Diploma Programme
Programme du diplôme
Programa del Diploma

Sports, exercise and health science
Higher level
Paper 1

25 April 2024

Zone A afternoon | **Zone B** afternoon | **Zone C** afternoon

1 hour

Instructions to candidates

- Do not open this examination paper until instructed to do so.
- Answer all the questions.
- For each question, choose the answer you consider to be the best and indicate your choice on the answer sheet provided.
- The maximum mark for this examination paper is **[40 marks]**.

2224 – 6807

16 pages

1. Which states the correct anatomical relationship among the bones of the hands and arms?

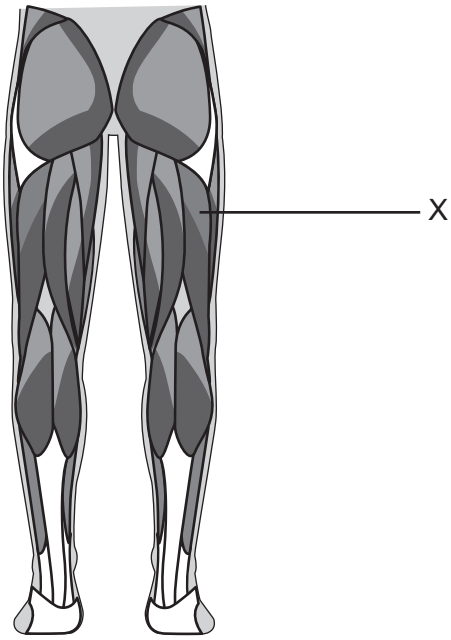
A. Phalanges are medial to the humerus.

B. Carpals are proximal to the ulna.

C. Humerus is distal to the metacarpals.

D. Ulna is medial to the radius.

2. The diagram shows a posterior view of the legs. Which skeletal muscle is labelled X?



A. Biceps femoris

B. Gastrocnemius

C. Gluteus maximus

D. Soleus

3. Which are principal structures of the ventilatory system?

A. Pulmonary artery and pharynx

B. Alveoli and larynx

C. Cerebellum and nose

D. Diaphragm and lungs

4. Which volume defines total lung capacity?

A. Air in the lungs after a maximum inhalation

B. Air breathed in and out in any one breath

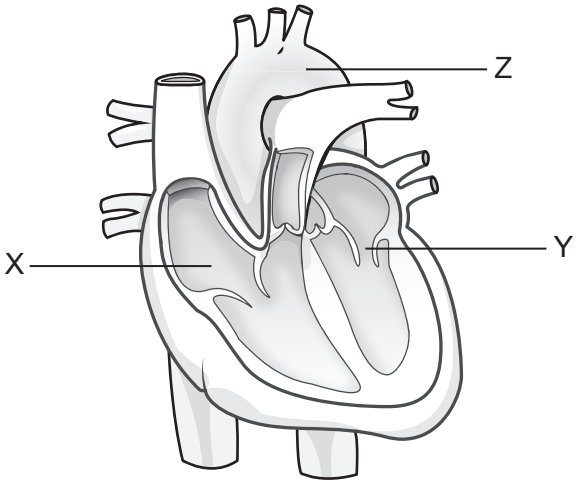
C. Air in excess of tidal volume that can be exhaled forcibly

D. Air still contained in the lungs after a maximal exhalation

5. Which correctly characterizes the relationship between blood acidity levels and ventilation during a sub-maximal training session?

	Blood acidity levels	**Ventilation**
A.	Rise (low pH)	Increases
B.	Low (normal pH)	Increases
C.	Rise (low pH)	Decreases
D.	Low (normal pH)	Decreases

6. The diagram shows a cross-section of the heart. What are structures X, Y and Z?



	Structure X	Structure Y	Structure Z
A.	Right atrium	Pulmonary valve	Vena cava
B.	Left atrium	Pulmonary valve	Aorta
C.	Right atrium	Bicuspid valve	Aorta
D.	Left atrium	Bicuspid valve	Vena cava

7. Maximal oxygen consumption represents the functional capacity of the oxygen transport system. Which person would likely have the highest VO_2 max?

A. Elite marathon runner

B. Chess player

C. Novice hiker

D. Young weightlifter

8. Which characteristic distinguishes unsaturated fatty acids from saturated fatty acids?

A. Ability to bond to glycerol

B. Composition of carbon, hydrogen and oxygen

C. Plant origin

D. Presence of double bonds between carbon atoms

9. Which metabolic reaction describes aerobic catabolism?

A. The use of small molecules and energy to build larger molecules

B. The breakdown of large organic molecules in the presence of oxygen to release energy

C. The breakdown of large organic molecules in the absence of oxygen to release energy

D. The use of small molecules and oxygen to build larger molecules

10. Insulin and muscle contraction influence glucose during exercise. Which combination correctly states how they influence glucose uptake?

	Insulin	**Muscle contraction**
A.	Stimulates	Stimulates
B.	Stimulates	Inhibits
C.	Inhibits	Stimulates
D.	Inhibits	Inhibits

11. Which processes require the presence of oxygen to produce adenosine triphosphate (ATP)?

I. Glycolysis by the lactic acid system

II. Glycolysis followed by the Krebs cycle and electron transport chain

III. Beta oxidation of fatty acids followed by the Krebs cycle and electron transport chain

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

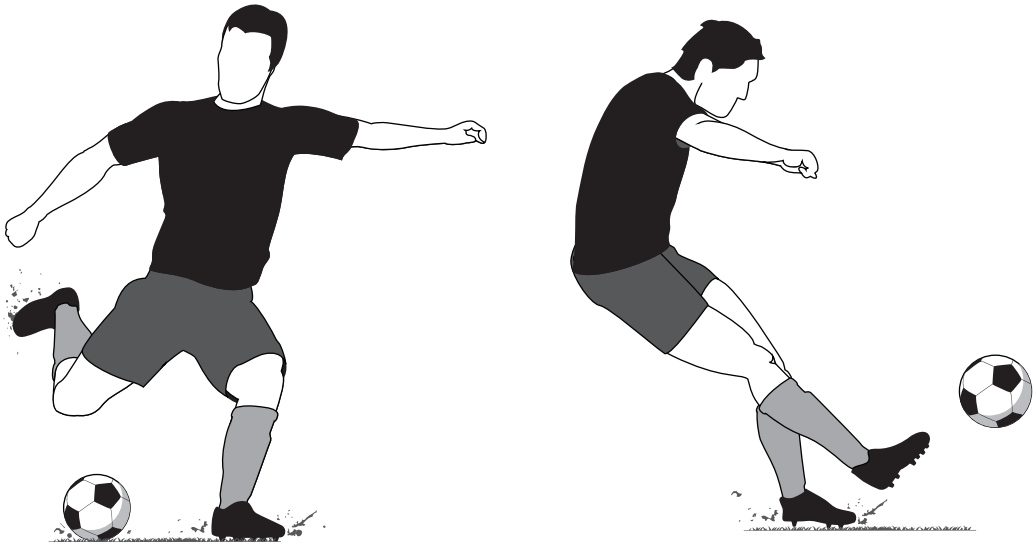
12. Which correctly identifies functions of slow twitch (type I) muscle fibres?

	Force generation	**Durability**
A.	Small	Maintain contractions for a long time
B.	Moderate	Fatigue quickly
C.	Large	Maintain contractions for a long time
D.	Small	Fatigue quickly

13. Which correctly characterizes reciprocal inhibition during the upward phase of a bicep curl?

	Agonist		**Antagonist**	
	Nervous control	**Muscle contraction**	**Nervous control**	**Muscle contraction**
A.	Stimulation	Eccentric	Stimulation	Concentric
B.	Stimulation	Concentric	Inhibition	Relaxation
C.	Inhibition	Relaxation	Stimulation	Eccentric
D.	Inhibition	Eccentric	Inhibition	Concentric

14. During a penalty kick in football (soccer), which type of movement and muscle contraction occurs at the knee and quadriceps?



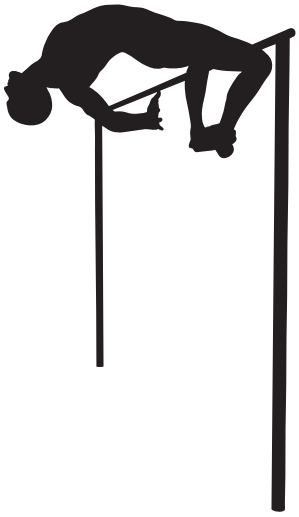
	Type of movement	Muscle contraction
A.	Flexion	Concentric
B.	Extension	Concentric
C.	Flexion	Eccentric
D.	Extension	Eccentric

15. Which sporting action illustrates the performer's centre of mass temporarily outside the body?

A. Sprint

B. Volleyball serve

C. Pirouette



D. High jump

16. Which classes of lever have the effort force and the resistance force on the same side of the fulcrum?

I. First

II. Second

III. Third

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

17. Performers use multiple skills throughout a competition. Which type of skill predominates when a golfer analyses the relief of a green and decides how to approach a putt?

A. Cognitive

B. Motor

C. Perceptual

D. Perceptual motor

18. Which combination characterizes a novice skier when compared to a skilled skier?

	Novice skier	
	Performance consistency	**Movement efficiency**
A.	Higher	Higher
B.	Higher	Lower
C.	Lower	Higher
D.	Lower	Lower

19. Swimmers perform a 200 m backstroke race. What types of feedback do they receive when they look at the clock at the end of the race?

A. Intrinsic and concurrent

B. Extrinsic and concurrent

C. Intrinsic and terminal

D. Extrinsic and terminal

20. Which statement defines performance?

A. A relatively permanent change in ability brought about by experience

B. A temporary occurrence that fluctuates over time

C. A set of rules that are generic to a group of movements

D. The effect that practising one task has on another task

21. A volleyball player serves well due to training. Which type of transfer occurs when the volleyball player successfully performs tennis serves?

A. Skill to skill

B. Practice to performance

C. Stage to stage

D. Whole–part–whole

22. What is the coefficient of variation?

A. The graphical representation of the variability of data

B. The arithmetic centre of a set of values

C. The ratio of the standard deviation to the mean expressed as a percentage

D. The spread of values around the mean

23. Which option is correct for a laboratory test of maximal oxygen consumption?

	Strength	**Limitation**
A.	Broadly accessible	Not reliable
B.	Accurate	Not broadly accessible
C.	Valid	Not accurate
D.	Reliable	Not valid

24. Which option correctly matches the fitness test to the components of fitness?

	Component of fitness	**Fitness test**
A.	Body composition	Cooper’s 12-minute run
B.	Coordination	Underwater weighing
C.	Body composition	Sit and reach
D.	Coordination	Hand ball toss

25. Which option states essential elements of a general training programme?

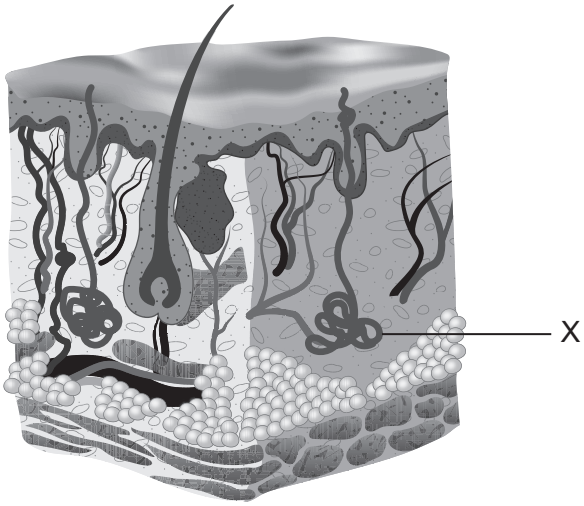
A. A balanced diet and endurance training

B. Endurance training and regular medical check-ups

C. Regular medical check-ups and stretching activities

D. Endurance training and stretching activities

26. The diagram shows the generalized structure of the skin. What is labelled X?



A. Dermis

B. Hair follicles

C. Glands

D. Fat

27. Which is a major artery that supplies blood to the brain?

A. Carotid

B. Coronary

C. Pulmonary

D. Renal

28. What is the location of the pancreas in the human body?

A. Head

B. Chest

C. Abdomen

D. Lower extremities

29. Which factor causes insulin levels in the blood to increase?

A. Low levels of blood glucose

B. Low levels of glycogen in the liver

C. High levels of glycogen in the liver

D. High levels of blood glucose

30. What are the features of peripheral fatigue?

	Develops during	Causes
A.	Prolonged exercise	Central nervous system impairment
B.	High-intensity exercise	Central nervous system impairment
C.	Prolonged exercise	Increased muscle cell force
D.	High-intensity exercise	Reduced muscle cell force

31. Which are correct for an endurance activity?

	Major sources of energy	Duration of activity
A.	Aerobic processes	1 minute
B.	Anaerobic processes	1 minute
C.	Aerobic processes	1 hour
D.	Anaerobic processes	1 hour

32. Which statement is correct about friction?

A. Acts parallel to the interface of two surfaces that are in contact, and opposes their relative motion.

B. Acts perpendicular to the interface of two surfaces that are in contact, and opposes their relative motion.

C. Acts perpendicular to the interface of two surfaces that are in contact, and promotes their relative motion.

D. Acts parallel to the interface of two surfaces that are in contact, and promotes their relative motion.

33. Drag increases with speed. Which action increases a swimmer's drag?

A. Shaving before the race

B. Staying underwater for as long as is allowed at the start of the race

C. Pushing off the wall in a streamlined position

D. Wearing a cap without covering the edges of the goggles

34. Which is an environmental constraint to learning to play basketball?

A. The athlete's decision to pass the ball

B. Lines on a basketball court

C. Setting a goal to reach *x* number of layups

D. Enforcing specific performance conditions

35. Which is an example of the phase analysis model of qualitative biomechanical analysis for an archery shot?

A. Coordination

B. Force

C. Retraction

D. Speed

36. Which is an example of the use of nutrition software in sports analysis?

A. Capturing motion data during a softball game

B. Tracking calorie intake on a cell phone app

C. Recording how you felt during training sessions while fasting

D. Weighing yourself on an analogue scale

37. Which statement is correct?

A. Genotypes are modified by training.

B. Genotypes are determined by phenotypes.

C. Phenotypes are determined by genotypes.

D. Phenotypes are never inherited.

38. Which human characteristics are influenced by genetics?

I. Flexibility
II. Height
III. Muscle fibre type

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

39. An athlete has a high training load for a prolonged period of time. This causes the athlete to have sustained increases in levels of cortisol. What are the effects on immune system function?

	Effects on innate immune system function	Effects on adaptive immune system function
A.	Increases	Increases
B.	Increases	Decreases
C.	Decreases	Increases
D.	Decreases	Decreases

40. Which behaviour increases risk from infection among athletes?

A. Close contact with large groups of people

B. Regular teeth brushing

C. Eating a balanced diet

D. Consistent and sufficient sleep

Disclaimer:

Content used in IB assessments is taken from authentic, third-party sources. The views expressed within them belong to their individual authors and/or publishers and do not necessarily reflect the views of the IB.

References:

2. elenabs, 2023. *The muscular system*. [image online] Available at: https://www.gettyimages.co.uk/detail/illustration/the-muscular-system-royalty-free-illustration/485210366?adppopup=true [Accessed 19 July 2023]. Source adapted.

6. ZooFari. https://commons.wikimedia.org/wiki/File:Heart_diagram_blood_flow_en.svg. Licensed under CC BY-SA 3.0.

14. youngID, 2023. *Soccer Players*. [image online] Available at: https://www.gettyimages.co.uk/detail/illustration/soccer-players-royalty-free-illustration/165814366?adppopup=true [Accessed 19 July 2023]. Source adapted.

15. Image A: sportpoint, 2023. *Young female athlete runner run sprint race black silhouette*. [image online] Available at: https://www.gettyimages.co.uk/detail/illustration/young-female-athlete-runner-run-sprint-race-royalty-free-illustration/1320309040?adppopup=true [Accessed 19 July 2023].

Image B: XonkArts, 2023. *Volleyball men Silhouettes*. [image online] Available at: https://www.gettyimages.co.uk/detail/illustration/volleyball-men-silhouettes-royalty-free-illustration/165691738?adppopup=true [Accessed 19 July 2023]. Source adapted.

Image C: 4x6, 2023. *Professional ballerina practicing dance moves*. [image online] Available at: https://www.gettyimages.co.uk/detail/illustration/professional-ballerina-practicing-dance-royalty-free-illustration/472284767?adppopup=true [Accessed 19 July 2023]. Source adapted.

Image D: hypergon, 2023. *High Jump Silhouettes*. [image online] Available at: https://www.gettyimages.co.uk/detail/illustration/high-jump-silhouettes-royalty-free-illustration/165070909?phrase=high+jump&adppopup=true [Accessed 19 July 2023]. Source adapted.

17. XonkArts, 2023. *Silhouette of a golfer putting*. [image online] Available at: https://www.gettyimages.co.uk/detail/illustration/golfer-putting-royalty-free-illustration/165688178?adppopup=true [Accessed 19 July 2023].