2225 – 6808M

Diploma Programme
Programme du diplôme
Programa del Diploma

Markscheme

May 2025

Sports, exercise and health science

Higher level

Paper 2

27 pages

Subject details: Sports, exercise and health science HL paper 2 markscheme

Mark Allocation

Candidates are required to answer **ALL** questions in Section A **[50 marks]** and **TWO** question in Section B **[40 marks]**.
Maximum total = **[90 marks]**.

Markscheme format example:

Question			Answers	Notes	Total
5.	**c**	**ii**	this refers to the timing of the movements ***OR*** the extent to which the performer has control over the timing of the movement ✓ external paced skills are sailing/windsurfing/receiving a serve ✓ internal paced skills are javelin throw/gymnastics routine ✓		**2 max**

1. Each row in the "Question" column relates to the smallest subpart of the question.

2. The maximum mark for each question subpart is indicated in the "Total" column.

3. Each marking point in the "Answers" column is shown by means of a tick (✓) at the end of the marking point.

4. A question subpart may have more marking points than the total allows. This will be indicated by "**max**" written after the mark in the "Total" column. The related rubric, if necessary, will be outlined in the "Notes" column.

5. An alternative word is indicated in the "Answers" column by a slash (***/***). Either word can be accepted.

6. An alternative answer is indicated in the "Answers" column by "***OR***". Either answer can be accepted.

7. An alternative markscheme is indicated in the "Answers" column under heading **ALTERNATIVE 1** *etc*. Either alternative can be accepted.

8. Words inside chevrons **« »** in the “Answers” column are not necessary to gain the mark.

9. Words that are underlined are essential for the mark.

10. The order of marking points does not have to be as in the “Answers” column, unless stated otherwise in the “Notes” column.

11. If the candidate’s answer has the same “meaning” or can be clearly interpreted as being of equivalent significance, detail and validity as that in the “Answers” column then award the mark. Where this point is considered to be particularly relevant in a question it is emphasized by ***OWTTE*** (or words to that effect) in the “Notes” column.

12. Remember that many candidates are writing in a second language. Effective communication is more important than grammatical accuracy.

13. Occasionally, a part of a question may require an answer that is required for subsequent marking points. If an error is made in the first marking point then it should be penalized. However, if the incorrect answer is used correctly in subsequent marking points then **follow through** marks should be awarded. When marking, indicate this by adding **ECF** (error carried forward) on the script. “ECF acceptable” will be displayed in the “Notes” column.

14. Do **not** penalize candidates for errors in units or significant figures, **unless** it is specifically referred to in the “Notes” column.

Question			Answers	Notes	Total
1.	**a**	**i**	Control and 24-hour **«**recall count**»**✓	*Must include group and condition for credit.*	**1 max**
1.	**a**	**ii**	2.90 – 2.90 = 0.00✓	*Relevant workings/ stages must be included.* *Accept 2.9 as alternative for 2.90.* *Accept 0 as alternative for 0.00.*	**1 max**
1.	**a**	**iii**	Both SD are 2.90/ the same **«**value**»**/ show no difference✓ The SD is large **«**relative to the mean**»** which indicates lower reliability of the data✓		**2 max**
1.	**b**		**Capacity** Selected/ rehearsed information transfers from the STM **«**for future reference**»**✓ **«**Theoretically**»** unlimited capacity✓ **Duration** More than 10 seconds✓ **Retrieval** Dependent on perceived importance/ **«**mental/ physical**»** rehearsal/ context information was stored✓ Information must be retrieved from the LTM into the STM✓ Occurs through recall/ cues/ recognition **«**of previous information**»**✓	*Max [2] per characteristics.* *Accept any measurable length of time more than 10 seconds e.g. hours/ lifetime. Do NOT accept unlimited.*	**3 max**

1.	**c**	**i**	SA is the ability to filter/ attend to relevant cues/ stimuli/ signals ***OR*** Ability to block out noise/ irrelevant information✓		**1 max**
1	**c**	**ii**	A performer has reduced ability to select relevant cues ***OR*** A performer does not know what cues to selectively attend to✓ Reduced/ ineffective SA can cause information overload/ confusion✓ Limited experience of the skill limits relevant long-term memory to draw from✓ Limiting overwhelming the STM can lead to better/ faster learning✓		**2 max**
1.	**c**	**iii**	Word list would be processed mentally multiple times/ repeatedly✓ Rehearsal aids the transfer/ storage into the LTM✓ Therefore, improving recall/ retrieval of the word list✓		**2 max**
1.	**d**	**i**	22 **«**L/ min**»**✓		**1 max**
1.	**d**	**ii**	Cardiac output/ Q is the volume of blood pumped out by the heart per minute✓ Stroke volume/ SV × heart rate/ HR = Cardiac output/ Q ***OR*** Cardiac output is directly affected by stroke volume/ SV **and** heart rate/ HR✓ Fluctuations in an individual's cardiac output can be caused by exercise/ fluid levels/ medical health/ medication/ stress/ age✓		**2 max**

Question			Answers	Notes	Total
2.	a		**Contractility:** Ability to generate force/ create tension✓ **Extensibility:** Ability to be stretched beyond its **«**normal**»** resting length✓ **Elasticity:** Ability to return to **«**normal**»** resting length after it has been stretched✓ **Atrophy:** A decrease in myofibrils/ fibre diameter/ muscle size/ mass **«**due to a lack of physical activity**»**✓ **Hypertrophy:** An increase in myofibrils/ fibre diameter/ muscle cross-sectional area/ dry mass **«**due to an increase in activity/ training**»**✓	*Do not accept reference to controlled by nerve stimuli or fed by capillaries.* *Do not accept can contract for contractility.* *Do not accept a list.*	**4 max**
2.	b		Training can improve VO_2 max✓ Type/ volume of training affects gains in VO_2 max✓ **«**Endurance**»** training causes physiological adaptations e.g. maximal cardiac output increases✓ Initial gains in VO_2 max will be greater the less trained you are✓	*Do not credit reference to variability between males or females.* *MP3 accept reference to other suitable physiological adaptations.* *Do not accept Q increases without reference to maximal.*	**2 max**

2.	**c**		Decrease/ suppress **«**innate and adaptive**»** immune function✓ Due to increases in levels of cortisol/ adrenaline over long periods✓ Low concentrations of lymphocytes✓ Leucocyte numbers may decrease ✓	*Do not accept increased susceptibility to infection.*	**1 max**
2.	**d**		Individuals inherit 50% of their genes from each parent which will determine their athletic potential✓ Genetic factors can provide an advantage, but are not the sole determinant of success ***OR*** To achieve the full potential of genetic factors, appropriate nutrition **and** training are required✓ Research is unclear on the relative contribution of genetic factors to sporting success in elite athletes✓ **Genetic factors examples:** Height/ limb length: e.g. taller basketballers may have greater success shooting/ defending/blocking✓ Muscle fibre type: e.g. slow twitch fibres increase aerobic potential/ endurance running✓ Anaerobic threshold: e.g. can work aerobically at higher intensity improving endurance potential/e.g long distance cyling✓ Lung capacity: e.g. will increase potential for gaseous exchange/ aerobic capacity improving endurance potential/marathon runner✓ Flexibility: e.g. greater range of motion enables gymnasts to execute skills effectively increasing chance to achieve a higher tariff/judge's score✓	*Max [2] without reference to a sporting example.* *Max [1] for genetic factor examples. Must include details of how the genetic factor can lead to potential success in a particular sport.* *Do not accept greater VO_2 max as a genetic factor.* *MP5 Must identify the fibre type responsible e.g. fast/ Type II or slow/ Type 1.*	**3 max**

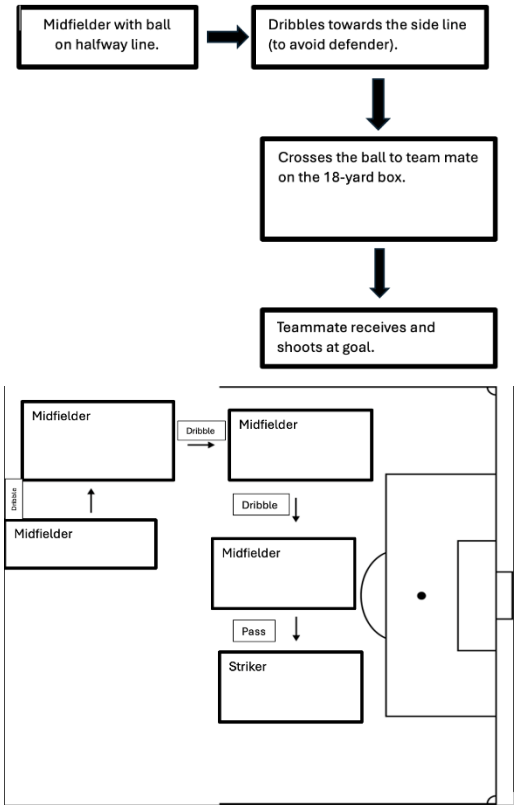
2.	**e**		Identification of life-threatening conditions✓ Potential to predict susceptibility to injury✓ May provide an opportunity to predict/ identify talent/ athletic potential✓ Discrimination/ involuntary exclusion in sport✓ Discrimination beyond sport **«**e.g. employment**»**✓ May encourage gene doping/ modification✓	*Do not accept expense or availability.*	**3 max**

Question			**Answers**	**Notes**	**Total**
3.	**a**		X – vastus lateralis✓ Y – rectus femoris✓	*Do not accept biceps femoris.*	**2 max**
3.	**b**		X – perimysium/ fascicle✓ Y – myofibril/ sarcomere(s)✓		**2 max**
3.	**c**		**FG/ IIb are:** Effective for powerful/ explosive/ high-intensity movements/ e.g. long jump✓ Because they have a high speed of contraction/ force production✓ **«**Due to**»** high glycogen/ ATP/ PC stores/ energy mostly produced anaerobically✓ However, they are ineffective for endurance activities/ e.g. marathon✓ Because they have a low resistance to fatigue/ fatigue quickly✓ Due to low myoglobin/ mitochondria/ capillary density/ limited ability to produce energy aerobically ✓	*Accept any other appropriate recognized characteristics e.g. low triglyceride storage/ durability.* *Accept higher/ lower/ greater/ decreases/ increased as alternative terms.*	**4 max**
3.	**d**		Insulin is released from pancreas **«**beta cells**»** in response to elevated <blood> glucose levels✓ Insulin increases muscle/ fat/ liver cell permeability **«**through translocation of GLUT 4 or GLUT 1 for the liver**»**✓	*Do not credit storage of glycogen.*	**3 max**

			This stimulates glucose uptake/ glycogen formation/ glycogenesis in **«**skeletal**»** muscle/ fat/ liver **«**cells**»**✓ Glycogen is formed linking large numbers of glucose molecules together ***OR*** Formation of glycogen is through a condensation reaction✓		

Question			Answers	Notes	Total
4.	**a**		Friction **«**between track/ block and footwear**»** prevents a sprinter from slipping✓ Friction maximizes acceleration/ motion forward ***OR*** Friction allows sprinter to complete race in a faster time✓ Tartan/ specialised tracks have greater friction than grass/ gravel/ sand✓ Sprinters increase their friction by wearing spikes/ using blocks✓ Spikes/ blocks increase the surface area in contact with the ground✓	*MP1 and MP2 accept in the converse.*	**3 max**

4.	**b**		**Physical** Ambient/ weather conditions enable focus/ practice/ replicate competition **«**e.g. indoor training during non-optimal conditions**»**✓ Suitable flat non-slip surface **«**e.g. tartan track**»**✓ Sufficient/appropriate light to provide visibility/alertness **«**e.g. use of flood lights/ indoor facility/ away from glare of sun**»** ***OR*** Optimal ambient sound for focus/motivation **«**e.g. for instructions to be heard/ music to support training **»**✓ Sufficient space to execute the whole skill **«**e.g.100m for a sprint**»**✓ **Social** Positive/ supportive peer/ teammate relationships **«**e.g. learn from shared experience/ feedback**»**✓ Encouraging/ supportive/ motivating coaching style **«**e.g. valuing effort/ providing choice/ autonomy**»**✓ Positive societal/ cultural perception around participation **«**e.g. inclusive/ collaborative/ value of perseverance **»**✓ Supportive family network allowing commitment/ dedication to training/ practice✓ Opportunities for positive social interaction **«**e.g. making friends/ build community/ well-being**»**✓	*Accept any relevant outline of a physical or social constraint.* *Do not accept a list.* *Do not accept examples without reference to outline of constraint.*	**2 max**

4.	**c**		Location (field of play) of possession/ change(s) in possession✓ The player who has possession/ receives the change in possession✓ The method of change in possession/location e.g. tackle/ interception/ shot/ dribble✓	*Max [1] if not drawn in sequential order.* *Accept any appropriate example.* *Location can be implied from a diagram of the field of play.* *Flow chart must refer to events that have occurred e.g. not potential/ possible options.* 	**3 max**

4.	**d**		**Weather:** e.g. a coach may take the session inside to avoid harsh weather and increase enjoyment in the session✓ **Peers:** e.g. a coach may group players based on their friendship groups to enhance motivation during training✓ **Coaching:** e.g. provide a supportive/ encouraging environment through praising effort over outcome✓ **Individual differences:** e.g. group players based on their previous experience/ physical fitness/ attributes to provide appropriate challenge✓ **Goals:** e.g. set individualized performance goals for athletes to achieve success✓ **Cognition:** e.g. provide opportunity for problem solving/ decision making to feel autonomy✓ **Equipment:** e.g. use a low bounce tennis ball for younger/ novice performers to allow more time and success to connect with the ball✓ **Rules:** e.g. play small side games such as 3v3 to increase touches/ participation/ interaction✓ **Scoring:** e.g. adapt scoring system to motivate performers to practise positive behaviours✓ **Playing area:** e.g. make the playing area smaller such as a smaller tackle box to increase the chance of success when defending in 1v1 situation✓	*Accept any suitable/ appropriate example.* *Must make reference to how the example/ constraint can improve motivation.*	**3 max**

Question			Answers	Notes	Total
5.	**a**		Gases diffuse across the alveoli **«**membrane**»**✓ **«**PP**»**O_2 is higher in air breathed in/ alveoli/ lungs compared to blood✓ **«**PP**»**CO_2 is higher in the **«**capillary**»** blood compared to the air breathed in/ alveoli/ lungs✓ **«**Net**»** movement of gases is from high to low PP/ down a PP gradient✓ The PP gradient is maintained due to ventilation/ blood flow✓ Diffusion is facilitated by the thin/ moist barrier/ large alveoli surface area/ short diffusion pathway ***OR*** Volume and rate of gas exchange occurring across at the alveoli depends on the PP of gases, thickness of the wall and surface area **«**Fick's Law**»**✓ **During exercise:** Rate of diffusion increases during exercise due to a steeper PP gradient✓ Greater volumes of gaseous exchange when exercising compared to rest✓	*Accept concentration instead of PP/ partial pressure.* *Accept answers in the converse where appropriate.* *Max [5] if no reference to the effects of exercise on the process.* *Accept reference to one cell thick for both capillary **and** alveoli for MP6.1 diffusion pathway.*	**6 max**

5.	**b**		Angular momentum is created by applying torque/ an eccentric force to a body✓ Angular momentum is defined as moment of inertia × angular velocity ***OR*** Angular velocity and moment of inertia are inversely proportional✓ Angular momentum is how much rotation/ spin the ballet dancer has about **«**the longitudinal/ an**»** axis✓ A moment of inertia is determined by the distance of the load from the rotational axis✓ Angular momentum remains constant unless the ballet dancer is acted upon by an unbalanced force✓ Ballet dancer can increase their moment of inertia by moving their limbs away from the centre of their body/ axis✓ Ballet dancer can increase their angular velocity by moving their limbs close to the center of the body/ axis✓ **Picture A/ C/ Open limbs:** the **«**ballet**»** dancer has a large moment of inertia therefore their rate of spin/ angular velocity is low✓ **Picture B/ Close limbs*:*** the **«**ballet**»** dancer has a small moment of inertia therefore their rate of spin/ angular velocity is high✓	*MP6 Accept in the converse.* *MP7 Accept in the converse.* *Reference to body position or image is required for credit.* *Reference to body position or image is required for credit.*	**6 max**

5.	**c**		**Mechanism:** Hypothalamus signals the pituitary gland to regulate bodily functions/ maintain homeostasis✓ Proximity of the hypothalamus to the pituitary gland allows signals to travel quickly ***OR*** Hypothalamus signals the pituitary gland through the infundibulum/ pituitary stalk✓ Hypothalamus produces hormones **«**e.g. ADH**»** which are sent to the **«**posterior**»** pituitary gland to be stored <ready for release>✓ Neurohormones **«**e.g. GHRH/ somatostatin**»** from the hypothalamus travel in the blood/ portal system to the **«**anterior**»** pituitary gland✓ Hypothalamus send nerve impulses through nerve fibres to **«**posterior**»** pituitary gland✓ **Effects:** E.g. Nerve impulses stimulate the **«**posterior**»** pituitary gland to release **«**stored**»** ADH to maintain water balance/stimulate conservation of water in the kidney ***OR*** E.g. Nerve impulses stimulate the **«**posterior**»** pituitary gland to inhibit the release of ADH to maintain water balance/ suppress conservation of water in the kidney✓ E.g. Hypothalamus sends GHRH to stimulate the release of growth hormone/ GH by the **«**anterior**»** pituitary gland to promote growth/ maintain metabolism/ repair tissue ***OR*** E.g. Hypothalamus sends somatostatin to inhibit the release of growth hormone/ GH by the **«**anterior**»** pituitary gland to maintain hormonal balance of GH/TSH✓	*Max [3] if not reference to specific hormones e.g. ADH/ GHRH/ GH.* *Max [3] if no reference to effects on the pituitary gland.* *Accept other suitable hormones and their effects.* **«***Posterior***»** *pituitary gland e.g. oxytocin.* **«***Anterior***»** *pituitary gland e.g. testosterone/ FSH/ luteinizing hormone/ GHIH.*	**4 max**

5.	**d**		**Surface drag:** **«**Sum of**»** friction forces between fluid molecules and the object✓ As a body moves through a fluid, its outer surface catches a layer of the fluid nearby, opposing motion✓ **«**Therefore**»** the smoother the surface, the lower the surface drag✓ **Form drag:** As a body push against a fluid, the fluid pushes back **«**action and reaction**»**✓ **«**Therefore**»** the greater the surface area the greater the drag✓ **Wave drag:** Acts where there is a reaction between two types of fluids✓ When a body moves along the surface of a fluid, some fluid is displaced to form a wave that can oppose motion✓ **«**Therefore**»** no/less interaction between two types of fluid reduces wave drag✓	*Only credit **TWO** types of drag.* *Outline must relate to the appropriate type of drag.* *Accept applied example to outline types of drag.* *Do not accept reference to how to minimise drag such as e.g. wear shark suit.* *Accept answers in the converse where appropriate.*	**4 max**

Question			Answers	Notes	Total
6.	**a**		**Overload:** Coach plans to increase intensity/ frequency/ time/ FID of sessions **«**with appropriate rest**»** to elicit beneficial adaptations✓ E.g. Increasing frequency of training per week✓ **Specificity:** Coach plans sessions that focus on developing muscles/ skills/ energy systems/ movement patterns/ strategy that are relevant for their performance✓ E.g. Sprinter developing leg muscles✓ **Reversibility:** Coach needs to plan sessions/ training/ recovery to ensure that the loss of any performance gains does not occur✓ E.g. Schedule practice two days after performance✓ **Variety:** To maintain motivation/ prevent boredom, coach plans a range of activities/ methods✓ E.g. CrossFit training✓	*Max [2] per principle 1 for explanation, 1 for example.* *Do not accept reference to periodisation or progression.* *Do not accept a list of key principles.* *Must explain how the principle is used to optimize performance.*	**4 max**

6.	**b**		**Nucleus** Contains the DNA✓ Has the instructions for the functioning of the cell✓ **Cytoplasm** The matrix/ fluid that is inside a cell✓ Provides a medium for chemical reactions/ metabolic processes/ storage of molecules/ transport of molecules✓ Holds/ supports organelles in place **«**preventing damage**»**✓ Optimizes/ regulates cell environment✓ **Cell membrane** Outer wall of the cell✓ Controls the movement of substances in and out of the cell✓ Many cells have 2 membranes✓ **Mitochondrion** Involved in aerobic/ cellular respiration/ production of ATP✓ **Ribosomes** Involved in protein synthesis (production)✓ Commonly bound to a membrane forming rough endoplasmic reticulum✓ **Rough endoplasmic reticulum** Involved in protein synthesis✓ **Smooth endoplasmic reticulum** Produces vesicles (sacs) for transporting proteins around the cell✓ Synthesises lipids/ steroids✓ **Golgi apparatus/ body** Involved in the processing and packaging of proteins/ fats✓ **Centriole** Involved in organizing the cell during cell division✓	*Outline must be linked to appropriately named structure.* *Max [1] per structure.* *Award marks for a correctly annotated diagram.* *Accept any other suitable answer for each feature.*	**6 max**

			Lysosome Break down/digest cell debris/ waste material/ pathogens✓ Repair damaged cell membranes✓		
6.	**c**		**Running during a soccer game is a/ an:** **(Use of muscle mass & precision)** Gross skill because it involves large muscles movements✓ **(Environmental impact on the performance of the skill)** Open skill because it involves a changing/ unpredictable setting/ environment✓ Externally paced skill as their speed can be determined by the movement of the opposition e.g. when tracking back to defend the goal **OR** Self/ internally paced as the player controls how fast/when they begin running ✓ Interactive skill as the performance of the skill is directly affected by the position and performance of an opponent ✓ **Throwing a dart is a relatively:** **(Use of muscle mass & precision)** Fine skill because it involves intricate/ precise/ small muscle movements✓ **(Environmental impact on the performance of the skill)** Closed skill because it takes place in a fixed/ stable environment✓ Self/internally paced skill because the participant begins when they are ready✓ Individual skill as the participant performs the skill whilst the opponent waits their turn ✓	*Max [2] for each motor skill (throwing a dart, running during a soccer game).* *Max [1] Environmental impact on performance of each motor skill.* *The justification for each MP is essential for the MP to be awarded.* *Subheadings are not required.*	**4 max**

6.	**d**		Positioned between the brain stem the cerebrum/ cerebral cortex✓ Thalamus **AND** hypothalamus form **«**part of**»** the diencephalon✓ **Functions (Thalamus 3-7, Hypothalamus 8-11)** A main function is perceptions of sensations/ cognition✓ Relays sensory input **«**except smell**»** from receptors to the cerebrum✓ Regulates sensory input to the conscious brain important for motor control✓ Regulation of sleeping/ wakefulness by suppressing sensory information which may wake an individual✓ Role in emotions and awareness of danger **«**due to connection to amygdala**»**✓ Maintains homeostasis/bodily functions through pituitary gland/ ANS/ endocrine system/ neuroendocrine control ✓ Regulates sensations of thirst/ hunger through nervous and chemical signals✓ Monitors blood temperature, stimulating heat loss/ retention/ production through the ANS✓ Regulates circadian rhythms by communicating with the cerebrum/ endocrine system ✓	*Max [5] functions only.* *Do not need to reference function to the thalamus or hypothalamus specifically.*	**6 max**

Question			Answers	Notes	Total
7.	a		**Apply to MSFT/ Cooper 12-minute run/ Harvard Step test:** **Strengths:** Can administer to many at once✓ Inexpensive/ minimal equipment✓ No training required to administer✓ **Limitations:** An indirect measure/ estimation of VO_2 max therefore less accurate✓ Data collected can be affected by the motivation levels of the participant ✓ **ALTERNATIVE TEST 1**: Multistage fitness test/ bleep test/ beep test/ Leger test **Strengths:** Large normative data available✓ Correlation with VO_2 max is good✓ Can be conducted in the performance environment **«**e.g. soccer field**»**/ high ecological validity✓ **Limitations:** Requires lots of turning, which can be a confounding factor✓ Maximal nature may make it unsuitable for people with health issues✓ **ALTERNATIVE TEST 2:** Cooper's 12-minute run **Strengths:** Limited turning involved✓ Can be conducted in the performance environment **«**e.g. track**»**/ high ecological validity✓ **Limitations:** Relies on athlete pacing themselves correctly✓	*Only accept evaluation for MSFT/ Cooper Run/ Harvard Step Test.* *Only credit **TWO** tests.* *Credit can be awarded from the apply to all and alternative test mark points.* *Max [4] for unacceptable test(s) or no test name(s).* *Max [4] for each test.* *Max [2] for strength or limitation for each test.*	**6 max**

			ALTERNATIVE TEST 3: Harvard step test **Strengths:** Clearly paced by metronome✓ Submaximal nature makes it effective for people with health issues✓ **Limitations:** Significantly affected by lower body muscular endurance✓ Has low ecological variability✓		
7.	**b**		**First law:** A body will continue in a state of rest/ uniform motion unless acted upon by an **«**external/ internal**»** force✓ E.g. the ball will remain on the penalty spot until a player kicks the ball✓ E.g. once kicked a ball remains in uniform motion until acted on by air resistance/ gravity/ friction/ impact✓ **Second law:** F=ma/ Acceleration is proportional to the net force, and is inversely proportional to the mass✓ E.g. when the ball is struck by the players' foot **«**in a free kick**»** the player applies a force to ball which causes the ball to accelerate **«**in direction of the force**»** E.g. the greater the force applied by a football player to a ball **«**during a free kick**»** the faster the ball will accelerate **«**towards goal**»**✓ **Third law:** For every action **«**force**»** there is an equal **and** opposite reaction **«**force**»**✓ E.g. the player applies an action force to the ball where an equal **and** opposite force is applied to the player✓ E.g. The differences in the apparent acceleration of the ball compared to the player is due to the differences in mass between the ball and player✓	*Max [2] per law; [1] for the law, [1] for the example.* *Accept all appropriate examples from any type of football.*	**6 max**

7.	**c**		<Primarily> controlled by negative feedback✓ Once the substance reaches a certain level, it sends a signal that stops further release of the substance✓ Chemical control of hormone release in response to changes in extracellular fluids✓ E.g. a rise in blood glucose levels triggers the pancreatic release of insulin✓ Endocrine glands release hormones when stimulated by hormones released by other endocrine glands ***OR*** E.g. the hypothalamus produces hormones that stimulate <the anterior> pituitary gland✓ The nervous system directly stimulates endocrine glands to release hormones ***OR*** E.g. adrenaline stress response✓ Can be controlled by positive feedback e.g., oxytocin during labour✓	*Max [1] for a list with relevant examples*.	**4 max**
7.	**d**		Increase of epithelial linings✓ Change of pH due to inflammation/ healing to fight pathogen/ infection✓ Leucocytes/ white blood cells fight pathogens/ infection **«**releasing heat/ debris**»**✓ Antibodies are produced by **«**B cells**»** to fight the antigen/ pathogen/ infection✓ Leucocytes/ white blood cells release cytokines to stimulate inflammation✓ Inflammation/ mucous secretions remove debris/ supply immune cells/ support tissue repair✓ Clotting **«**by platelets**»** reduces blood loss/ repair physical barrier✓	*Do not accept reference to heat.*	**4 max**

Question			Answers	Notes	Total
8.	a		**Whole–part–whole** Learner first tries the whole skill **«**in its entirety to get a feel of movement**»**✓ Then practice individual parts before integrating back into whole skill✓ Allows performers to focus on more challenging/ difficult aspects of the skill✓ E.g. complete the long jump in full, then break down the run, the take off and then complete the full long jump routine✓ **Progressive part** Learner experiences initial movement and then adds a new movement to the previous part building a sequence✓ Used when a skill is too complex/ difficult for the learner allowing each part to be mastered✓ E.g. start with the run up, then add the take off, then add focus on the flight, then add focus on the landing✓ **Part** Parts/ challenging/ dangerous elements of a skill are practised in isolation✓ Allows performers to develop master of each element✓ Used when the learning the skill in sequence is not vital✓ E.g. isolate parts of the skill, such as the run up only, take-off and landing only✓ **Whole** Skill is practised in its entirety✓ E.g. complete the jump as one whole movement, run, take off, flight, landing✓ Movement can't be broken down into component parts «as it loses aspects of the skill in performance»✓	*Explanation must correctly match method for mark.* *Explanation must refer to practising/ doing/ performing/ executing the skill. Not observing/ being shown/ presented the skill.* *Max [2] for each method.*	**4 max**

8.	**b**		Creatine phosphate/ CP/ PCr is a high-energy molecule/ fuel✓ «The system» uses the enzyme creatine kinase✓ CP releases energy «exothermic reaction» and phosphate molecule/ Pi✓ Energy released is used to add P_i to ADP/ re-synethsise ATP «endothermic reaction»✓ Reaction is a coupled reaction «where one reaction is linked to another reaction»✓ The reactions take place in the sarcoplasm/ cytoplasm of muscle cell✓ 1 PC = 1ATP✓ Does not require oxygen/ anaerobic✓ Is the first system to provide ATP/ occurs up to first 20 seconds of exercise✓	*Accept a reaction equation for MP1-3, when sufficient/ similar information is presented.* *Accept anything up to 20 seconds.*	**4 max**
8.	**c**		**Inhalation during exercise:** Diaphragm and **«**external**»** intercostal muscles contract **«**more forcefully**»**✓ Raising the rib cage upwards and outwards **«**further**»**✓ This increases the thoracic volume **«**more deeply**»**✓ This decreases the thoracic pressure **«**resulting in air rushing into the lungs**»**✓ Accessory muscles contract such as trapezius/ sternocleidomastoids/ scaleni✓ **Exhalation during exercise:** Diaphragm and «external» intercostal muscles relax✓ Internal intercostal muscles contract✓ Lowering the rib cage downwards and inwards **«**actively**»**✓ This decreases the thoracic volume **«**actively/more frequently**»**✓ This increases the thoracic pressure **«**resulting in air rushing out of the lungs**»**✓ During exercise exhalation becomes active✓ Accessory muscles contract such as the abdominal muscles✓	*Mark points must clearly be linked to the relevant process of inhalation or exhalation.* *Max [4] from inhalation/ exhalation.* *Max [5] if no reference to exercise.* *Accept any other suitable accessory muscles.*	**6 Max**

8.	**d**		**High-intensity exercise:** Involves vigorous/ explosive bouts of exercise✓ Exercise that lasts up to 2 minutes✓ E.g. 100m sprint/ plyometrics/ some types of interval training/ plyometrics✓ Predominantly uses anaerobic energy systems✓ **Endurance activities:** Involve prolonged sessions of **«**comparably**»** lower-intensity activity✓ Exercise/ activities over 2 minutes in duration✓ E.g. marathon/ leisure cycling/ jogging✓ Predominantly uses the aerobic energy system ✓	*Max [4] for either high-intensity or endurance exercise.*	**6 max**