

© International Baccalaureate Organization 2025

All rights reserved. No part of this product may be reproduced in any form or by any electronic or mechanical means, including information storage and retrieval systems, without the prior written permission from the IB. Additionally, the license tied with this product prohibits use of any selected files or extracts from this product. Use by third parties, including but not limited to publishers, private teachers, tutoring or study services, preparatory schools, vendors operating curriculum mapping services or teacher resource digital platforms and app developers, whether fee-covered or not, is prohibited and is a criminal offense.

More information on how to request written permission in the form of a license can be obtained from <https://ibo.org/become-an-ib-school/ib-publishing/licensing/applying-for-a-license/>.

© Organisation du Baccalauréat International 2025

Tous droits réservés. Aucune partie de ce produit ne peut être reproduite sous quelque forme ni par quelque moyen que ce soit, électronique ou mécanique, y compris des systèmes de stockage et de récupération d'informations, sans l'autorisation écrite préalable de l'IB. De plus, la licence associée à ce produit interdit toute utilisation de tout fichier ou extrait sélectionné dans ce produit. L'utilisation par des tiers, y compris, sans toutefois s'y limiter, des éditeurs, des professeurs particuliers, des services de tutorat ou d'aide aux études, des établissements de préparation à l'enseignement supérieur, des fournisseurs de services de planification des programmes d'études, des gestionnaires de plateformes pédagogiques en ligne, et des développeurs d'applications, moyennant paiement ou non, est interdite et constitue une infraction pénale.

Pour plus d'informations sur la procédure à suivre pour obtenir une autorisation écrite sous la forme d'une licence, rendez-vous à l'adresse <https://ibo.org/become-an-ib-school/ib-publishing/licensing/applying-for-a-license/>.

© Organización del Bachillerato Internacional, 2025

Todos los derechos reservados. No se podrá reproducir ninguna parte de este producto de ninguna forma ni por ningún medio electrónico o mecánico, incluidos los sistemas de almacenamiento y recuperación de información, sin la previa autorización por escrito del IB. Además, la licencia vinculada a este producto prohíbe el uso de todo archivo o fragmento seleccionado de este producto. El uso por parte de terceros —lo que incluye, a título enunciativo, editoriales, profesores particulares, servicios de apoyo académico o ayuda para el estudio, colegios preparatorios, desarrolladores de aplicaciones y entidades que presten servicios de planificación curricular u ofrezcan recursos para docentes mediante plataformas digitales—, ya sea incluido en tasas o no, está prohibido y constituye un delito.

En este enlace encontrará más información sobre cómo solicitar una autorización por escrito en forma de licencia: <https://ibo.org/become-an-ib-school/ib-publishing/licensing/applying-for-a-license/>.

# Sports, exercise and health science

## Higher level

### Paper 1

29 April 2025

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]**.

1. What number of bones are fused to form the sacrum?
  - A. 4
  - B. 5
  - C. 7
  - D. 12
  
2. Which is the location of a hinge joint?
  - A. The medial end of the clavicle
  - B. The proximal end of the femur
  - C. The anterior end of the ribs
  - D. The distal end of the femur
  
3. Which characteristics are shared by both cardiac and smooth muscle fibres?
  - I. A single nucleus in a cell
  - II. Presence of striation
  - III. Involuntary control
  - A. I and II only
  - B. I and III only
  - C. II and III only
  - D. I, II, and III
  
4. Which is the smallest lung volume at rest?
  - A. Vital capacity
  - B. Tidal volume
  - C. Inspiratory reserve volume
  - D. Forced vital capacity

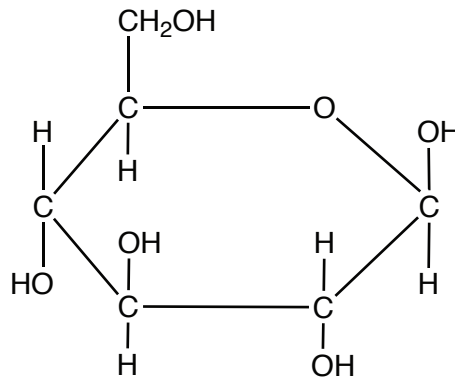
5. Which increases the rate of ventilation?
- A. Decreasing the airflow through the nose, larynx, trachea and bronchi to the alveoli
  - B. Increasing the pressure in the thoracic cavity during expiration
  - C. Increasing blood oxygen concentration during exercise
  - D. Decreasing pH levels in the blood

6. Which structures carry deoxygenated blood?

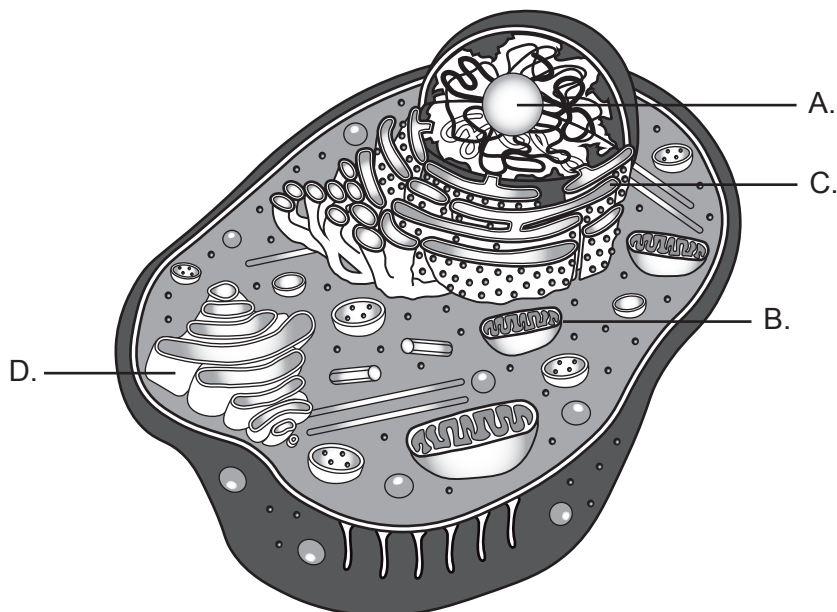
A.	Aorta	Left ventricle	Vena cava
B.	Pulmonary vein	Right ventricle	Pulmonary artery
C.	Pulmonary vein	Left ventricle	Aorta
D.	Vena cava	Right ventricle	Pulmonary artery

7. Which are extrinsic heart rate regulators?
- A. The sinoatrial (SA) node which carries electrical impulses from the atrioventricular (AV) node to the ventricles
  - B. Adrenaline which is released in the parasympathetic nervous system
  - C. The atrioventricular (AV) node which initiates atrial contraction
  - D. The sympathetic nervous system which increases the heart rate
8. Which statement applies to maximal oxygen consumption?
- A. Cycling produces higher  $VO_2$  max than arm ergometry.
  - B.  $VO_2$  max is a measure of anaerobic capacity.
  - C.  $VO_2$  max is only determined by environmental factors.
  - D. Mean  $VO_2$  max of 30-year-old athletes is higher for females than males.

9. Which type of molecule is represented in the diagram?



- A. Polysaccharide
  - B. Monosaccharide
  - C. Saturated fatty acid
  - D. Unsaturated fatty acid
10. Which statement applies to triglycerides?
- A. Broken down in catabolic reactions in response to insulin
  - B. Stored in the liver and muscles in response to glucagon
  - C. Synthesised in catabolic reactions from fatty acids and glycerol
  - D. Broken down in slow twitch (type I) muscle fibres in response to adrenaline
11. The diagram shows a human cell. Which structure do ribosomes bind to?



12. Which describes the structure of mitochondria?
- A. Abundant in fast twitch (type IIb) muscle fibres
  - B. Aid anaerobic respiration and produce lactate
  - C. Have an inner membrane with cristae for effective ATP synthesis
  - D. Aid synthesis of creatine phosphate (CP) for ATP re-synthesis
13. Which is required for muscle relaxation to occur?
- A. Breakdown of acetylcholine by cholinesterase
  - B. Release of calcium ions from sarcoplasmic reticulum
  - C. Hydrolysis of ATP bound to myosin head
  - D. Binding of ATP to actin head
14. Which muscle is the agonist during shoulder abduction?
- A. Deltoid which contracts concentrically
  - B. Deltoid which contracts eccentrically
  - C. Latissimus dorsi which contracts eccentrically
  - D. Latissimus dorsi which contracts concentrically
15. The hamstrings relax when the quadriceps femoris contracts during the upward phase of a squat. Which statement explains this?
- A. Antagonist contracts by a reflex action of the sympathetic nervous system
  - B. Agonist contracts upon stimulation by motor neurons
  - C. Antagonist relaxes upon stimulation of acetylcholine
  - D. Agonist relaxes under voluntary control during reciprocal inhibition

- 16.** Which describes the lever system of the calf–ankle joint?
- A. It is an example of a third class lever.
  - B. The effort force has a shorter arm than the load force.
  - C. The fulcrum is an equal distance from the load and effort force.
  - D. The load force is located between the fulcrum and the effort force.
- 17.** Which is an example of Newton’s second law of motion?
- A. A ball is stationary on a penalty spot before it is kicked.
  - B. A ball will travel faster if greater force is applied by a racquet.
  - C. A ball applies a backward force on a racquet when it is hit.
  - D. Once kicked, a ball’s acceleration is affected by gravity.
- 18.** Which represents the relationship between momentum, velocity and mass?
- A. Momentum is inversely proportional to velocity and proportional to mass.
  - B. Momentum is proportional to velocity and inversely proportional to mass.
  - C. Momentum is inversely proportional to velocity and mass.
  - D. Momentum is proportional to velocity and mass.
- 19.** Which situation is an example of the psychological refractory period (PRP)?
- A. A defender’s reaction is delayed as a player steps to shoot and suddenly changes direction.
  - B. Selective attention (SA) overreaction causes a false start in a race.
  - C. Attention deficit leads to a delayed nerve transmission in a race.
  - D. Response time is improved as a player focuses on the ball and reacts quickly.

20. A dance instructor plans to teach a dance routine. The training schedule is shown in the table below.

Session number	1	2	3	4
Session content	Practice step A	Practice step B, rehearse AB	Practice Step C, rehearse ABC	Practice Step D, rehearse ABCD

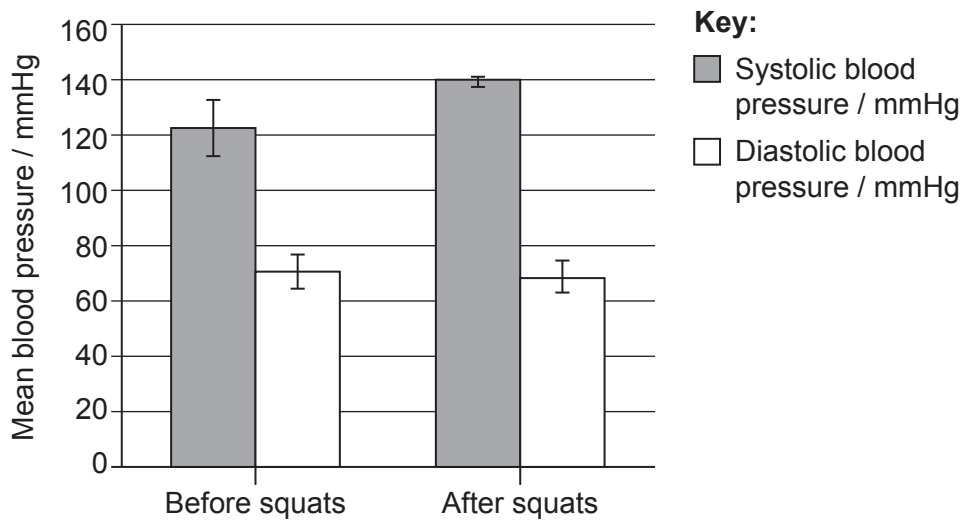
Which type of presentation is being used by the dance instructor?

- A. Whole
  - B. Part
  - C. Whole-part-whole
  - D. Progressive part
21. A dance instructor demonstrates every step of an exercise routine to a class. Which teaching style is being used?
- A. Command
  - B. Reciprocal
  - C. Problem-solving
  - D. Variable
22. Which can cause a plateau in learning for a tennis player?
- A. An increase in motivation due to regular success when serving
  - B. A lack of interest in practicing a forehand due to boredom
  - C. Mastering the backhand allows for a variety of shot types in a game
  - D. Progress in learning the technique of the slice is slower than the volley

23. Which are health-related fitness components?

A.	Balance	Flexibility	Muscular endurance
B.	Body composition	Strength	Speed
C.	Speed	Balance	Body composition
D.	Flexibility	Muscular endurance	Strength

24. The following graph shows the mean systolic and diastolic blood pressure measured in 3 individuals before and after they performed 10 squats.



Which principle of study design could be introduced to improve the investigation?

- A. Double-blinding to increase the validity of conclusions
- B. Adding a control group to increase the accuracy of data
- C. Increasing the sample size to improve statistical analysis
- D. Adding a placebo to improve randomization

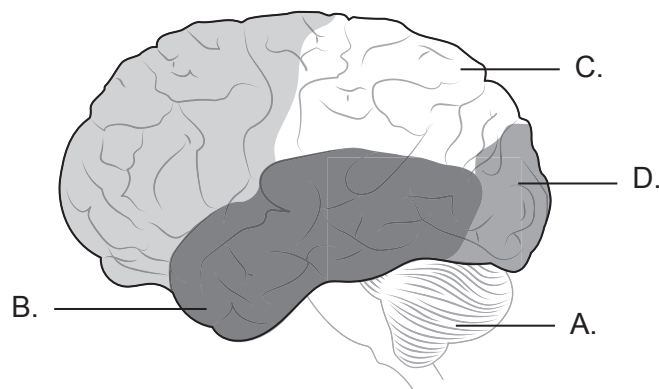
25. Which describes the Harvard step test when measuring aerobic capacity?

A.	Sub-maximal	Laboratory	Specific
B.	Sub-maximal	Field	Valid
C.	Maximal	Laboratory	Accurate
D.	Maximal	Field	Reliable

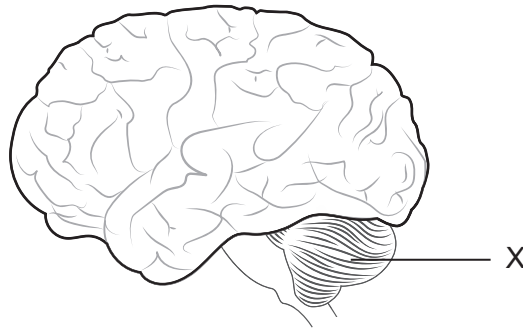
26. What training principle can be monitored using the Karvonen method?

- A. Progression
- B. Reversibility
- C. Intensity
- D. Reliability

27. The diagram shows the left lateral view of the brain. Which region is the temporal lobe?



28. Which activity is controlled by the structure labelled X?



- A. Playing chess
  - B. Evaluating a lost game
  - C. Balancing on a beam
  - D. Interpreting new imagery techniques
29. Hormones can be regulated by complex feedback loops. Which may influence the feedback loops?
- I. Other hormones
  - II. Chemical signals
  - III. Neural signalling
- A. I and II only
  - B. I and III only
  - C. II and III only
  - D. I, II and III
30. Which applies to hormones?
- A. Act only on target cells possessing specific receptors
  - B. Examples include thyroid and testosterone
  - C. Are only released over longer periods of time
  - D. Are secreted by exocrine glands

31. A sprinter is unable to complete the final 50 m repetition of a multiple repetition training session due to a reduction in muscle cell force. Which fatigue is the athlete experiencing?
- A. Mental fatigue
  - B. Peripheral fatigue
  - C. Emotional fatigue
  - D. Central fatigue
32. Which plays a role in recovery from fatigue?
- A. Decrease of creatine phosphate (CP)
  - B. Increase of hydrogen ions
  - C. Replenishment of myoglobin stores
  - D. Depletion of acetylcholine
33. Which has the highest coefficient of friction?
- A. An ice hockey puck on ice
  - B. A ski travelling downhill on snow
  - C. A football cleat on grass
  - D. A volleyball player's foot on sand
34. Which correctly describes the static and dynamic friction experienced by a speed skater as they push off at the start of a race?
- A. Static friction equals dynamic friction
  - B. Static friction is larger than dynamic friction
  - C. Static friction is smaller than dynamic friction
  - D. Static friction stays the same and dynamic friction increases

- 35. Which would be recorded using a flow chart?
  - A. The location of where possession is gained
  - B. A table of shots on target
  - C. The heart rate data of performers
  - D. The motion tracking of a ball
  
- 36. Which is a feature of a phase analysis model of individual technique?
  - A. Focuses on movement principles
  - B. Focuses on mechanical relationships
  - C. A notational system to assess frequency of movement
  - D. Uses hierarchical organization to look at performance

37. Which option could be used by a football (soccer) coach for tactical and technical evaluation?

	<b>Type of digital technology</b>	<b>Example</b>	<b>Description</b>
A.	Motion tracking software	Bodybyte	Match analysis system
B.	Nutrition analysis software	Dartfish	Training analysis system
C.	Performance analysis software	Prozone	Match analysis system
D.	Fitness training software	Hawkeye	Training analysis system

- 38. Which describes how genes can influence athletic performance?
  - A. Most characteristics related to athletic performance are determined by multiple genes.
  - B. Characteristics influencing athletic performance cannot change during a person's lifetime.
  - C. Only a single, or at most a few, genes are responsible for superior athletic performance.
  - D. Genes responsible for athletic performance cannot be switched on or off.

39. Which is the immune response that occurs during delayed onset muscle soreness (DOMS)?
- A. Overtraining increases red blood cells.
  - B. Overstretching increases the pH of bodily fluids.
  - C. Inflammation recruits white blood cells.
  - D. Antibody production increases due to pathogens.

40. Which shows the relationship between susceptibility to infection and exercise intensity?

