Diploma Programme
Programme du diplôme
Programa del Diploma

Sports, exercise and health science
Higher level
Paper 2

Tuesday 30 October 2018 (afternoon)

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]**.

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International Baccalaureate
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Bachillerato Internacional

Section A

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

1.   A study examined physical fitness levels of 10-year-old children who regularly participate in sports. The 900 participants were divided evenly between three groups according to their training level:

- Low: training less than 1 hour per week
- Moderate: training between 1 and 5 hours per week
- High: training more than 5 hours per week.

Each participant performed the standing broad jump fitness test. The mean results are shown in the graph.
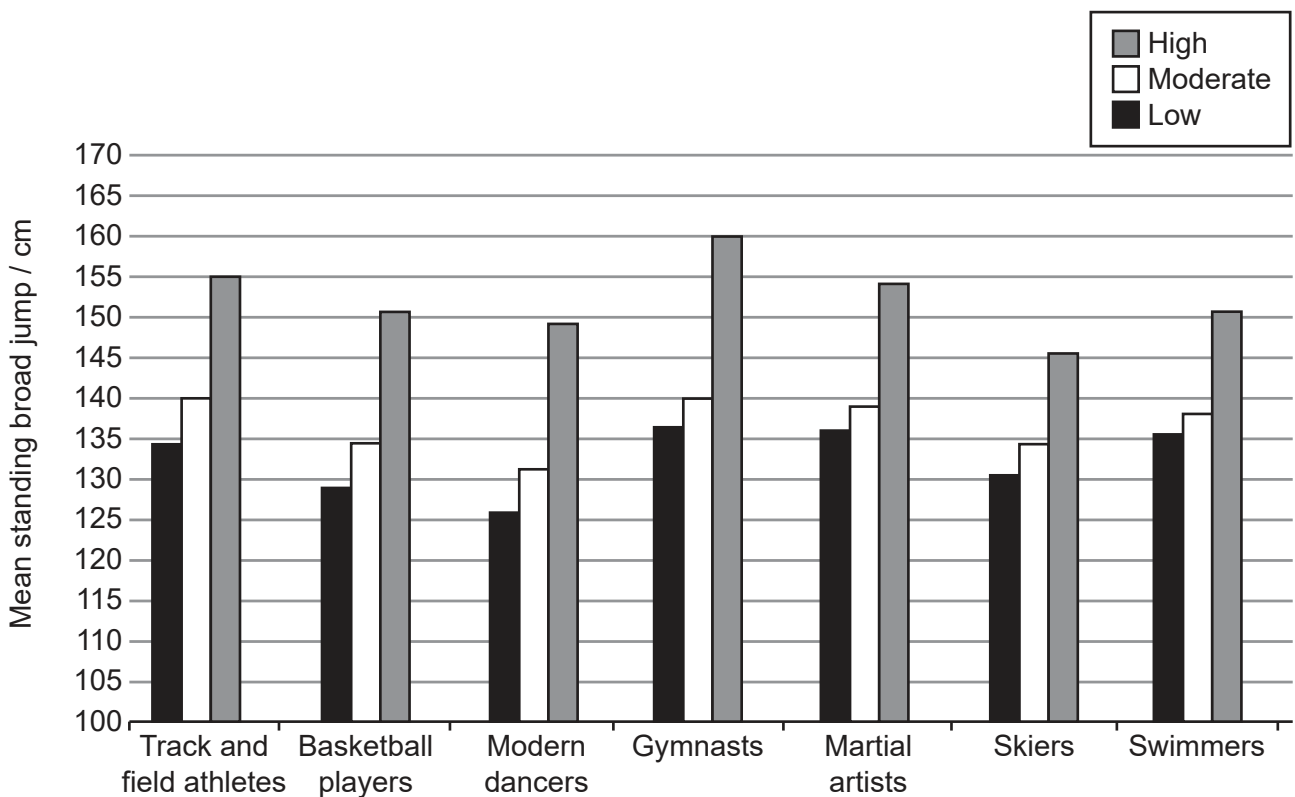
[Source: © International Baccalaureate Organization 2018]

(a)   (i)   Identify the training level and sport for the group that has the highest mean score on the standing broad jump fitness test.   [1]

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(Question 1 continued)

(ii) Calculate the difference of mean standing broad jump fitness test score between moderate and high training levels for the group stated in 1(a)(i). [2]

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(iii) Using the data, deduce the effect of high level of participation in sport on performance in the standing broad jump test. [2]

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(iv) A two-tailed, unpaired t-test was conducted on the data. The calculations yielded the following results:

- comparing low and moderate training level yielded $p > 0.05$
- comparing moderate and high training level yielded $p < 0.05$
- comparing low and high training level yielded $p < 0.01$.

Comment on the meaning of the results from the t-test. [3]

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(Question 1 continued)

    (b)   (i)   State an alternative test (other than standing broad jump) for measuring leg power. [1]

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          (ii)   Outline the procedure for measuring leg power in the test stated in 1(b)(i). [3]

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2. A study investigated teaching that supports individual differences in skill learning. Two groups of 10-year-old participants were taught for four weeks using the following techniques:

- Variable practice (non-linear pedagogy)
- Drills (traditional pedagogy).

Participant movement was recorded by digital video and scored against criteria. The graph shows the mean score of successful movements during the pre-test performance (day 1), post-test performance (4 weeks), and retention testing (10 weeks).
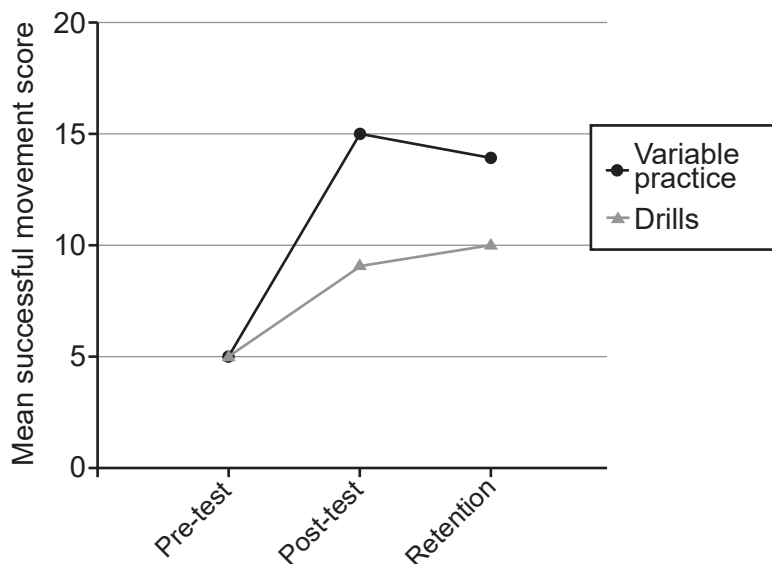
[Source: Lee MCY, Chow JY, Komar J, Tan CWK, Button C (2014) Nonlinear Pedagogy: An Effective Approach to Cater for Individual Differences in Learning a Sports Skill. *PLoS ONE* **9**(8): e104744. https://doi.org/10.1371/journal.pone.0104744. Licenced under a Creative Commons International 4.0 licence, https://creativecommons.org/licenses/by/4.0.]

(a) Identify the highest mean movement score for retention testing. [1]

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(b) Calculate the change between the pre-test and post-test mean movement scores for the variable practice participants. [2]

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(Question 2 continued)

     (c)   Suggest reasons for the trends shown in the graph. [3]

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3.   (a)   State the general characteristic common to muscle tissue that allows the muscle to stretch and return to its original resting length. [1]

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(Question 3 continued)

(b)   (i)   Identify the origin and insertion for the rectus femoris.   [2]
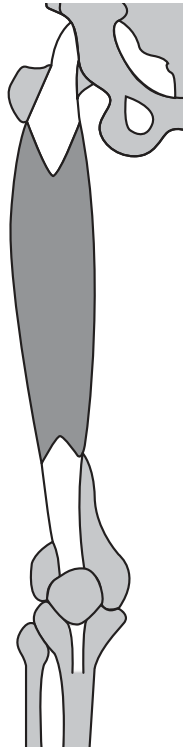
Origin:

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(ii)   Describe the functions of ligaments and tendons in a joint such as the knee joint.   [2]

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(Question 3 continued)

   (c)   Distinguish between maximal oxygen consumption during cycling and arm ergometry.   [1]

   (d)   Describe the process of oxygen exchange between the lungs and pulmonary capillaries
         at rest.   [4]

   (e)   (i)   Outline the characteristics of hormones.   [2]

         (ii)   Describe how circulating hormone levels are regulated.   [2]

4.   (a)   Explain how acetylcholine (ACh) initiates skeletal muscle contraction.   [2]

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(b)   Analyse how capillary and mitochondrial densities affect slow twitch (type I) muscle fibres. [2]

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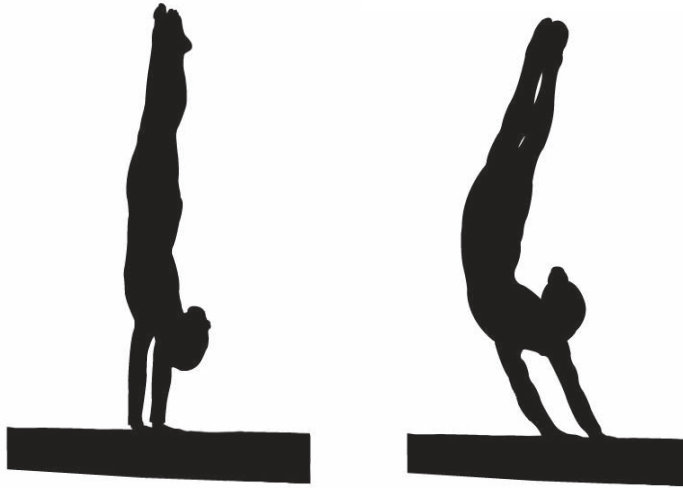
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(Question 4 continued)

(c)   Diagram A, shows a gymnast balanced on a beam. In Diagram B, she is about to fall.
        Explain how a fall can be avoided by moving the body and therefore the centre of mass.   [3]

[Source: © Ranko Bojanovic/123RF.COM]

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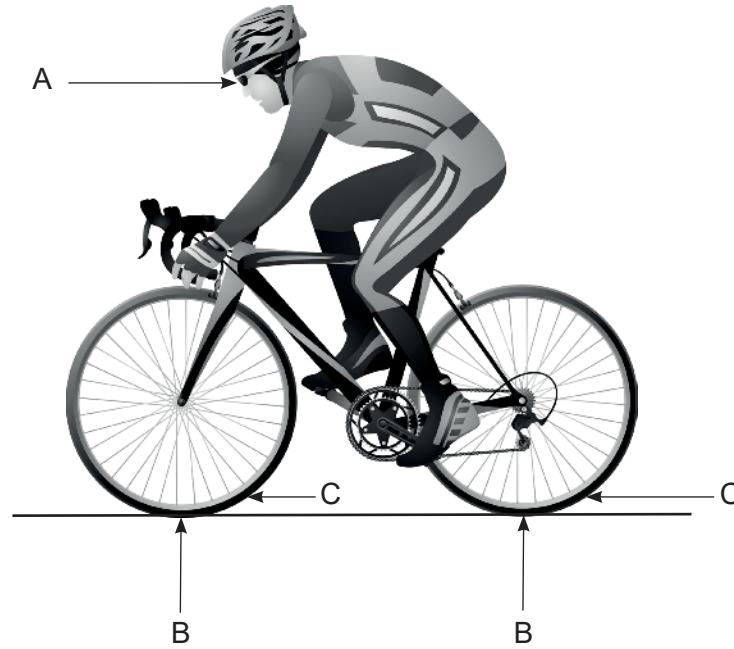
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(Question 4 continued)

(d) The diagram shows a cyclist.

[Source: elmm/Vector Images/Shutterstock]

Label the **three** forces: A, B, and C. [2]

A: . . . .

B: . . . .

C: . . . .

(e) Outline how wave drag can be reduced for a swimmer. [2]

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5. (a) List the functions of the cerebrum. [2]

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(b) Evaluate the implications of genetic screening for sports, exercise and health. [5]

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Section B

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

6. (a) Describe the need for glucose and oxygen by the brain.   [3]

(b) Using an example, describe how selective attention prevents information overload.   [3]

(c) (i) Define *motor programme*.   [1]

(ii) Apply the concept of motor programme to improving performance of a gymnastics
routine.   [2]

(d) Explain how genetic and environmental factors contribute to improved performance in
long distance runners.   [5]

(e) Discuss how the **three** energy systems contribute to ATP production during an
800-metre run.   [6]

7. (a) Describe how cardiovascular drift takes place.   [3]

(b) Identify the location and function of the pituitary gland.   [3]

(c) Outline the chemical control of ventilation during exercise.   [3]

(d) Explain physiological causes of peripheral fatigue in long distance running.   [5]

(e) Explain excess post-exercise oxygen consumption (EPOC) during recovery.   [6]

8. (a) Outline characteristics of performance outcome model of qualitative biomechanical
analysis for an individual sports technique.   [3]

(b) Distinguish between the movement permitted in different types of joints.   [3]

(c) (i) Define *delayed onset muscle soreness* (DOMS).   [1]

(ii) Outline components of a resistance training session in order to reduce DOMS.   [2]

(d) Analyse factors that decrease drag for a road cyclist.   [5]

(e) Explain sliding filament theory after acetylcholine (ACh) increases muscle membrane
permeability.   [6]

9.   (a)   Describe the path taken by blood from the right ventricle to the left ventricle.   [3]

(b)   Distinguish how cardiac output, stroke volume and resting heart rate would differ
between trained and untrained women during exercise.   [3]

(c)   Draw a flowchart with features that can be used for match analysis in a team invasion
game of choice.   [3]

(d)   Discuss how exercise affects susceptibility to infectious disease in a highly-trained
athlete.   [5]

(e)   Using examples from team sports, evaluate the concept of the psychological refractory
period (PRP).   [6]

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