Revision practice

International Baccalaureate · IB Diploma · Sports, Exercise and Health Science · HL

Original open focus revision; complete specification coverage remains unfinished.

1 Exercise physiology: responses and recovery

- cardiac output
- stroke volume

Question 1

Which distinguishes a training adaptation from an acute response?

- It develops over repeated training sessions
- It must occur within one heartbeat
- It is unrelated to the body

Available marks: 2.

Worked answer

It develops over repeated training sessions

- An acute response occurs during or soon after exercise. A training adaptation develops over repeated sessions. A lower post-exercise heart rate cannot alone establish greater fitness without comparable workload and participant conditions.

Question 2

Heart rate is 100 beats/min and stroke volume is 70 mL/beat. Find cardiac output in L/min.

Available marks: 4.

Worked answer

7 L/min

- Appropriate relation; consistent substitution; correct result; meaningful unit and interpretation.

A heart-rate monitor measures one response, not every dimension of performance. Hydration, stress, medication and recent activity can confound comparisons.

2 Hydration: interpret balance without forcing dehydration

- water balance
- sweat rate

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Question 1

Which quantity is required in addition to before/after mass in this model?

- Recorded fluid intake and urine output
- Only the athlete's favourite sport
- A forced period without drinking

Available marks: 2.

Worked answer

Recorded fluid intake and urine output

- For a simplified field estimate, sweat loss in kilograms is approximately pre-activity mass minus post-activity mass plus drink mass minus urine mass. Express the estimate per hour only after recording duration. This approximation omits some respiratory and metabolic mass changes and assumes comparable dry clothing and a suitable balance.

Question 2

Fictional mass changes from 70.0 to 69.7 kg, with 0.40 kg drink and 0.10 kg urine in one hour. Estimate sweat loss.

Available marks: 4.

Worked answer

0.6 kg

- Appropriate relation; consistent substitution; correct result; meaningful unit and interpretation.

A change in mass is not necessarily a change in body fat. A modelled sweat estimate does not justify fluid restriction, diagnosis, or a one-size-fits-all sports recommendation.

3 Digestion, transport and health evidence

- digestion
- absorption

Question 1

Which statement about bile is correct?

- It is a protease
- It emulsifies lipids
- It breaks every nutrient into monomers

Available marks: 2.

Worked answer

It emulsifies lipids

- Absorption moves soluble products into blood or lymph. Thin exchange surfaces and a large surface area shorten diffusion paths and increase transfer. Enzyme activity and transport are different processes.

■ Question 2

9 of 36 participants report an outcome. Calculate the percentage.

Available marks: 4.

Worked answer

25 %

- Appropriate relation; consistent substitution; correct result; meaningful unit and interpretation.

Bile is not an enzyme. A positive food test identifies a component under the test conditions; it does not show that a food is healthy or unhealthy in every diet.

4 Biomechanics: movement and impulse

- impulse
- base of support

■ Question 1

For a fixed momentum change, doubling stopping time does what to average force?

- Halves it
- Doubles it
- Leaves it unchanged

Available marks: 2.

Worked answer

Halves it

- A biomechanical analysis must define the segment, direction and phase of movement. Net force and a single muscle force are not interchangeable. A longer lever arm can change torque without changing applied force.

■ Question 2

Momentum change is 120 kg metres per second over 0.40 s. Find average force magnitude.

Available marks: 4.

Worked answer

300 N

- Appropriate relation; consistent substitution; correct result; meaningful unit and interpretation.

The largest force is not the same as average force. A school movement study should not deliberately create high-impact landings to test a prediction.

5 Injury evidence: compare exposure as well as counts

- incidence rate
- overuse injury

■ Question 1

Why use athlete-hours when comparing injury counts?

- To account for unequal recorded exposure
- To prove every injury has one cause
- To remove all reporting bias automatically

Available marks: 2.

Worked answer

To account for unequal recorded exposure

- An incidence rate divides new injury events by exposure time, often expressed per 1,000 athlete-hours. Use the same case definition and exposure method in comparisons. Severity, recurrence and missing records also matter; two groups with equal incidence can have different time lost or different injury types.

■ Question 2

A fictional group records 9 injuries in 4,500 athlete-hours. Calculate injuries per 1,000 hours.

Available marks: 4.

Worked answer

2 per 1,000 hours

- Appropriate relation; consistent substitution; correct result; meaningful unit and interpretation.

A rate estimate from a small number of events is uncertain. A low recorded rate can reflect under-reporting, and exposure-normalized association is not proof of a prevention intervention's causal effect.

6 Motivation, stress and evidence in sport

- motivation
- coping

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Question 1

Which classroom approach is ethically appropriate?

- Induce distress deliberately
- Use an approved voluntary anonymous questionnaire
- Diagnose participants from one scale score

Available marks: 2.

Worked answer

Use an approved voluntary anonymous questionnaire

- A self-report scale measures reported experience under its design. It does not diagnose a disorder or establish a universal relationship between arousal and performance. Analyse within-person and between-person variation separately.

Question 2

Scores are 3, 5, 5 and 7. Find the mean.

Available marks: 4.

Worked answer

5

- Appropriate relation; consistent substitution; correct result; meaningful unit and interpretation.

Correlation does not prove that stress caused a performance result. Students should not induce distress to investigate coping.

7 Motor control: feedback, timing and evidence

- augmented feedback
- knowledge of results

Question 1

Which comparison best examines persistence after practice?

- A delayed test without the practice prompts
- Only the best prompted attempt
- A different number of attempts for each group without adjustment

Available marks: 2.

Worked answer

A delayed test without the practice prompts

- Distinguish knowledge of results from knowledge of performance. A score reports the outcome; a description of arm position reports movement features. Feedback can guide practice, yet immediate success with continuous prompts may not persist

when prompts are removed. Retention and transfer therefore provide stronger learning evidence than one practice score.

■ Question 2

Success rate changes from 80% in practice to 55% in retention. Find the decrease in percentage points.

Available marks: 4.

Worked answer

25 percentage points

- Appropriate relation; consistent substitution; correct result; meaningful unit and interpretation.

Open-loop and closed-loop are models, not a claim that an athlete's nervous system uses only one mechanism. Feedback timing, task complexity and sensory availability affect what can be inferred.

8 Motor learning, feedback and retention

- retention
- knowledge of results

■ Question 1

Which measure best tests lasting learning?

- Performance only while the coach supplies every correction
- A delayed unassisted retention test
- The participant favourite colour

Available marks: 2.

Worked answer

A delayed unassisted retention test

- A retention test after a delay and without the same assistance can provide evidence of learning. Practice conditions, prior experience and task difficulty need control before comparing feedback methods.

■ Question 2

15 of 25 retention attempts succeed. Find success percentage.

Available marks: 4.

Worked answer

60 %

- Appropriate relation; consistent substitution; correct result; meaningful unit and interpretation.

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More feedback is not always better for independent performance. A short-term improvement alone does not demonstrate a lasting learning change.

9 Uncertainty, gradients and model testing

- uncertainty
- systematic error

■ Question 1

Which is most likely a systematic error?

- A balance reads 0.20 g when empty
- Repeated values fluctuate either side of the mean
- Random differences in reaction time

Available marks: 2.

Worked answer

A balance reads 0.20 g when empty

- For a product or quotient, adding fractional uncertainties is a common maximum-uncertainty approximation. For a difference, add absolute uncertainties. A nonzero intercept can reveal an offset or an incomplete model.

■ Question 2

A 40 cm reading has an absolute uncertainty of 1 cm. Find percentage uncertainty.

Available marks: 4.

Worked answer

2.5 %

- Appropriate relation; consistent substitution; correct result; meaningful unit and interpretation.

Repeating readings reduces random uncertainty in a mean but does not automatically remove a zero error. Do not quote more decimal places than your measurement can support.