

1

Define cardiac output.

(Total 1 mark)

2

Breathing enables gaseous exchange to occur at the alveoli.

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

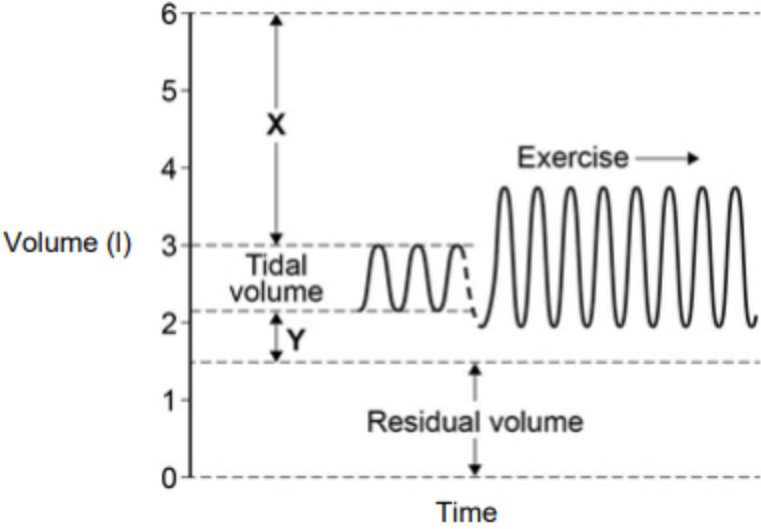
1. _____

2. _____

(Total 2 marks)

3

The diagram shows the lung volumes recorded on a spirometry trace.



Identify the lung volumes labelled X and Y.

X: _____

Y: _____

(Total 2 marks)

4

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)

5

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)

6

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)

7

(a) Identify the blood vessel that carries oxygenated blood away from the heart.

(1)

(b) State **two** characteristics of the blood vessel identified in **part (a)**.

1. _____

2. _____

(2)

(c) Evaluate the importance of vasodilation when taking part in physical exercise

(4)
(Total 7 marks)

8

There are many different types of strength.

Outline what static strength is **and** using a sport of your choice, justify why it is important to performers in that sport.

(Total 4 marks)

9

Holding a balanced position is important in many physical activities.

Give **one** static balance and explain how the muscles work to maintain this balance.

(Total 5 marks)

10

Amar has been training for months in preparation to complete a half marathon. He trains four times a week and does a mixture of steady state running, stretching and weight training.

- (a) Amar's cardiovascular endurance will improve as a result of completing steady state running.

State **three** other long-term effects that Amar is likely to experience as a result of completing steady state running.

1. _____

2. _____

3. _____

(3)

- (b) Just before exercising, Amar may encounter a slight rise in heart rate.

What is this slight rise called **and** what is it caused by?

(2)

- (c) During one of his training sessions, Amar decided to record his heart rate every two minutes. Some of the figures he recorded are shown in the table below.

Time into run (minutes)	12	14	16	18	20
Heart rate (BPM)	128	130	130	132	134

If Amar is 20 years old, do the recorded figures suggest that he was working in his aerobic training zone? Justify your answer.

(3)

(Total 8 marks)

11

Evaluate how appropriate an ice bath may be to aid the recovery of a performer immediately after a game of badminton.

(Total 6 marks)

Mark schemes

1

[AO1 = 1]

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]

2

[AO1 = 2]

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]

3

[AO1 = 2]

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

X = Inspiratory reserve volume / IRV (1)

Y = Expiratory reserve volume / ERV (1)

Max 2 marks

[2]

4

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]

5

(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]

6

[AO1 = 2]

(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

[AO2 = 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]

7

[AO1 = 1]

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

- Artery (1) Accept aorta

Max 1 mark

[AO1 = 2]

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

- Thick elastic walls (1)
- Small lumen (1)
- Smooth muscle layer (1)
- Carries blood at high pressure (1)

Accept any other suitable characteristic of the type of blood vessel identified in part (a).

Max 2 marks

[AO1 = 1 AO2 = 1 AO3 = 2]

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

AO1

- Vasodilation is part of the vascular shunt / opening of vessels to allow more blood through (1)

AO2

- Exercise requires more blood to the working muscles / more oxygenated blood (1)

AO3

- Vasodilation allows more blood to travel through the arteries to the muscles which need a greater supply of oxygen during exercise (1)
- Vasodilation must work with vasoconstriction, i.e. limit the blood to the areas which do not need large supply during exercise (1)
- To maintain exercise intensity / sustained performance (1)
- The higher the intensity, the greater the importance that oxygen is supplied to the desired areas (1)
- A lack of oxygen during exercise would result in waste products / lactic acid, etc (1)

Accept any other suitable evaluative point about the importance of vasodilation when taking part in physical exercise.

Max 4 marks

[7]

8

[AO1 = 1 AO2 = 1 AO3 = 2]

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

AO1

- (Static strength is the) ability to hold a body part (limb) in a static position / muscle length stays the same / maximum force that can be applied to an immovable object (1)

AO2

- How it is used in the chosen sport, e.g. gymnast who holds a handstand (1)

AO3

- Development of the argument / justification linking the use of static strength to its importance, e.g. if a handstand is not held the move is incorrect / marks could be deducted in a competition / the proceeding move may not be possible (1)

Accept any other suitable justification of why static strength is important. Answers must be linked to a named sport and be applicable to performers in that sport.

Max 4 marks

[4]

9

one static balance to be named (1 mark).

(key is *stationary*)

In order to hold the body in a still position, the joint(s) must be kept in the same position (1 mark) [*named joints no extra mark*] by:

- the muscles working in pairs (1 mark)
- working at the joint - must work isometrically (1 mark)
not: one muscle contracts, the other relaxes - they must maintain contraction/pull (1 mark) without changing length (1 mark)
- a muscle 'fixing' the joint
- standing on one leg (1 mark)
- muscles of the (upper) leg (Q+H) work together (1 mark), contract isometrically (1 mark) to hold the knee locked (1 mark)
could also apply in arm
- correct names for appropriate muscles working together (1 mark);

In a handstand this would involve muscles working at the wrist, elbow, shoulder, neck, vertebrae, hip, knee and ankle!

[5]**10****[AO2 = 3]**

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

- Body shape may change to less fat content / leaner (1)
- Improved muscular endurance (1)
- Improved stamina (1)
- Increase in the size of the heart / hypertrophy (1)
- Lower resting heart rate / bradycardia (1)

Accept any other long term effect of completing steady state running. Do not accept improved cardiovascular endurance.

Max 3 marks**[AO1 = 2]**

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

- (It is called) anticipatory rise (1)
- (It is caused by the) release of adrenaline (1)

Max 2 marks

[AO1 = 1 AO2 = 1 AO3 = 1]

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

AO1

- 220 – age (60-80%) (1)

AO2

- 220 – 20 = 200, 60 – 80 % = 120 – 140 bpm (1)

AO3

- All figures in this zone so it is the aerobic training zone (1)

Max 3 marks

[8]

11

[AO1 = 1 AO2 = 2 AO3 = 3]

Level	Marks	Description
3	5-6	Knowledge of ice baths is accurate and generally well detailed. Application to performers in badminton is mostly appropriate, clear and effective. Evaluation is thorough, reaching valid and well-reasoned conclusions as to the appropriateness of badminton players using ice baths to aid recovery. The answer is generally clear, coherent and focused, with appropriate use of terminology throughout.
2	3-4	Knowledge of ice baths is evident. There is some appropriate and effective application to performers in badminton, although not always presented with clarity. Any evaluation is clear but links to the appropriateness of badminton players using ice baths to aid recovery are not always valid and well reasoned. The answer lacks coherence in places, although terminology is used appropriately on occasions
1	1-2	Knowledge of ice baths is limited. Application to performers in badminton is either absent or inappropriate. Evaluation is poorly focused or absent, with few or no reasoned conclusions for the appropriateness of badminton players using ice baths to aid recovery. The answer as a whole lacks clarity and has inaccuracies. Terminology is either absent or inappropriately used.
	0	No relevant content.

Possible content may include:

AO1 – Knowledge of ice baths, e.g.

- A method used for recovery purposes to remove lactic acid / procedures for using an ice bath (Involves sitting in ice cold water for) between 5–20 minutes / physiological explanation

AO2 – Application to badminton, e.g.

- Badminton can be aerobic and anaerobic, i.e. can be long duration and low intensity but equally can be fast paced / intensive
- Recovery may be needed after badminton due to lactic acid build up
- Changes of direction / speed around the court / movement around the court means that EPOC required due to anaerobic components
- Rallies can be long and exhaustive
- DOMS may occur after badminton / muscle soreness

AO3 – Analysis / evaluation of the appropriateness of an ice bath to aid the recovery of a performer after a game of badminton

- Ice baths may not be readily accessible in indoor spaces / sports halls / leisure centres
- Would require some help assistance / to prepare ice bath / help in and out
- Because of the nature of badminton (sprints / anaerobic elements) lactic acid can be a major issue and any method to reduce this is viable
- If available, fairly quick and simplistic method requiring little / no specialist equipment
- Could be incorporated into a cool down after a badminton match fairly easily
- All muscles used in a badminton match can be submerged in water thus causing extremities to experience the process / vasoconstrict / vasodilate
- Not particularly pleasant due to extreme cold and similar results could be experienced simply by cooling down / stretching

Credit other suitable responses relevant to the question.

Max 6 marks

[6]