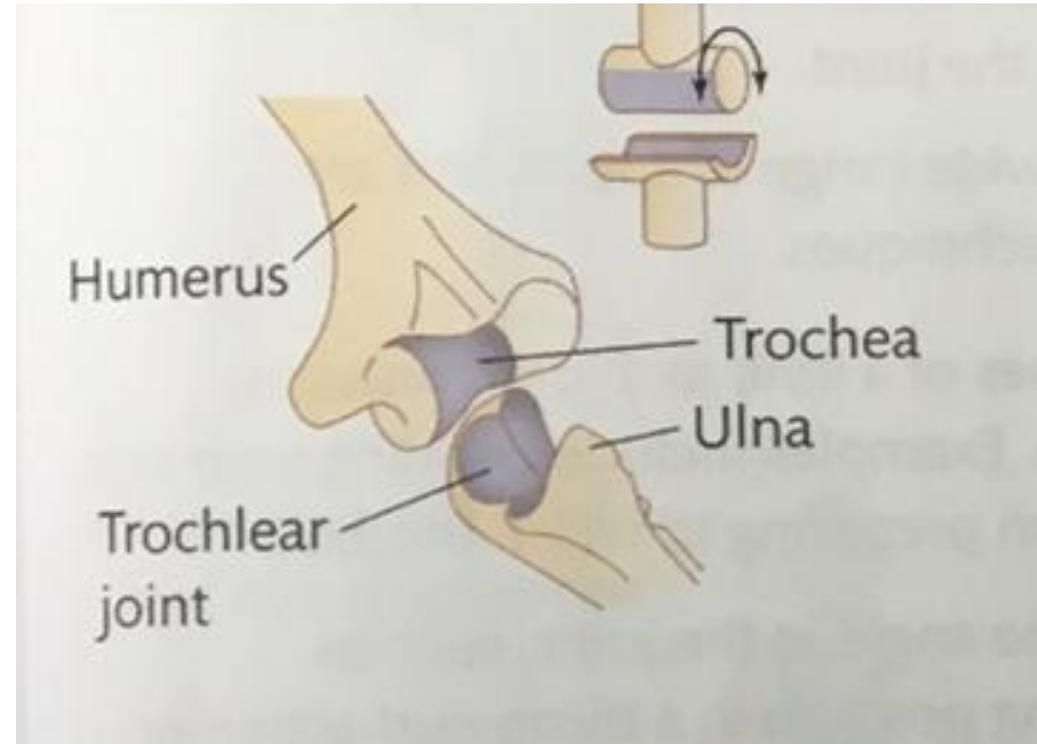
# Pivot Joint



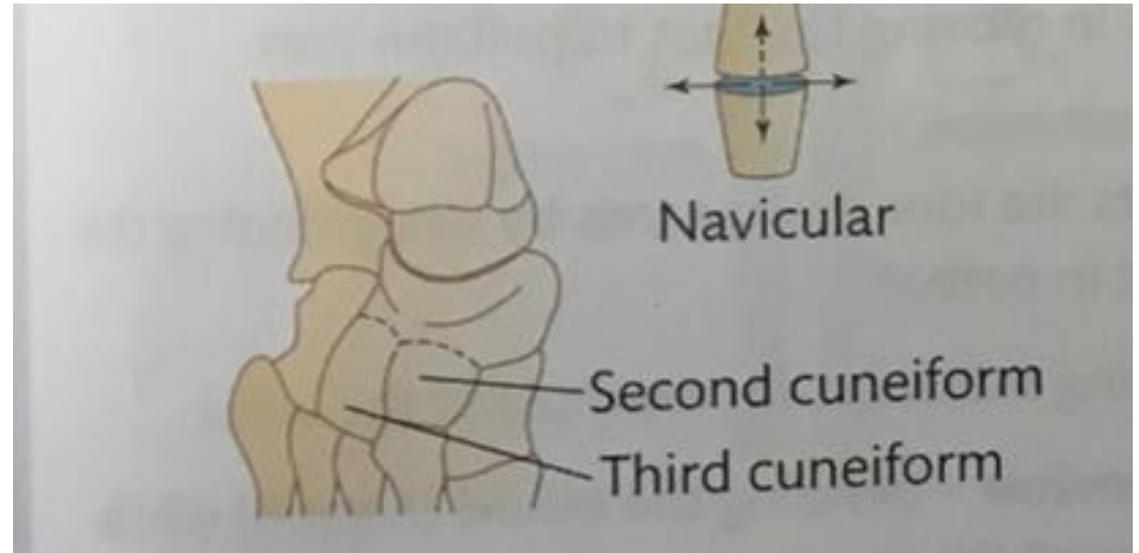
# Saddle Joint



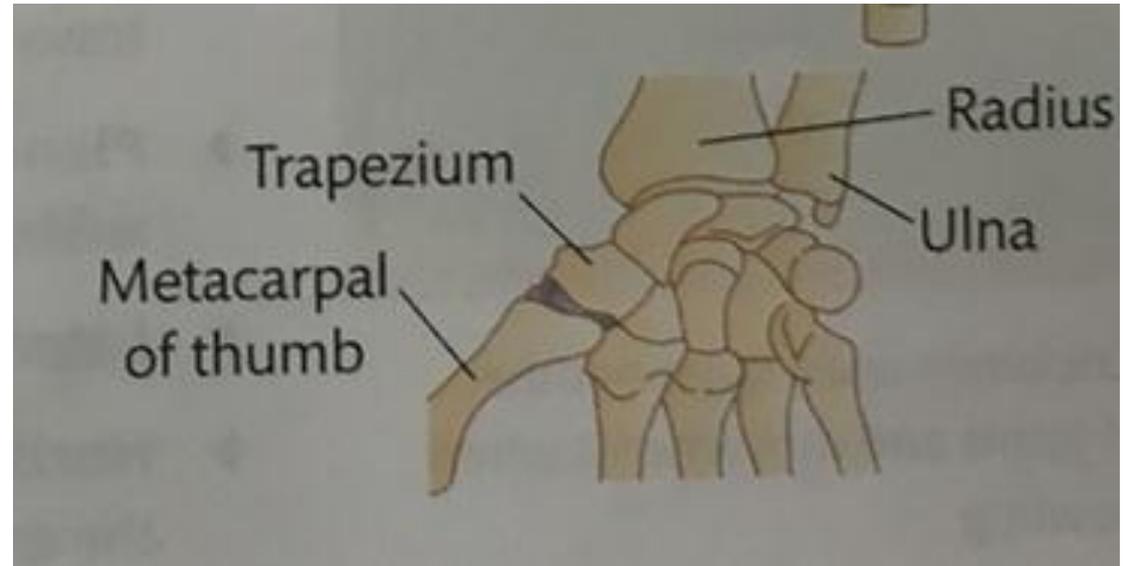
**Name the  
joint! and  
which type  
of joint is  
this?**



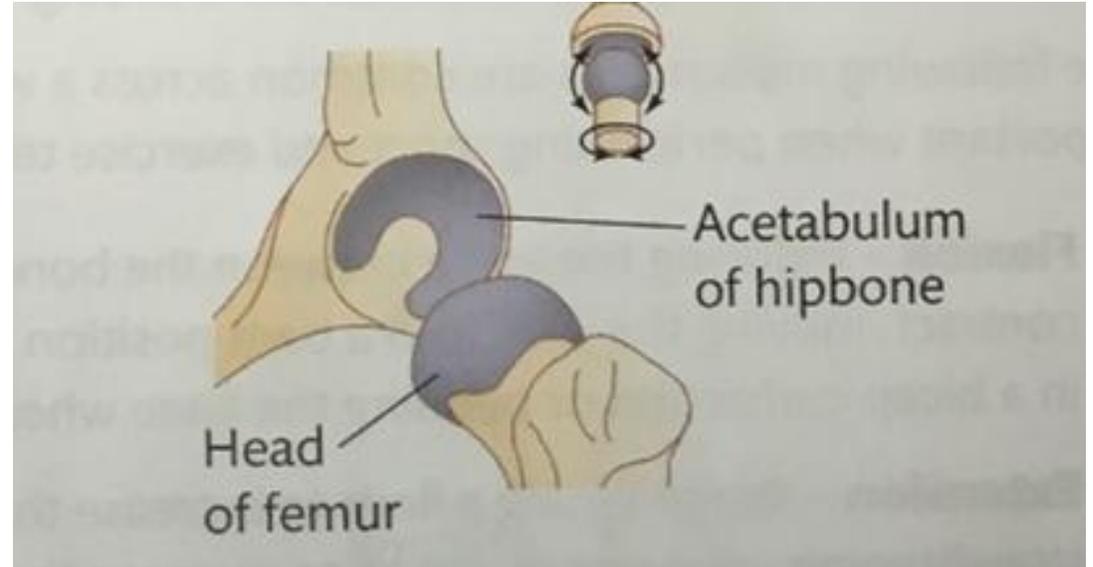
**Name the  
joint! and  
which type  
of joint is  
this?**



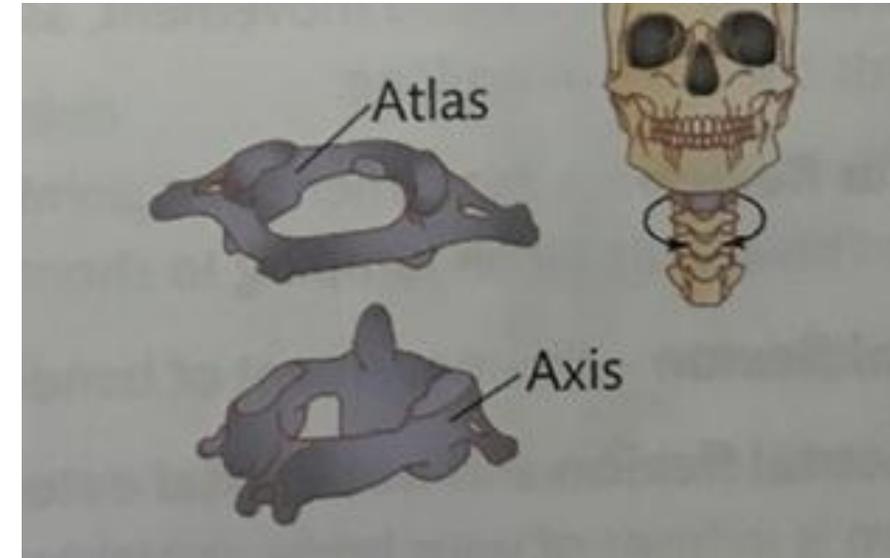
**Name the  
joint! and  
which type  
of joint is  
this?**



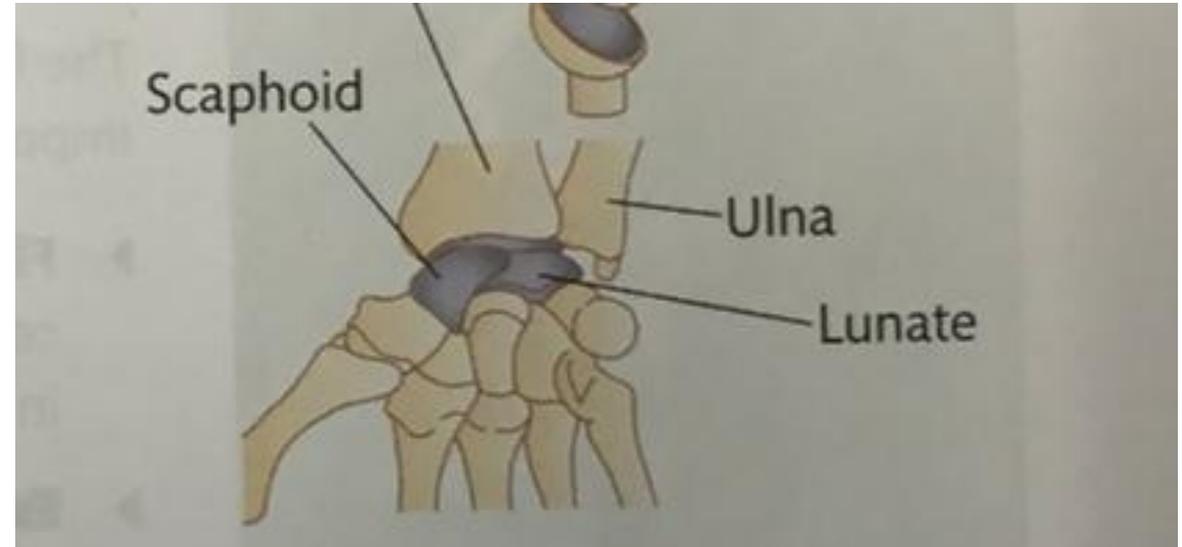
**Name the joint! and which type of joint is this?**



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



**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

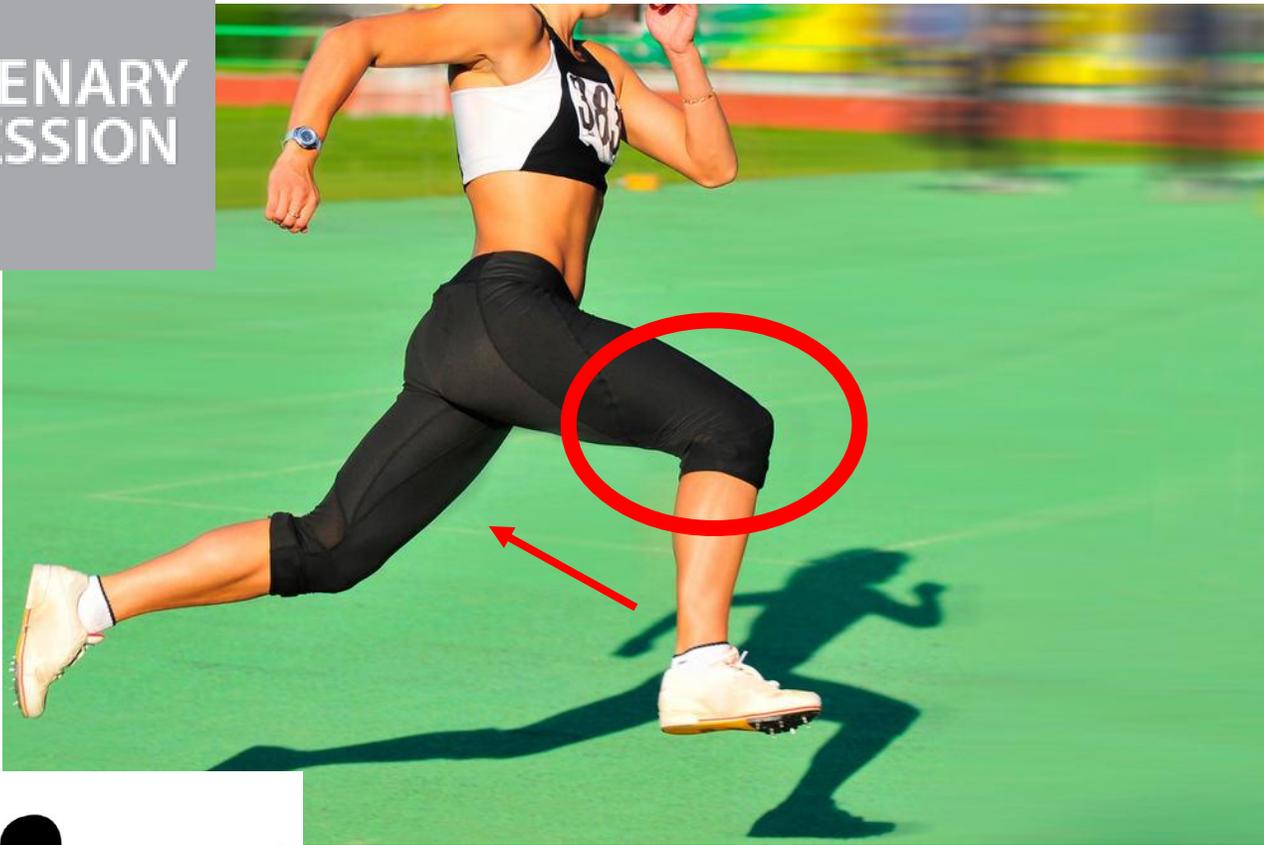
Fill in the definitions of each basic movement by using pages 14-15 in the text books

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



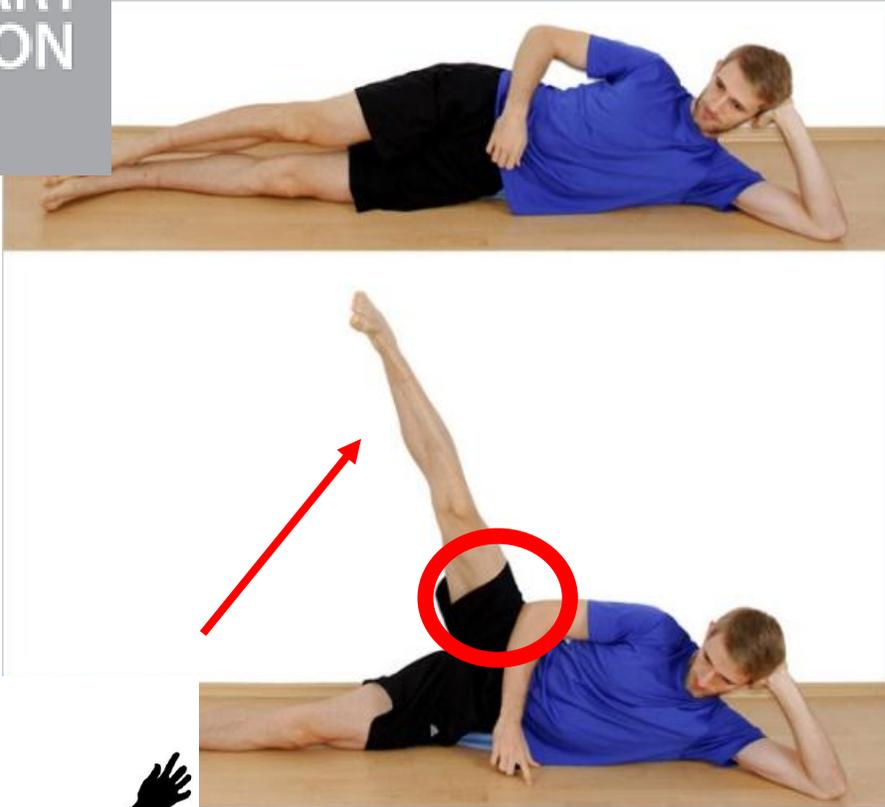
Name the movement and where it's taking place...

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?



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



## Table Text

You will be divided into 3 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

Arthritis

Osteoporosis

Age



All: To identify additional factors affecting the skeletal system

Most: To explain additional factors affecting the skeletal system

# 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

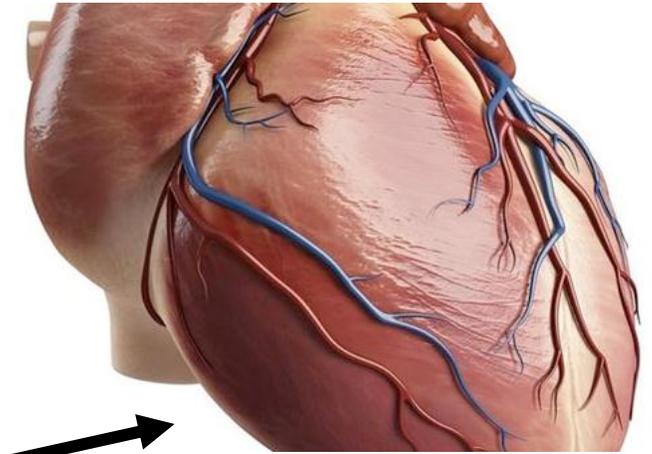
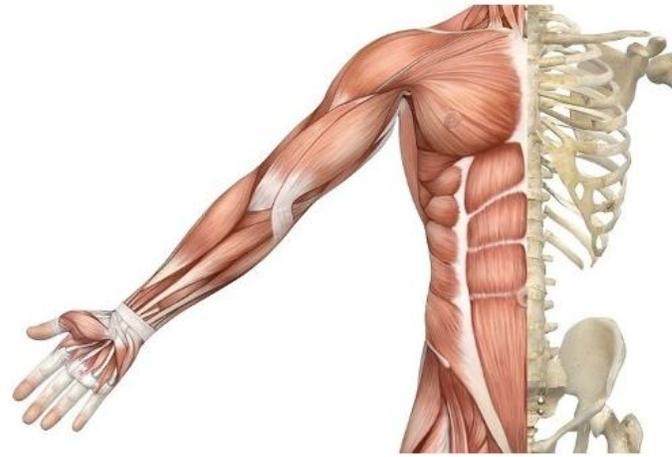
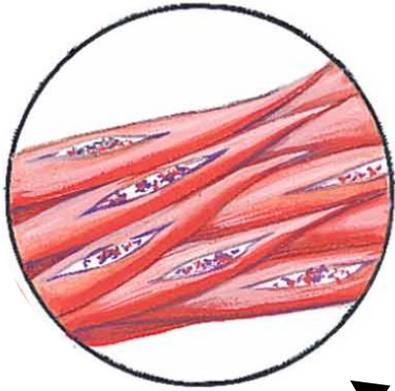
kaSleelt uescMI

dCriaac Mesclu

hSomot sMeclu



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



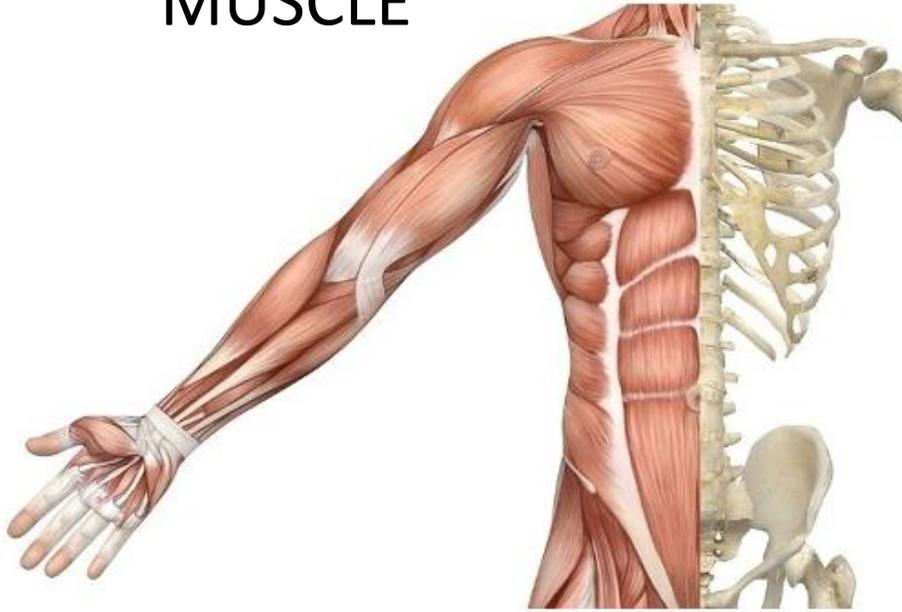
CARDIAC MUSCLE

SMOOTH MUSCLE

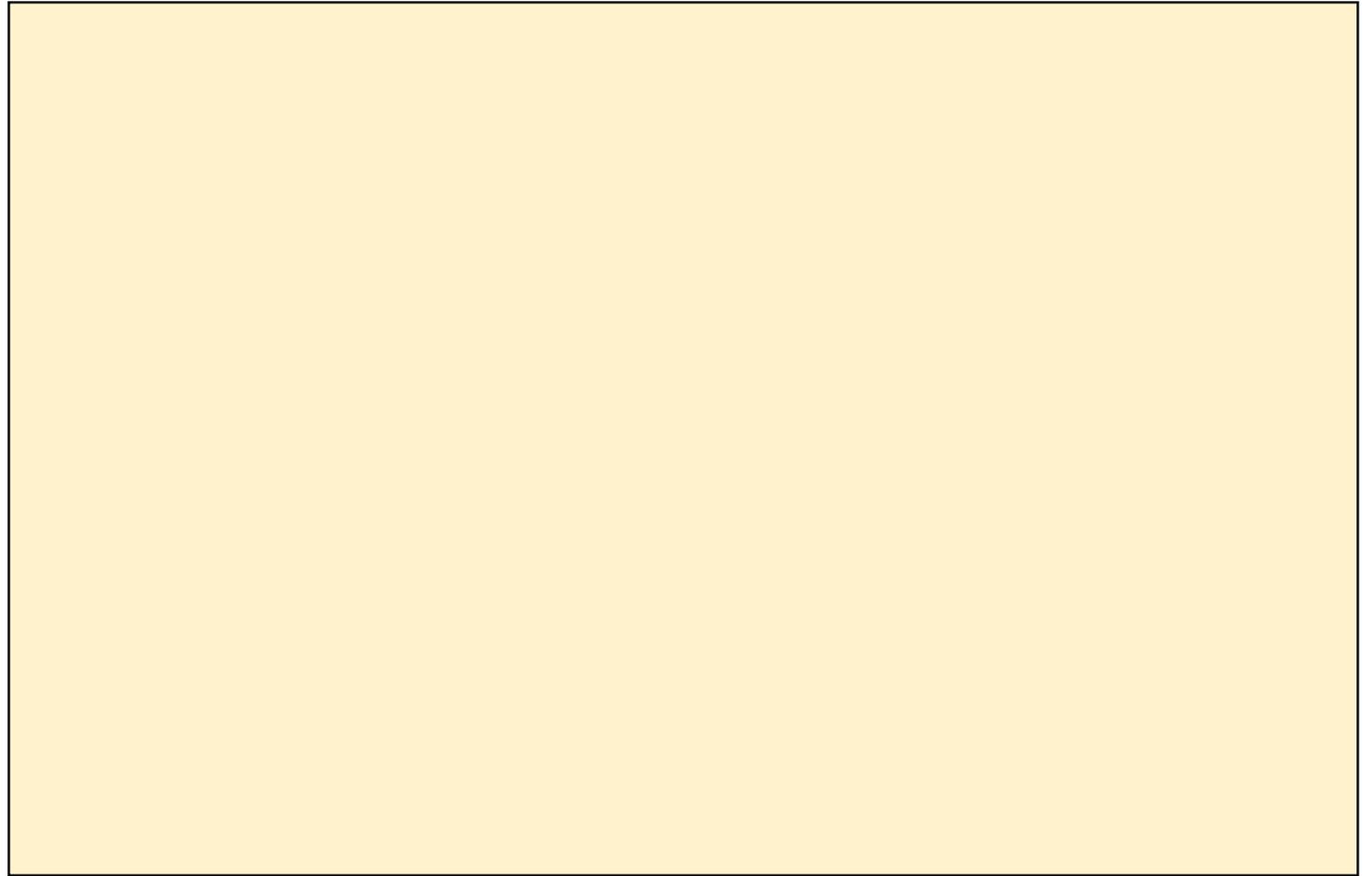
SKELETAL  
MUSCLE



## SKELETAL MUSCLE

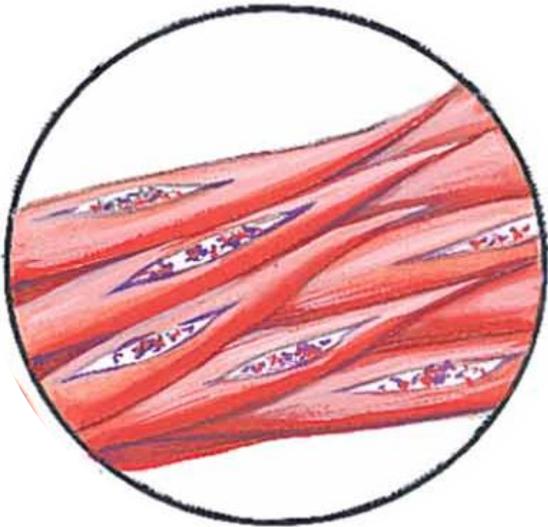


Read through pages 18-19 to identify the characteristics and functions



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

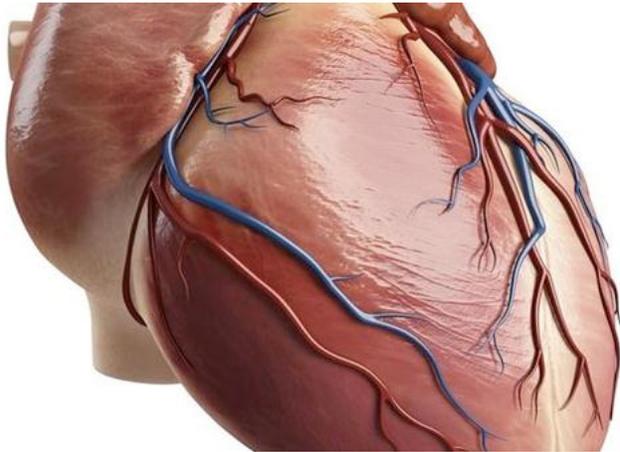
## SMOOTH MUSCLE



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



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



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

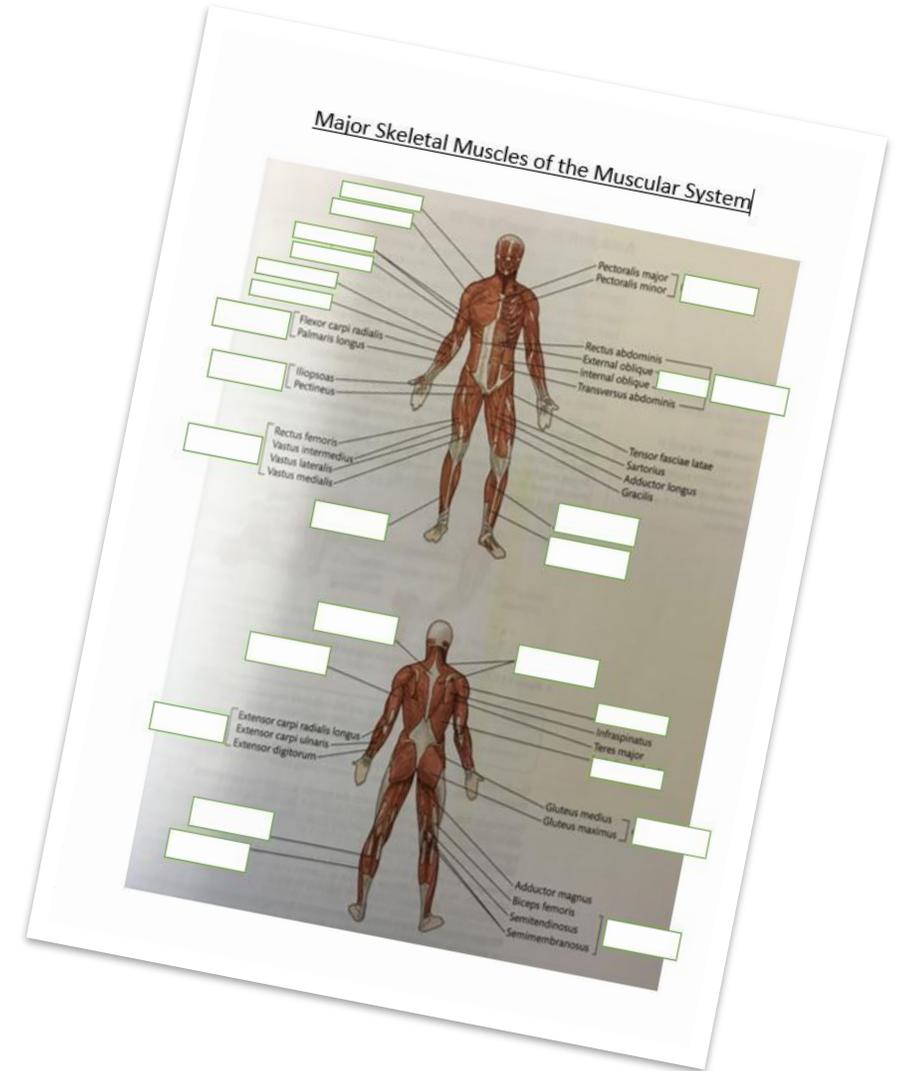
- All: To identify the main muscles of the body
- Most: To locate and describe the function of each muscle
- Some: To give a sport/exercise example of when each muscle is used





# How many gaps can you fill in?

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



All: To identify the main muscles of the body

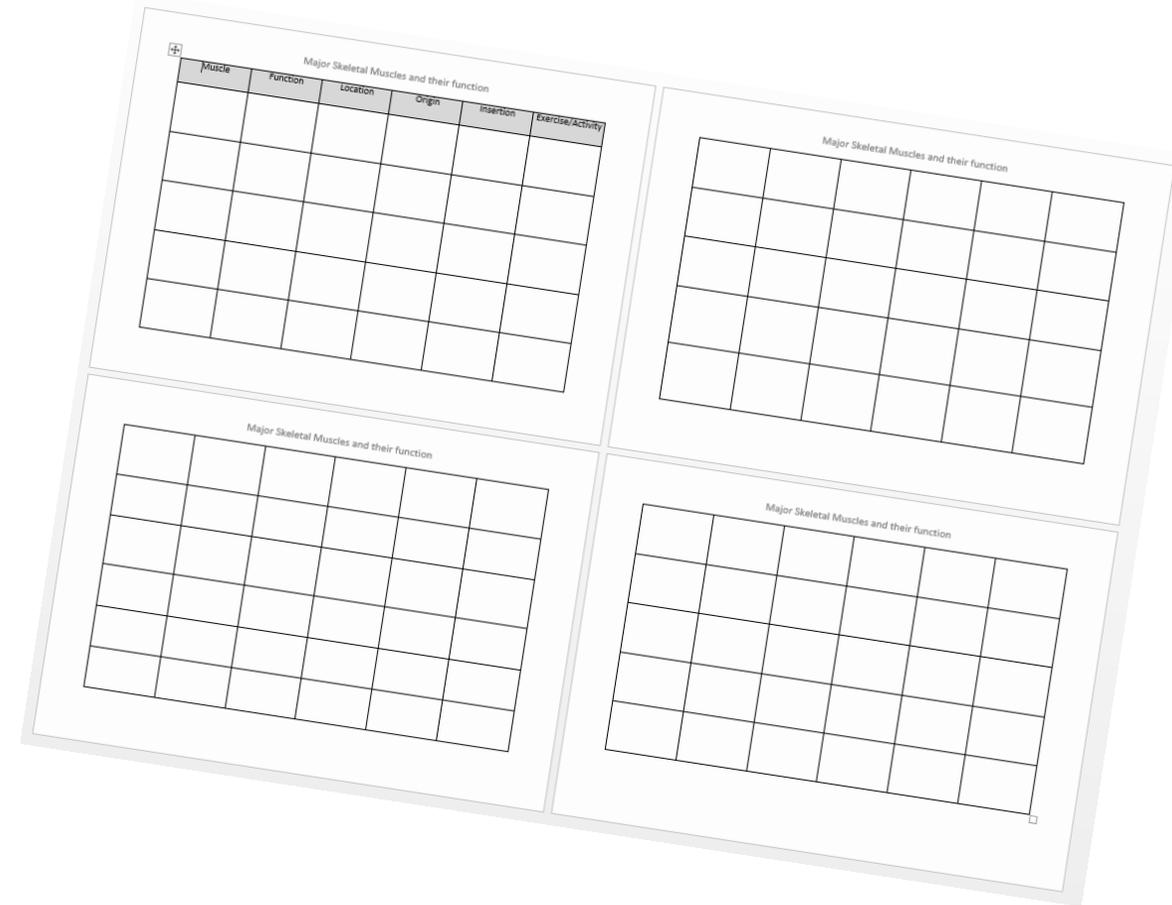
Most: To locate and describe the function of each muscle





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!



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...)*



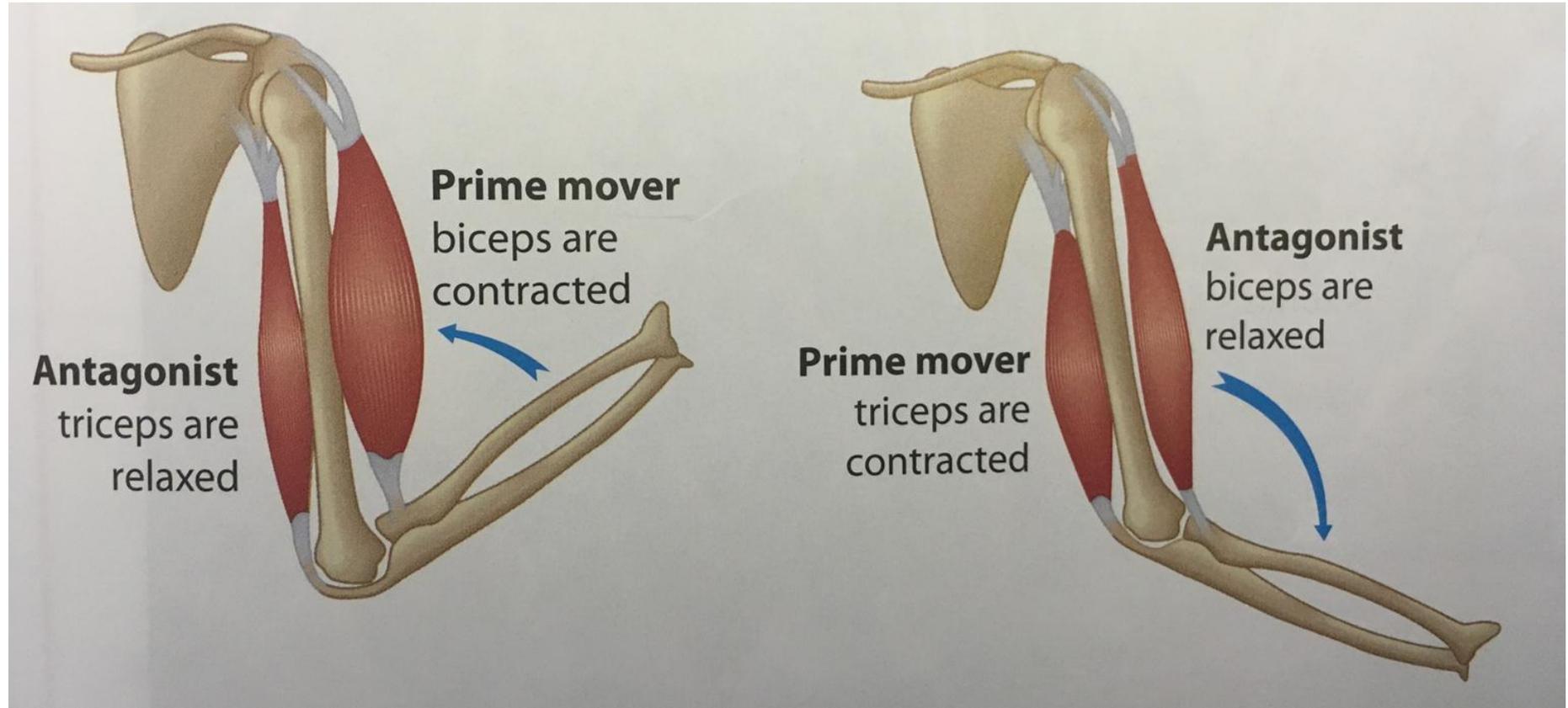
## B: The effects of exercise and sports performance on the muscular system - Antagonistic muscle pairs

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



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



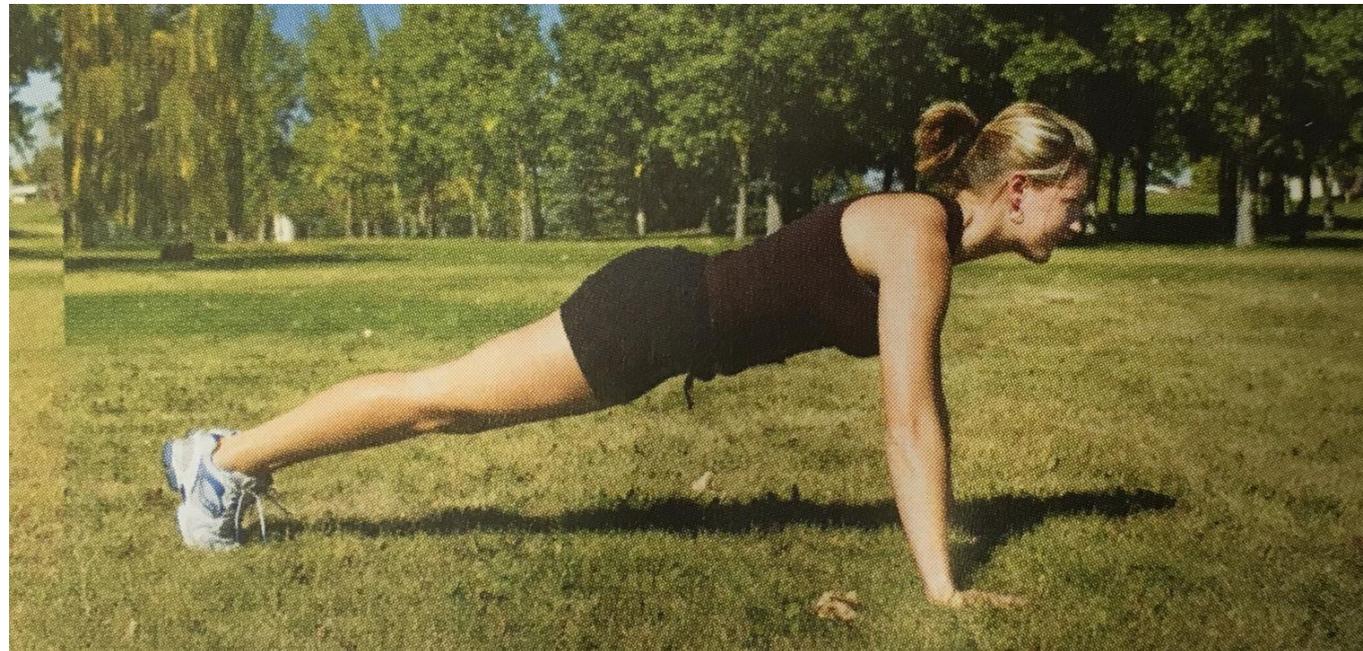
All: Identify the 3 main types of muscle contraction

Most: Explain the 3 main types of muscle contraction

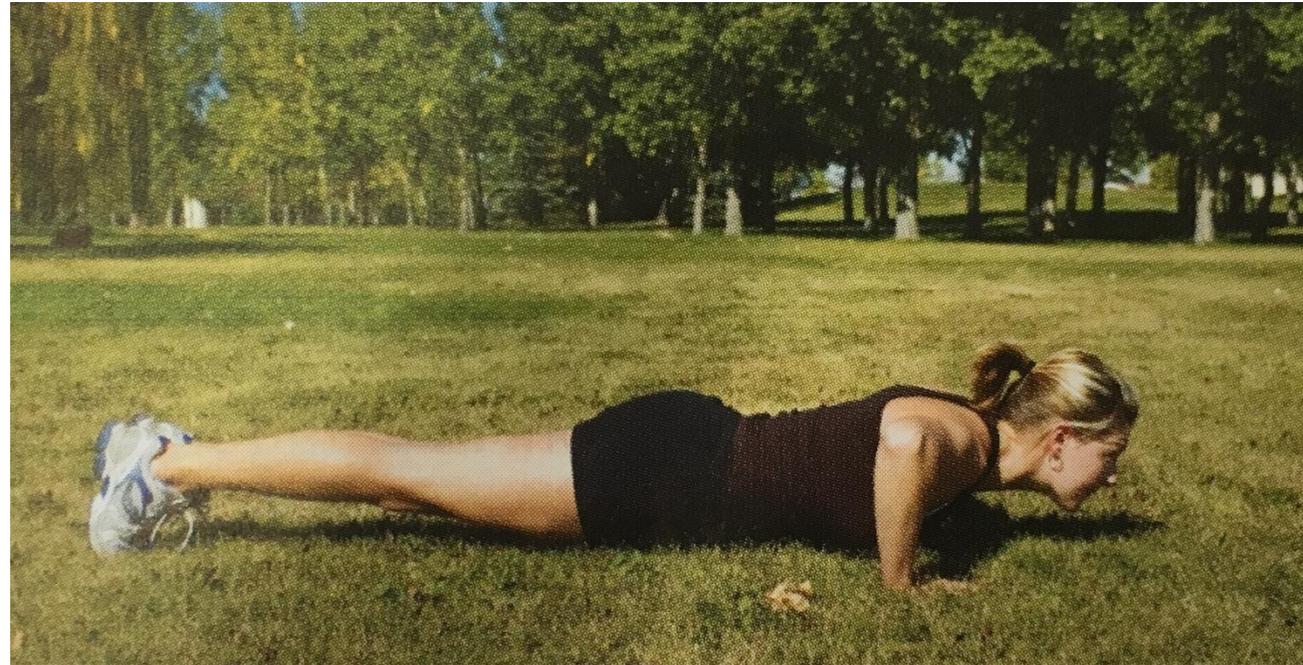
**CONCENTRIC ISOTONIC CONTRACTION?      ECCENTRIC ISOTONIC CONTRACTION?  
ISOMETRIC CONTRACTION?**



**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





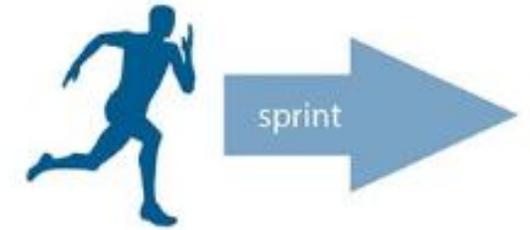
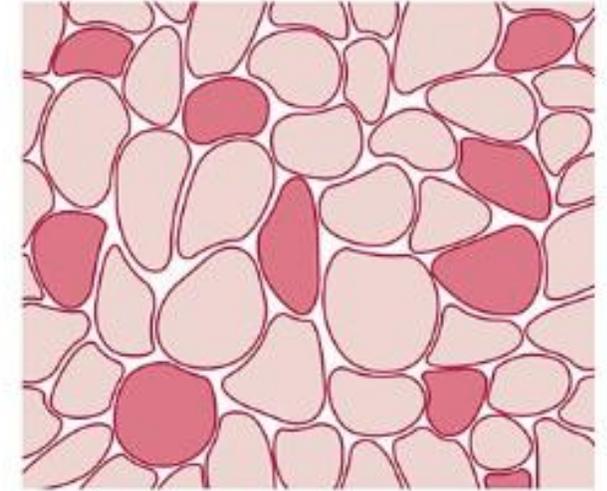
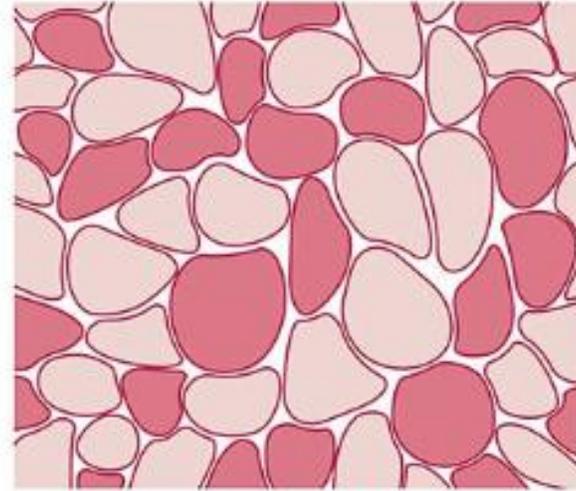
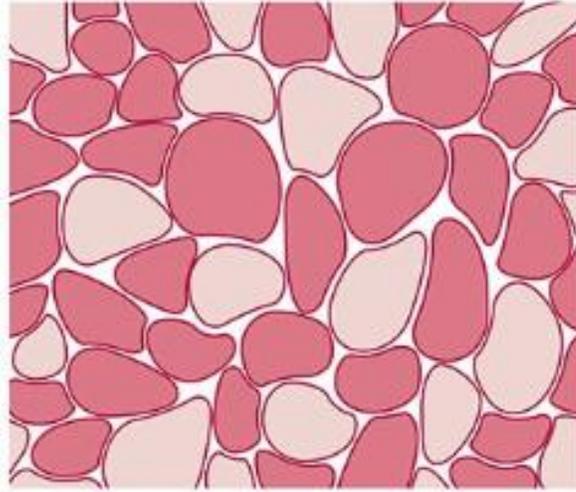
# **B: The effects of exercise and sports performance on the muscular system**

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



# Type I, Type IIa or Type



# Type I, Type IIa or Type



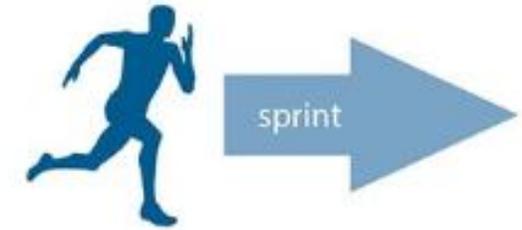
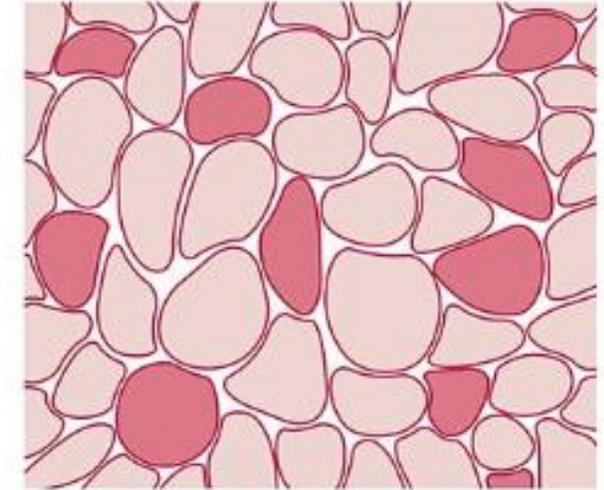
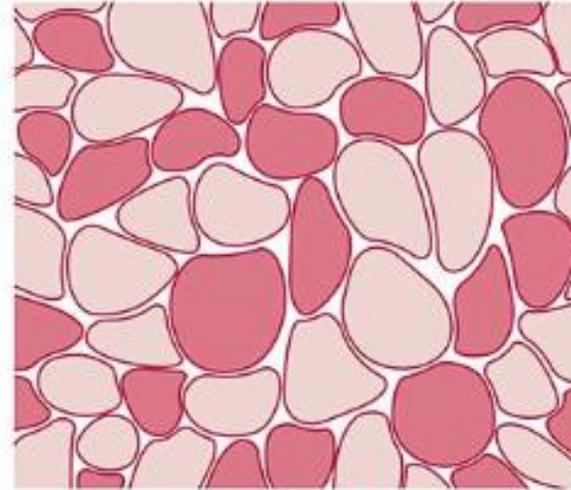
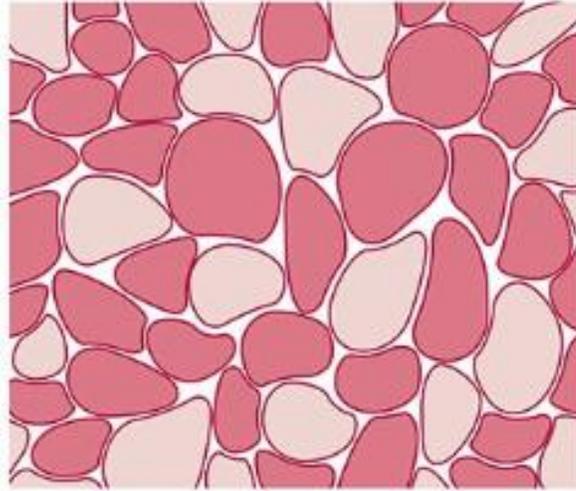
# Type I, Type IIa or Type



**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

In the space below define the term 'Carbohydrate'

PLENARY  
SESSION



**Pearson BTEC National Sport – Extended Certificate**

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



# Age



All: To identify additional factors affecting the muscular system

Most: To explain additional factors affecting the muscular system

# Cramp



All: To identify additional factors affecting the muscular system

Most: To explain additional factors affecting the muscular system

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**

**BTEC**



# 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

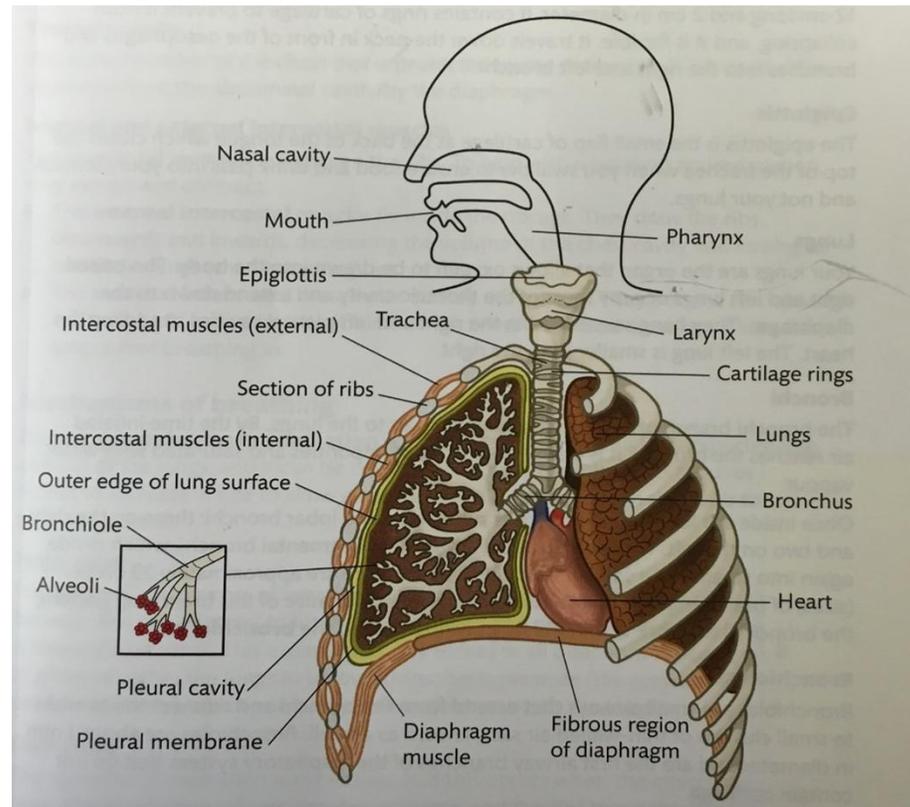
## Learning Objectives

- 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



## 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

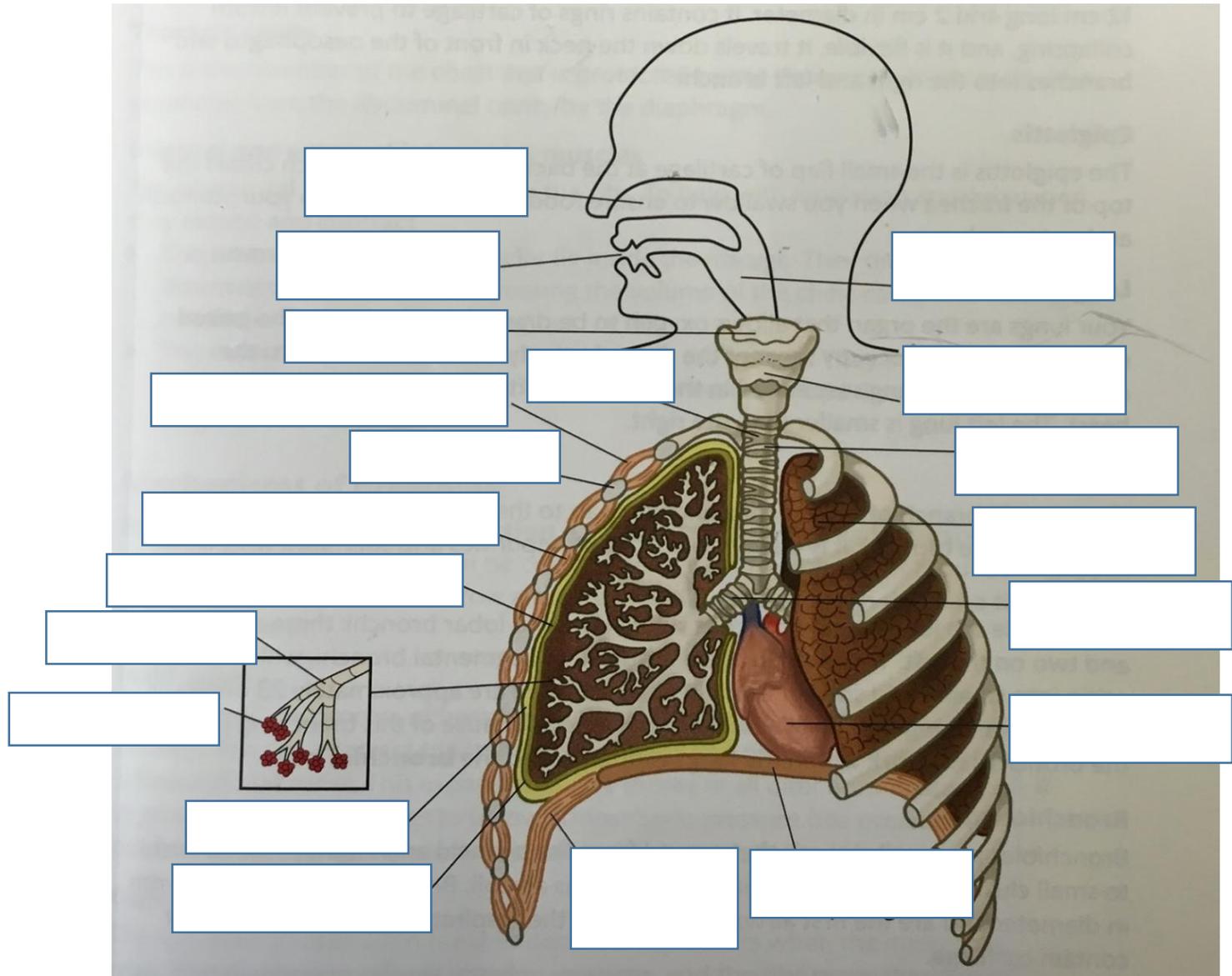
## Learning Objectives

- 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

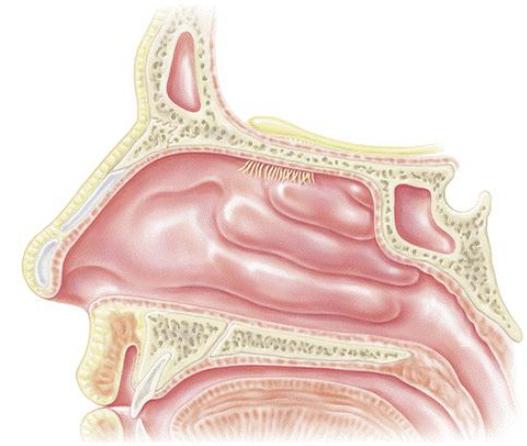




Fill in the  
blanks!



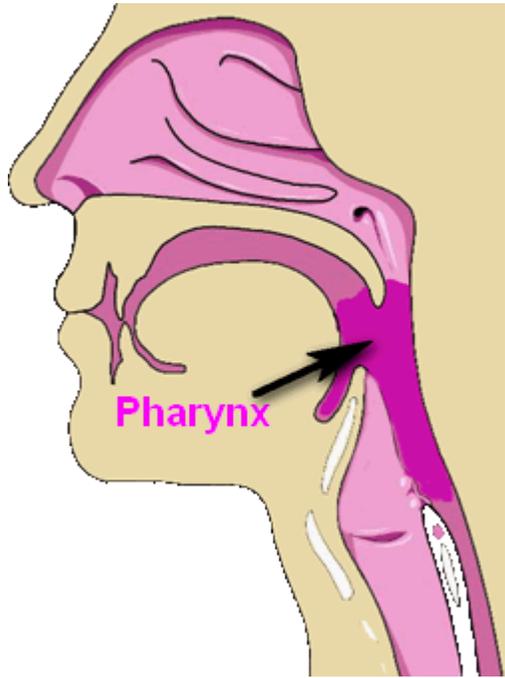
## NASAL CAVITY



Most: To explain the main structures of the respiratory system

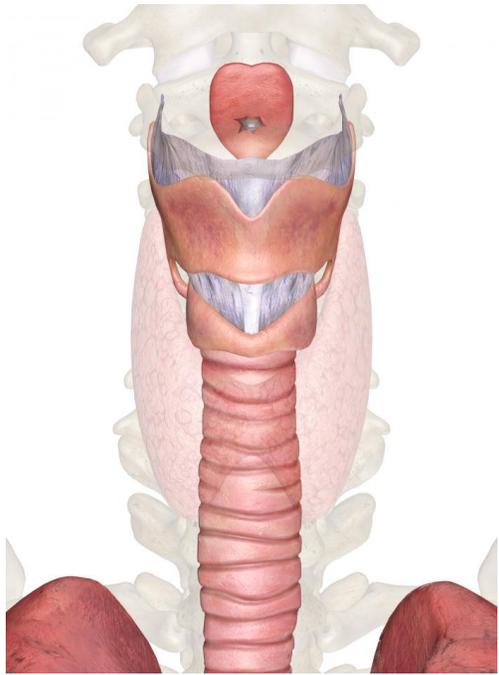
Some: To understand the function of the respiratory system

## PHARYNX



Most: To explain the main structures of the respiratory system

Some: To understand the function of the respiratory system



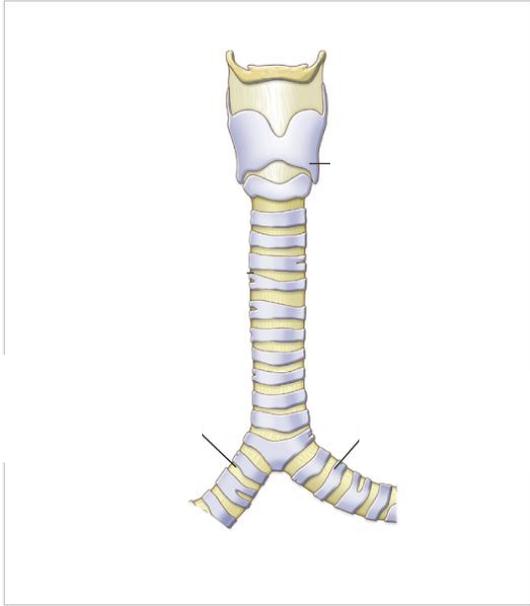
## LARYNX



Most: To explain the main structures of the respiratory system

Some: To understand the function of the respiratory system

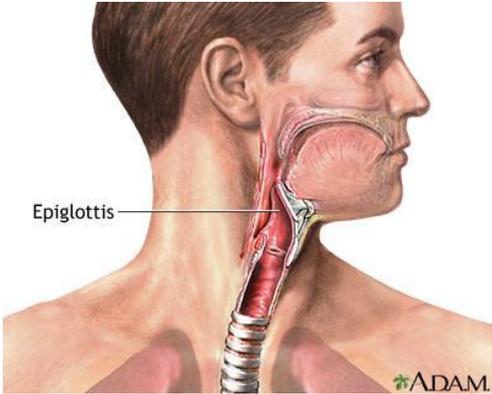
## TRACHEA



Most: To explain the main structures of the respiratory system

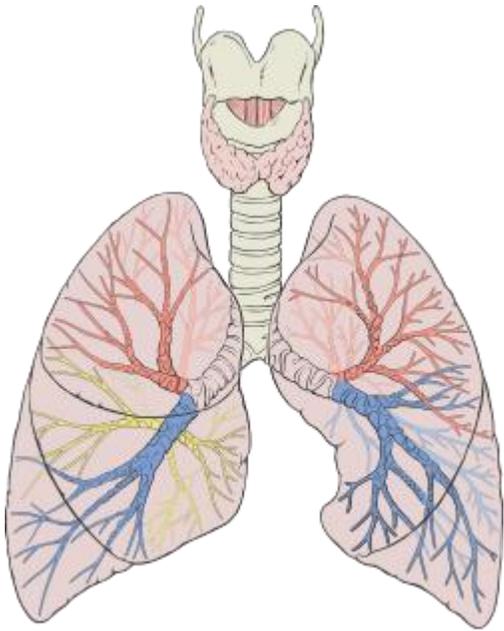
Some: To understand the function of the respiratory system

## EPIGLOTTIS



Most: To explain the main structures of the respiratory system

Some: To understand the function of the respiratory system



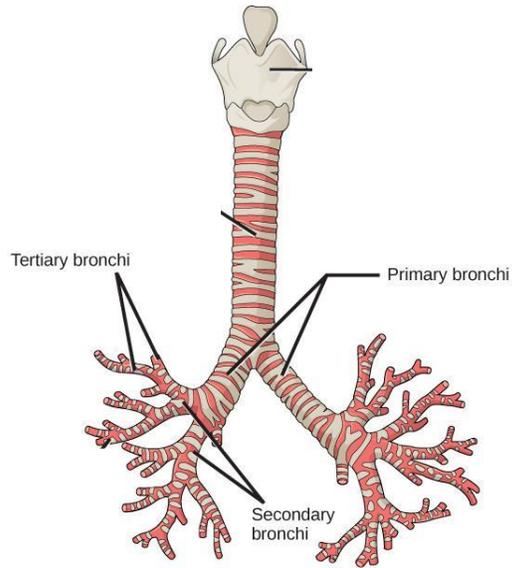
## LUNGS



Most: To explain the main structures of the respiratory system

Some: To understand the function of the respiratory system

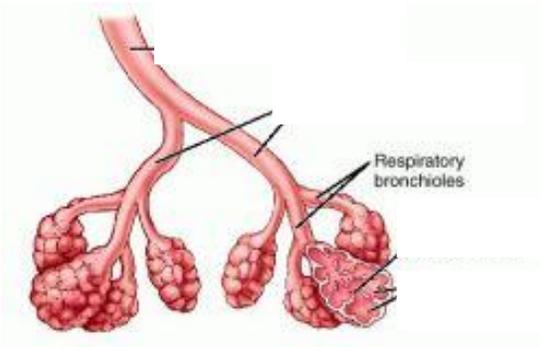
## BRONCHI



Most: To explain the main structures of the respiratory system

Some: To understand the function of the respiratory system

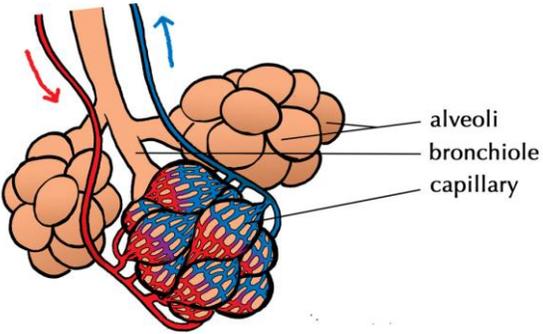
## BRONCHIOLES



Most: To explain the main structures of the respiratory system

Some: To understand the function of the respiratory system

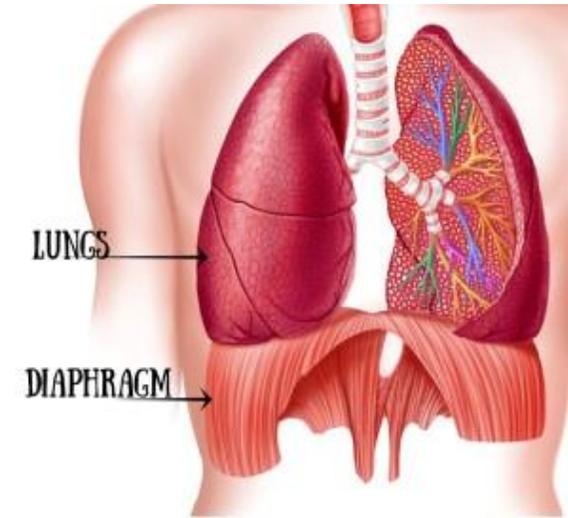
## ALVEOLI



Most: To explain the main structures of the respiratory system

Some: To understand the function of the respiratory system

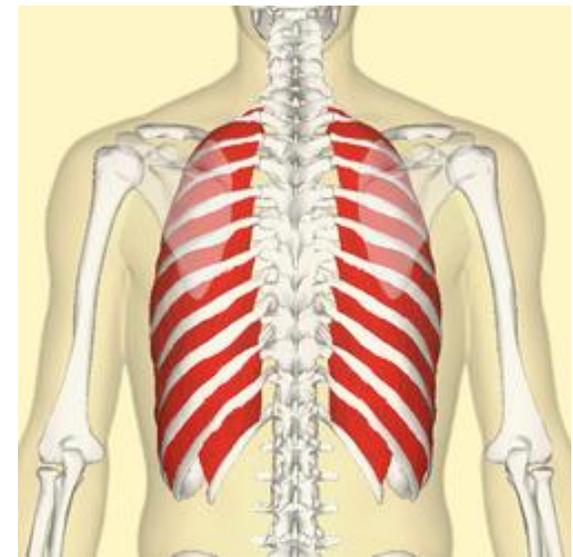
## DIAPHRAGM



Most: To explain the main structures of the respiratory system

Some: To understand the function of the respiratory system

## THROACIC CAVITY



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

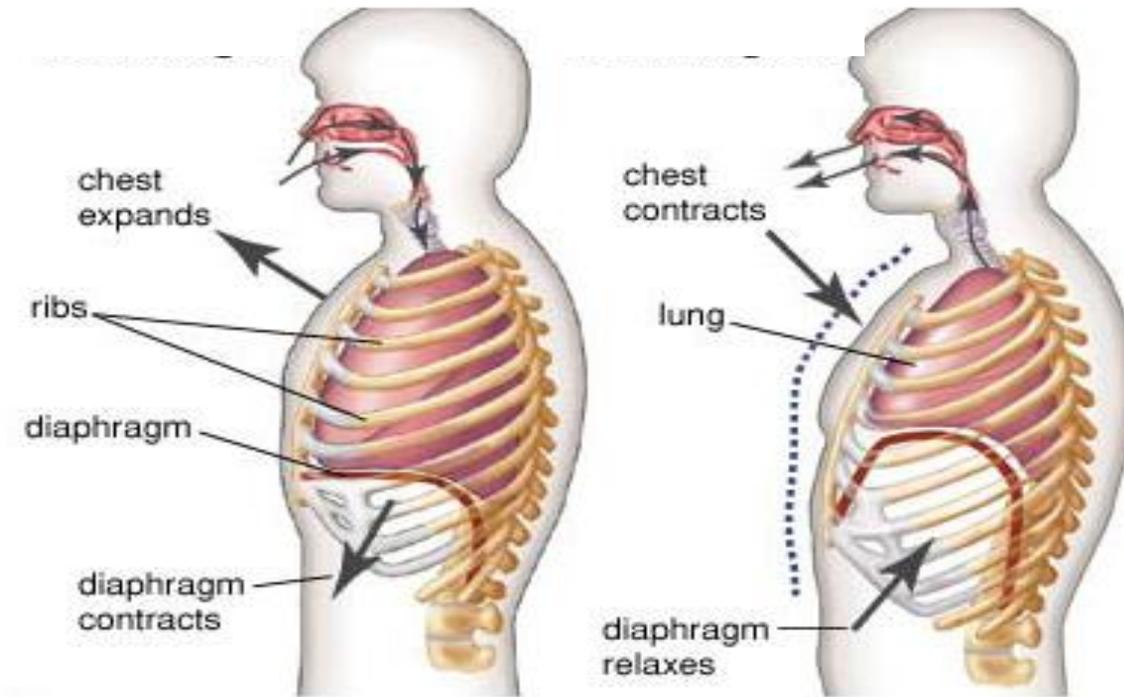
## Learning Objectives

- 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:

A large, empty rectangular box with a black border, intended for students to write their notes about inspiration and expiration.





Make  
notes  
from  
page  
31-32

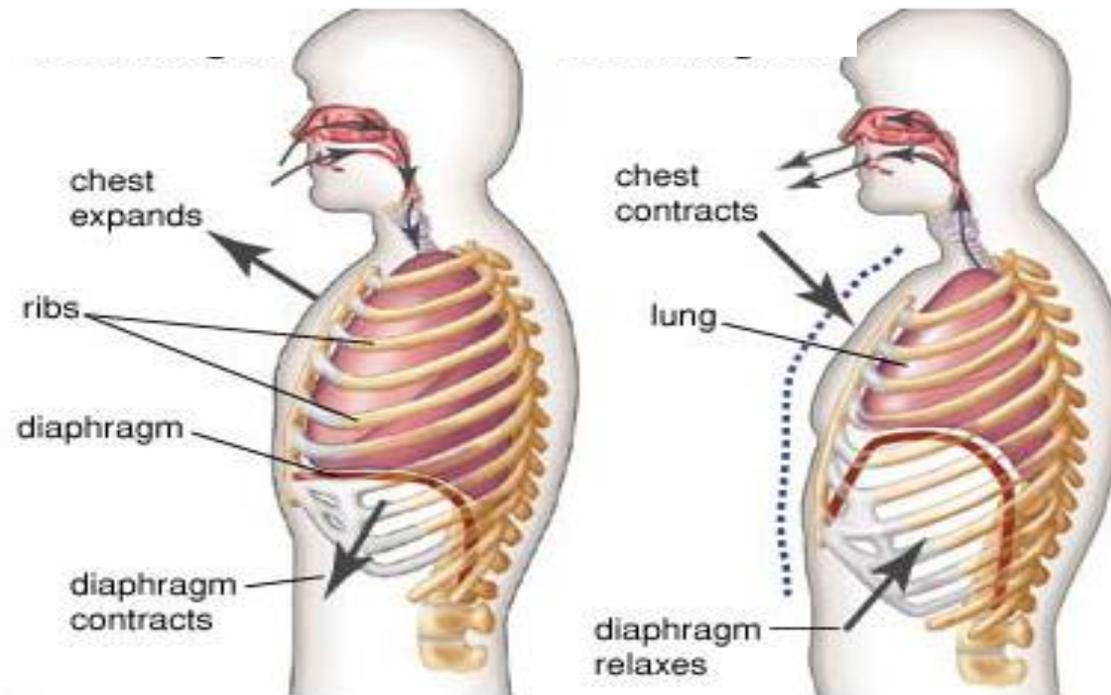
Write notes here about Neural Control and Chemical Control:

A large, empty rectangular box with a black border, intended for students to write their notes on the topics of 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





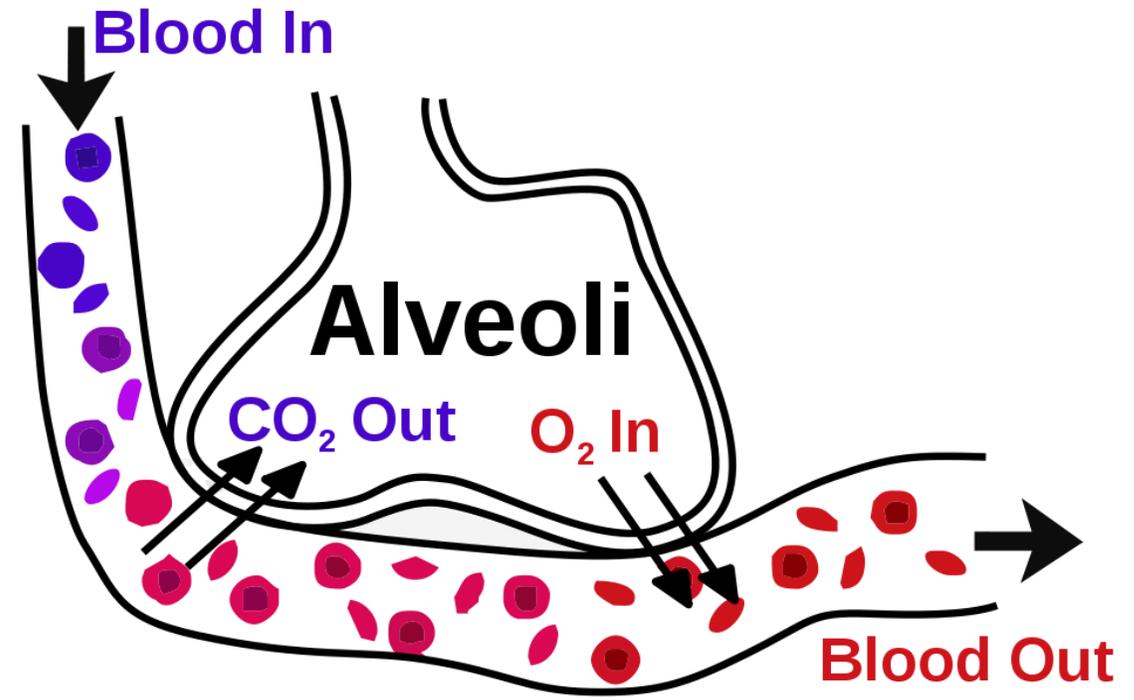
If this is the answer, what is the question?

*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



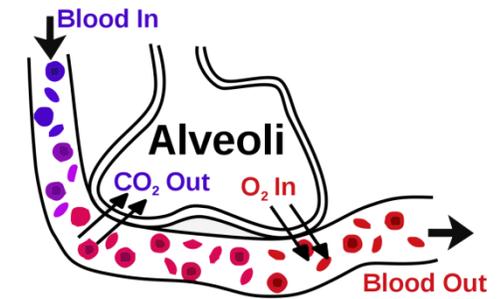
Use page 32 to summarise notes about what Gaseous Exchange is:



PLENARY  
SESSION

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

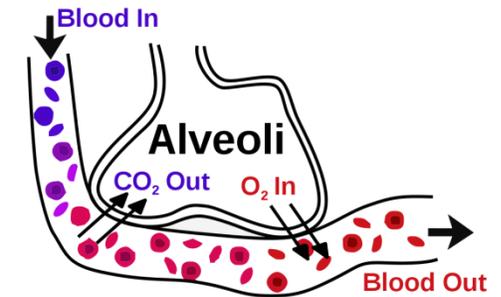
Flip card >



PLENARY  
SESSION

## 2. Explain diffusion

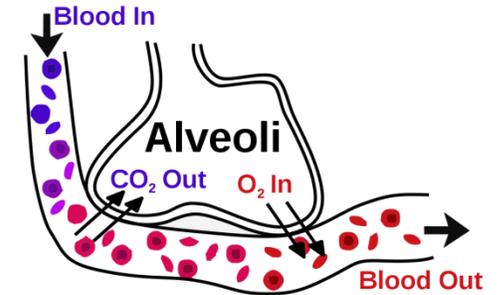
Flip Card >



PLENARY  
SESSION

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

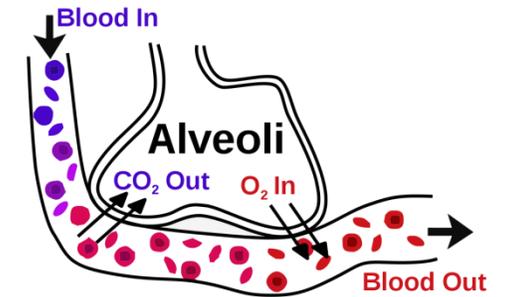
Flip Card >



PLENARY  
SESSION

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

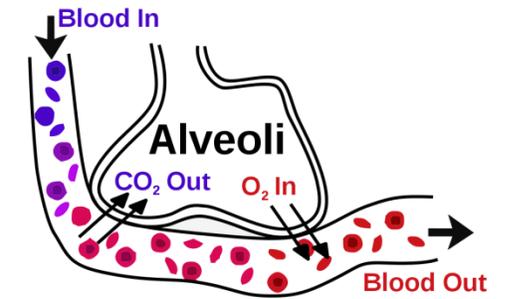
Flip Card >



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





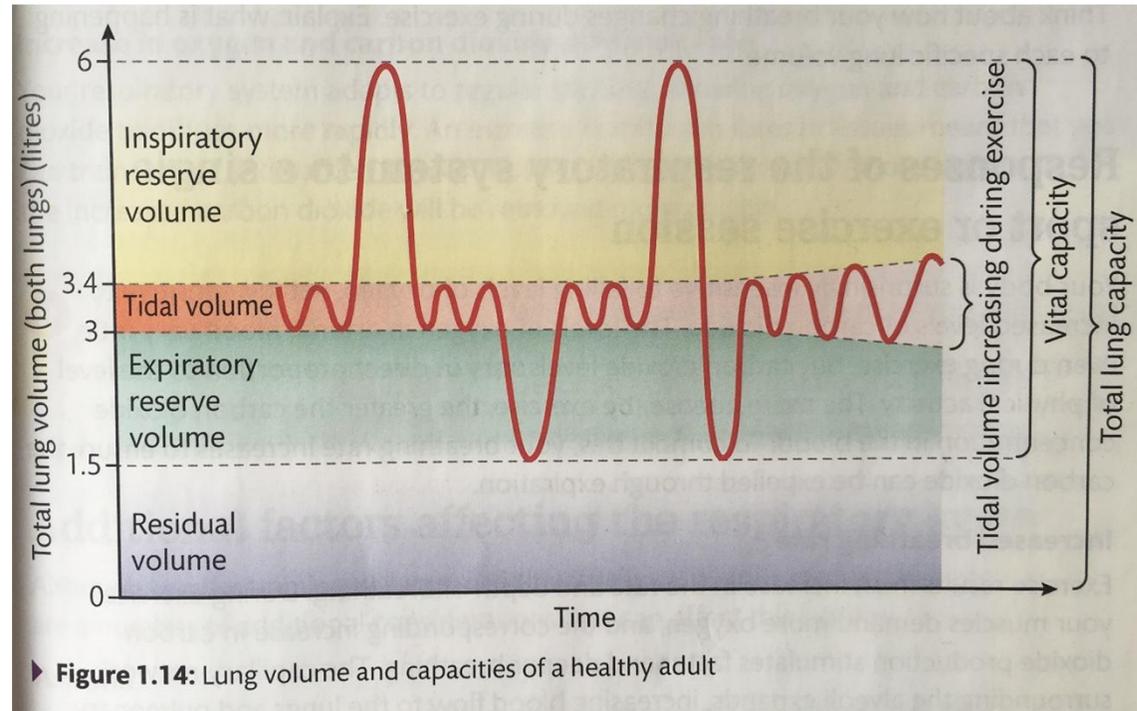
What happens to your breathing when you are exercising or training?

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



**Pearson BTEC National Sport – Extended Certificate**

All: To identify additional factors affecting the respiratory system

Most: To explain additional factors affecting the respiratory system

# Asthma



All: To identify additional factors affecting the respiratory system

Most: To explain additional factors affecting the respiratory system

## Altitude/Partial pressure



All: To identify additional factors affecting the respiratory system

Most: To explain additional factors affecting the respiratory system

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

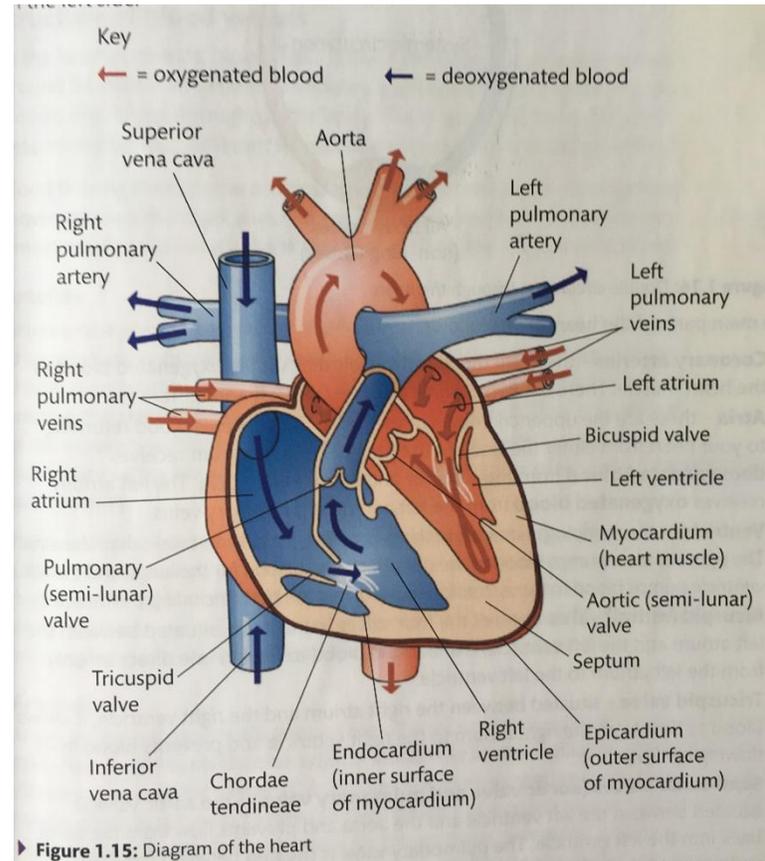
## Learning Objectives

- 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 structures of the cardiovascular system
- Most: To locate the main structures 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



**Pearson BTEC National Sport – Extended Certificate**

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



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



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...



**Pearson BTEC National Sport – Extended Certificate**

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

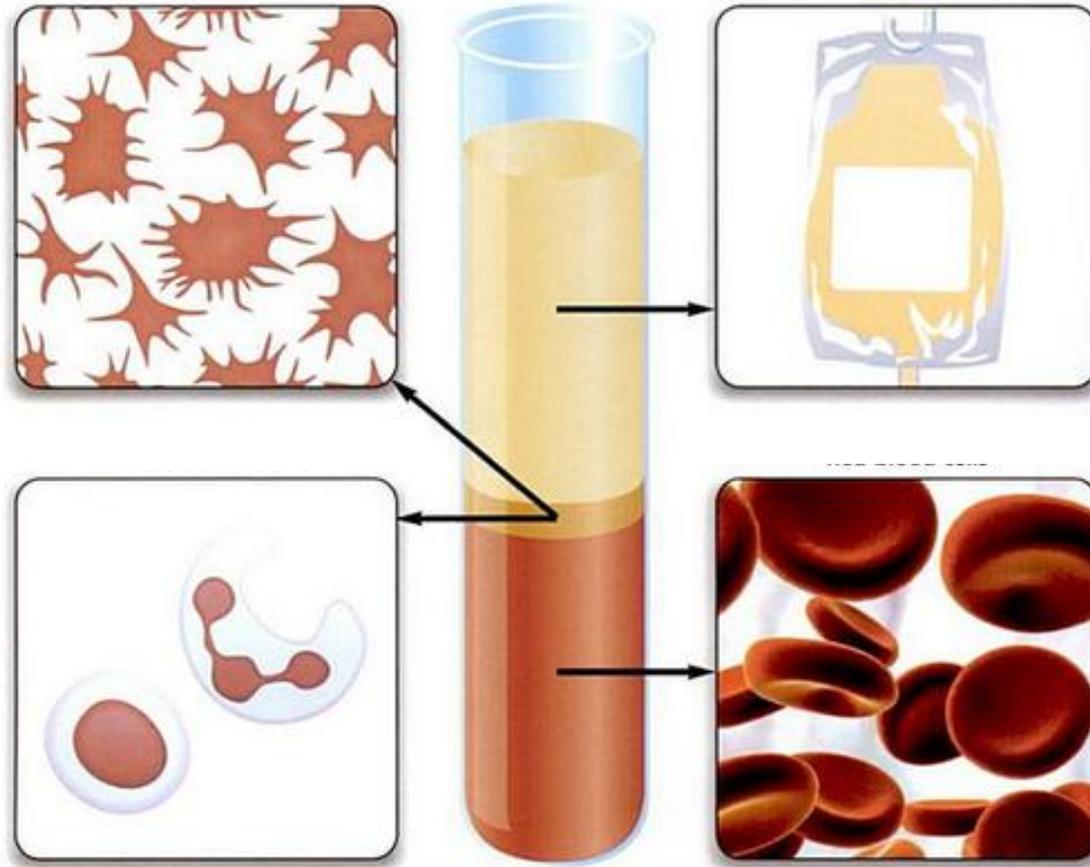
## Learning Objectives

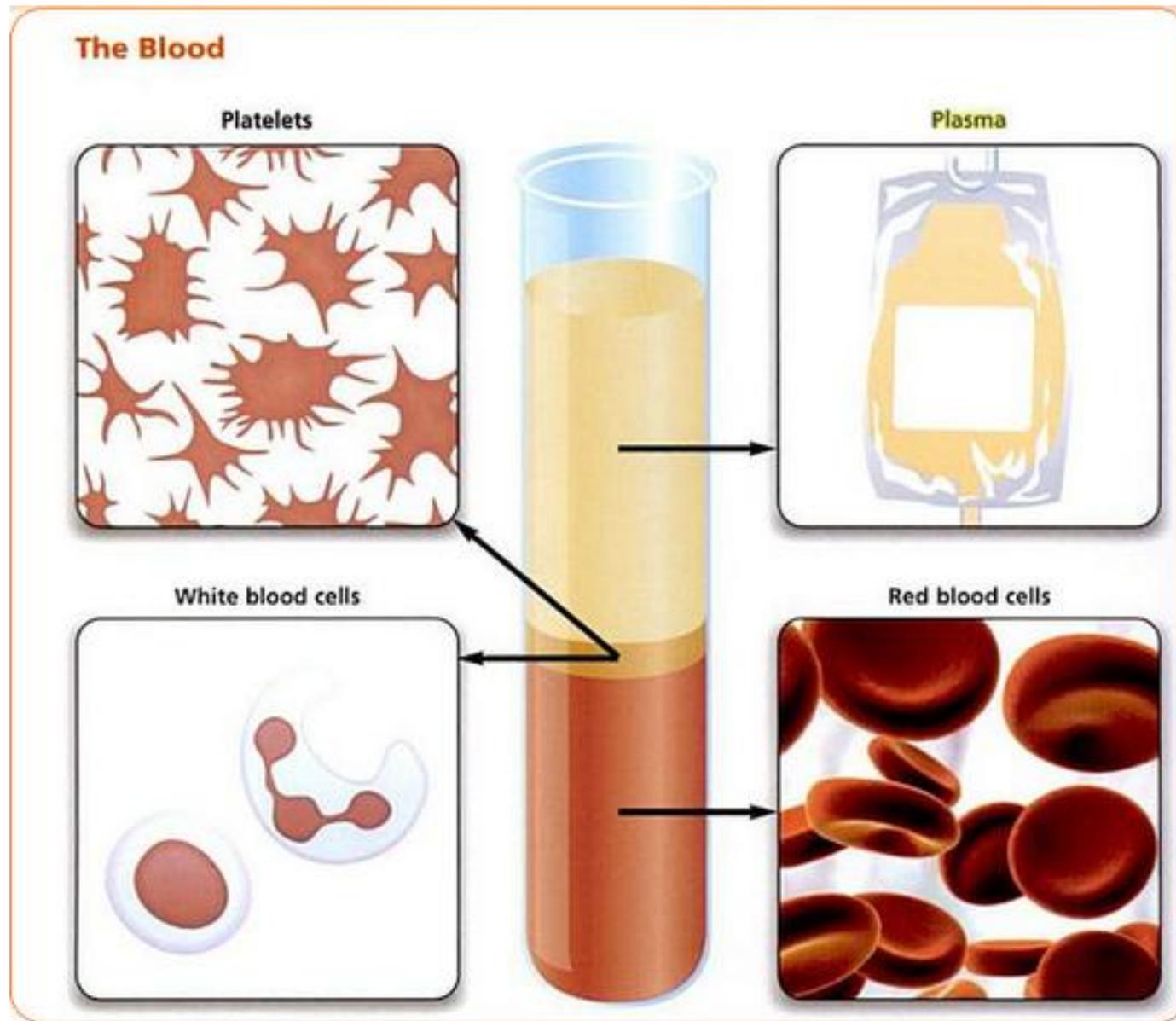
- All:** To identify what the blood is composed of
- Most:** To describe what the blood is composed of
- Some:** To explain what the blood is composed of





# 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



Plasma



## White Blood Cells



# Platelets



PLENARY  
SESSION

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

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



# BLOOD



**Pearson BTEC National Sport – Extended Certificate**

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)

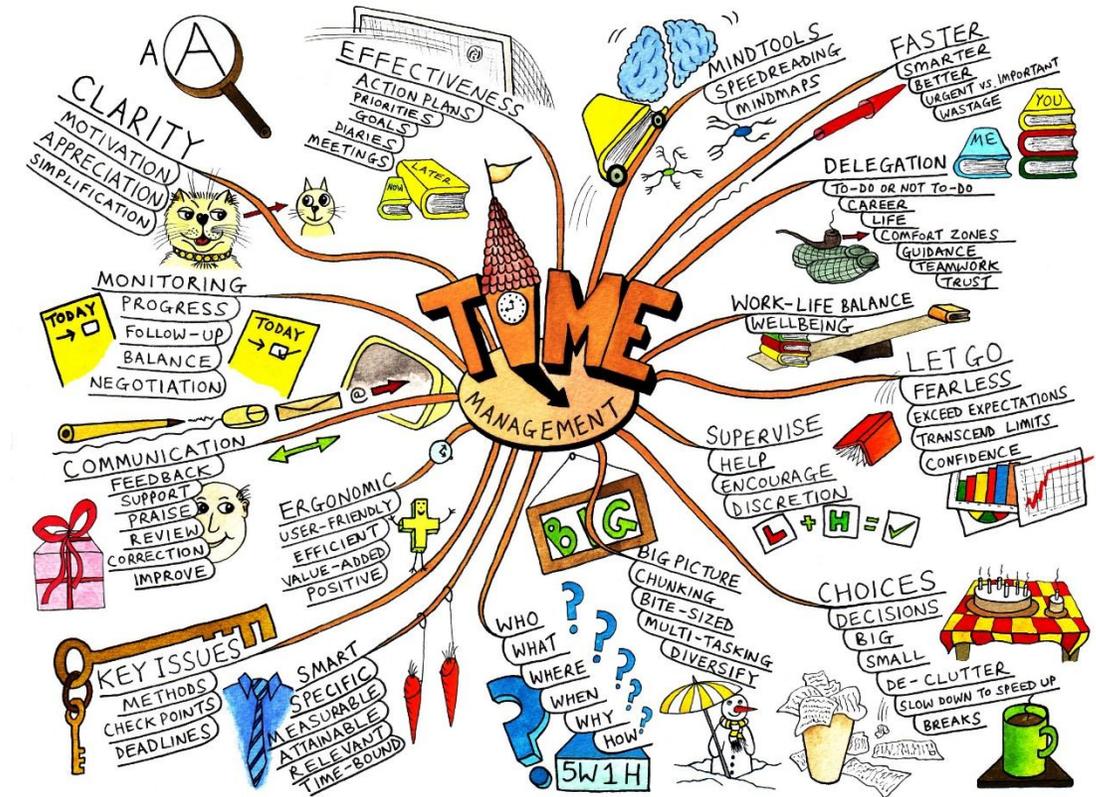
List down what you think the main functions of the cardiovascular system are by watching this you tube clip.

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

# 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



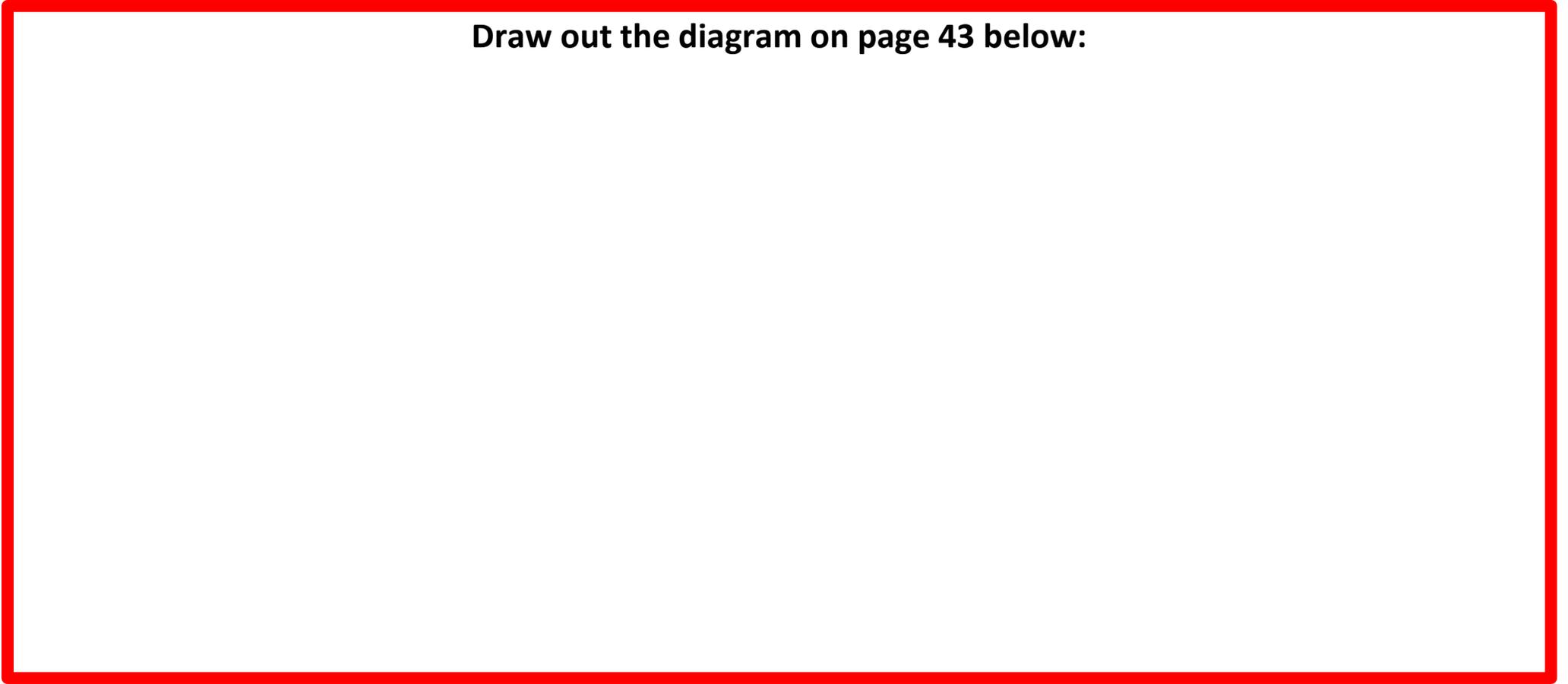


If this is the question what is the answer?

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



**Pearson BTEC National Sport – Extended Certificate**

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



All: To identify additional factors affecting the cardiovascular system

Most: To explain additional factors affecting the cardiovascular system

# 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

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?



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

Complete the diagram of ATP here:



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](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](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



**Pearson BTEC National Sport – Extended Certificate**

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.



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**

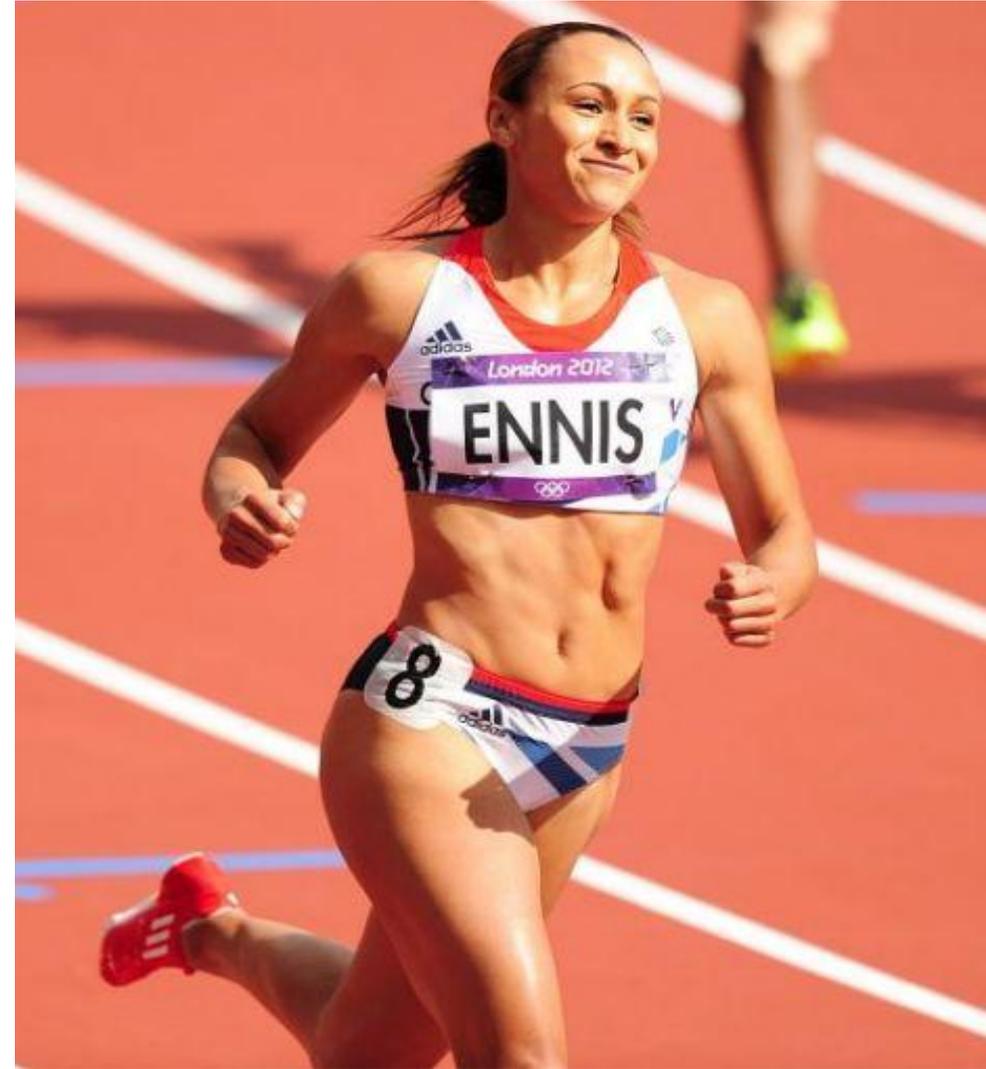
All: To define the Lactate System

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=PQMJSme780>

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?

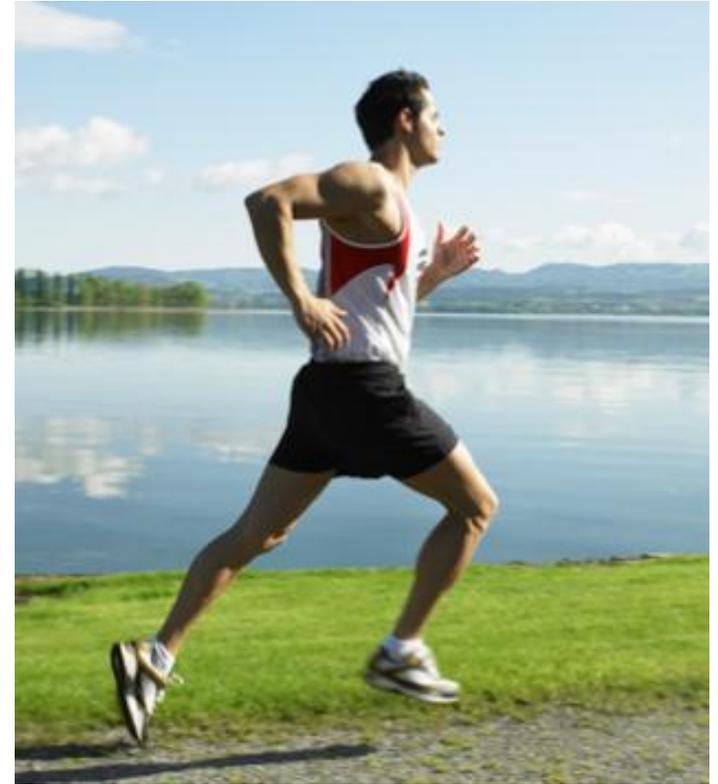
Make a list...





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

A large, empty rectangular box with a purple border, intended for students to write their bullet-pointed notes on the process of starting to run.



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

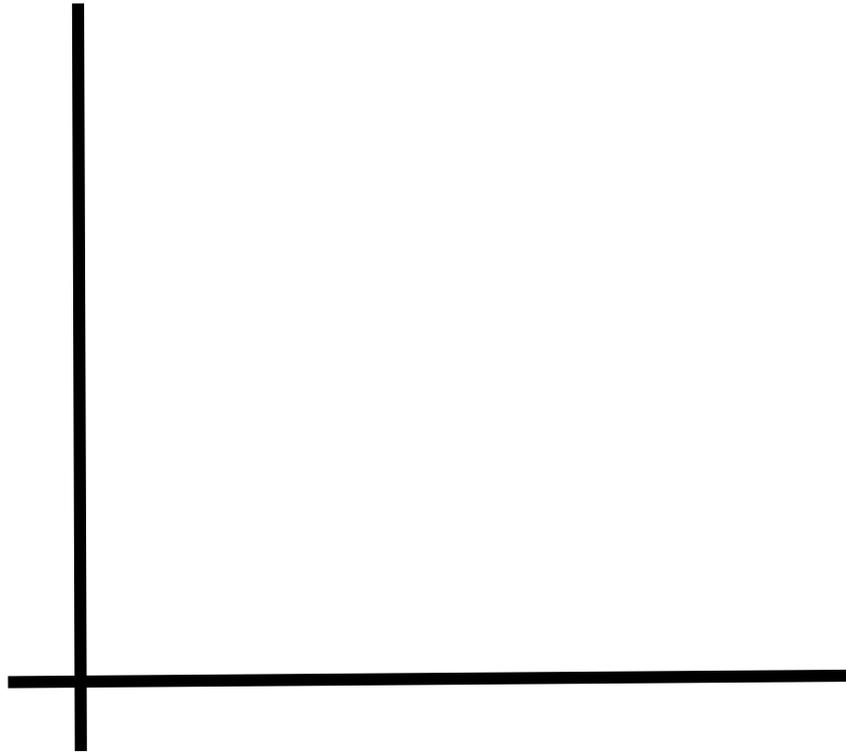


All: To know the energy systems in combination

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



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**

