

© International Baccalaureate Organization 2022

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 2022

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, 2022

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
Standard level
Paper 2

Thursday 19 May 2022 (morning)

Candidate session number

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

1 hour 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 one question.
- Answers must be written within the answer boxes provided.
- A calculator is required for this paper.
- The maximum mark for this examination paper is **[50 marks]**.



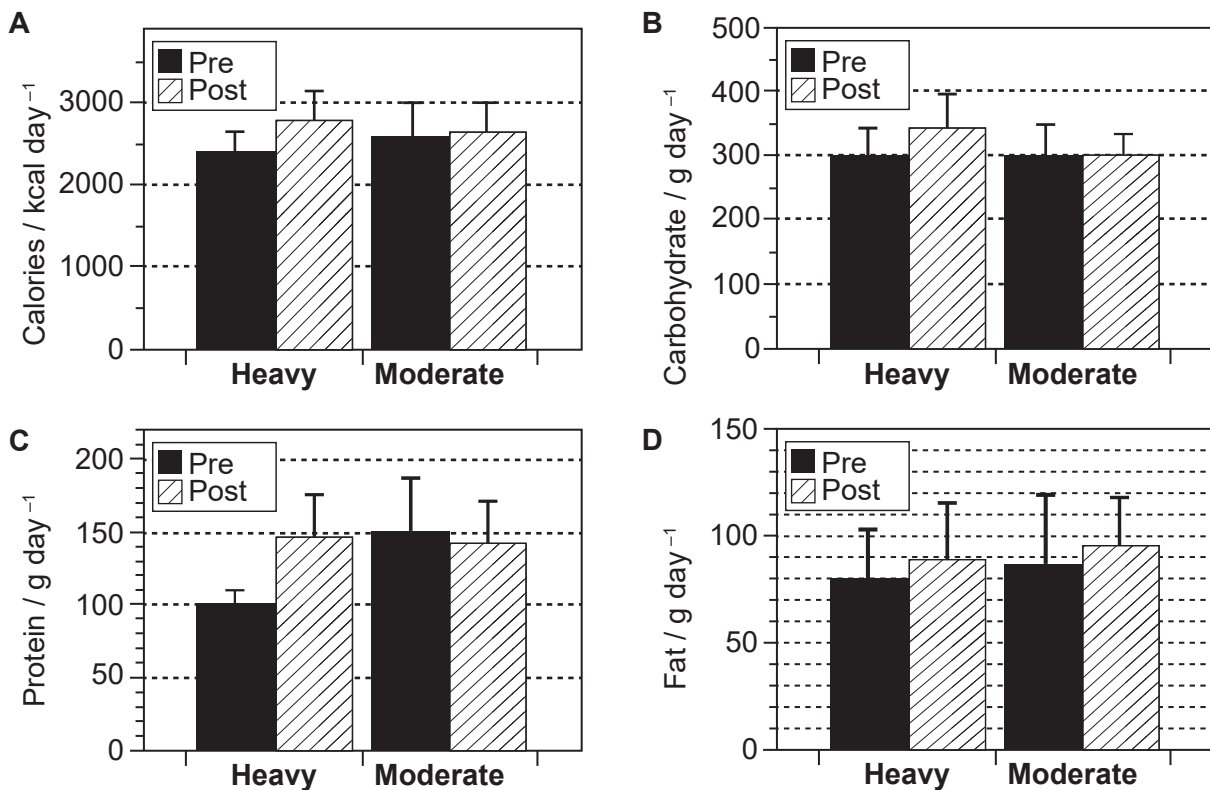
Section A

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

1. A study investigated the impact of heavy and moderate load-resistance training on nutritional intake. Nineteen resistance-trained athletes were randomly assigned to one of two groups:
- **Heavy training load** group: Trained in a loading range of 90–95% of 1 repetition maximum (1RM); 2–4 repetitions per set;
 - **Moderate training load** group: Trained in a loading range of 80–85% of 1RM; 8–12 repetitions per set.

Both groups performed 3 sets of 7 exercises for the major muscle groups of the upper and lower body. Training took place 3 days a week for 8 weeks. The nutritional intake of participants was monitored during the study.

Figure 1: Nutritional intake pre- and post-intervention for the heavy and moderate training load groups, showing mean (\pm SD)



- (a) (i) Identify the training method and nutritional component that indicated the greatest proportional change pre- and post-intervention. [1]

.....

.....

(This question continues on the following page)



(Question 1 continued)

- (ii) Calculate the difference in fat intake pre- and post-testing for the heavy training load group. [2]

.....

.....

.....

.....

- (iii) With reference to **Figure 1**, discuss the effect of heavy and moderate training load on carbohydrate intake. [2]

.....

.....

.....

.....

- (iv) The results in **Figure 1** are inconclusive for fat intake in the moderate training load group. Outline the statistical reasons for this finding. [2]

.....

.....

.....

.....

- (v) Outline **two** reasons for differences in protein intake between the heavy and moderate training load groups. [2]

.....

.....

.....

.....

(This question continues on the following page)



(Question 1 continued)

(b) State the composition of a molecule of triacylglycerol. [1]

.....
.....

(c) (i) Identify **one** fitness component that the study cited in Question 1 is designed to improve. [1]

.....
.....

(ii) Explain the benefits of field fitness tests. [4]

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



2. (a) Identify the bone type of the scapula.

[1]

.....

.....

(b) The diagram shows a gymnast holding a position called an iron cross.



Discuss the response of systolic and diastolic blood pressure to this static position.

[3]

.....

.....

.....

.....

.....

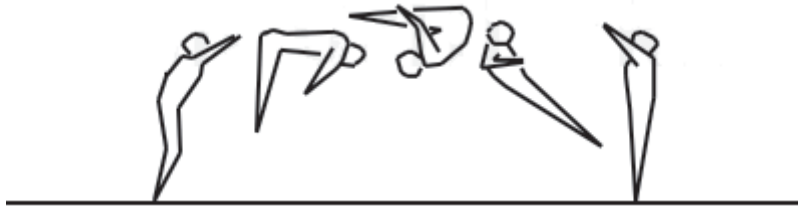
.....



3. (a) Define the term *centre of mass*. [1]

.....
.....

(b) The diagram shows a gymnast performing a piked somersault.



Explain the manipulation of the moment of inertia during the flight and landing phases. [4]

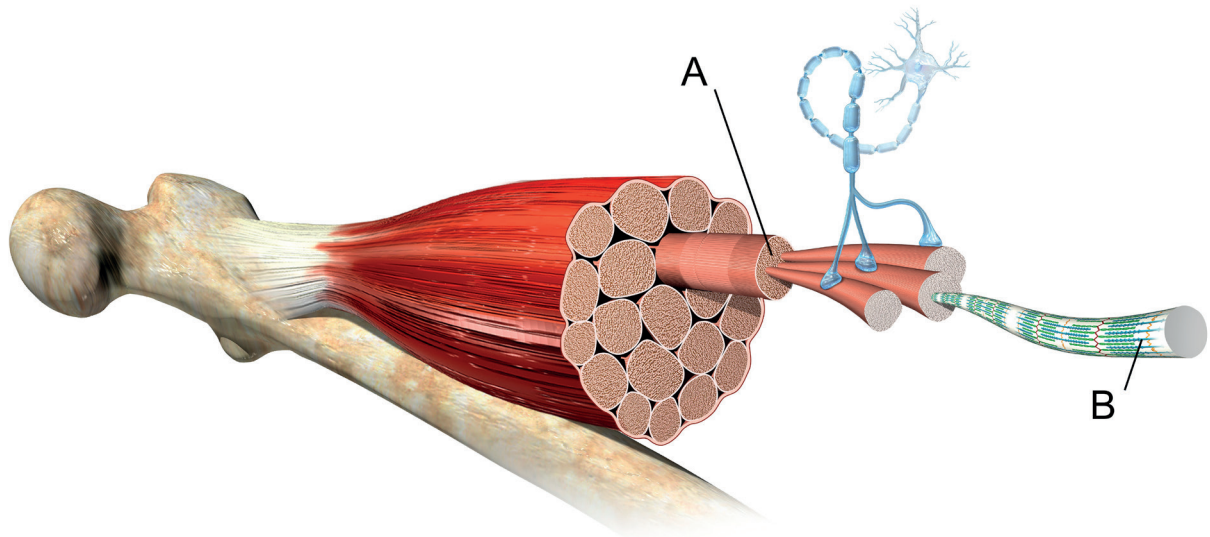
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....

(This question continues on the following page)



(Question 3 continued)

(c) The diagram shows skeletal muscle.



Identify the parts labelled A and B.

[2]

A:
B:

(d) Describe the sequence of excitation of the heart muscle.

[3]

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

(This question continues on the following page)



16EP07

Turn over

(Question 3 continued)

- (e) A beginner participated in a seven-week tennis programme. Each week, they recorded their successful serves out of 50 attempts. Identify the type of learning curve represented by the data. [1]

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7
Successful serves (out of 50)	1	2	4	7	15	30	46

.....

.....



Section B

Answer **one** question. Answers must be written within the answer boxes provided.

4. (a) Describe nervous control of ventilation during exercise. [3]
- (b) Describe the resynthesis of adenosine triphosphate (ATP) by the lactic acid (anaerobic glycolysis) system. [4]
- (c) Outline **three** general features of muscle tissue. [3]
- (d) An attacking football player moves in one direction and immediately changes to the opposite direction. This deceives the defender.
- Explain the concept the attacking player is using to evade the defender. [4]
- (e) Discuss the structure and function of the leg muscle fibres of an elite long jumper and a marathon runner. [6]
5. (a) Distinguish the characteristics of smooth and cardiac muscle. [2]
- (b) Describe how a long jumper can manipulate the factors that affect projectile motion to increase their distance jumped during a competition. [4]
- (c) A chronic adaptation of aerobic training is an increase in hemoglobin. Outline how this adaptation would benefit an athlete running a marathon. [4]
- (d) Explain why an elite basketballer would be able to process relevant sporting signals more effectively than a novice. [4]
- (e) Using examples from sport, compare motor programmes from both open-loop and closed-loop perspectives. [6]
6. (a) Describe the most appropriate teaching style for a coach to use with a group of novice javelin throwers. [3]
- (b) Giving an example, outline the characteristics of saturated fatty acids. [3]
- (c) Explain the phenomenon of cardiovascular drift and **one** method of reducing it. [5]
- (d) A table-tennis ball is hit with topspin. Apply the Bernoulli principle to the projectile motion of the ball. [4]
- (e) Discuss the factors that determine the dominant energy system. [5]



A large rectangular area with horizontal dotted lines, intended for writing or drawing.



16EP10

A large rectangular area containing horizontal dotted lines for writing.



16EP11

Turn over

A large rectangular area containing horizontal dotted lines for writing.



16EP12

A large rectangular area containing 30 horizontal dotted lines for writing.



16EP13

Turn over

A large rectangular area containing horizontal dotted lines for writing.



16EP14

A large rectangular area containing 25 horizontal dotted lines, intended for handwritten notes or answers.



References:

- Figure 1.** Schoenfeld, B. J., Contreras, B., Vigotsky, A. D., and Peterson, M., 2016. Differential effects of heavy versus moderate loads on measures of strength and hypertrophy in resistance-trained men. *Journal of Sports Science and Medicine*, 15, pp. 715–722
2. (b) Gwoeii / Shutterstock.
3. (b) www.gymdrills4profs.com.
3. (c) HENNING DALHOFF/SCIENCE PHOTO LIBRARY.

All other texts, graphics and illustrations © International Baccalaureate Organization 2022



16EP16