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Diploma Programme
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Markscheme

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Sports, exercise and health science

Standard level

Paper 3

14 pages

Option A — Optimizing physiological performance

Question			Answers	Notes	Total
1.	a		3200 «g» ✓		1
1.	b		3200–2800 ✓ = 400 «g» ✓	*Accept the subtraction in a different order.*	2
1.	c		CWI did not affect muscle mass ✓ ACT helped in the development of muscle mass ✓ CWI is «significantly» less effective than ACT in developing muscle mass ✓	*Accept in the converse.*	2
2.	a		overreaching is transient overtraining ✓ increasing frequency/intensity/duration of an exercise for improvement ✓		1
2.	b		overtraining is when an athlete attempts to do more training than he or she is able to physically and/or mentally tolerate ✓		1
2.	c		decreased appetite. Noticeable behavioural change in food intake leading to body weight loss/fat and muscle loss ✓ chronic soreness such as muscle or bone tenderness/soreness «which is a sign the muscles are not recovering» ✓ fatigue indicators including sleep disturbance «combination of nervous system and or hormonal system overload»/nausea ✓ elevated resting HR/BP ✓ unexplained decline in performance ✓ increased susceptibility to infections/reduced immune function/ continual catabolic state ✓	*Award **[1 max]** for listing three indicators.*	3 max

Question			Answers	Notes	Total
3.	a		plasma is the source of sweat formation ✓ sympathetic nervous system activates sweat glands ✓ sweat is produced in the coiled hollow/tubular glands in the dermis of the skin ✓ the amount of sweat the body can produce is dependent on the amount of sweat the gland can produce ✓ dependent on the number/density of sweat glands «per cm^2» of sweat glands an individual has ✓ amount of sweat depends on the individual/ exercise intensity/ acclimatization/ hydration status ✓		**2 max**
3.	b		«relative» high water content of ambient air decreases capacity to accept more water molecules ✓ impacts the efficiency of the sweating mechanism/response/skin evaporation «temperature regulation» ✓ lack of evaporation of sweat inhibits cooling ✓ core temperature rises, having a negative effect on physiological functioning ✓ leads to potential decreased performance ✓	*Award **[2 max]** if no reference made to performance.*	**3 max**

Question			Answers	Notes	Total
4.	**a**		a substance/device/phenomenon that can improve an athlete's performance ✓		**1**
4.	**b**		*Strengths:* **«**inhibit adrenaline and therefore**»** reduce nervousness/anxiety ✓ steady hand allows more motor control ✓ useful for target-based sports **«**such as archery, shooting, baseball pitching**»** ✓ *Limitations:* illegal **«**in accordance with WADA code**»** ✓ can lead to cardiac arrest/excessive slowing of heart rate/ poor peripheral circulation ✓ erectile dysfunction ✓ digestive problems *eg* upset stomach/constipation/diarrhoea/nausea ✓	*Candidates cannot be marked down for omitting limitations in this section.*	**4 max**

Option B — Psychology of sport

Question			Answers	Notes	Total
5.	**a**		control ✓		**1**
5.	**b**		38.33–32.21 ✓ = 6.12 «kg» ✓	*Accept the subtraction in a different order.*	**2**
5.	**c**		*Data:* imagery improved 1RM «5.88 kg» score more than the control group «0.91 kg» ✓ imagery improvement «5.88 kg» was «almost» as effective as physical practice improvement «6.12 kg» ✓ *Theory:* cognitive-based imagery aids task performance by improving focus / concentration ✓ cognitive-based imagery aids skill learning ✓ motivational-based imagery improves confidence ✓ imagery can be used to improve motivation ✓	*Mere presentation of figures from table without stating improvement is not sufficient for mark. Reference to numbers must be the difference in values.* *Award **[2 max]** for theoretical points.*	**3 max**

Question			Answers	Notes	Total
6.	a		the internal mechanisms and external stimuli which arouse and direct our behaviour ✓	*Accept other appropriate definitions.*	1
6.	b		extrinsic rewards can be a controlling influence on behaviour ✓ extrinsic/controlling rewards reduce intrinsic motivation «while possibly increasing extrinsic motivation» ✓ extrinsic rewards seen as information providing feedback on performance ✓ information rewards can increase intrinsic motivation ✓ Intrinsic motivation leads to greater satisfaction with performance therefore satisfaction may be decreased with extrinsic rewards ✓		3 max
7.	a		novice learns through observing «paying attention to» the experienced teammate ✓ novice retains «through coding or images» the behaviours of the experienced teammate in memory ✓ novice reproduces/replicates/models behaviour of experienced teammate ✓ can have a positive or negative effect depending on the behaviours modelled ✓		2 max
7.	b		not all questionnaires are valid ✓ the context within which the questionnaires are used is important *eg* not appropriate for use in young children «when validated in adult samples» ✓ questionnaire administration could be in breach of confidentiality ✓ athletes may fake/falsify responses to conceal a perceived weakness ✓ use of results determines the effectiveness rather than the test itself, *eg* feedback given or knowledge of test administrator ✓		3 max

Question			Answers	Notes	Total
8.	**a**		a feeling of worry/nervousness/unease about something with an uncertain outcome ✓	*Accept other appropriate definitions.*	**1**
8.	**b**		*Positive emotions:* excitement **«**encourages optimum levels of arousal and attention**»** ✓ joy **«**encourages positive memories and reduces stress**»** ✓ relief **«**is associated with endorphine release**»** ✓ pride **«**may help to boost confidence and foster intrinsic motivation**»** ✓ *Negative emotions:* anxiety/fear **«**can lead to attentional narrowing, somatic symptoms, and promotes negative memories**»** ✓ anger **«**can lead to attentional narrowing and tension**»** ✓ guilt/shame **«**leading to a belief of failed personal responsibility**»** ✓	*Award **[2 max]** from positive.* *Award **[2 max]** from negative.* *Award **[1 max]** for list.*	**4 max**

Option C — Physical activity and health

Question			Answers	Notes	Total
9.	**a**	**i**	Southeast Asia ✓		**1**
9.	**a**	**ii**	60–30 ✓ = 30 «%» ✓	*Accept the subtraction in a different order.*	**2**
9.	**a**	**iii**	*Compare:* adults aged ≥ 60 highest proportion of physical inactivity in both regions ✓ from 30+, there is a similar trend in increasing levels of inactivity ✓ *Contrast:* when comparing each age group, Americas have more inactivity than Western Pacific ✓ inactivity increases with age in Americas but does not in Western Pacific ***OR*** there is a greater increase in inactivity from 30–44 to 45–59 and to >60 in Americas compared to Western Pacific ✓ 15–29 year olds are the most active/least inactive in Americas but they are more inactive than 30–44 years and 45–59 years in Western Pacific ✓	*Award **[2 max]** for contrast.* *Must be clear that comparison is age group to same age group between regions.* *Accept other appropriate interpretations.*	**3 max**
9.	**b**		a condition that involves narrowing or blockage of blood vessels that supply the heart «leading to heart attack/angina ✓		**1**

9.	**c**		*Inactive individuals are more likely to have:* high blood pressure ✓ atherosclerosis ✓ obesity ✓ type 2 diabetes ✓ low HDL-cholesterol ✓	*Award **[2 max]** for list.*	**3 max**

10.	**a**		Body Mass Index (BMI) by determining the ratio of height to weight «and reference to normative values» ✓ skinfold thickness by measuring subcutaneous fat deposit ✓ waist circumference to hip ratio «with reference to normative values» ✓ bio-impedance to determine the extent to which the body impedes electric current flow ✓	*Award **[1 max]** for list.*	**2 max**
10.	**b**		hormones are produced by the stomach and small intestine after eating ✓ leptin produced by adipose tissue ✓ hormones pass to an appetite control centre in the brain that regulates feelings of hunger ✓		**2 max**

11.	**a**		blindness ✓ kidney disease ✓ nerve damage ✓ cardiovascular disease ✓		**2 max**

			OR amputation/ limb loss ✓		
11.	**b**		*Similarities:* both forms represent an imbalance of insulin ✓ both can be treated with insulin ✓ *Differences:* type 1 is characterised by the destruction of insulin producing cells of the pancreas whereas type 2 is a disease of insulin resistance ✓ type 1 usually manifests in young people whereas type 2 is usually diagnosed in older adults ✓ type 1 is often treated with insulin injections/pump whereas type 2 is often treated through dietary modification/exercise modification ✓ type 1 is often associated with higher normal ketone levels and not associated with excess body weight whereas type 2 is associated with hypertension and/or high cholesterol levels and excess body weight ✓	*Award **[3 max]** for differences.*	**4 max**

Option D — Nutrition for sport, exercise and health

Question			Answers	Notes	Total
12.	**a**		1.55 «minutes» ✓		**1**
12.	**b**		29.49–26.46 «minutes» ✓ = 3.03 «minutes» ✓	*Accept subtraction in a different order.*	**2**
12.	**c**		there was no significant change in running or cycling performance from start to end of study for the control group ✓ there was no significant change in running performance from start to end of study for the early consumption group ✓ there was a significant change/improvement in cycling performance between start and end of study for the early consumption group ✓ *Conclusion:* early carbohydrate consumption may be beneficial in some activities/sport ✓	*Award **[2 max]** if no conclusion.*	**3 max**
13.	**a**		pepsin ✓ trypsin ✓	***Two** required in list to award **[1]** mark.*	**1 max**
13.	**b**		a catalyst for the breakdown of large food molecules into smaller molecules ✓ smaller molecules are more soluble ✓ substances, which can be absorbed from the gut into the bloodstream ✓ speed up the rate of digestion ✓ carbohydrates are acted on by amylase ✓ ***OR*** proteins are acted on by pepsin ✓	*Award **1 [max]** for specific example.* *Accept other relevant examples.*	**3 max**

			OR fats are acted on by lipase ✓		

Question			Answers	Notes	Total
14.	**a**		the rate of metabolism measured under standard or basal conditions **«**awake, at rest, fasting**»** ***OR*** the lowest rate of body metabolism that can sustain life ✓		**1**
14.	**b**		*Gaining muscle mass:* adequate protein intake must be consumed **«**in addition to correct strength training**»** ✓ changes in body composition as a result of this strategy occur slowly over time ✓ excess protein cannot be stored in the body and is excreted ✓ there are risks associated with excessive protein intake relating to damaging the kidneys **«**in addition to causing dehydration and constipation**»** ✓ *Reducing fat mass:* low energy intake **«**negative energy balance**»** causes the body to metabolize stores of fat **«**causing them to lose weight**»** ✓ associated with lean athletes and particularly women ✓ there are risks associated with losing excessive levels of body fat that can prevent the normal functioning of the body **«***eg* amenorrhea / electrolyte imbalance / development of gall stones **»** ✓ *Dehydration:* participants may deliberately avoid or restrict food and fluid intake in order to remain weight category	*Award **[2 max]** from each section.*	**3 max**

			OR to gain entry to a lower weight category «*eg* boxing/martial arts and rowing» ✓ there are risks associated with dehydration «due to the impact on the functioning of the cardiorespiratory system» ✓		

Question			Answers	Notes	Total
15.	**a**		monitoring of urine colour: darker colour indicates dehydration ✓ urine osmolarity measures the concentration of urine, which is affected by hydration ✓ variation in body mass loss/weight may be indicative of change in hydration ✓ a hydrometer measures the specific gravity of urine ✓	*Award **[1 max]** for list.*	**2 max**
15.	**b**		sweating leads to reduced blood plasma ✓ loss of blood plasma results in increased blood osmolality ✓ increased blood osmolality stimulates the hypothalamus ✓ hypothalamus sends neural signal to the pituitary gland ✓ pituitary gland secretes ADH into the blood ✓ ADH acts on the kidneys, increasing water permeability of the renal tubules and collecting ducts ✓ ADH acting on the kidneys leads to increased reabsorption of water ✓		**4 max**