

Name .....

Paper 1

Target Grade:

# GCSE PE

## *Chapter Support:*

*A&P – Cardio-respiratory System*



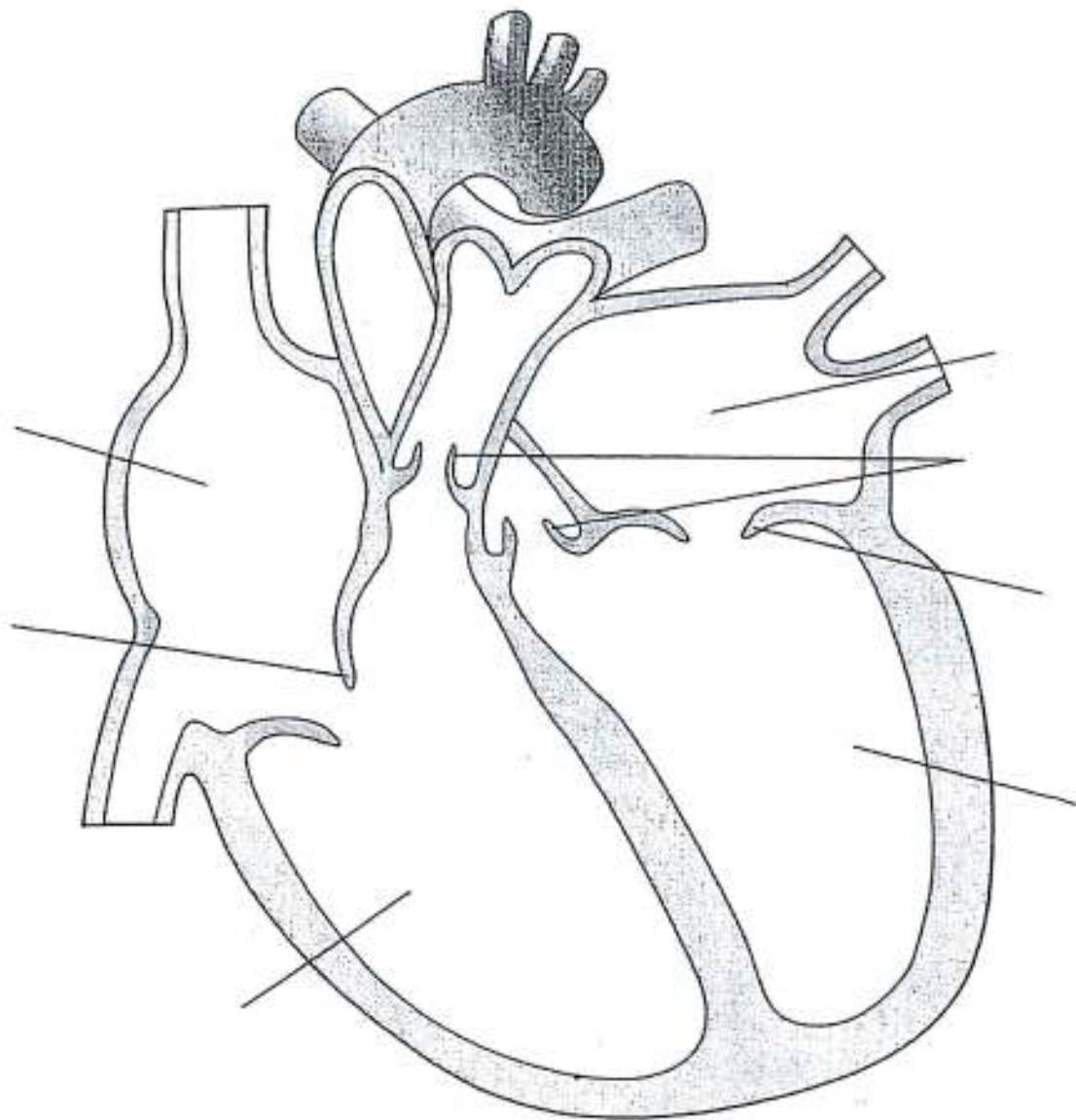
A simple booklet designed to support you  
chapter by chapter through GCSE PE



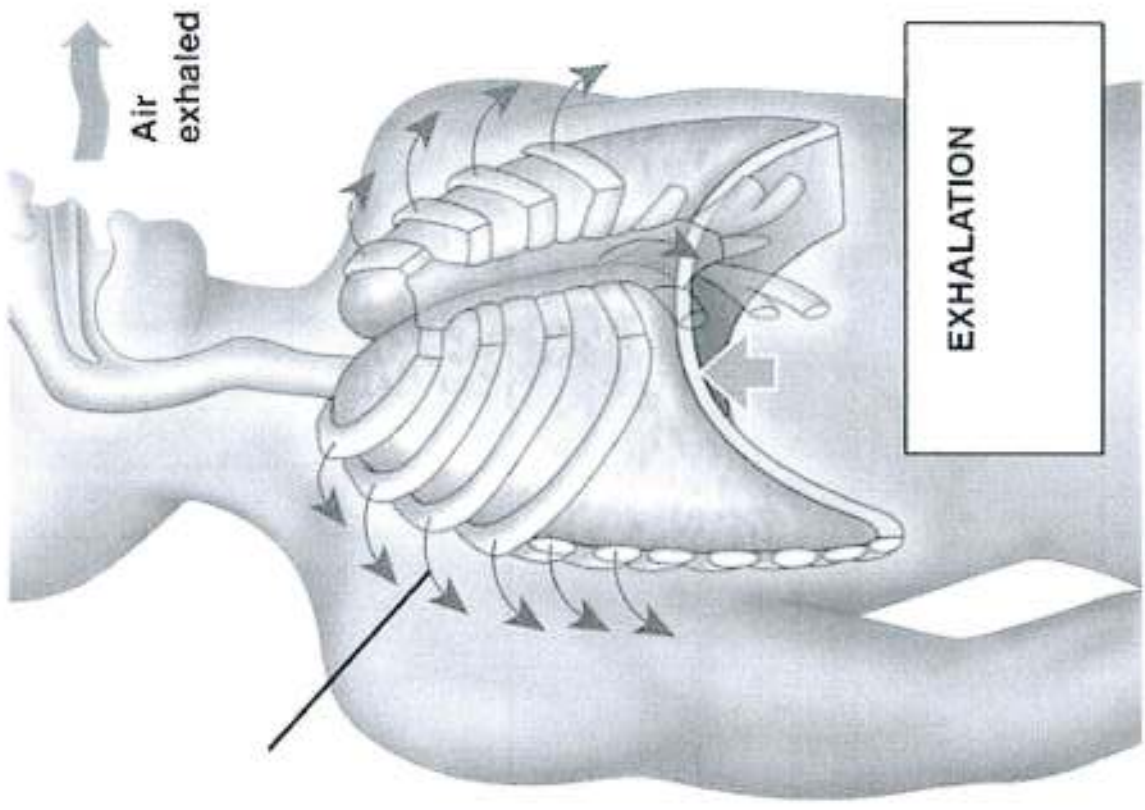
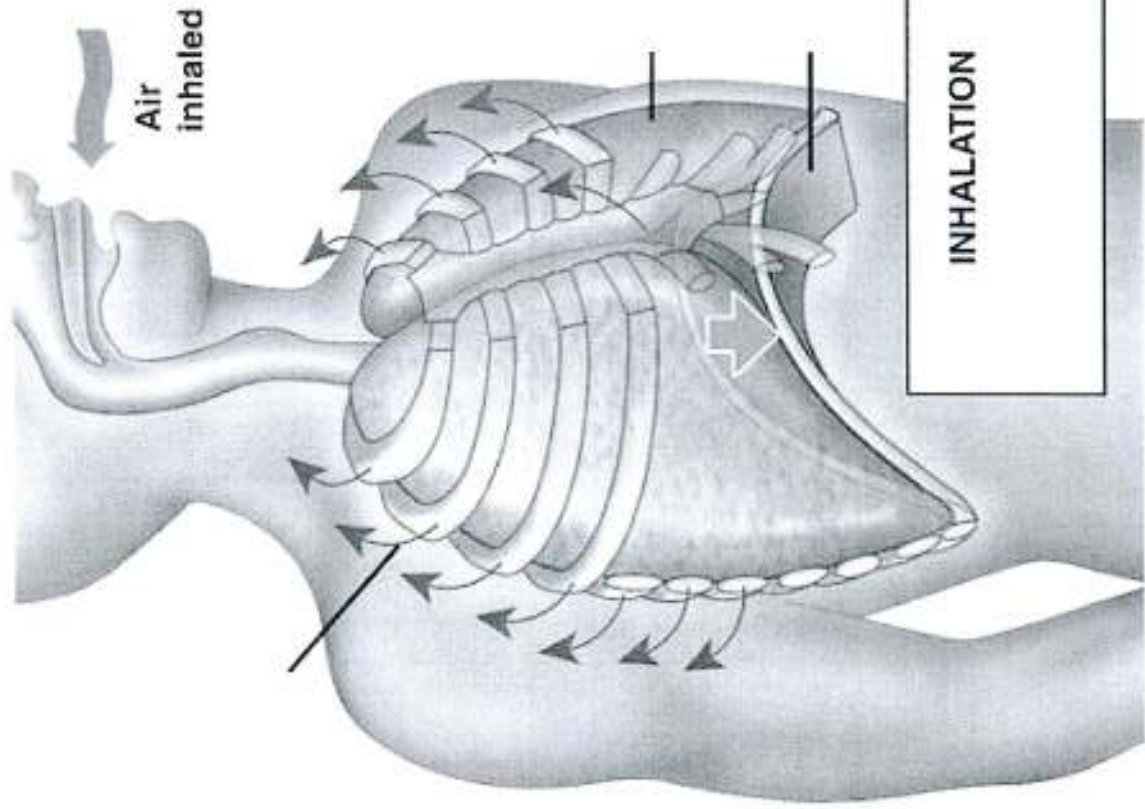
GCSE PHYSICAL EDUCATION



The Heart  
Heart Structure



**Mechanics of Breathing**







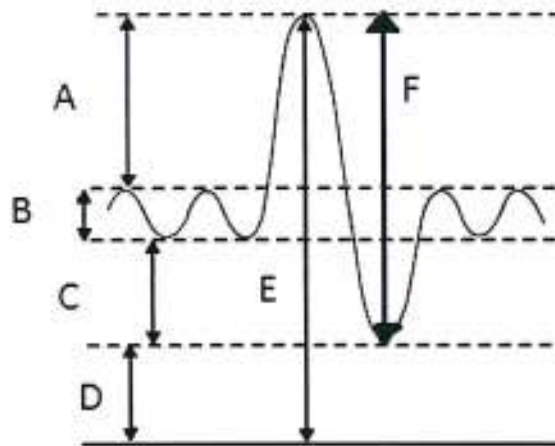
## Spirometer Trace Task

### Task 1:

While running a performer will experience changes in lung volumes. Complete the table below to show how the tidal volume, inspiratory reserve volume and the expiratory reserve volume change during exercise. (3 marks)

Volume Name	Value at Rest	Change during Exercise
Breathing Rate	16 breaths/min	Increases
Tidal Volume	500cm <sup>3</sup>	
Inspiratory Reserve Volume	3100cm <sup>3</sup>	
Expiratory Reserve Volume	1200cm <sup>3</sup>	
Residual Volume	1100cm <sup>3</sup>	No Change

### Task 2:






Interpret the Spirometer trace above and complete the table (use the word bank below).

A	
B	
C	
D	
E	
F	

TIDAL VOLUME	INSPIRATORY RESERVE VOLUME	VITAL CAPACITY
EXPIRATORY RESERVE VOLUME	RESIDUAL VOLUME	TOTAL LUNG VOLUME

# Blood Vessels

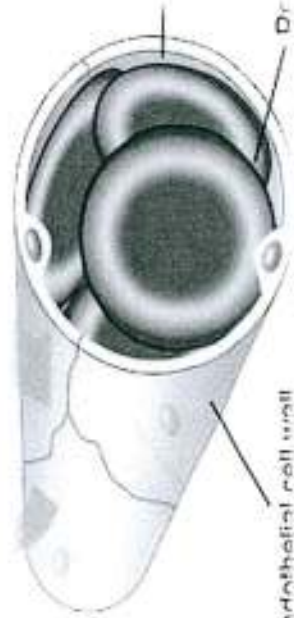
	Veins	Capillaries	Arteries
<b>Structure:</b>			
<b>Functions:</b>			



A \_\_\_\_\_ have very \_\_\_\_\_  
and muscular walls. This is to deal  
with high \_\_\_\_\_  
They carry \_\_\_\_\_ blood



V \_\_\_\_\_ have \_\_\_\_\_  
walls and \_\_\_\_\_ to stop  
backflow. They carry  
\_\_\_\_\_ blood which is  
moving \_\_\_\_\_ the heart



C \_\_\_\_\_ walls are extremely thin  
and only \_\_\_\_\_ thick. This  
allows oxygen & carbon dioxide to  
\_\_\_\_\_ through. Capillaries  
allow \_\_\_\_\_ to occur

Endothelial cell wall

**The Cardio-Respiratory System**

**Effects of Exercise**

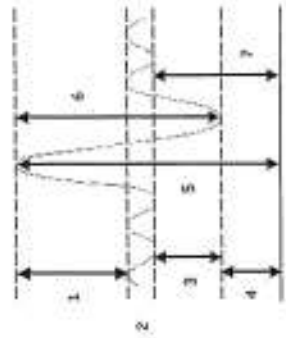
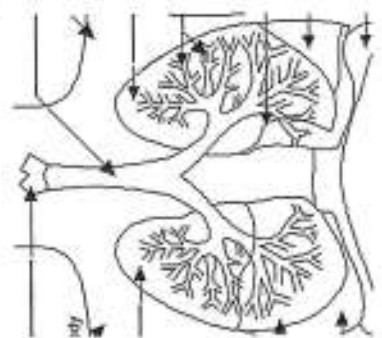
**Inspiration and Expiration**

**Cardiac Output**

**Gaseous Exchange**

**Blood Vessels**

**Structure of the Heart and the Pathway of Blood**



**Anaerobic and Aerobic**

**Respiration**

**Spirometer Trace**



# Test Yourself.

## The Cardio-respiratory system

Breathing enables gaseous exchange to occur at the alveoli.

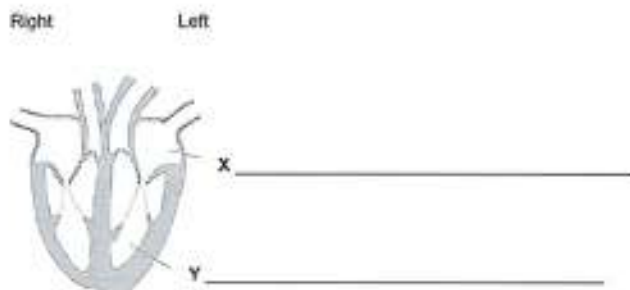
Outline how **two** features of the alveoli assist in gaseous exchange.

1. \_\_\_\_\_  
\_\_\_\_\_
2. \_\_\_\_\_  
\_\_\_\_\_

(Total 2 marks)

A diagram of the heart is shown below.

Using the diagram, identify the names of the chambers of the heart labelled X and Y.



(Total 2 marks)

Define cardiac output.

\_\_\_\_\_

\_\_\_\_\_

(Total 1 mark)

Zack is a 16-year-old GCSE PE student. He is just about to play a game of basketball for his school team.

(a) Zack's respiratory system will experience a number of changes before and during the game of basketball.

Define the terms tidal volume **and** residual volume.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(2)

(b) Outline what will happen to Zack's tidal volume **and** residual volume once exercise starts.

\_\_\_\_\_

\_\_\_\_\_

(2)  
(Total 4 marks)

# Test Yourself.

## The Cardio-respiratory system

In order for respiration to take place air must be taken in.

- (i) Name **two** of the air passages which allow air to enter the body.

1. \_\_\_\_\_

2. \_\_\_\_\_

(2)

- (ii) **Describe** what gaseous exchange is and clearly state **where** it takes place.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(3)

(Total 5 marks)

The circulatory system contributes to the efficient performance of a sports performer.

**Explain** how the heart acts as a pump in a double circulatory system.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(Total 3 marks)

The pulse rate can be used to monitor the effects of exercise on the body.

**Describe two** places on the body where the pulse can be found.

Place 1 \_\_\_\_\_

Place 2 \_\_\_\_\_

(2)

**Explain** why it is important to monitor and record the pulse rate when exercising or training.

(3)

# Test Yourself.

## The Cardio-respiratory system

The effective working of the breathing and respiratory system is important for all performers.

- (i) The air passages are one part of the breathing system. Name **three** other parts.

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

(3)

- (ii) **Describe** how respiration takes place.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(3)

(Total 6 marks)

Name **two** body systems involved in providing energy for movement and physical activity.

\_\_\_\_\_

\_\_\_\_\_

(Total 2 marks)

What is the pulse?

\_\_\_\_\_

(Total 1 mark)

What is blood pressure?

\_\_\_\_\_

How does physical activity affect blood pressure

during activity? \_\_\_\_\_

\_\_\_\_\_

in the long term? \_\_\_\_\_

\_\_\_\_\_

(Total 4 marks)

### Mark schemes

#### Q1.

Award **one** mark for each of the following points up to a maximum of two marks.

- Large surface area of alveoli to allow larger volumes of gases / oxygen and carbon dioxide to move between the lungs and the bloodstream (1)
- Moist thin walls / one cell thick creating a short distance for diffusion / short diffusion pathway (1)
- Lots of capillaries around the alveoli so large area for gas exchange (1)
- Large blood supply to carry gases / oxygen and carbon dioxide (1)
- Movement of gas from high concentration to low concentration means there is a pressure gradient which allows diffusion to occur (1)

Accept any other suitable outline of how features of the alveoli assist in gaseous exchange. Answers must link the feature to how it assists in gaseous exchange.

[2]

#### Q2.

Award **one** mark for each of the following points up to a maximum of two marks.

- X. (Left) atrium (1)
- Y. (Left) ventricle (1)

[2]

#### Q3.

Award **one** mark for each of the following points up to a maximum of one mark.

- The amount of blood ejected / pumped from the heart in one minute (1)
- Stroke volume  $\times$  heart rate (1)

Accept any other suitable definition of cardiac output.

[1]

#### Q4.

(a) Award **one** mark for each of the following points up to a maximum of two marks.

- Tidal volume – volume of air inspired or expired / exchanged per breath (1)
- Residual volume – volume of air left in the lungs after maximal expiration (1)

Accept any other suitable definitions of tidal volume and residual volume.

2

(b) Award **one** mark for each of the following points up to a maximum of two marks.

- Tidal volume increases (once exercise starts) (1)
- Residual volume stays the same (once exercise starts) (1)

2

[4]

#### Q5.



## Test Yourself.

## The Cardio-respiratory system

(i) Award **one** mark for each of the correctly named air passages

- mouth
- nose
- pharynx
- epiglottis
- larynx
- trachea
- bronchi
- bronchioles

2

(ii) Award up to **three** marks for a correct answer.

- award up to **two** marks for correctly describing it as the oxygen being taken in / being exchanged for the carbon dioxide which is to be breathed out
- award **one** mark for stating that gaseous exchange occurs in the lungs / alveoli

3

[5]

### Q6.

Award up to **three** marks for correctly explaining the double pump function:

- blood enters the right atrium / dark red in colour with little oxygen
- right atrium pumps blood / into the right ventricle
- the right ventricle pumps through the pulmonary artery / to the lungs
- from the lungs the blood returns / to the left atrium
- the left atrium pumps the blood / into the left ventricle
- the left ventricle pumps the blood / into the aorta/ to the body

Accept the above plus other suitable examples.

In order to obtain the maximum marks candidates must clearly identify

at least **three** of the stages identified above.

[3]

### Q7.

(i) Award **one** mark for **each** correctly described pulse point. Note that some might be correctly named and for others a description of their exact location may be accepted.

- Radial pulse/at the base of the thumb on the inside of the wrist
- Temporal pulse/just over the temple at the side of the forehead
- Carotid pulse/on either side of the neck
- Femoral pulse-in the groin.

2

(ii) Award up to **three** marks for a correct explanation.

Examples:

- The heart rate lets you know how quickly the blood is being pumped around the body
- This is effectively providing the energy to allow the body to exercise
- There are certain zones or areas which the heart rate can be increased to or worked in
- The speed of your recovery rate is a general indicator of your fitness levels
- The quicker you are able to return your pulse to its resting rate the fitter you are
- Monitoring the rate can be used as a training indicator to make sure you are working at the correct levels
- Varying the pulse rate can be used relative to the principle of overload
- Safety aspects can be considered to ensure you are not working at too high a level.

Accept the above plus any other suitable examples.

3

[5]

### Q8.

## Test Yourself.

# The Cardio-respiratory system

Award up to **three** marks for a correct response. Each response can consider the back position, the leg position and the location of the item to be carried:

- The back should be kept straight/the legs should be bent/the item to be carried should be held close to, and secure to, the body
- Other factors which might be considered include wearing the correct footwear, using more than one person for particularly heavy equipment, not lifting or lowering until told to do so
- Accept sport/activity specific examples, eg carrying a javelin, moving heavy equipment on an astro pitch surface.

Accept the above plus any other suitable examples.

[3]

### Q9.

- (i) Award **one** mark for **each** correctly identified part of the breathing system other than the air passages which were included in the question.

Examples:

- trachea
- alveoli
- bronchioles lungs
- diaphragm
- mouth
- nasal cavity or nose
- larynx
- pharynx
- intercostal muscles
- bronchus, bronchi.

3

- (ii) Award up to **three** marks for a correct description of how respiration takes place.

Examples:

- the process by which the body / takes in oxygen / and gives out carbon dioxide
- the process of the lungs / inspiring / and expiring
- reference to aerobic and anaerobic respiration is also acceptable.

Accept the above plus any other suitable examples.

3

[6]

**Q10.**

**Two** systems from....

circulatory

respiratory

digestive

accept cardiovascular

[2]

**Q11.**

The beat/pump (a single contraction) of the heart.

*accept....* heart beat

[1]

**Q12.**

(i) Resistance in the cardio-vascular system (one mark) to the flow of blood round the body (one mark).

force of the blood (one mark) passing through an artery (one mark)

*accept* a measure of blood flow/ease at which blood flows around the body.

a measure of the blood flow through an artery = 2 marks.

*do not accept* the speed at which blood travels/how fast blood travels.

- (ii)
- blood pressure goes up during physical activity;
  - blood pressure stays low/is lowered in the long term.

[4]