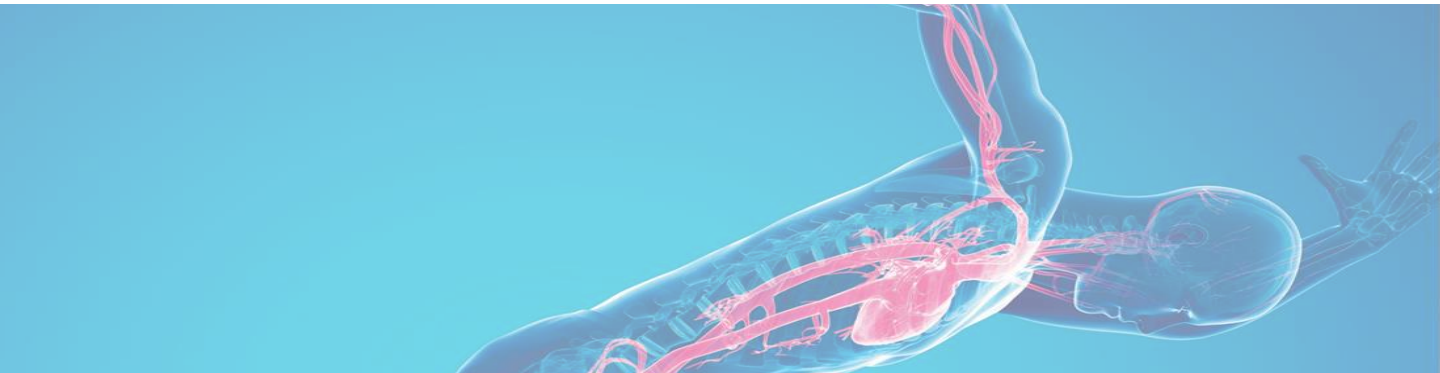
1 AQA GCSE Physical Education Applied Anatomy & Physiology Homework Booklet

Name……

Form……

Teacher……



1 Applied Anatomy & Physiology Definition of Key Terms

Abduction	movement of a bone or limb away from the midline of the body
Adduction	movement of a bone or limb towards the midline of the body
Aerobic exercise	working at a low to moderate intensity so that the body has time to use oxygen for energy production and can work for a long period of time
Alveoli	small air sacs in the lungs where gaseous exchange takes place
Anaerobic exercise	working for short periods of time at a high intensity without oxygen for energy production
Antagonist	the muscle or group of muscles that relax to allow a movement to take place. The antagonist works in an antagonistic pair with the agonist
Articulating bones	bones that meet at a joint to enable movement
Backflow	the flowing backwards of blood. Valves in the veins prevent backflow
Blood pressure	the pressure that blood is under. The systolic reading measures the pressure the blood is under when the heart contracts. The diastolic reading measures the pressure the blood is under when the heart relaxes

Capillaries	a network of microscopic blood vessels. They are only one cell thick
Cardiac cycle	one cycle of diastole and systole is called the cardiac cycle
Cardiac output (Q)	the volume of blood ejected from the heart in one minute. Cardiac output (Q) = stroke volume (SV) × heart rate (HR)
Cardio-respiratory system	the name used to describe the respiratory system and the cardiovascular system working together
Deoxygenated blood	blood containing a low concentration of oxygen
Diastole	the phase of the heartbeat when the chambers of the heart relax and fill with blood
Diffusion pathway	the distance travelled during diffusion. The diffusion pathway is short in gaseous exchange
DOMS	Delayed Onset Muscle Soreness, the pain you feel in your muscles the day after you exercise
Dorsiflexion	movement at the ankle joint that flexes the foot upwards and decreases the angle at the ankle joint
Excess Post-exercise Oxygen Consumption (EPOC)	the amount of oxygen needed to recover after exercise. It is characterised by an increased breathing rate and deeper breathing after exercise
Exhalation	the process of breathing out. Also known as expiration

Expiration	the process of breathing out. Also known as exhalation
Expiratory reserve volume	the amount of air that can be forced out after tidal volume (after a normal expiration). Expiratory reserve volume decreases during exercise
Extension	increase in the angle of bones at a joint
Fatigue	physical fatigue is a feeling of extreme or severe tiredness due to a build-up of lactic acid in the muscles or working for a long period of time
Flexion	decrease in the angle of bones at a joint
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
Haemoglobin	the protein found in red blood cells that transports oxygen (as oxyhaemoglobin) and carbon dioxide around the body
Heart rate	the number of times your heart beats in one minute. One heartbeat is one contraction and relaxation of the heart. Heart rate is measured in beats per minutes (bpm)
Hypertrophy	the enlargement of an organ or tissue caused by an increase in the size of its cells. When a muscle is trained, small tears are created. As they heal, they become thicker and increase in size
Inhalation	the process of breathing in. Also known as inspiration
Inspiration	the process of breathing in. Also known as inhalation

Inspiratory reserve volume	the amount of air that can be forced in after tidal volume (after a normal inspiration). Inspiratory reserve volume decreases during exercise
Intensity	the amount of energy needed to complete an activity. Working at a high intensity requires a large amount of energy. Working at a low intensity requires less energy
Isometric contraction	a muscle contraction where the length of the muscle does not change when it contracts. There is no limb movement as a result
Isotonic contraction	a muscle contraction where the muscle changes length when it contracts, resulting in limb movement. Isotonic contractions can be concentric (when the muscle contracts and shortens) or eccentric (when the muscle contracts and lengthens)
Lactic acid	a mild poison and waste product of anaerobic respiration
Musculoskeletal system	the name used to describe the muscular system and the skeletal system working together
Oxygenated blood	blood containing a high concentration of oxygen
Oxyhaemoglobin	a chemical formed when haemoglobin bonds to oxygen
Plantar flexion	movement at the ankle joint that points the toes and increases the angle at the ankle joint
Prime mover (or 'agonist')	the muscle or group of muscles that contract to create movement. The prime mover works in an antagonistic pair with the antagonist
Pulse	the rhythmic throbbing that you can feel as your arteries pump blood around the body. You can measure your heart rate using your pulse

Residual volume	the amount of air that remains in the lungs after maximal expiration. There is no change in residual volume during exercise
Rotation	a circular movement around a joint or, in other words, a movement around an axis
Stroke volume (SV)	the volume of blood pumped out of the heart by each ventricle during one contraction
Synovial joint	an area of the body where two or more articulating bones meet
Systole	the phase of the heartbeat when the chambers of the heart contract and empty of blood; when blood is ejected from the heart
Tendon	connective tissue that attaches muscle to bone. Its role is to transfer the effort created by a contracting muscle to the bone, resulting in the movement of that bone
Tidal volume	the normal amount of air inhaled or exhaled per breath. Tidal volume increases with exercise
Vasoconstriction	the narrowing of the internal diameter of a blood vessel to decrease blood flow. The arteries constrict during exercise so that less blood is delivered to inactive areas
Vasodilation	the widening of the internal diameter of a blood vessel to increase blood flow. The arteries dilate during exercise so that more blood is delivered to active areas, increasing their oxygen supply
Vital capacity	the largest volume of air that can be forcibly expired after the deepest possible inspiration

1 Question Command words

Analyse
Separate information into components and identify their characteristics.

Apply
Put into effect in a recognised way.

Calculate
Work out the value of something.

Compare
Identify similarities and or differences.

Complete
Finish a task by adding to given information.

Consider
Review and respond to given information.

Define
Specify meaning.

Describe
Set out characteristics.

Discuss
Present key points about different ideas or strengths and weaknesses of an idea.

Evaluate
Judge from available evidence.

Explain
Set out purposes or reasons.

Identify
Name or otherwise characterise.

Illustrate
Present clarifying examples.

Interpret
Translate information into recognisable form.

Justify
Support a case with evidence.

Outline
Set out main characteristics.

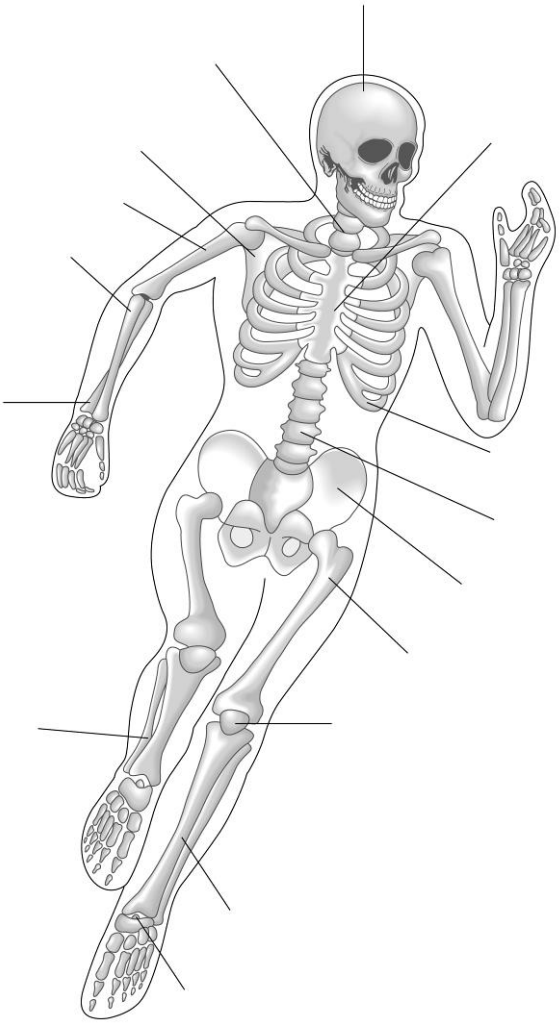
Suggest
Present a possible case/solution.

State
Express clearly and briefly.

1.1 The structure and functions of the skeleton

Label the most common bones in the human body, including the articulating bones that connect at the shoulder, elbow, hip, knee and ankle joints. Then write down the type of each bone next to its name (flat, long, short or irregular). Next to that, note down how the type of bone influences what the bone does. For each bone, work the information away from the skeleton, like a mind map.

You can also colour the skeleton to show the bone classifications.



Key

- Long bones
- Short bones
- Flat bones
- Irregular bones

Describe each of the four different types of bone and give an example of where each can be found in the body.

Flat bones

Long bones

Short bones

Irregular bones

Name the articulating bones of the following joints and identify the type of bone of each:

Shoulder:

Elbow:

Wrist:

Hip:

Knee:

Ankle:

Name the bone of the upper arm and the bones of the lower leg and identify what type of bone they are.

The skeletal system has six functions, which can be recalled using the mnemonic '**S**ometimes **P**ractising **M**oving **S**wiftly **B**rings **S**uccess'.
Write down the key points about each function, remembering to mention how each function is important for physical activity:

S

P

M

S

B

S

Select two practical sports and give specific examples as to how each function of the skeleton is important in the sports you have selected.

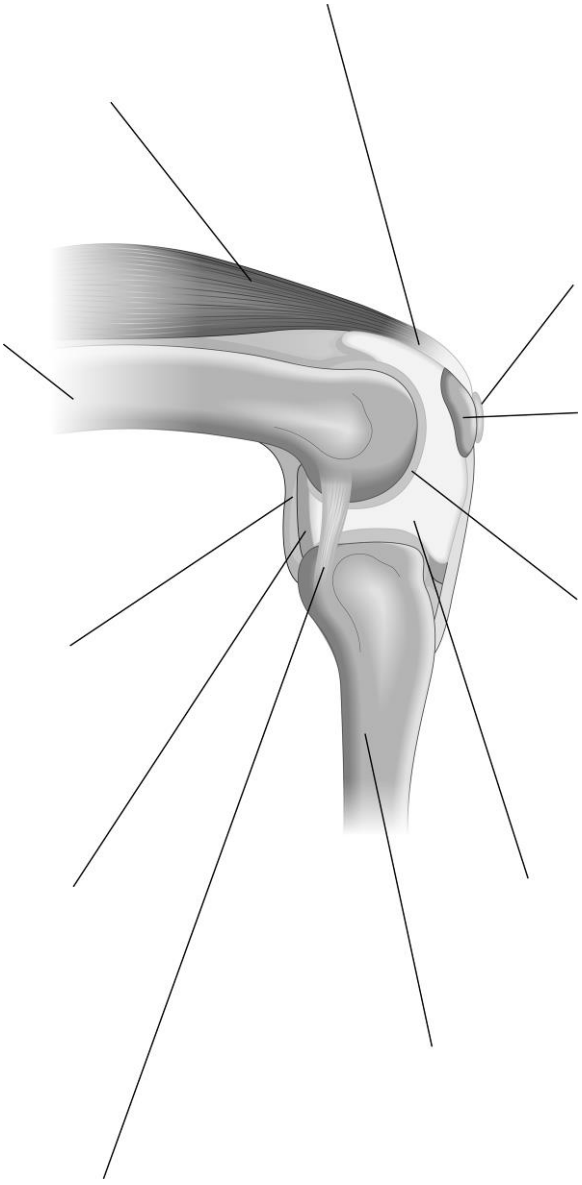
1.

2.

1.1 Synovial joints

Synovial joints, or freely moveable joints, are the most common type of joint in the human body. They are found at the shoulder, elbow, hip, knee and ankle.

Label the diagram of the synovial joint at the knee, describing how each part of the joint works to prevent injury.



1.1 Movement at synovial joints

For each diagram of a synovial joint below:

1. Identify the location of the joint

2. Identify the type of joint

3. Identify the movements that take place at the joint.

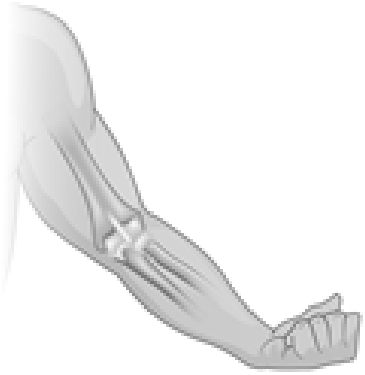
Location: Shoulder joint

Type: .....

Movements: .....

.....

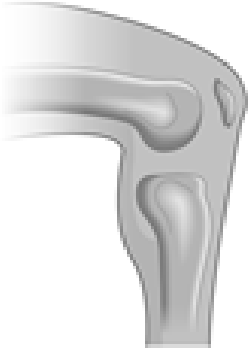
.....



Location: .....

Type: .....

Movements: Flexion and extension

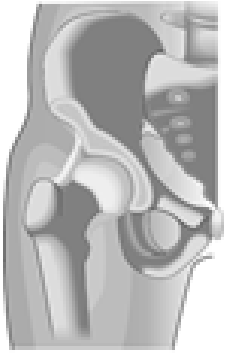


Location: .....

Type: Hinge joint

Movements: .....

.....



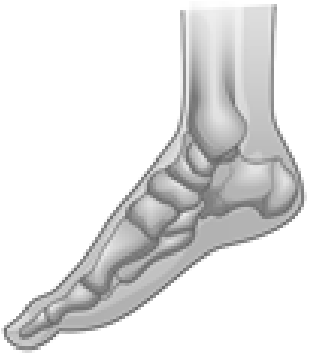
Location: .....

Type: .....

Movements: .....

.....

.....



Location: .....

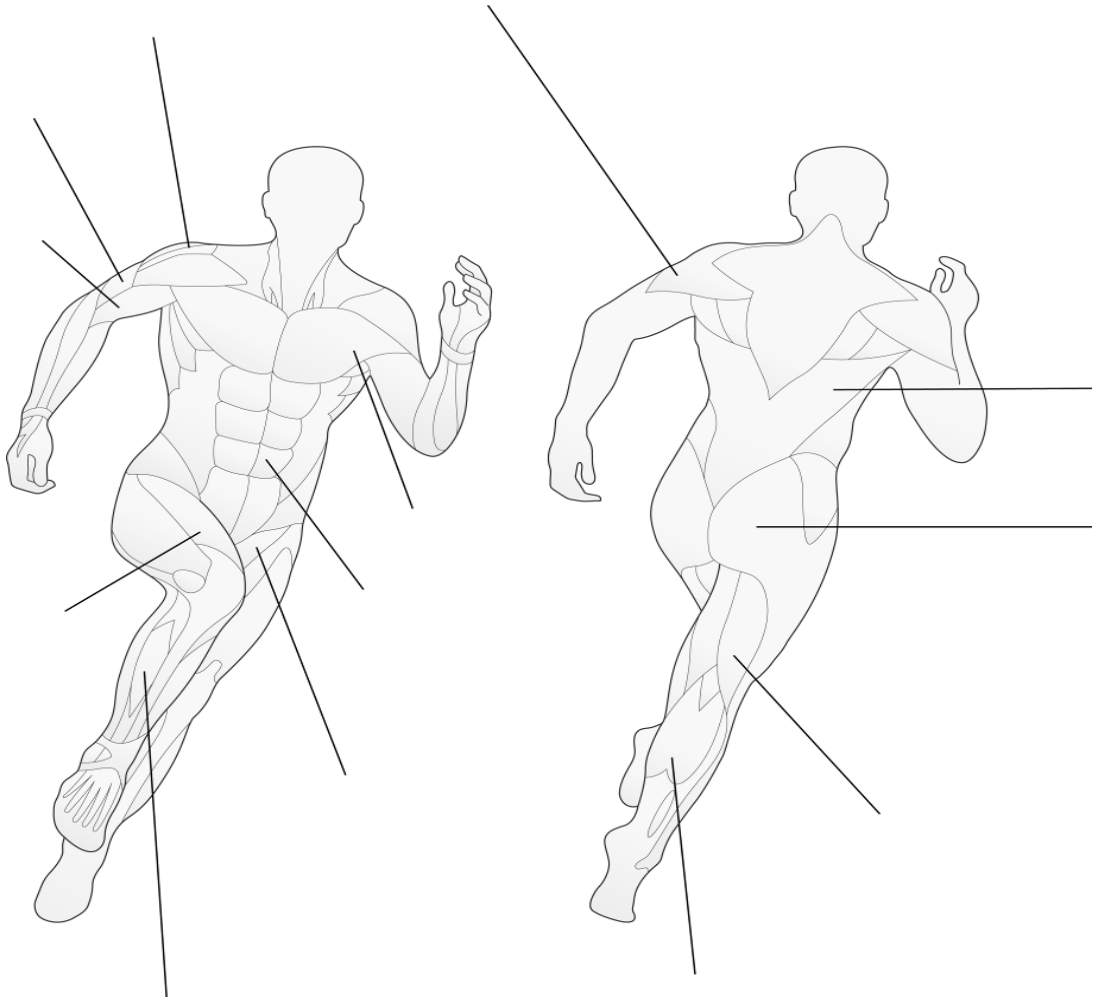
Type: .....

Movements: .....

.....

1.2 Muscles

Identify the major muscles of the body by labelling the diagram below:

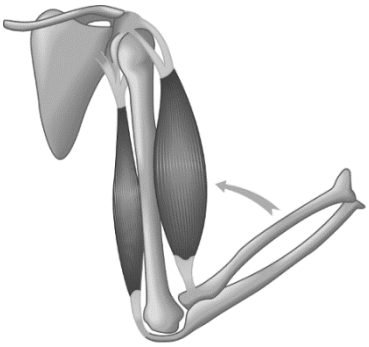


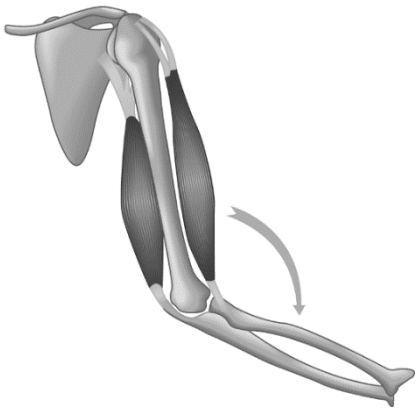
Fully describe the following key term:

Tendon:

1.2 Muscles

Add labels and notes to the diagrams below to explain how an antagonistic pair of muscles work together to cause movement at a joint.





Describe the role of the muscle acting as the prime mover/agonist:

Describe the role of the muscle acting as the antagonist:

Explain, with a sporting example, how muscles and bones work together at a joint to cause movement:

List the four most obvious antagonistic pairs in the human body:

The antagonistic pair acting at the elbow joint:

The antagonistic pair acting at the hip joint:

The antagonistic pair acting at the knee joint:

The antagonistic pair acting at the ankle joint:

1.2 Muscle contractions

Muscles can contract in two different ways**: Isotonically** and **isometrically**.
Isotonic contractions can occur by concentric or eccentric contractions.

Write a description of each type of contraction:

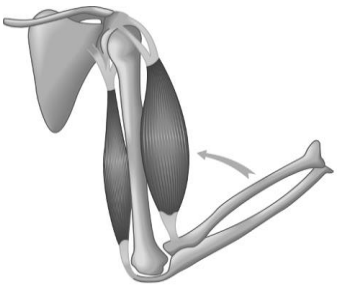
Isometric contractions:

Isotonic contractions:

Concentric contraction:

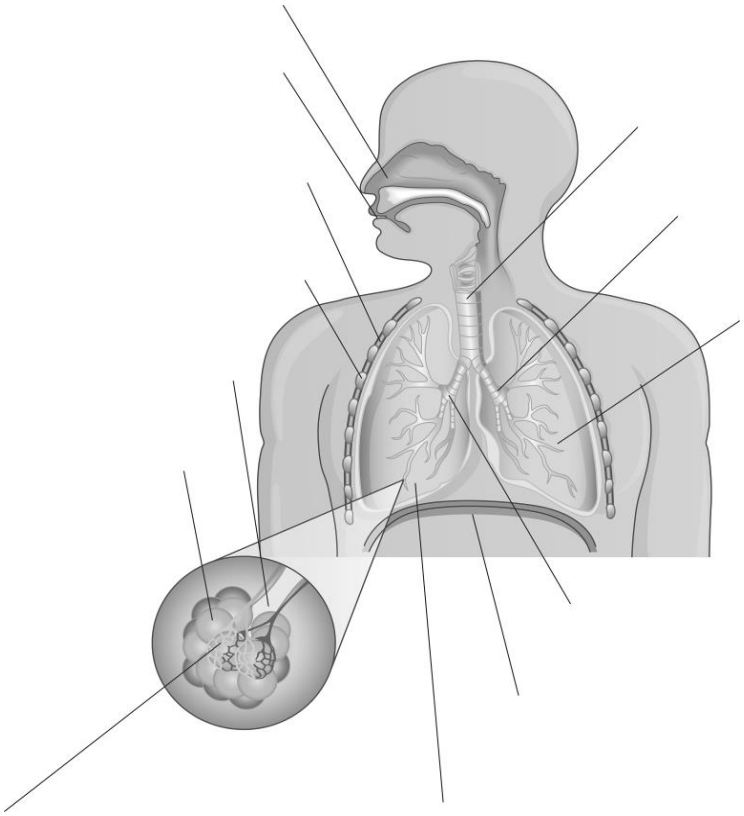
Eccentric contraction:

Identify which muscle contraction is taking place in each image and the muscle or muscles producing that contraction. Write your answers under each image.



1.3 Structure and function of the Cardio-respiratory system

Fully label the diagram of the respiratory system below:



Fully describe the following key term:

Cardio-respiratory system:

_____

_____

_____

_____

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_____

Describe the structure of the **Trachea** and explain how this structure helps it to perform it's function within the respiratory system.

Fully describe the following key term:

Respiratory system:

Ryan is a long distance runner (1500m) and relies heavily on his cardiovascular and respiratory systems working together effectively. Fully explain how these two systems work together to provide oxygen to the working muscles and remove waste products from the body.

1.3 Gaseous Exchange

Using the key terms and phrases given, describe the process of gaseous exchange in as much detail as you can.

oxygen	air	alveoli	red blood cells	capillaries
haemoglobin	oxyhaemoglobin	carbon dioxide	gas	lungs

Complete these sentences to explain how the structure of the alveoli and the capillaries assist in gaseous exchange.

The alveoli are .....

The walls of the alveoli are .....

They provide a large ..... for gaseous exchange to take place.

The capillaries are .....

Lots of capillaries run across the alveoli ensuring .....

Using the key terms and phrases given, describe diffusion and the diffusion pathway in as much detail as you can.

high concentration	diffusion	distance
diffusion pathway	short	low concentration

1.3 The mechanics of breathing

Using the information provided to help you, draw two diagrams in the space below to show what happens when you inhale and exhale.

Inhalation (also known as inspiration)	**Exhalation (also known as expiration)**
1. The diaphragm contracts. It flattens and moves downwards. 2. The intercostal muscles contract, raising the ribs and pushing out the sternum, making the chest cavity larger. 3. The lungs increase in size and the air pressure inside the lungs is reduced. 4. The air pressure outside the body is now higher than the air pressure inside the body. Air travels from areas of high pressure to areas of low pressure, so air is pulled into the lungs.	1. The diaphragm relaxes. It moves back up into a dome shape. 2. The intercostal muscles relax, lowering the ribs and dropping the sternum, making the chest cavity smaller. 3. The lungs reduce in size and the air pressure inside the lungs is increased. 4. The air pressure outside the body is now lower than the air pressure inside the body. Air travels from areas of high pressure to areas of low pressure, so air leaves the lungs.

Now explain how this process changes when a person begins to exercise. .....

.....

.....

.....

.....

1.3 Spirometer trace

A spirometer measures the five volumes associated with the lungs. Explain each volume in your own words.

Tidal volume:

Expiratory reserve volume:

Inspiratory reserve volume:

Residual volume:

Vital capacity:

A spirometer trace records these volumes. Complete this spirometer trace by:

1. Labelling the five volumes on the spirometer trace.
2. Continuing the spirometer trace to show how the respiratory volumes change during exercise.

1.3 The heart

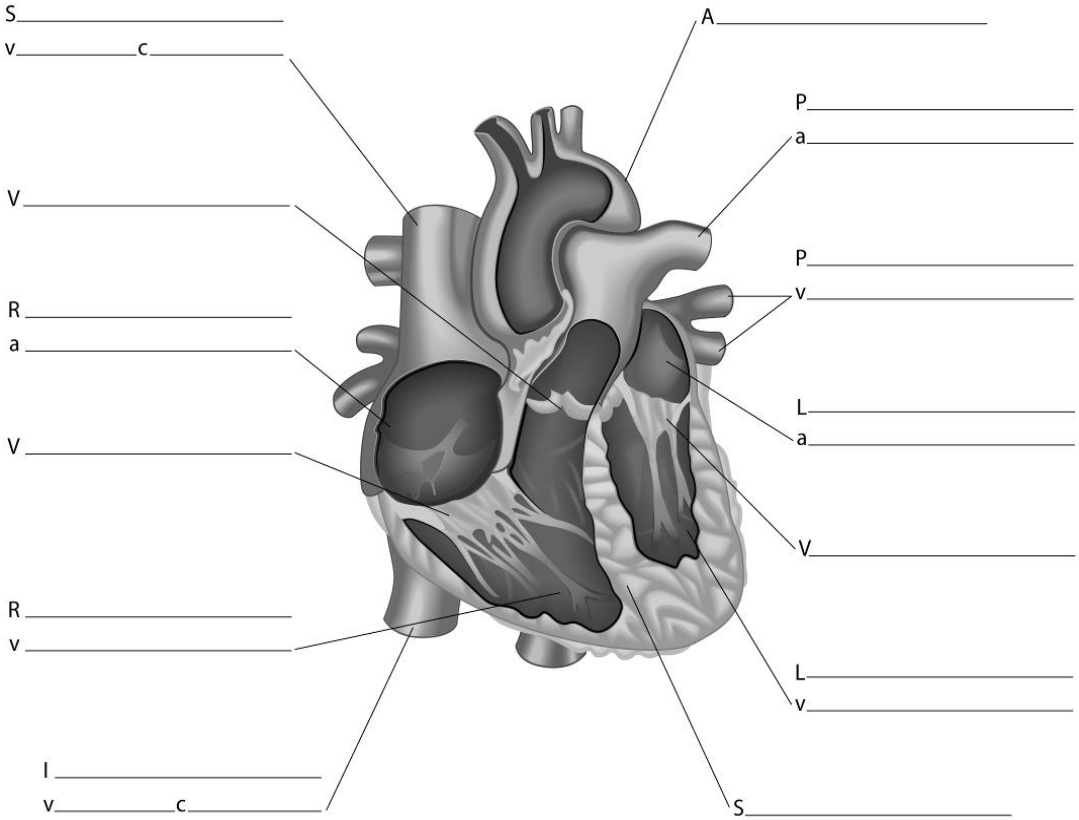
Complete the following paragraph.

The heart is an efficient pump and, like any other muscle, it contracts and relaxes. One contraction and relaxation is called a heartbeat, and your heart rate – the number of times your heart beats in one minute, measured in beats per minutes (bpm) – increases when you exercise. This is because .....

.....

.....

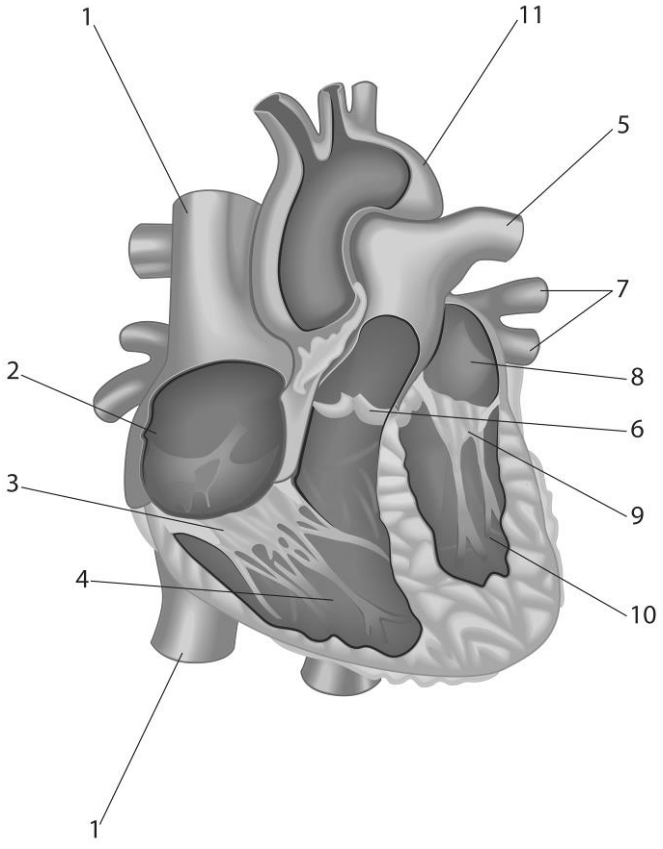
Now, label the diagram of the heart below. In the space around the outside of the diagram, add details about what each structure you've labelled does.



1.3 The pathway of blood

Write a commentary around the outside of this diagram to describe what is happening at each stage of the blood's journey through the heart. Start your journey at '1'. Use completed activity 1.12 to help you and remember to include the following key words and phrases in your commentary:

oxygenated blood	deoxygenated blood	backflow	diastole	systole



Colour the heart to show oxygenated and deoxygenated blood flow and highlight your commentary to show the diastole and systole phases of the cardiac cycle.

Revision technique: linking information to a diagram

Often people, especially visual learners, find pictures and diagrams easier to remember than blocks of text. By linking information to a diagram, you'll have something to visualise in your exam, which will help you recall key information.

Do you like this technique? Does it work for you? ☹ 😐 ☺

1.3 Structure and function of blood vessels

Identify each blood vessel and give as many details as you can on it's **structure/ shape** and its **function** in the cardio-respiratory system

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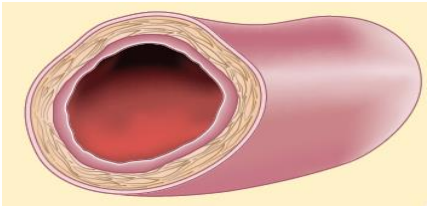

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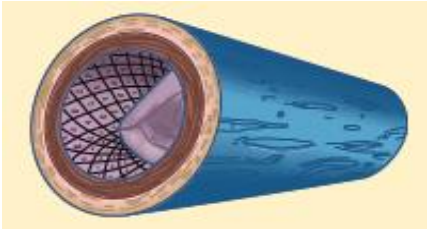

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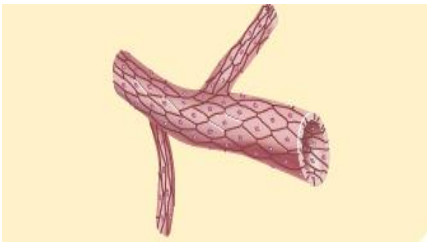

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1.3 Redistribution of blood

Sarah is a netball player playing for Team Northumbria. Her body is very efficient at redistributing blood during a game. Full explain how and why her blood vessels vasoconstrict and vasodilate to allow her muscles to work aerobically **(9 marks).**

AO1- Knowledge of factors
AO2- Applied to Sarah/ Netball
AO3- Justified reasoned conclusions.

1.3 Cardiac output, stroke volume & heart rate

Annotate the equation below to define each value:

cardiac output (Q) = stroke volume (SV) × heart rate (HR)

Cardiac output ..... when you exercise. This is because

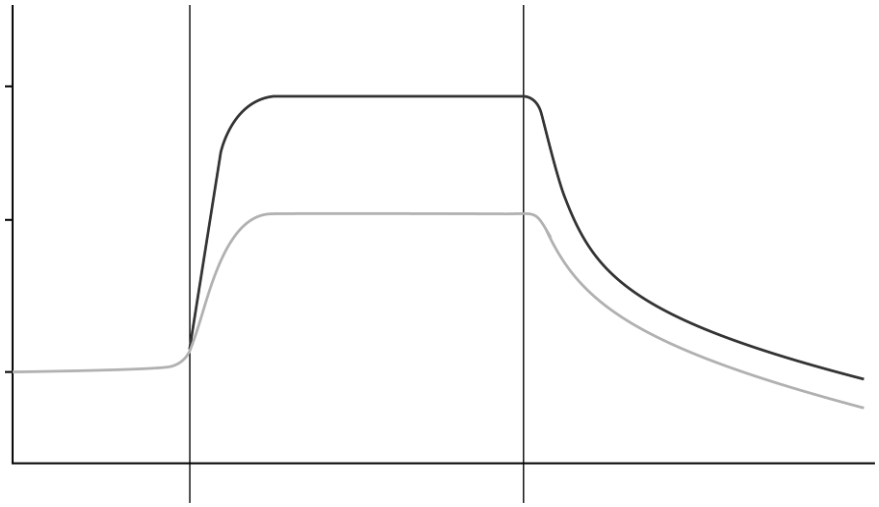
.....

.....

.....

Annotate this graph to show what happens to your heart rate when you exercise.

Think about what happens to your heart rate before you begin to exercise, during your warm up, your main activity and your cool down.



1.4 Aerobic exercise

Briefly describe aerobic exercise:

Annotate the aerobic exercise equation to explain what each item in the equation is.

glucose + oxygen → energy + carbon dioxide + water

Give two examples of sports or physical activities that use aerobic energy production and describe what makes them aerobic activities.

1.

2.

1.4 Anaerobic exercise

Design a **POSTER** which gives in depth knowledge of **ANAEROBIC EXERCISE.**

Your poster should be in colour and well presented, including:

- What anaerobic exercise is
- How anaerobic exercise is different to aerobic exercise
- An annotated equation for anaerobic exercise
- Explained sporting examples of anaerobic exercise (include printed images of sports performers which are cut and glued to your poster)

1.4 The recovery process

Andy is a tennis player playing at professional level. He spends a huge amount of time after a match to recover effectively. He uses a **cool down**, **ice baths/ massage** and a **strict diet** to give his body the recovery it requires. Fully explain how these processes are effective in recovery from exercise.

AO1- Knowledge of factors **AO2- Applied to Andy** **AO3- Justified reasoned conclusions**

1.5 The effects of exercise

Create a mind map to capture everything you know about the immediate, short-term and long-term effects of exercise.

Revision technique: mind maps

Invented by Tony Buzan, mind mapping is a technique for capturing information. It has been shown to improve your memory and creativity. Find out more about mind mapping at imindmap.com/how-to-mind-map.

Do you like this technique? Does it work for you? ☹ 😐 ☺

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Alveoli
Anaerobic exercise
Antagonist
Articulating bones
Backflow
Blood pressure

Capillaries
Cardiac cycle
Cardiac output (Q)
Cardio-respiratory system
Deoxygenated blood
Diastole
Diffusion pathway
DOMS
Dorsiflexion
Excess Post-exercise Oxygen Consumption (EPOC)
Exhalation

Expiration
Expiratory reserve volume
Extension
Fatigue
Flexion
Gaseous exchange
Haemoglobin
Heart rate
Hypertrophy
Inhalation
Inspiration

Inspiratory reserve volume
Intensity
Isometric contraction
Isotonic contraction
Lactic acid
Musculoskeletal system
Oxygenated blood
Oxyhaemoglobin
Plantar flexion
Prime mover (or 'agonist')
Pulse

Residual volume
Rotation
Stroke volume (SV)
Synovial joint
Systole
Tendon
Tidal volume
Vasoconstriction
Vasodilation
Vital capacity

1 Question Command words

Analyse

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