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**Sports, exercise and health science**  
**Higher level**  
**Paper 1**

Friday 17 May 2019 (afternoon)

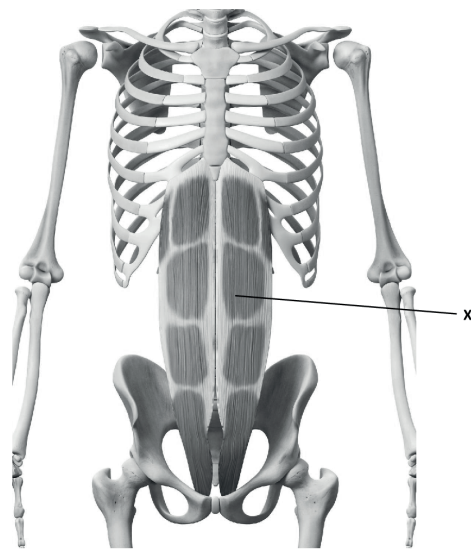
1 hour

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**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. An athlete's broken leg is immobilized in a cast. Which muscle characteristic causes difficulty in walking after the prolonged inactivity?
  - A. Extensibility
  - B. Elasticity
  - C. Atrophy
  - D. Hypertrophy
  
2. What is the muscle labelled X in the diagram?



[Source: ID 45575799 © Sebastian Kaulitzki | Dreamstime.com]

- A. Abdominus rectus
  - B. External obliques
  - C. Erector spinae
  - D. Iliopsoas
  
3. What is vital capacity?
  - A. Inspiratory reserve volume plus total lung capacity
  - B. Total lung capacity minus residual volume
  - C. Tidal volume plus inspiratory reserve volume
  - D. Residual volume minus expiratory reserve volume

4. Which component of blood is greatest by volume?
- A. Electrolytes
  - B. Plasma
  - C. Erythrocytes
  - D. Leucocytes
5. How does an increased erythrocyte level benefit an athlete?
- A. By increasing the oxygen carrying capacity of the blood
  - B. By decreasing the capacity of the blood to clot in case of an injury
  - C. By increasing the ability of the body to fight infection
  - D. By decreasing viscosity of the blood
6. What type of blood is pumped by each of the blood vessels listed?

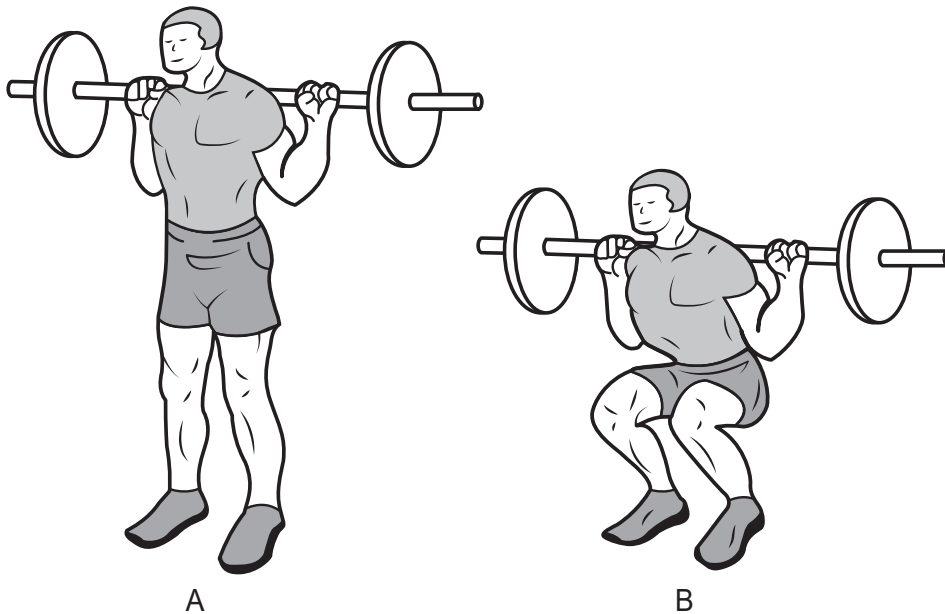
	<b>Vena cava</b>	<b>Pulmonary artery</b>	<b>Pulmonary vein</b>	<b>Aorta</b>
A.	oxygenated	deoxygenated	deoxygenated	oxygenated
B.	deoxygenated	oxygenated	deoxygenated	deoxygenated
C.	deoxygenated	deoxygenated	oxygenated	oxygenated
D.	oxygenated	deoxygenated	oxygenated	deoxygenated

7. What is the chemical composition of a protein molecule?
- A. Glycerol and three fatty acids
  - B. Only carbon, hydrogen and oxygen
  - C. Only carbon and oxygen
  - D. Carbon, hydrogen, oxygen and nitrogen

Turn over

8. What is the correct order (greatest to least) for the amount of energy contained in 100 g of each body fuel?
- A. Carbohydrate, protein, lipid
  - B. Lipid, carbohydrate, protein
  - C. Protein, carbohydrate, lipid
  - D. Lipid, protein, carbohydrate
9. What type of process is lipolysis?
- A. Aerobic anabolism
  - B. Anaerobic anabolism
  - C. Aerobic catabolism
  - D. Anaerobic catabolism
10. Which energy system is the most rapid to resynthesize ATP?
- A. Anaerobic glycolysis
  - B. Aerobic glycolysis
  - C. Lactic acid
  - D. Creatine phosphate

11. Which type of contraction occurs in the rectus femoris while performing a squat (moving from position A to B)?

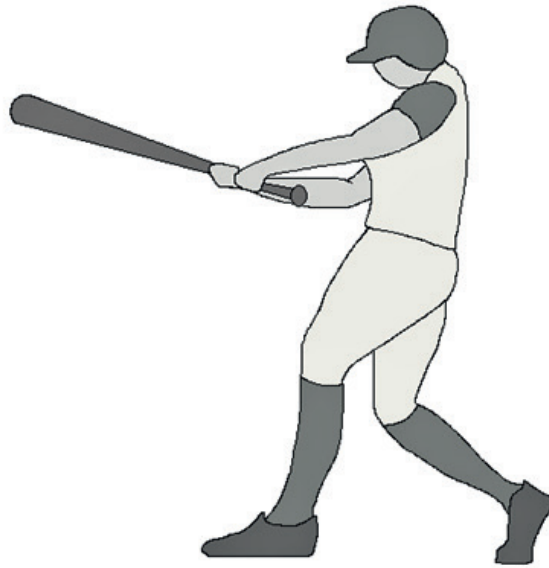


[Source: adapted from "parallel squat" by Everkinetic, <https://commons.wikimedia.org/wiki/File:Squats.svg>. Licensed under a Creative Commons Attribution-ShareAlike 3.0 Unported license. <https://creativecommons.org/licenses/by-sa/3.0/>.]

- A. Isometric
  - B. Isotonic eccentric
  - C. Isotonic concentric
  - D. Isokinetic eccentric
12. Which is an example of a second-class lever?
- A. The ankle joint during plantar flexion
  - B. The elbow during flexion
  - C. The knee during extension
  - D. The hip during abduction

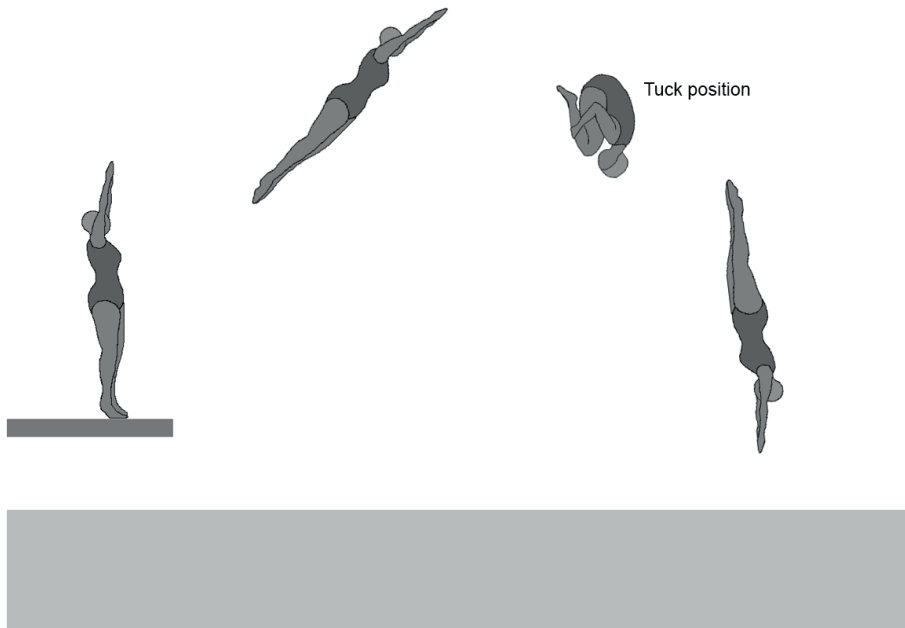
Turn over

13. Which of Newton's laws predicts the increase in acceleration of the swing when a child uses a lighter baseball bat?



- A. First
- B. Second
- C. Third
- D. First and second

14. Why does a diver use the tuck position?



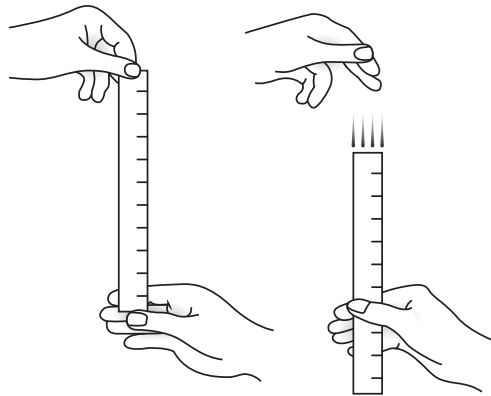
[Source: used with permission]

- A. To reduce spin by decreasing moment of inertia
  - B. To reduce spin by increasing moment of inertia
  - C. To increase spin by decreasing moment of inertia
  - D. To increase spin by increasing moment of inertia
15. Which motor skill classifications apply when an athlete runs a 100 m race?
- A. Gross, interactive, externally paced
  - B. Fine, individual, internally paced
  - C. Gross, coactive, externally paced
  - D. Fine, coactive, internally paced

Turn over



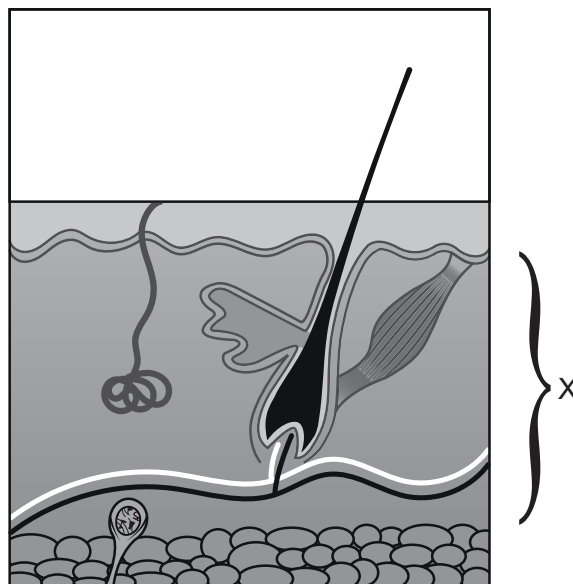
16. What is measured by the drop test?



[Source: © Thapos, thapos.com.]

- A. Reaction time
  - B. Response time
  - C. Movement time
  - D. Coordination
17. As a golfer hits the ball they feel a sharp pain in the right bicep; this is an example of which types of feedback?
- A. Knowledge of result, negative, terminal
  - B. Knowledge of result, positive, concurrent
  - C. Knowledge of performance, negative, concurrent
  - D. Knowledge of performance, positive, terminal
18. What is coefficient of variation?
- A. The ratio of the standard deviation to the mean expressed as a percentage
  - B. The sum of the standard deviation and the mean
  - C. The ratio of the mean to the standard deviation expressed as a percentage
  - D. The sum of the standard deviation subtracted from the mean

19. Which terms apply to the use of the multistage fitness test to evaluate the muscular power of a 100 m swimmer?
- A. Reliable and valid
  - B. Not reliable and not valid
  - C. Not reliable but valid
  - D. Reliable and not valid
20. Why would an athlete work at different heart rate training zones rather than a maximum heart rate zone?
- A. To avoid overreaching
  - B. To increase the number of fast-twitch fibres
  - C. To target specific training adaptations
  - D. To reduce excess post-exercise oxygen consumption (EPOC)
21. On the diagram of the skin, what structure is labelled X?



[Source: udaix / Bigstock.com]

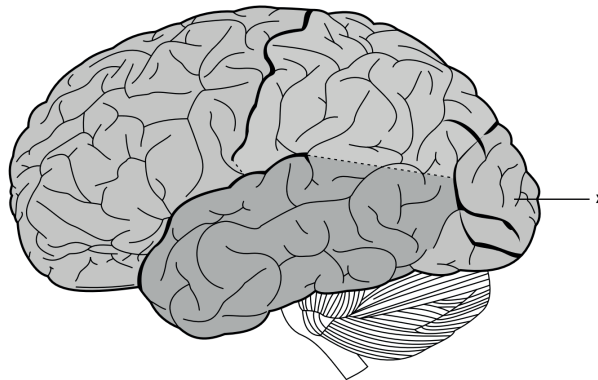
- A. Fat
- B. Glands
- C. Epidermis
- D. Dermis

Turn over

22. Which are the functions of the skin?

- I. Temperature regulation
  - II. Excretion
  - III. Synthesis of vitamin D
- A. I only
  - B. I and II only
  - C. II and III only
  - D. I, II and III

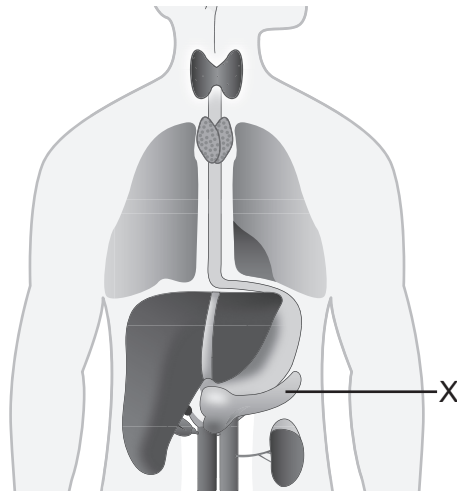
23. On the diagram of the brain, which lobe is labelled X?



[Source: adapted from Henry Gray, Anatomy of the Human Body, 20th edition (Philadelphia and New York: Lea and Febiger), 1918.]

- A. Frontal
  - B. Occipital
  - C. Temporal
  - D. Limbic
24. What is the principal source of energy for the brain?
- A. Aerobic glycolysis
  - B. Anaerobic glycolysis
  - C. Aerobic lipolysis
  - D. Creatine phosphate

25. What is the endocrine organ labelled X in the diagram?



[Source: By ttsz/iStock Photos]

- A. Pineal gland
  - B. Hypothalamus
  - C. Pancreas
  - D. Thyroid gland
26. How do local hormones differ from circulating hormones?
- A. They are secreted by endocrine glands
  - B. They regulate a range of bodily functions
  - C. They do not enter the blood stream
  - D. They bind to specific receptors
27. A soccer player misjudges a pass and has an impaired reaction time. What type of fatigue is this?
- A. Central
  - B. Chronic
  - C. Peripheral
  - D. Local

Turn over

28. How is high intensity activity characterized?

	<b>Duration</b>	<b>Peak force</b>	<b>Fuel</b>
A.	Short	Low	Carbohydrate
B.	Long	High	Glucose
C.	Long	Low	Fats
D.	Short	High	Creatine phosphate

29. What is friction?

- I. A force that acts parallel to two surfaces in contact
- II. A force that opposes relative motion
- III. A force that acts through the centre of mass

- A. I only
- B. I and II only
- C. II and III only
- D. I, II and III

30. In canoeing, why is it easier to maintain a constant speed than begin movement from a stationary position?

- A. Water density changes with movement
- B. Coefficient of static friction is greater than dynamic friction
- C. Coefficient of dynamic friction is greater than static friction
- D. Friction is increased between the water and the canoe as it moves

31. What is the relevant force acting on the athlete identified as X in the diagram?



[Source: © International Baccalaureate Organization 2019 ]

- A. Ground reaction force
  - B. Air resistance
  - C. Friction
  - D. Body weight
32. An athlete and coach work together to solve a problem with a given set of constraints. Which type of pedagogy is this?
- A. Linear
  - B. Traditional
  - C. Non-linear
  - D. Non-traditional
33. What are some of the advantages of using the “Dartfish” program?
- A. It provides a rating of perceived exertion.
  - B. It provides immediate on-field feedback directly to athlete.
  - C. It quantifies performance in a consistent and reliable manner.
  - D. It is used to determine the mental state of the athlete.

**Turn over**

34. The following notational analysis data was collected from the French Tennis Open where Serena Williams played Maria Sharapova. How can it be used to improve performance?

	Williams	Sharapova
Aces	10	2
1st serve percentage	69	55
Fastest serve / kmph	200	183
Clear winning shots	29	10
Unforced errors	21	17
Match duration	1 hour, 45 minutes	

- A. Tactical evaluation, technical evaluation, mental relaxation prior to game
  - B. Analysis of movement, mental relaxation prior to game, tactical evaluation
  - C. Analysis of movement, development of databases, treatment of injuries
  - D. Tactical evaluation, technical evaluation, analysis of movement
35. Which principles form a phase analysis model?
- A. Preparation, retraction, force, specific performance
  - B. Preparation, retraction, action, follow through
  - C. Speed, action, follow through, coordination
  - D. Speed, force, coordination, performance
36. What percentage of a girl's DNA would be inherited from her grandfather?
- A. 0%
  - B. 25%
  - C. 50%
  - D. 100%

- 37.** Identical twins, Carlos and Juan, have been undertaking the same aerobic training programme for four months. Carlos lives at sea level, Juan lives at an elevation of 1600 m. A blood test showed that Carlos had significantly lower levels of hemoglobin than Juan. What caused this difference?
- A. Juan was more motivated than Carlos due to extrinsic feedback
  - B. Developmentally Carlos has inferior genetic makeup to Juan
  - C. Juan genetically has more fast-twitch fibres than Carlos
  - D. Environmental conditions have triggered greater gene expression in Juan than Carlos
- 38.** What is the function of the immune system?
- A. Carries oxygenated blood
  - B. Regulates growth of the body
  - C. Protects the body from disease
  - D. Body thermoregulation
- 39.** Which adaptive mechanism is used in response to pathogens in the body?
- A. Increased antibody production
  - B. Decreased resting heart rate
  - C. Decreased body temperature
  - D. Increased blood pH
- 40.** How can athletes minimize their risk of infection?
- A. Maintain hydration levels, maintain high levels of cortisol
  - B. Reduce recovery time between training sessions, maintain oral hygiene
  - C. Ensure sufficient sleep, maintain high levels of adrenaline
  - D. Maintain varied diet, avoid contact with people with infections
-