



PE.HW8 Hydration Strategies and the Effects of Dehydration on Performance

AQA 8582 · Calculators not allowed · about 40 minutes

Total Marks

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Name: _____ Date: ____ / ____ / ____

Answer all questions. Write full sentences for questions worth 3 marks or more. Aim to complete the pack in about 40 minutes.

- 1** Name one common early sign of dehydration that a tennis player might notice during a long match in warm weather.

(Total for Question 1 is 1 mark)

- 2** Identify one effect of moderate dehydration on a football player's concentration during a competitive match.

(Total for Question 2 is 1 mark)

- 3** State one reason why maintaining hydration is particularly important for a marathon runner during a race in hot weather.

(Total for Question 3 is 1 mark)

- 4** Tick one box: Which of the following fluids is best for rapid rehydration during a prolonged event lasting more than 90 minutes, such as an ultra-distance cycling stage?

- ☐ A) Plain water only
- ☐ B) Isotonic sports drink containing electrolytes and carbohydrates
- ☐ C) Full strength fruit juice
- ☐ D) Carbonated soft drink

(Total for Question 4 is 1 mark)

- 5 Describe two sensible pre-event hydration practices a 5 km cross-country runner should follow in the 24 hours before a race in cool conditions.

(Total for Question 5 is 2 marks)

- 6 Explain two ways in which losing 2 percent of body mass from sweat during exercise can harm an athlete's physical performance in a team sport match.

(Total for Question 6 is 2 marks)

- 7 Describe two practical hydration strategies a goalkeeper playing in a hot climate could use during a one-hour training session to reduce the risk of dehydration.

(Total for Question 7 is 2 marks)

- 8 Explain two reasons why a team coach should avoid encouraging players to drink very large volumes of water immediately before a match.

(Total for Question 8 is 2 marks)

- 9 Tick one box: Which of the following is a likely muscular symptom caused by dehydration during high intensity sprint work?

- ☐ A) Muscle cramps
- ☐ B) Increased flexibility
- ☐ C) Faster reaction time
- ☐ D) Greater power output

(Total for Question 9 is 1 mark)

- 10** A netball player plans to hydrate during a 40 minute competitive match using drinks during intervals. State two pieces of information they should consider when choosing the volume and composition of their drink.

(Total for Question 10 is 2 marks)

- 11** Explain how impaired thermoregulation caused by dehydration can lead to heat exhaustion in a rugby player training intensely on a hot day.

(Total for Question 11 is 2 marks)

- 12** Describe three practical actions a coach should take after a cyclist shows early signs of dehydration and muscle cramps during a training ride in hot weather.

(Total for Question 12 is 3 marks)

- 13** State two differences between an isotonic sports drink and plain water in terms of rehydration during prolonged exercise.

(Total for Question 13 is 2 marks)

- 14** A coach considers advising runners to do a pre-event salt loading protocol to reduce cramp risk in a hot 10 km race. Suggest one advantage and one limitation of this approach.

(Total for Question 14 is 2 marks)

- 15** Evaluate the hydration strategy of a marathon runner who plans to drink 150 ml of an isotonic sports drink every 20 minutes during a race in hot conditions, and to drink freely after the finish. In your answer, judge whether this plan is likely to maintain performance and avoid heat illness, and suggest any improvements. Use sporting examples and make a clear judgement.

(Total for Question 15 is 6 marks)

Mark scheme · PE.HW8 Hydration Strategies and the Effects of Dehydration on Performance

Question 1

- **B1** any one of: thirst / dry mouth / dark urine / reduced urine volume / lightheadedness
- **Answer: For example, thirst.**

Question 2

- **B1** reduced attention / slowed decision making / increased errors in judgement
- **Answer: Reduced attention leading to poorer concentration.**

Question 3

- **B1** any one of: to aid thermoregulation / to replace sweat losses / to maintain blood volume / to support cardiac output
- **Answer: To aid thermoregulation by replacing sweat losses.**

Question 4

- **B1** B
- **Answer: B (Isotonic sports drink containing electrolytes and carbohydrates)**

Question 5

- **B1** drink regularly throughout the day before the event to ensure adequate fluid stores, not just immediately before, oe
- **B1** avoid excessive alcohol or diuretics and include electrolyte drinks if large sweat losses are expected, oe
- **Answer: Drink regularly throughout the day before the race to maintain fluid balance, and avoid alcohol or other diuretics while considering electrolyte drinks if heavy sweating is expected.**

Question 6

- **B1** reduced blood volume leading to decreased stroke volume and cardiac output, which reduces endurance and ability to sustain high intensity, oe
- **B1** increased perceived effort and earlier onset of fatigue, impairing repeated sprints and high intensity actions, oe
- **Answer: Two percent body mass loss reduces blood volume which lowers stroke volume and cardiac output, limiting endurance, and increases perceived effort so fatigue comes earlier, reducing ability to perform repeated sprints and high intensity actions.**

Question 7

- **B1** drink fluids at regular short breaks, for example 150-250 ml every 15-20 minutes, oe
- **B1** use a drink containing electrolytes rather than plain water if sweating heavily, to replace sodium and help fluid retention, oe
- **Answer: Drink small amounts regularly, for example 150-250 ml every 15-20 minutes during breaks, and use a drink containing electrolytes to replace sodium lost in sweat and help retain fluid.**

Question 8

- **B1** large volumes immediately before exercise can cause stomach discomfort and nausea, impairing performance, oe
- **B1** rapid intake of plain water may dilute blood sodium in extreme cases and reduce fluid retention compared with paced drinking with electrolytes, oe
- **Answer: Drinking very large volumes right before play can cause stomach discomfort or nausea which impairs performance, and drinking plain water rapidly may dilute blood sodium and be less effective at retaining fluid than paced drinking with electrolytes.**

Question 9

- **B1** A
- **Answer: A (Muscle cramps)**

Question 10

- **B1** expected sweat rate or estimated fluid loss
- **B1** whether electrolyte replacement is needed or a small carbohydrate content is useful, oe
- **Answer: They should consider their expected sweat rate or estimated fluid loss, and whether electrolyte replacement or a small amount of carbohydrate in the drink is needed.**

Question 11

- **B1** dehydration reduces sweat production and blood volume, limiting heat loss from the skin, oe
- **B1** reduced heat loss causes core temperature to rise and can lead to symptoms of heat exhaustion such as dizziness, nausea and collapse, oe
- **Answer: Dehydration reduces sweat production and blood volume, which limits heat loss from the skin; this causes core temperature to rise and can lead to heat exhaustion with symptoms such as dizziness, nausea and collapse.**

Question 12

- **B1** stop or reduce intensity and move the cyclist to shade or a cooler environment, oe
- **B1** offer fluids containing electrolytes and small amounts of carbohydrate, and encourage small frequent sips, oe
- **B1** monitor symptoms and, if cramps persist or the athlete shows severe signs (confusion, vomiting, fainting), seek medical help, oe
- **Answer: Stop or reduce intensity and move the cyclist to shade or a cooler area, offer electrolytes and carbohydrate in small frequent sips, and monitor symptoms with a plan to seek medical help if severe signs appear.**

Question 13

- **B1** isotonic drinks contain electrolytes (sodium) whereas plain water does not
- **B1** isotonic drinks contain carbohydrate which can provide energy, plain water does not provide carbohydrate
- **Answer: Isotonic sports drinks contain electrolytes such as sodium and also provide carbohydrate for energy, whereas plain water contains neither electrolytes nor carbohydrate.**

Question 14

- **B1** advantage: may increase plasma sodium and help retain fluid, reducing likelihood of cramp and hyponatraemia, oe
- **B1** limitation: excess salt can cause gastrointestinal discomfort, increased blood pressure in some athletes, and is not a substitute for appropriate fluid intake, oe
- **Answer: Advantage: it may increase plasma sodium and help retain fluid, reducing cramp risk. Limitation: excess salt can cause gastrointestinal discomfort or raise blood pressure and is not a substitute for proper fluid intake.**

Question 15

- **Level 3** (5-6): A well developed evaluation that considers multiple strengths and weaknesses of the plan, links points to marathon performance in hot conditions, suggests practical improvements, and reaches a clear justified judgement using appropriate sporting terminology.
- **Level 2** (3-4): Provides several relevant points about the plan with some application to marathon performance and makes a reasonable judgement, but the discussion may lack depth or full justification.
- **Level 1** (1-2): Offers simple points about the plan with little application or judgement, for example noting one pro or one con without development.
- **Level 0** (0): No relevant content.
- **Indicative content:**
 - Strength: regular sipping of 150 ml every 20 minutes gives about 450 ml per hour, which can partially replace sweat losses and supply electrolytes and carbohydrate to sustain performance.
 - Strength: isotonic composition helps with fluid absorption and sodium replacement, reducing risk of hyponatraemia and helping retention.
 - Weakness: individual sweat rates vary; 150 ml every 20 minutes may be insufficient for a heavy sweater losing more than 1 litre per hour, so personalised pre-race testing is needed.
 - Weakness: drinking 'freely' only after the finish risks neglecting post-race rehydration planning during the immediate recovery window; a more specific post-race replacement target based on body mass loss is better.
 - Improvement: measure pre- and post-training body mass to estimate sweat rate and adjust volume; consider slightly larger volumes or more frequent sipping if sweat loss is high, and include a scheduled small post-race bolus of electrolyte drink within 30 minutes.
 - Improvement: combine fluid plan with cooling strategies in hot conditions such as ice vests or sponging to reduce heat strain in addition to hydration.
 - Judgement: the plan is a sensible baseline and likely to help many runners but requires individualisation and an explicit post-race rehydration protocol to be fully effective at maintaining performance and avoiding heat illness.