

# Markscheme

November 2018

**Sports, exercise and health science**

**Standard level**

**Paper 3**

14 pages

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**Option A — Optimizing physiological performance**

Question		Answers	Notes	Total
1.	a	3200 «g» ✓		1
1.	b	3200–2800 ✓ = 400 «g» ✓	<i>Accept the subtraction in a different order.</i>	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 ✓	<i>Accept in the converse.</i>	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 ✓	<i>Award [1 max] for listing three indicators.</i>	3 max

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

Question		Answers	Notes	Total
4.	a	a substance/device/phenomenon that can improve an athlete's performance ✓		1
4.	b	<p><i>Strengths:</i></p> <p>«inhibit adrenaline and therefore» reduce nervousness/anxiety ✓</p> <p>steady hand allows more motor control ✓</p> <p>useful for target-based sports «such as archery, shooting, baseball pitching» ✓</p> <p><i>Limitations:</i></p> <p>illegal «in accordance with WADA code» ✓</p> <p>can lead to cardiac arrest/excessive slowing of heart rate/ poor peripheral circulation ✓</p> <p>erectile dysfunction ✓</p> <p>digestive problems eg upset stomach/constipation/diarrhoea/nausea ✓</p>	<i>Candidates cannot be marked down for omitting limitations in this section.</i>	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	<p><i>Data:</i></p> <p>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» ✓</p> <p><i>Theory:</i></p> <p>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 ✓</p>	<p>Mere presentation of figures from table without stating improvement is not sufficient for mark. Reference to numbers must be the difference in values.</p> <p>Award [2 max] for theoretical points.</p>	3 max

Question		Answers	Notes	Total
6.	a	the internal mechanisms and external stimuli which arouse and direct our behaviour ✓	<i>Accept other appropriate definitions.</i>	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 ✓	<i>Accept other appropriate definitions.</i>	1
8.	b	<p><i>Positive emotions:</i></p> <p>excitement «encourages optimum levels of arousal and attention» ✓</p> <p>joy «encourages positive memories and reduces stress» ✓</p> <p>relief «is associated with endorphine release» ✓</p> <p>pride «may help to boost confidence and foster intrinsic motivation» ✓</p> <p><i>Negative emotions:</i></p> <p>anxiety/fear «can lead to attentional narrowing, somatic symptoms, and promotes negative memories» ✓</p> <p>anger «can lead to attentional narrowing and tension» ✓</p> <p>guilt/shame «leading to a belief of failed personal responsibility» ✓</p>	<p><i>Award [2 max] from positive.</i></p> <p><i>Award [2 max] from negative.</i></p> <p><i>Award [1 max] for list.</i></p>	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	<p><i>Compare:</i> adults aged ≥ 60 highest proportion of physical inactivity in both regions ✓ from 30+, there is a similar trend in increasing levels of inactivity ✓</p> <p><i>Contrast:</i> when comparing each age group, Americas have more inactivity than Western Pacific ✓ inactivity increases with age in Americas but does not in Western Pacific</p> <p><b>OR</b> there is a greater increase in inactivity from 30–44 to 45–59 and to &gt;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 ✓</p>	<p>Award <b>[2 max]</b> for contrast. Must be clear that comparison is age group to same age group between regions.</p> <p>Accept other appropriate interpretations.</p>	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	<p><i>Inactive individuals are more likely to have:</i></p> <p>high blood pressure ✓</p> <p>atherosclerosis ✓</p> <p>obesity ✓</p> <p>type 2 diabetes ✓</p> <p>low HDL-cholesterol ✓</p>	<p><i>Award [2 max] for list.</i></p>	<p><b>3 max</b></p>
10.	a	<p>Body Mass Index (BMI) by determining the ratio of height to weight «and reference to normative values» ✓</p> <p>skinfold thickness by measuring subcutaneous fat deposit ✓</p> <p>waist circumference to hip ratio «with reference to normative values» ✓</p> <p>bio-impedance to determine the extent to which the body impedes electric current flow ✓</p>	<p><i>Award [1 max] for list.</i></p>	<p><b>2 max</b></p>
10.	b	<p>hormones are produced by the stomach and small intestine after eating ✓</p> <p>leptin produced by adipose tissue ✓</p> <p>hormones pass to an appetite control centre in the brain that regulates feelings of hunger ✓</p>		<p><b>2 max</b></p>
11.	a	<p>blindness ✓</p> <p>kidney disease ✓</p> <p>nerve damage ✓</p> <p>cardiovascular disease ✓</p>		<p><b>2 max</b></p>

			<p><b>OR</b> amputation/ limb loss ✓</p>		
11.	b		<p><i>Similarities:</i> both forms represent an imbalance of insulin ✓ both can be treated with insulin ✓</p> <p><i>Differences:</i> 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 ✓</p>	<p><i>Award [3 max] for differences.</i></p>	<p><b>4 max</b></p>

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 ✓ <i>Conclusion:</i> 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 ✓ <b>OR</b> proteins are acted on by pepsin ✓	Award 1 [max] for specific example. Accept other relevant examples.	3 max

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

			<p><b>OR</b></p> <p>to gain entry to a lower weight category «eg boxing/martial arts and rowing» ✓</p> <p>there are risks associated with dehydration «due to the impact on the functioning of the cardiorespiratory system» ✓</p>	
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Question		Answers	Notes	Total
15.	a	<p>monitoring of urine colour: darker colour indicates dehydration ✓</p> <p>urine osmolarity measures the concentration of urine, which is affected by hydration ✓</p> <p>variation in body mass loss/weight may be indicative of change in hydration ✓</p> <p>a hydrometer measures the specific gravity of urine ✓</p>	<p><i>Award [1 max] for list.</i></p>	<p><b>2 max</b></p>
15.	b	<p>sweating leads to reduced blood plasma ✓</p> <p>loss of blood plasma results in increased blood osmolality ✓</p> <p>increased blood osmolality stimulates the hypothalamus ✓</p> <p>hypothalamus sends neural signal to the pituitary gland ✓</p> <p>pituitary gland secretes ADH into the blood ✓</p> <p>ADH acts on the kidneys, increasing water permeability of the renal tubules and collecting ducts ✓</p> <p>ADH acting on the kidneys leads to increased reabsorption of water ✓</p>		<p><b>4 max</b></p>