

STUDENT NOTE

Please note that most answers are not exact, and that equivalent answers are usually acceptable.

CHAPTER I – HEALTH, EXERCISE, FITNESS & NUTRITION

Text between pages 14 and 26, answers to questions on page 26 of the text book.

- 1) Name and define **two** main components of health-related fitness required by an elite swimmer. Explain how these components are used in this sport. 4 marks

Answer

- Muscular endurance.
- Flexibility.

Explanation:

- Muscular endurance is needed to maintain repeated contractions of working muscles in training and racing situations without undue fatigue.
- Flexibility is needed to produce an efficient and effective stroke, for example the butterfly stroke requires great flexibility.

- 2) a) What is meant by the term specific fitness? 2 marks

Answer

- Specific fitness is a task-oriented definition.
- Based on the ability to perform specific aspects of sports or occupations.

- b) Compare the fitness components essential for an elite sprinter with those required by an elite marathon runner. 4 marks

Answer

- Sprinters and marathon runners need completely different components of health-related and skill-related fitness.
- Sprinters need strength, flexibility, power, speed,
- Reaction time, good balance and co-ordination from starting blocks into full speed running.
- Compared with an elite marathon runner who relies on stamina.
- And muscular endurance.

- 3) a) Using a sport of your choice, identify **two** main components of health-related fitness required and explain their importance. 4 marks

Answer

- Example, sprinting.

Components of physical fitness relevant to sprinting:

- Dynamic strength needed as muscle groups exert maximal force.
- Speed needed because in sprinting person needs to move limbs at maximum rate.
- Flexibility required because of range of movement at joint site, such as the hip joint which needs to be fully extended during the rear leg driving phase.

- b) Power is a major fitness component required by high jumpers. Define what is meant by power. 2 marks

Answer

- The rate at which mechanical work can be done which tests bodily strength.
- Measured in joules per second or watts.

- c) Describe a recognised specific test for measuring the power output of a high jumper. 3 marks

Answer

- Vertical jump test, also known as the Sergeant jump test.
- Adjust vertical board so that stretched arms and fingertips touch edge end of scale, whilst feet are flat on the floor.
- Jumper prepares for take-off by flexing knees.
- And then jumps as high as possible.
- Touching a calibrated scale.
- Measure distance between standing two arm reach and highest single hand jump reached.

3) d) Identify **two** skill-related or motor fitness components that are considered important for high jumpers. 2 marks

Answer

- *Agility.*
- *Balance.*
- *Reaction Time.*
- *Co-ordination.*

4) Briefly describe an outline for a week's exercise programme that would be suitable for an overweight and ageing adult. In your answer identify the major fitness components to be stressed. 8 marks

Answer

Table 1.3 – answer to question 4)

	activity	major fitness component
day 1	45 min slow walk	stamina
day 2	15 min stretching (active + passive) working major muscle groups	flexibility, balance
day 3	weights circuit at local gym. 30 min light weights, repetition 6–8, 1 set at each of eight different exercises	muscle strength, local muscle endurance, co-ordination, agility
day 4	rest day	
day 5	30 min fast walk	stamina
day 6	30 min aerobic class	stamina
day 7	rest day	

5) There is overwhelming medical evidence that supports the direct relationship between smoking and reduced oxygen transportation. Explain how smoking interferes with oxygen transportation. 4 marks

Answer

- *Smoking scars inner lining of arteries.*
- *Producing a plaque (rigid layer) that **clogs** the blood vessel.*
- *Thereby reducing vessel elasticity, blood flow and oxygen transport.*
- *One of the toxic gases in cigarette smoking is **carbon monoxide**.*
- *This gas binds to the haemoglobin sites (the oxygen-carrying component in red blood cells).*
- *Resulting in a reduced oxygen uptake and therefore reduced oxygen carrying capacity.*

6) Lifestyle choices can have a negative effect upon our health and fitness.

a) Identify **three** lifestyle choices that have adverse effects on our future health and fitness.

3 marks

Answer

Select **three** from the following. There could be other acceptable answers.

- *Smoking.*
- *Recreational drugs.*
- *Alcohol.*
- *Diet.*
- *Stress.*

- 6) b) Choose **one** of your answers given in part a) and discuss how you could influence an individual to change to healthy lifestyle choices. **3 marks**

Smoking:

Discuss the negative effects of smoking such as:

- *Reduced life expectancy* due to increased risks from diseases such as throat and lung cancer.
- *Health risks for the passive smoker.*
- *Health risks for the unborn child.*
- *Financial cost of smoking.*

Discuss the positive effects of giving up:

- *Increased life expectancy.*
- *Improved life chances for others.*
- *Financially better off.*

Recreational drugs:

Discuss the harmful effects of drug taking:

- *Damage to bodily organs such as the brain.*
- *Destroys family and social life.*
- *Destroys self-esteem due to drug dependence.*
- *Can lead to criminal behaviour.*

Discuss the positive effects of giving up:

- *Increased life expectancy.*
- *Improved psychological, physiological and social well-being.*

Alcohol:

Discuss the harmful effects of drinking:

- *Alcohol-related diseases such as liver cirrhosis and premature death.*
- *Alcohol dependency.*
- *Destroys family and social life.*
- *Destroys self-esteem.*

Discuss the positive effects of giving up:

- *Increased life expectancy.*
- *Psychological, physiological and social well-being.*

Diet:

Discuss the issues of malnutrition - meaning a bad diet:

- *Long-term health problems associated with obesity such as arthritis, coronary heart disease and atherosclerosis.*
- *Long-term health problems associated with anorexia nervosa such as reduced strength and lethargy.*
- *Reduced physical capability and life expectancy.*

Discuss the positive effects of controlling body mass:

- *Increased life expectancy.*
- *Increase lifestyle fitness chances to take part in physical activity.*
- *Improved psychological, physiological and social well-being.*

6) b) (continued)

Stress:

Discuss stress-related issues:

- Identify the **symptoms** of stress such as increased heart rate, sweating, nail biting, feeling out of control.
- Identify the **causes** of stress (known as **stressors**) such as worry, social relationships.

Discuss the management of stress:

- Relaxation techniques to control breathing rate, mental activity and muscle tension.
- Manage time effectively and think positively.
- Keep the body physically active and in good health.

7) What are the purposes of the three main groups of food?

3 marks

Answer

- **Protein** - essential for growth, bodybuilding and repair.
- **Carbohydrate** - principal energy giver.
- **Fat** - storage and another source of energy and a carrier of fat-soluble vitamins.

8) a) Discuss how a balanced diet could be manipulated to increase an athlete's glucose reserves prior to a marathon race.

6 marks

Answer

- **Carbo-loading** (or glycogen loading) before the event (modern method).
- This consists of tapering of training, whilst eating 50% CHO diet.
- Partially **depletes** glycogen stores.
- Therefore energy levels are not compromised.
- And glycogen synthase activity is increased.
- Then, gradually increase CHO intake to 70% of diet, with light training.
- Day of rest and 70% CHO diet.
- **Repletes** glycogen stores on day of marathon.
- Taking in isotonic fluids during the event will top up blood glucose levels during the event.

b) Carbohydrates are used as an energy source during both aerobic and anaerobic conditions. It is therefore beneficial that an elite athlete's stores of carbohydrate are at a maximum before competition day. Discuss the advantages and disadvantages of glycogen loading.

4 marks

Answer

Advantages:

- Enhanced glycogen stores in muscle and liver.
- Overall effect is for overall times in aerobic activities beyond 90 minutes to improve significantly.

Disadvantages:

- Increased body mass due to increased water retention.
- Needed for enhanced glycogen storage.
- During CHO depletion phase decreased energy levels.
- And increased fatigue (if using classic method of carbo-loading).

c) How can an athlete's diet aid the recovery process?

2 marks

Answer

- Quick ingestion of carbohydrates after exercise (2 hour window of opportunity) will speed up recovery.
- Eating foods, such as rice and bananas, that have a **high glycemic index**.
- To raise blood glucose levels quickly and stimulate greater insulin release needed to convert glucose into glycogen.
- Water needed to **rehydrate** the body.
- Electrolyte replenishment needed to aid the metabolic process.
- Protein needed to aid tissue damage, repair and growth.

- 9) You have been asked to provide some nutritional strategies for an elite swimmer competing in seven races in the Regional Championships in a week's time. What can you recommend? 3 marks

Answer

- Cut back on the swimming training and then rest completely on the last day – this concept is known as **tapering**.
- This will allow the carbohydrates eaten to be stored as full muscle glycogen stores that will help the swimmer to recover quicker between races.
- Stay with a **balanced diet**.
- Keep the fat intake low and focus on eating slow-release (**low GI**) carbohydrates such as lentils and peanuts.
- Continue to eat 2-3 portions of protein a day.
- **Keep drinking water** – taking care not to be dehydrated during the week before the gala.
- Check colour of urine – it should be pale yellow or almost clear.
- Aim to drink 2 litres of fluids per day, and more in hot weather.

- 10) Provide recommendations for carbohydrate, fat and protein intake for a cross-country skier and a ski jumper. Give reasons for your recommendations. 6 marks

Answer

- **Ski jumper** is a power athlete who will need additional protein when compared with cross-country skier who is an endurance-based athlete.
- The difference in protein intake is because after heavy resistance training, the rate of protein breakdown and resynthesis (building – muscle hypertrophy) for the strength or power athlete is greater when compared with the needs of the endurance athlete.
- Fat intake should be restricted for both cross-country skier and ski jumper, since if it is not used as an energy source, fat will be stored as adipose tissue under the skin and in the body cavity.

Reasons for recommendations:

- The **cross-country skier** will require a higher CHO diet when compared with the ski jumper.
- This is because there are greater demands on replenishing depleted glycogen stores stressed more in endurance events such as cross-country skiing.
- Both endurance and power athletes need a balanced diet with the dietary composition adjusted as described above.

- 11) What are the effects of obesity on health and what are its causes based on energy considerations? 4 marks

Answer**Physical effects are:**

- The cardio-respiratory system has to work much harder.
- Inability to remove waste heat due to fat layer insulation.
- More likely to suffer from cardiovascular and other diseases.
- Mechanical injury to the body.
- Greater surgical risks.

Psychological effects of obesity on health:

- Embarrassment and fear of ridicule about poor physical condition.
- The major cause for most people is a positive energy balance and lack of exercise.

- 12) Describe the most effective way of reducing body weight. 4 marks

Answer

- Devise a **weight loss plan** that is personal, specific, realistic and measurable.
- Reduce kilojoule intake or increase energy expenditure.
- This can be achieved by continuing to eat a balanced but reduced diet.
- Along with a corresponding increase of energy expenditure (by undertaking exercise) to create a **negative energy balance**.
- One of the effects of aerobic exercise is to increase the metabolic rate of the body and as a result the obese person can substantially burn off body fat.
- Also he or she would begin to utilise fat as a fuel food since this takes longer to initiate within a given exercise situation than in carbohydrate or glycogen utilisation.

- 13) What is body mass index? What is its significance? 3 marks

Answer

- Body mass index (BMI) determines a person's BMI by dividing body mass in kilograms by the square of the body height in metres.
- BMI values are divided into five categories: underweight, normal weight, overweight, obesity and extreme obesity.
- These 5 categories provide boundaries that separate each category and therefore give the individual a picture of the individual's body composition.