

© 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 2

30 April 2025

Zone A morning | **Zone B** morning | **Zone C** morning

Candidate session number

2 hours 15 minutes

--	--	--	--	--	--	--	--	--	--

Instructions to candidates

- Write your session number in the boxes above.
- Do not open this examination paper until instructed to do so.
- Section A: answer all questions.
- Section B: answer two questions.
- Answers must be written within the answer boxes provided.
- A calculator is required for this paper.
- The maximum mark for this examination paper is **[90 marks]**.



Please **do not** write on this page.

Answers written on this page
will not be marked.



Section A

Answer **all** questions. Answers must be written within the answer boxes provided.

1. A study investigated the effect of an 8-week static stretching programme on maximum strength. Participants were placed into two groups.

- Intervention group (IG): Static stretching 15 minutes per day
- Control group (CG): No stretching routine

The following were tested:

- Isometric strength (ISO)
- Dynamic one-repetition maximum (1RM)
- Shoulder range of motion (ROM).

Measurements were recorded pre- and post-training and are presented in the table below.

Group	Test	Pre-training mean (±SD)	Post-training mean (±SD)
Intervention group (IG)	1RM (kg)	75.25 (33.62)	79.69 (34.0)
	ISO (N)	649.99 (337.07)	685.53 (325.11)
	ROM (cm)	54.61 (9.05)	49.28 (8.7)
Control group (CG)	1RM (kg)	68.65 (25.76)	69.19 (26.11)
	ISO (N)	600.50 (251.37)	643.61 (241.67)
	ROM (cm)	50.00 (5.34)	49.69 (5.7)

(a) Identify the group with the lower pre-training ISO mean. [1]

.....

.....

(b) Determine the percentage change in the 1RM mean from pre-training to post-training for the intervention group. [2]

.....

.....

.....

(This question continues on the following page)



Turn over

(Question 1 continued)

The investigators allowed adequate time for muscles to recover between tests to prevent fatigue.

(c) Define *fatigue*.

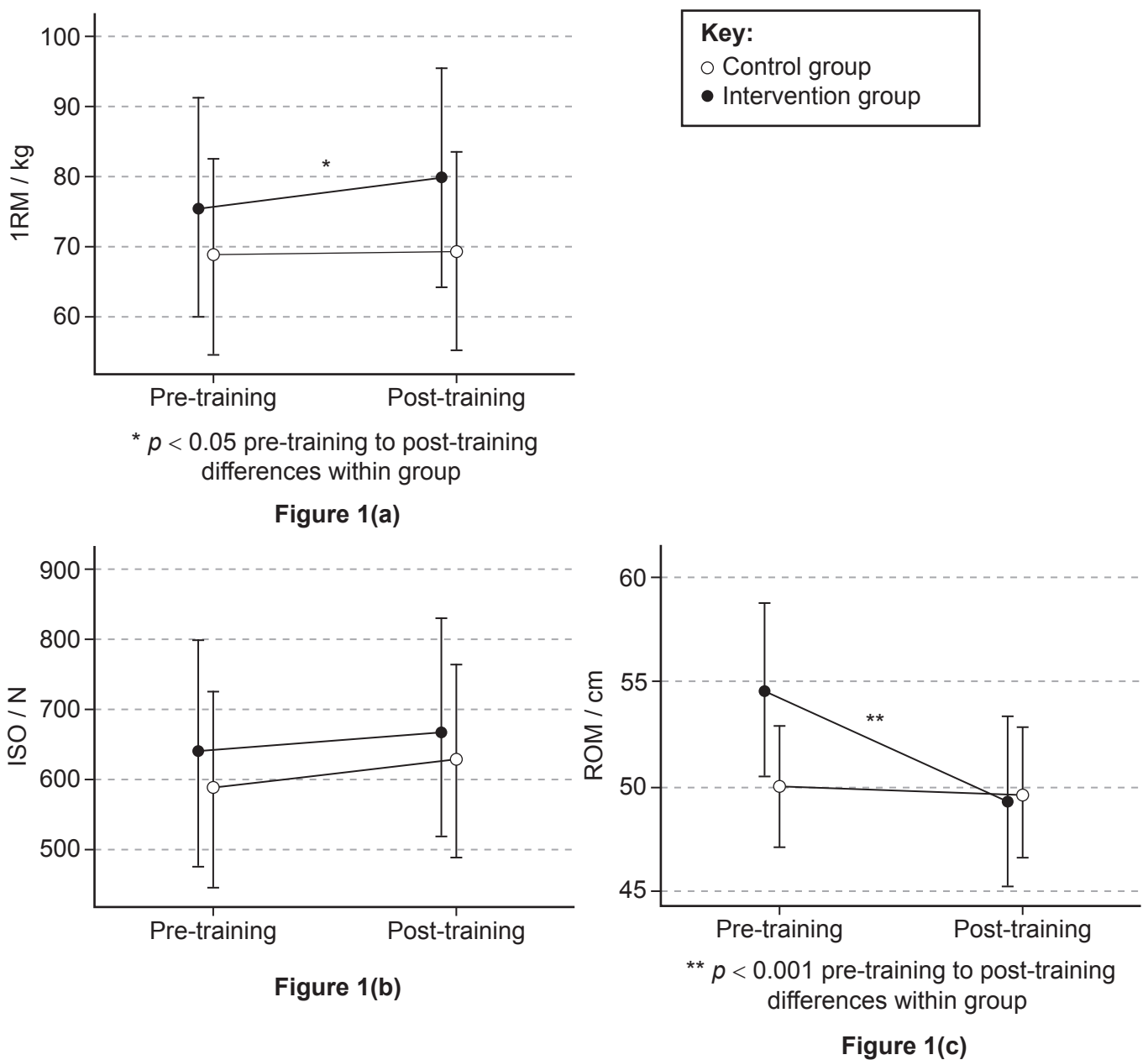
[1]

.....

.....

The data from the investigation was made into a series of graphs. The graphs for 1RM, ISO and ROM are presented in **Figure 1**.

Figure 1: (a) 1RM, (b) ISO, and (c) ROM



(This question continues on the following page)



(Question 1 continued)

- (d) The coefficient of variation is the ratio of the standard deviation to the mean expressed as a percentage. Compare and contrast the coefficients of variation of the data represented in **Figure 1(a)** and **Figure 1(b)**. [2]

.....

.....

- (e) With reference to **Figure 1(c)**, compare and contrast the reliability of the results for ROM for the control and intervention groups. [2]

.....

.....

.....

.....

- (f) Using **Figure 1**, comment on the impact of an 8-week static stretching programme on strength and flexibility. [3]

.....

.....

.....

.....

.....

.....



Please **do not** write on this page.

Answers written on this page
will not be marked.



2. Protein is an important macronutrient required to support strength training.

(a) List the chemical composition of protein. [1]

.....

(b) Outline the importance of essential amino acids to an individual's health. [1]

.....
.....

(c) Protein is essential for the production of blood cells. Outline the functions of the **three** types of cells that form blood. [3]

.....
.....
.....

(d) Identify the recommended relative percentage intake of protein for a balanced diet. [1]

.....

(e) Outline how a performer is assessed during a standing broad jump. [2]

.....
.....
.....



3. A coach is coaching a performer to play tennis.

(a) State the coaching pedagogy in which learning is collaborative, creative and process-orientated. [1]

.....

(b) Define the concept of *transfer*. [1]

.....
.....

(c) Outline abilities to skills as a type of transfer when learning to return the ball in tennis. [1]

.....
.....

(d) Using examples, suggest **three** task constraints that could be introduced for a tennis player to increase their motivation and success. [3]

.....
.....
.....
.....
.....

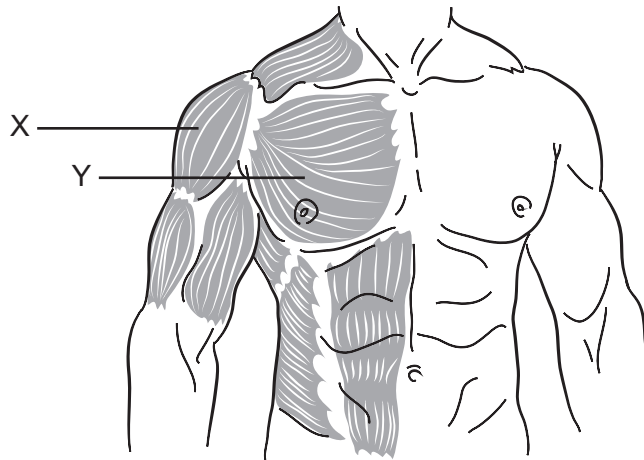
(This question continues on the following page)



(Question 3 continued)

(e) Identify the muscles labelled X and Y.

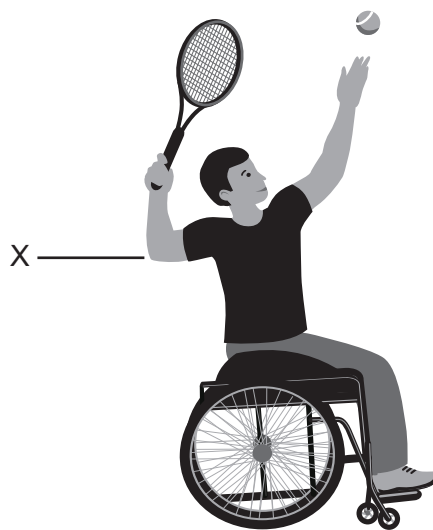
[2]



X:

Y:

Figure 2: A tennis player serving the ball during a match



(f) Analyse the movement occurring at the elbow labelled X in Figure 2 as the tennis player stretches to serve.

[4]

Joint	Joint action	Agonist	Contraction type of agonist	Antagonist
Elbow



4. Many individuals take up running as a form of endurance exercise. This is because it is often cheap, accessible and has cardiovascular benefits.

(a) An increase in stroke volume is an adaptation of the heart to regular endurance exercise. Outline **one** other adaptation of the heart. [1]

.....

(b) Predict the change in stroke volume at rest as a child grows into an adult athlete. [1]

.....

(c) Describe cardiovascular drift and **one** method for reducing it. [4]

.....
.....
.....
.....
.....
.....
.....

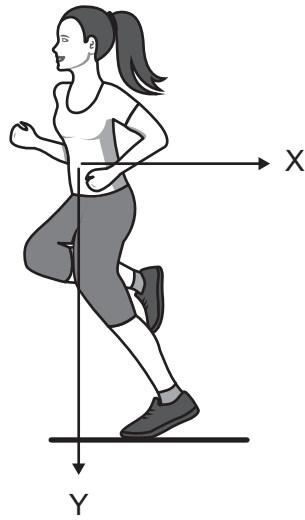
(This question continues on the following page)



(Question 4 continued)

(d) Identify the forces labelled X and Y.

[2]



X:

Y:



5. A gymnast is competing in the floor exercise which is composed of gymnastic and acrobatic skills demonstrating strength, balance and flexibility. The routine duration is limited to 70 seconds for male gymnasts and 90 seconds for female gymnasts.

(a) Gymnastics is considered a high-intensity activity. Define the term *high-intensity*. [1]

.....
.....

(b) Analyse the relative contributions of the anaerobic energy systems during the floor exercise. [4]

.....
.....
.....
.....
.....
.....
.....

(c) On completion of the floor exercise, the gymnast breathes heavily during the recovery period (EPOC). Explain oxygen deficit and its impact on excess post-exercise oxygen consumption. [3]

.....
.....
.....
.....
.....
.....

(This question continues on the following page)



(Question 5 continued)

The diagram shows a gymnast holding a balance position on the parallel bars for one minute in training.



- (d) Determine which type of exercise is shown and its effects on systolic and diastolic blood pressure.

[3]

.....

.....

.....

.....



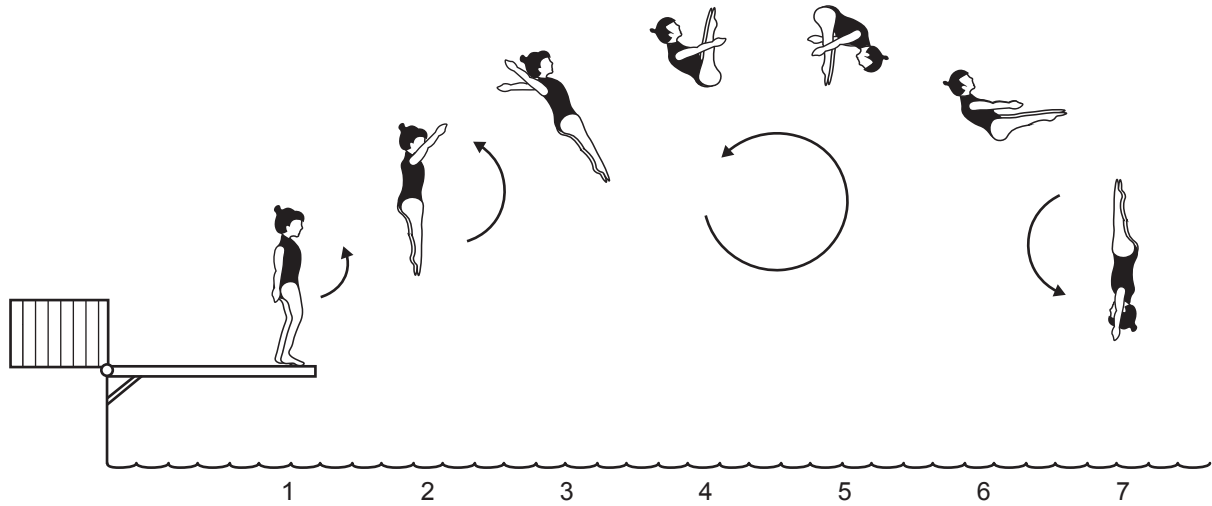
Section B

Answer **two** questions. Answers must be written within the answer boxes provided.

6. (a) Outline **four** features of a synovial joint. [4]
- (b) Explain the mechanism of expiration (exhalation) when exercising. [5]
- (c) State the location of the pituitary and thyroid glands. [2]
- (d) Explain the role of the pituitary gland in maintaining homeostasis. [5]
- (e) Outline the genetic mechanism for the inheritance of potential athletic ability. [4]
7. (a) Identify **two** arteries that carry blood from the brachiocephalic trunk to the brain. [2]
- (b) Explain how the sarcomere of the skeletal muscle shortens after calcium ions are released from the sarcoplasmic reticulum. [5]
- (c) Describe **four** roles of the skin for an athlete training outside. [4]
- (d) Analyse the physiological factors that lead to reduced muscle cell force in a triathlete as a result of endurance training. [5]
- (e) Using examples, apply the classification of motor skills to an athlete competing in a marathon race. [4]
8. (a) Describe **two** types of drag and how each affects a cyclist. [4]
- (b) Identify **two** ways a cyclist can minimize drag. [2]
- (c) Suggest the possible strengths of using information technology in sports analysis. [5]
- (d) Using examples, outline **four** features of a skilled performer. [4]
- (e) Periodization can be used to optimize an athlete’s development. Analyse how a coach uses the **other** key principles of training to enhance performance. [5]



- 9. (a) Identify **two** physiological reasons why athletes who overtrain may be more susceptible to infection. [2]
- (b) Describe **four** strategies that athletes may use to reduce the risk of infection in preparation for a competition. [4]
- (c) Analyse how the diver uses the concept of angular momentum to perform their dive. [5]



- (d) Analyse the environmental factors that contribute to improved performance in long-distance runners. [5]
- (e) Feedback can be received extrinsically or felt intrinsically during sport. Describe **four** other types of feedback that could be used when learning a skill. [4]



A large rectangular area containing horizontal dotted lines for writing.



20EP17

Turn over

A large rectangular area containing horizontal dotted lines for writing.



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:

1. Warneke, et al., 2023. Effects of a Home-Based Stretching Program on Bench Press Maximum Strength and Shoulder Flexibility. *Journal of Sports Science and Medicine*, 22, pp. 597–604. Source adapted.
- 3.(e) Kabanova, V., 2021. *Mens body arms shoulders chest and abs. – stock illustration*. [image online] Available at: <https://www.gettyimages.co.uk/detail/illustration/men-s-body-arms-shoulders-chest-and-abs-royalty-free-illustration/1359361226?adppopup=true> [Accessed 5 July 2024]. Source adapted.
- 3.(f) AnnaSqBerg, 2016. *Disabled Athlete On Wheelchair Play Tennis Sport Competition Vector - stock illustration*. [image online] Available at: <https://www.gettyimages.co.uk/detail/illustration/disabled-athlete-on-wheelchair-play-tennis-royalty-free-illustration/583809218?adppopup=true> [Accessed 5 July 2024]. Source adapted.
- 5.(d) chipstudio, 2011. *Silhouettes of a male gymnast on the parallel bars – stock illustration*. [image online] Available at: <https://www.gettyimages.co.uk/detail/illustration/silhouettes-of-a-male-gymnast-on-the-royalty-free-illustration/165759825> [Accessed 5 July 2024]. Source adapted.

All other texts, graphics and illustrations © International Baccalaureate Organization 2025



20EP20