



**Cambridge International Examinations**  
Cambridge International General Certificate of Secondary Education

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**PHYSICAL EDUCATION**

**0413/01**

Paper 1 Theory

**For examination from 2019**

MARK SCHEME

Maximum Mark: 100

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**Specimen**

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This document consists of **17** printed pages and **1** blank page.

**Generic Marking Principles**

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

**GENERIC MARKING PRINCIPLE 1:**

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

**GENERIC MARKING PRINCIPLE 2:**

Marks awarded are always **whole marks** (not half marks, or other fractions).

**GENERIC MARKING PRINCIPLE 3:**

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

**GENERIC MARKING PRINCIPLE 4:**

Rules must be applied consistently, e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

**GENERIC MARKING PRINCIPLE 5:**

Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).

**GENERIC MARKING PRINCIPLE 6:**

Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

Candidates may only use examples of physical activities from the list of physical activities in the syllabus when answering this paper.

Question	Answer	Marks
1(a)	Any two of: helps prepare mentally; increases heart rate/blood flow; warms muscles; warms and loosens joints; reduces the risk of injuries to muscles and joints; increases temperature (means body systems more ready for exercise); increases supply of oxygen to the working muscles;	2
1(b)	Any two of: stops the build-up of lactic acid in muscles; prevents immediate cramp; prevents muscle soreness and aching; maintains flexibility;	2

Question	Answer	Marks
2	A – humerus; B – femur;	2

Question	Answer	Marks
3(a)(i)	Answers must reflect the local nature of the team.  Any one of: inexpensive advertising; increased exposure of brand/name irrespective of how well the team performs; playing a part within the local community; tax incentives;	1
3(a)(ii)	Any three of: improving/maintaining access to specialist facilities; providing clothing/footwear for team; providing equipment; providing money for club development, e.g. buying players; raising the profile of the club;	3

Question	Answer		Marks
3(b)	One mark for the advantage/disadvantage and one mark for each corresponding explanation. A maximum of four marks for either advantages or disadvantages plus corresponding explanation. Answers must reflect the global nature of the event.		<b>6</b>
	<b>Advantages</b>	<b>Explanation</b>	
	better quality stadia for spectators;	e.g. improved view/seat/conditions paid for by sponsors;	
	catering outlets;	increased quality and variety;	
	higher-quality of performance;	a result of improved provision;	
	improved technology, e.g. scoreboards, large screens;	allows replays to improve viewing of events;	
	creation of excitement (from advertising before event);	raises people's awareness of the event;	
	provides alternative viewing experiences, e.g. in person, at home;	people have a choice of when and how to view;	
	changes of start and end times to fit TV schedules and worldwide viewing;	depending on where you live, can view at a convenient time;	
	large scale of global event reaches more people;	caters for a wider range of interests; provides greater exposure for minority sports;	
	free merchandise distributed to spectators at the event;	attracts younger people/children to the event; provides memorabilia of the event;	
	<b>Disadvantages</b>	<b>Explanation</b>	
	few tickets available;	due to some tickets being reserved for sponsors;	
	potential negative effects on viewing experience;	breaks in play for advertising are intrusive;	
	changes of start and end times to fit TV schedules and worldwide viewing;	non-standard start/end times may affect travel of spectators at the event;	
	monopolisation (e.g. of catering, merchandise, etc.);	leading to lack of choice/unhealthy choices;	

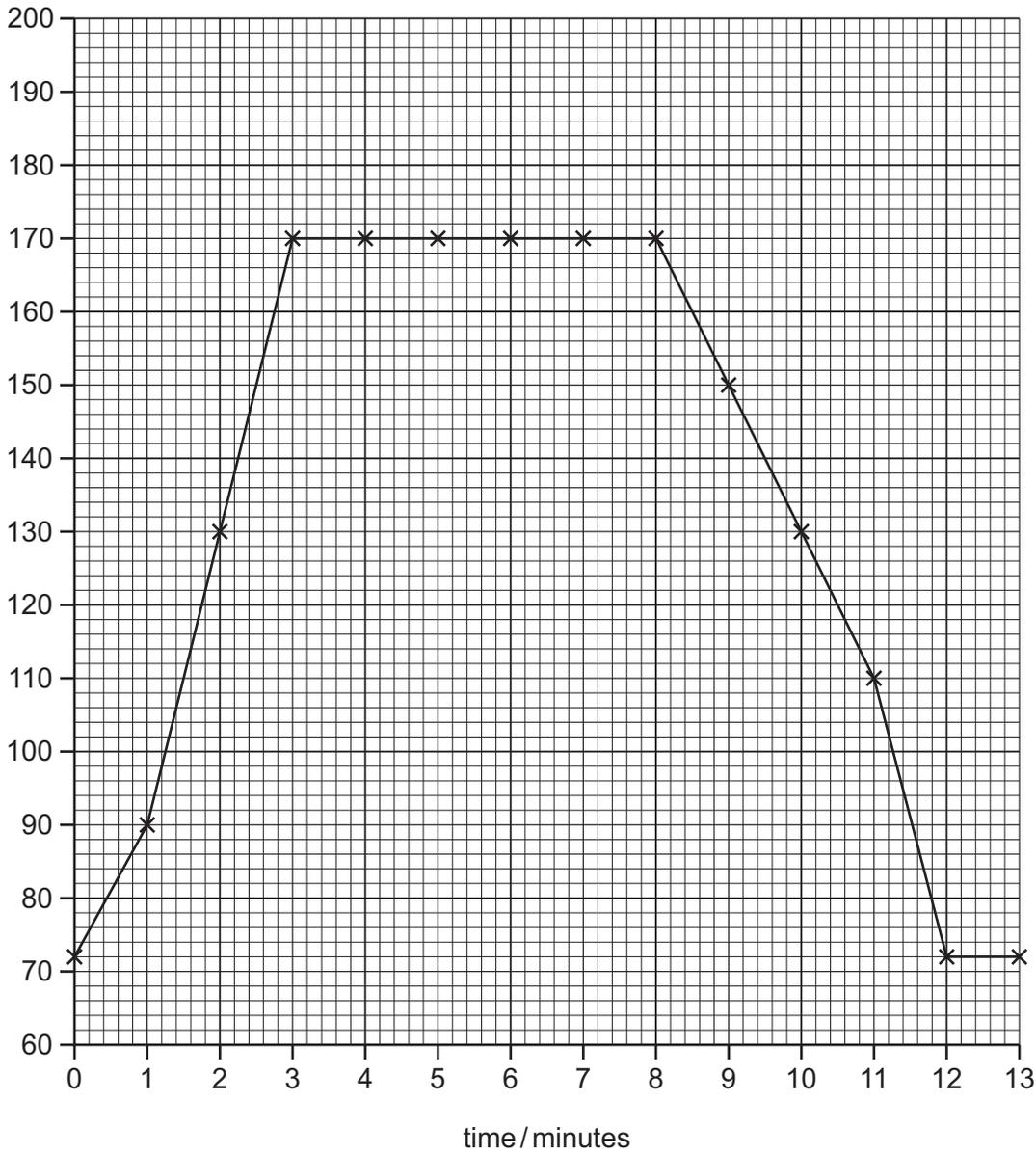
Question	Answer	Marks
4(a)	extension;	1
4(b)(i)	anaerobic;	1
4(b)(ii)	Any one of: activity is high intensity; maximum effort is required in one all-out effort; the demand of muscles for oxygen is so great that there is insufficient time to get oxygen to the muscles;	1
4(c)(i)	Any one of: exercises involving repeated rapid stretching and contracting of muscles to increase muscle power; exercises in which muscles exert maximum force in short intervals of training; explosive powerful training exercises that are used to activate the quick response and elastic properties of the major muscles in the body;  Accept description of a plyometric exercise, e.g. repeated jumping / rapid movement from muscle contraction to relaxation.	1
4(c)(ii)	Any two of: drop jumping – dropping from a platform and jumping immediately when landing; two-footed jumps over a low bench; bounding and hurdling; speed bounds; clapping press ups;  Accept other examples if they develop speed and power to enable a jump or repeated jumps or speed and power in arm movements.	2

Question	Answer	Marks
5(a)(i)	time taken to initiate a response to a stimulus;	1
5(a)(ii)	badminton – able to return a smash shot; tennis – able to return a fast serve; cricket – catching a ball in the slips;  Accept only examples of performers following the rules and protocols of the physical activity. Accept other examples that demonstrate speed of reaction.	2
5(b)(i)	balance;	1

Question	Answer	Marks
5(b)(ii)	Name of test for one mark: Standing Stork Test;  Description, any three of the following: the subject of the test is blindfolded; subject stands on both feet with hand on hips, lifts either leg and places the toes of that leg against the knee of the supporting leg; start timing when the subject is steady and continue timing until the subject is no longer stable; repeat the test with the <b>other</b> leg;  Accept variations of the Stork Test as long as they are recognised and standardised.	4
5(c)	Any one of: e.g. football/hockey/basketball, etc. – able to sidestep/beat an opponent; tennis – able to change direction to reach a ball; skiing – able to move between poles during slalom; gymnastics/dance – able to change direction in a floor routine; swimming – able to tumble turn;  Accept other relevant examples.	1

Question	Answer	Marks
6(a)	A – synovial fluid; B – cartilage;	2
6(b)(i)	component C/ligaments are strong and elastic and keep bones in place and return to their natural position and length after movement (2);  <b>Or:</b> component C/ligaments join bones to bones; component C/ligaments restrict unwanted movements of a joint/limits movement;	2
6(b)(ii)	Any two of: frequent and sudden twisting and turning movements; impact with other players; pitch conditions;	2

Question	Answer	Marks
7	Any two of: essential human needs are met; friendship and support; having value in society; ability to mix with other people;	<b>2</b>

Question	Answer	Marks																														
8(a)(i)	<p data-bbox="302 199 1523 231">One mark for correctly plotting all the points. Another mark for completing the line of the graph.</p>  <table border="1" data-bbox="560 263 1635 1460"><caption>Heart Rate Data</caption><thead><tr><th>time / minutes</th><th>heart rate / beats per minute</th></tr></thead><tbody><tr><td>0</td><td>72</td></tr><tr><td>1</td><td>90</td></tr><tr><td>2</td><td>130</td></tr><tr><td>3</td><td>170</td></tr><tr><td>4</td><td>170</td></tr><tr><td>5</td><td>170</td></tr><tr><td>6</td><td>170</td></tr><tr><td>7</td><td>170</td></tr><tr><td>8</td><td>170</td></tr><tr><td>9</td><td>150</td></tr><tr><td>10</td><td>130</td></tr><tr><td>11</td><td>110</td></tr><tr><td>12</td><td>72</td></tr><tr><td>13</td><td>72</td></tr></tbody></table>	time / minutes	heart rate / beats per minute	0	72	1	90	2	130	3	170	4	170	5	170	6	170	7	170	8	170	9	150	10	130	11	110	12	72	13	72	2
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11	110																															
12	72																															
13	72																															

Question	Answer	Marks
8(a)(ii)	The letter A should be on or between 8/9 minutes on the graph;	1
8(a)(iii)	170 (beats per minute);	1
8(a)(iv)	Accept 4–5 minutes to recover;	1
8(b)	<p>One mark for a factor. Another mark for explaining the factor. A maximum of two marks for a list of factors without any explanation.</p> <p>level of aerobic fitness – a fitter athlete recovers quicker;</p> <p>general health/body weight – poor health or being overweight puts greater stress on the heart and length of recovery;</p> <p>intensity of the exercise – heart rate during intense activity will be higher, taking longer to recover;</p> <p>whether the athlete smokes or drinks alcohol – increase in heart rate/reduction in oxygen transportation and recovery rate;</p> <p>levels of lactic acid in muscles/ability to tolerate or remove lactic acid – lactic acid is removed more slowly so heart rate stays higher to facilitate removal;</p> <p>diet/energy levels/restoration of glycogen stores – lack of replacement of glucose maintains lower energy levels for longer, meaning longer recovery;</p> <p>sleep/level of tiredness prior to exercise – body systems generally function more slowly, decreasing recovery rate;</p> <p>the muscle groups exercised – major muscle groups need more time to recover than exercises that use smaller muscle groups;</p> <p>age – older people take longer to recover than younger performers;</p> <p>genetic factors – some people have naturally better recovery powers;</p> <p>hydration – dehydration increases recovery time;</p>	6

Question	Answer	Marks
9(a)(i)	flexion;	1
9(a)(ii)	<p>Answers should relate to the bicep and tricep:</p> <p>bicep shortens/contracts (1);</p> <p>tricep relaxes (1);</p> <p>bicep is attached to the forearm and pulls it upward and the tricep relaxes (2);</p>	2

Question	Answer	Marks						
9(b)(i)	<p>Any three of:</p> <p>muscles increase in size/strength/power – able to move heavier weights/work against greater resistance;            increased flexibility/agility/balance – able to reduce the possibility of injury/movements will be smoother;            muscle coordination increases – able to link movements with greater efficiency and look more aesthetically pleasing;            recovers quicker after exercise due to the increase in blood supply – reduces the impact of lactic acid/able to return to taking part in exercise more quickly;            muscle tone and posture improve – reduces pressure on joints/improves breathing/reduces effort to complete movements in sport;            muscular endurance improves – able to maintain effort for a long period of time;            increased stores of glycogen – reduces the onset of lactic acid/able to maintain high levels of effort for longer;            muscles become more efficient at removing waste products – able to recover quicker after exercise;</p>	3						
9(b)(ii)	<p>Examples must demonstrate the following benefits in the physical activities used:</p> <table border="1" data-bbox="300 667 1877 798"> <thead> <tr> <th data-bbox="300 667 904 715">Description</th> <th data-bbox="904 667 1877 715">Benefit</th> </tr> </thead> <tbody> <tr> <td data-bbox="300 715 904 754">large number of reps with light weights</td> <td data-bbox="904 715 1877 754">improves muscle endurance and speed. Accept also: improves flexibility</td> </tr> <tr> <td data-bbox="300 754 904 798">small number of reps with heavy weights</td> <td data-bbox="904 754 1877 798">improves dynamic strength</td> </tr> </tbody> </table> <p>Examples can come from any single physical activity in the syllabus and could include:</p> <p><b>Basketball:</b>            a large number of reps with light weights: able to stretch to catch and control the ball/able to reach to intercept the ball;            a small number of reps with heavy weights: able to protect the ball when rebounding/able to block players from the boards/            able to shoot the ball from a distance;</p> <p><b>Gymnastics:</b>            a large number of reps with light weights: able to maintain a floor routine without muscle fatigue/speed on the approach for a vault/able to stretch and hold balance positions/able to reach further on the vault box/able to fully extend arms and legs in rings or vault;            a small number of reps with heavy weights: able to control the rings/support the body's movement along the pommel horse;</p> <p><b>Rugby:</b>            a large number of reps with light weights: able to last the whole game/recover quicker after sprinting for the ball/increased speed helps to run past a player; ensures good flexibility at the shoulder to be able to throw the ball at a line out;            a small number of reps with heavy weights: rugby forward able to push in a maul (not scrum)/lift a player at a line out/not be able to be tackled easily/able to protect the ball;</p>	Description	Benefit	large number of reps with light weights	improves muscle endurance and speed. Accept also: improves flexibility	small number of reps with heavy weights	improves dynamic strength	4
Description	Benefit							
large number of reps with light weights	improves muscle endurance and speed. Accept also: improves flexibility							
small number of reps with heavy weights	improves dynamic strength							

Question	Answer	Marks
10(a)	interest/family influences/availability of facilities or club/peer pressure/meet a personal goal/introduced to sport in school/social factors;	1
10(b)	Any two of:  Feedback should: be given soon after the training session to ensure the performer relates comments to actions taken; be kept short to avoid confusion/being overloaded with information; not be given too frequently in case the performer becomes too reliant on it; be positive to avoid demotivating the performer; identify areas to be developed; be given in terms that are relevant to age/not too technical; not describe what is obvious to the performer; include knowledge of results as well as knowledge of performance, e.g. number of successful first serves in tennis, so performer can start to recognise effective performance and develop the ability to interpret intrinsic feedback;	2
10(c)	Any two of: access to high-quality coaching; funding/sponsorship; opportunity to play against top-quality opposition/in top tournaments; access to high-quality facilities/equipment; medical support; sport science to support training; access to specialist centres of excellence; high-quality training groups;	2

Question	Answer	Marks
11(a)	A – atrium; B – ventricle; Do not accept 'left' atrium or ventricle.	2
11(b)	valves prevent blood from flowing backwards;	1

Question	Answer	Marks
11(c)	<p>component C is the cardiac muscle and increases in strength (no mark awarded for just naming component C);            increase in size of the ventricle (B);            walls of the ventricle thicken;            cardiac muscle becomes stronger, slightly bigger and beats more powerfully;            heart can work at maximum level for longer without being under stress;            reduction in resting heart rate;            stroke volume increases;</p>	<b>3</b>

Question	Answer	Marks
12(a)	<p>movements vary/dependent on the environment/performer does not have total control/outcome is unpredictable;</p>	<b>1</b>
12(b)	<p>No mark for the type of guidance alone. Guidance can be either visual, verbal or manual/mechanical.</p> <p>Any two from either visual, verbal or manual/mechanical:</p> <p>Visual:            more information can be absorbed than if given verbally;            does not know what skill looks like;            allows performer to copy the model;            shows the correct technical model;            an inexperienced performer can see that whole skill performed;            videos can be seen at any time;            wall charts can be seen on display all the time;            demonstrations can be given for left- or right-handed performers;</p> <p>Verbal:            tactics can be explained;            feedback can be given immediately;            can be broken down into small parts and altered to suit the needs of the performer;</p> <p>Manual/mechanical:            able to guide a novice through the skill;            use of harnesses allows performer to feel how the skill should be completed;            reduces the possibility of injury while skill develops;            helpful when a complex skill is being developed;</p>	<b>2</b>

Question	Answer	Marks
12(c)	<p>Any two of:</p> <ul style="list-style-type: none"> <li>the performer starts at a low level;</li> <li>first few practices always show a sharp increase in performance;</li> <li>skills are conducted at a slow pace to ensure success;</li> <li>practices/game situations are conducted to provide a positive outcome in the first stages of practice;</li> <li>the performer is highly motivated when they start a new skill;</li> <li>the skill may be related to a skill already learnt;</li> <li>the activity may be broken down easily into simple/basic skills and these have to be learnt first before complex skills are attempted;</li> </ul>	<b>2</b>
12(d)	<p>Any two of:</p> <ul style="list-style-type: none"> <li>the performer:</li> <li>has the ability to adapt skills;</li> <li>rarely makes mistakes;</li> <li>is not highly reliant on external feedback/is able to provide intrinsic feedback;</li> <li>is not highly affected by failure;</li> <li>is able to anticipate movement of others/plan ahead;</li> <li>is able to perform with little energy output/performances seem effortless;</li> <li>is able to perform skills fluently;</li> <li>is able to perform skills with little thought;</li> </ul>	<b>2</b>
12(e)	<p>Any three of:</p> <p>Candidates should apply SMARTER goal-setting to the situation, e.g.:</p> <ul style="list-style-type: none"> <li>Specific: focus is placed on a specific skill, so time is not wasted learning unnecessary information or skill/complex skills can be broken down with the most important parts learnt first/allows the performer to know exactly what is expected;</li> <li>Measurable: the performer will be able to compare results against either their previous performances or against standards, which enables a performer to know if they are making progress or the rate/speed of progress;</li> <li>Agreed: the discussion between the performer and coach provides greater clarity about what they are trying to achieve/it allows the performer to feel they have some control over training and the pace of training;</li> <li>Realistic: the performer will recognise that the skill being learnt is within their capacity to achieve, which will motivate them to work harder;</li> <li>Time-phased: by working within a time phase, the performer gets time to work and develop the skills – too little time does not allow the performer to practise, too much time can cause the performer to become bored;</li> <li>Exciting: by creating activities that are exciting or interesting it provides a performer with motivation to train;</li> <li>Recorded: if a performer records the results of their training or performances they are able to monitor their progress, so that they can know how close they are to completing their target, which can be motivating or can motivate a performer to continue to work harder;</li> </ul>	<b>3</b>

Question	Answer	Marks
13(a)	<p>A maximum of two marks each for advantages or disadvantages.</p> <p>Advantages:  performer can develop their skill level faster;  faster progression through the early stages of learning;  performer can use them regularly as sessions can be fitted into shorter time slots;  easy for beginners to find out if they like the sport;  equipment can usually be hired cheaply;  higher-level performer can maintain fitness for the sport;  performer can develop confidence quicker;  the activity is accessible/less time required for travel;</p> <p>Disadvantages:  lacks challenge for an experienced performer;  limited skills required/repetition of limited number of skills makes it become boring;  limited space available/often crowded/beginners' classes prevent experienced performers from using facilities;  lack of the natural environment;</p>	<b>4</b>

Question	Answer	Marks
13(b)	<p>Any two from a single activity:</p> <p>e.g. Climbing: wear helmet; ensure ropes are in good condition; ensure harnesses are in good condition; wear non-slip footwear / firm-soled shoes; ensure mats are in position at foot of wall;</p> <p>Skiing: wear gloves / long-sleeved top and long trousers; wear helmet; wear appropriate footwear; ensure skis are appropriate length; ensure ski bindings are appropriate for boot size; use wax that allows the skis to move smoothly;</p> <p>Water-based activities (sailing / canoeing / rowing): ensure canoe / dingy is watertight; ensure spray decks are in good condition, if being used; ensure life jackets are available and worn; wear helmet when canoeing; wear waterproof jackets and trousers; wear slip-proof trousers;</p> <p>Hill walking: wear waterproof clothing; take additional warm clothing; wear walking shoes / boots; take whistle; take mobile phone; take survival equipment – bivvy bag, torch, water, emergency food;</p>	<b>2</b>

Question	Answer	Marks								
14(a)	a balanced diet is one that gives your body all the nutrients it needs to function correctly/a diet consisting of proper quantities and portions of foods needed to maintain health and growth;	1								
14(b)	Nutrient and matching food source needed for one mark, e.g.: <table border="1" data-bbox="300 354 1624 635"> <thead> <tr> <th>nutrient</th> <th>food source rich in nutrient</th> </tr> </thead> <tbody> <tr> <td>carbohydrates</td> <td>chickpeas/fruit/oats/pasta/rice/sweet potatoes/wholemeal bread</td> </tr> <tr> <td>fats</td> <td>avocados/butter/certain fatty fish/dairy produce/chocolate/nuts/olive oil/whole eggs</td> </tr> <tr> <td>protein</td> <td>cheese/cottage cheese/egg whites/fish/meat/milk/nuts/seeds/soya beans/tofu</td> </tr> </tbody> </table>	nutrient	food source rich in nutrient	carbohydrates	chickpeas/fruit/oats/pasta/rice/sweet potatoes/wholemeal bread	fats	avocados/butter/certain fatty fish/dairy produce/chocolate/nuts/olive oil/whole eggs	protein	cheese/cottage cheese/egg whites/fish/meat/milk/nuts/seeds/soya beans/tofu	2
nutrient	food source rich in nutrient									
carbohydrates	chickpeas/fruit/oats/pasta/rice/sweet potatoes/wholemeal bread									
fats	avocados/butter/certain fatty fish/dairy produce/chocolate/nuts/olive oil/whole eggs									
protein	cheese/cottage cheese/egg whites/fish/meat/milk/nuts/seeds/soya beans/tofu									

Question	Answer	Marks
15(a)(i)	Any one of: sac-like structures that are grouped together; surrounded by capillaries; walls of the alveoli are moist; walls of the alveoli are one cell thick; alveoli allow oxygen and carbon dioxide to be moved in and out of blood (do not accept 'gas' instead of 'oxygen' and 'carbon dioxide');	1
15(a)(ii)	Any three of: as we breathe in the sacs of the alveoli fill with air; oxygen is transferred through the walls of the alveoli into the blood; as we breathe out the sacs of the alveoli empty; carbon dioxide is transferred through the walls of the alveoli from the blood; gas transfer takes place due to the changes in pressure;	3

Question	Answer	Marks
15(b)(i)	<p>Any two of: the maximum volume of air that can be exhaled forcibly; ref. to after maximum amount of air inhaled (accept in one breath);</p> <p><b>Or:</b> the maximum volume of air that can be inhaled forcibly; ref. to after maximum amount of air exhaled (accept in one breath);</p>	<b>2</b>
15(b)(ii)	<p><b>Either:</b> Inspiration: the diaphragm pulls down; the intercostal muscles contract; the chest area expands; air pressure in the chest cavity decreases;</p> <p><b>Or:</b> Expiration: the diaphragm relaxes into a dome position; intercostal muscles relax; chest area become smaller; air pressure in the chest increases;</p> <p><b>And</b> an indication that the reverse action occurs.</p> <p>A maximum of three marks for either inspiration or expiration only.</p>	<b>4</b>

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