Rewarding Learning

General Certificate of Secondary Education
2013

Physical Education

[G9741]

TUESDAY 14 MAY, AFTERNOON

MARK SCHEME

General Marking Instructions

Introduction

Mark schemes are published to assist teachers and students in their preparation for examinations. Through the mark schemes teachers and students will be able to see what examiners are looking for in response to questions and exactly where the marks have been awarded. The publishing of the mark schemes may help to show that examiners are not concerned about finding out what a student does not know but rather with rewarding students for what they do know.

The Purpose of Mark Schemes

Examination papers are set and revised by teams of examiners and revisers appointed by the Council. The teams of examiners and revisers include experienced teachers who are familiar with the level and standards expected of students in schools and colleges.

The job of the examiners is to set the questions and the mark schemes; and the job of the revisers is to review the questions and mark schemes commenting on a large range of issues about which they must be satisfied before the question papers and mark schemes are finalised.

The questions and the mark schemes are developed in association with each other so that the issues of differentiation and positive achievement can be addressed right from the start. Mark schemes, therefore, are regarded as part of an integral process which begins with the setting of questions and ends with the marking of the examination.

The main purpose of the mark scheme is to provide a uniform basis for the marking process so that all the markers are following exactly the same instructions and making the same judgements in so far as this is possible. Before marking begins a standardising meeting is held where all the markers are briefed using the mark scheme and samples of the students' work in the form of scripts. Consideration is also given at this stage to any comments on the operational papers received from teachers and their organisations. During this meeting, and up to and including the end of the marking, there is provision for amendments to be made to the mark scheme. What is published represents this final form of the mark scheme.

It is important to recognise that in some cases there may well be other correct responses which are equally acceptable to those published: the mark scheme can only cover those responses which emerged in the examination. There may also be instances where certain judgements may have to be left to the experience of the examiner, for example, where there is no absolute correct response – all teachers will be familiar with making such judgements.

			AVAILABLE MARKS
1	The World Health Organisation defines health as a state of complete **physical**, mental and social well-being.	[1]	1
2	**(e)** John keeps running personal best times in his 10 km races.	[1]	1
3	The term **practice** is most closely linked with learning a skill.	[1]	1
4	Any one of the following: phosphorus; iron; sodium; potassium.	[1]	1
5	**Potatoes** are best described as being **high in carbohydrate**.	[1]	1
6	A person's **metabolism** is the **rate** at which the person **processes or burns up food**.	[1]	1
7	**High fibre intake** is linked with a healthy diet.	[1]	1
8	**Obesity**.	[1]	1
9	**(a) Carbon monoxide**	[1]	
	(b) Tar	[1]	
	(c) Nicotine	[1]	3
10	One reason to account for the limit for "low-risk drinking" being up to three units per day for men but only up to two units per day for women, e.g.: **Women are usually smaller than men** [1]**;** **women usually have more fat than men** [1]**;** **women usually have less water in their bodies than men** [1]**.**	[1]	1
11	Two effects that sleep deprivation can have on health and/or performance; for example, sleep deprivation can lead to: interference with growth; interference with the repairing of muscles, neurones or other tissues; decreased alertness and motivation; the disruption of the pattern/stages of sleep; decreased attentiveness and concentration; decreased short-term memory; poor coordination; delayed reaction times; poor decision-making; moodiness; irritability and anxiety. (2 × [1])	[2]	2

AVAILABLE MARKS

12 Archery is an individual sport which suits introverts as they are often shy and like doing things on their own. Introverts are not always confident and so do not like team sports where they feel they could be letting the team down. Archery involves looking after and being careful with bows and arrows. This suits introverts as they are careful, safety-conscious and don't take risks. In competition, in archery, you are on your own, there is no physical contact, you need to be calm, steady and be able to concentrate. This suits the introverts. They are inward-looking so prefer to be on their own, prefer no physical contact and they are comfortable in shutting themselves off from the world and concentrating on their own performance.

Ice hockey is a team sport which suits extroverts as they are outgoing and mix well with others. Extroverts are optimistic and confident so are good team members for ice hockey. Ice hockey is fast, tough and exciting. This suits extroverts as they like to seek thrills, they like physical contact and they like speed. In competition you have to be able to play as part of the team, be aggressive and not be afraid. Extroverts tend to be competitive, not give up and so perform well in this type of sport. Training involves being with and working with others and can involve 'banter' between team members and competition for places in the team. Extroverts like being with others and can give and take 'banter'. They also thrive on the competition to get a place on the team.

Award **[0]** for an answer not worthy of credit.

Level 1 ([1]–[2])
The answer provides limited explanation linking archery to introverts and ice hockey to extroverts. The quality of written communication is basic. There is limited use of specialist terms and the spelling, punctuation and grammar are weak.

Level 2 ([3]–[4])
The answer provides a sound explanation linking archery to introverts and ice hockey to extroverts. The quality of written communication is moderate to good. A range of specialist terms is used with facility and the spelling, punctuation and grammar are reasonably good.

Level 3 ([5]–[6])
The answer provides a detailed explanation linking archery to introverts and ice hockey to extroverts. The quality of written communication is very good. A wide range of specialist terms is used adeptly and the spelling, punctuation and grammar are almost faultless. [6] 6

13 **(a)** *Regular exercise can help with weight control because* **exercise helps burn up kilocalories/fats** (so helps stop extra fat being deposited). [1]

(b) *Regular exercise can help with posture because* **it tones the muscles** (so that the body can be kept in positions of good posture). [1] 2

AVAILABLE MARKS

14 (a) Table 1

Aerobic/Anaerobic Ratio	Event
50% Aerobic/50% Anaerobic	800 m
85% Aerobic/15% Anaerobic	5000 m
1% Aerobic/99% Anaerobic	Shot Put or 100 m

(3 × [1]) [3]

(b) *A person's aerobic fitness is determined by the ability of* **the respiratory and circulatory systems to deliver oxygen and nutrients to the working muscles and the ability of the working muscles to use the supply**.

Award **[0]** for an answer not worthy of credit.
Award **[1]** for an answer that to some degree explains what determines a person's aerobic ability.
Award **[2]** for an answer that to a fair degree explains what determines a person's aerobic ability.
Award **[3]** for an answer that competently explains what determines a person's aerobic ability. [3]

(c) *Running is an* ***anaerobic*** *activity when*

- **It is performed at a very high intensity, for example, sprinting;**
- **It is performed without the use of oxygen** (the respiratory and circulatory systems cannot deliver sufficient oxygen and nutrients). [2]

8

15 (a) *This component of physical fitness is* **muscular speed**. [1]

(b) *This component of physical fitness is* **muscular power**. [1]

2

16 (a) *This is an example of* **anaerobic energy production** [1]

(b) *This is an example of* **muscular strength**. [1]

2

17 (a) The heart rate will rise at the beginning and then be kept at its target rate by maintaining a continuous steady pace. For example, the heart rate could rise from 70 bpm to 140 bpm and then be maintained around this rate for the 30 minutes.

Award **[0]** for an answer not worthy of credit.
Award **[1]** for an answer that to some degree explains how the heart rate will react **or** provides heart rates to demonstrate what happens.
Award **[2]** for an answer that competently explains how the heart rate will react **and** provides heart rates to demonstrate what happens. [2]

		AVAILABLE MARKS
(b)	The heart rate will rise at the beginning and then alternate between being high when bursts of speed are introduced and not so high when recovery is taking place. For example, the heart rate could rise from 70 bpm to 140 bpm then a burst of speed puts it up to 180 bpm, slow jogging brings it back down to 125 bpm then another burst takes it back up to 180 bpm. Award **[0]** for an answer not worthy of credit. Award **[1]** for an answer that to some degree explains how the heart rate will react **or** provides heart rates to demonstrate what happens. Award **[2]** for an answer that competently explains how the heart rate will react **and** provides heart rates to demonstrate what happens. [2]	4

18 Firstly, the intensity of 75% MHR is only a moderate intensity and within the range for developing aerobic endurance. Having this intensity over a distance of 200 m then getting a rest, even if it was only 20 seconds would be easy and could be done over many repetitions, never mind four repetitions. The intensity to be effective for improving anaerobic fitness should be over 90% MHR. This would make the person work hard even over the distance of 200 m. Anaerobic fitness training involves working without oxygen and to have that, the intensity needs to go above the 90% MHR.

Secondly, 20 seconds of recovery time may have been acceptable if the intensity had remained at 75% MHR. However, with the intensity increased to over 90% MHR and the person nearly working flat-out, then more time is needed to recover after sprinting the 200 m. It is recommended that the ratio of work to rest for anaerobic work should be at least 1:4. This means if the 200 m was run in 30 seconds then the recovery time before the next repetition should be at least two minutes.

The **two variables** that must be **changed** are the **intensity** and the **recovery time** between repetitions.

For each:
Award **[0]** for an answer not worthy of credit.
Award **[1]** if the candidate correctly identifies the variable that must be changed.
Award **[2]** if the candidate correctly identifies the variable and explains why it needs to be changed.
Award **[3]** if the candidate correctly identifies the variable, explains why it needs to be changed and explains what it should be changed to.
(2 × [3]) [6] — 6

19 **Static flexibility** exercises are **performed passively** when **another person provides the force to stretch** the muscle and **holds it** in that **stretched position** for a period of **time**.

Award **[0]** for an answer not worthy of credit.
Award **[1]** if the candidate correctly identifies that it is another person who provides the force to stretch the muscle.
Award **[2]** if the candidate correctly identifies that it is another person who provides the force to stretch the muscle and holds it in the stretched position for a period of time. [2] — 2

AVAILABLE MARKS

20 (a) The principle of overload states that you must work the body systems harder than they are being worked at present if you are to develop/improve your physical fitness in any of its components.

Award **[0]** for an answer not worthy of credit.
Award **[1]** if the candidate to a fair degree explains the principle of overload.
Award **[2]** if the candidate competently explains the principle of overload. [2]

(b) To apply the principle of overload you must work the body systems harder than they are being worked at present. To do this you can increase your frequency (F) of exercise, in other words, instead of doing three days of exercise you can overload and increase it to four days. You can increase your intensity (I), in other words, you can work harder than you did before, for example, work at 80% MHR instead of 70% MHR. Finally you can increase the length of time (T) you exercise for, in other words, instead of doing 30 minutes of exercise you increase it to doing 40 minutes. This is how the FITT principle is used to apply the principle of overload.

Award **[0]** for an answer not worthy of credit.
Award **[1]** if the candidate competently explains how one variable from FITT is used to apply the principle of overload.
Award **[2]** if the candidate competently explains how two variables from FITT are used to apply the principle of overload.
Award **[3]** if the candidate competently explains how three variables from FITT are used to apply the principle of overload. [3] 5

21 (a) First way
To monitor improvement in aerobic fitness you can **run a set distance** for the test and you **measure the time** it takes you to complete the distance. In subsequent tests **the faster** you can complete the distance **the fitter you are**.

Award **[0]** for an answer not worthy of credit.
Award **[1]** if the candidate competently explains that you set/control the distance that you run.
Award **[2]** if the candidate competently explains that you set/control the distance that you run and you measure how long it takes you to run it.
Award **[3]** if the candidate competently explains that you set/control the distance that you run; you measure how long it takes you to run it; this then means the faster you run it in, the fitter you are. [3]

Second way
To monitor improvement in aerobic fitness you can **run for a set time** for the test and you **measure how far you can run in the time**. In subsequent tests **the further the distance** you can complete in the time **the fitter you are**.

Award **[0]** for an answer not worthy of credit.
Award **[1]** if the candidate competently explains that you set/control the time that you run for.
Award **[2]** if the candidate competently explains that you set/control the time that you run for and you measure how far you run in that time.
Award **[3]** if the candidate competently explains that you set/control the time that you run for; you measure how far you can run in that time; the further you can run in the time the fitter you are. [3]

			AVAILABLE MARKS
(b)	**(i)**	This test would measure **muscular endurance**. [1]	
	(ii)	This test would measure **muscular power**. [1]	8

22 **(a)** Your ventilation increases when you start to exercise, e.g. run because:
- you start to breathe faster. Instead of 12 breaths per minute at rest you increase your rate to 20 breaths per minute. [1]
- you start to breathe deeper. Instead of taking in 2 litres of air in each breath at rest you increase this to 6 litres in each breath. [1]
- the respiratory centre in the brain detects the amount of carbon dioxide in the blood. This triggers the ventilation to increase. [1]

(2 × [1]) [2]

(b) You are able to take more oxygen in to your lungs with each breath
- the **intercostal muscles** become **stronger** [1]
- the **diaphragm** becomes **stronger** [1]

(2 × [1]) [2]

(c) The surface area for gaseous exchange is increased because:
- the **alveoli** [1] in the lungs which had a poor blood supply get an **increased capillary network** [1]. [2] 6

23 **Four different sports** are named and **four different** but acceptable **things/actions** are stated that would **help minimise the risk of injury** in the four sports.
Note: Do not credit name of sport.
The action to minimise the risk of injury **must** relate to the named sport.
(4 × [1]) [4] 4

24 *5 minutes hard running on the treadmill; 5 minutes hard cycling; 5 minutes hard rowing and 5 minutes hard work on a cross-trainer. This will provide a change from the weight training and will gradually lower the pulse rate.*

This section of the cool-down is not suitable. Doing 5 minutes hard work on each of the cardio machines is 20 minutes hard work. This is like another workout rather than a cool-down. The intensity for this section is hard. This intensity will not lower the pulse rate. This section is not needed. If the person requires the pulse rate to be gradually lowered then it should be done by gentle or easy exercise for no more than 5–10 minutes. One of the cardio machines could be used, but it is not necessary.

Do 2 sets of 30 repetitions for each of the exercises performed in the weight training workout but with a lighter weight (15RM). This will be easy work for the muscles and will help to develop endurance.

This section of the cool-down is not suitable. This is again repeating the workout but doing it for muscular endurance. Even if the person did two sets of thirty repetitions with a lighter weight it would be testing, not easy, but to do two sets of thirty repetitions with 15RM is impossible. This section should not be part of a cool-down and should be removed.

AVAILABLE MARKS

2 minutes of mobility exercises for each of the major joints. These will warm-up the synovial fluid surrounding the joints and allow the joints to move freely.

This section of the cool-down is also not suitable. To spend 2 minutes overall doing mobility exercises may have been okay, but to spend 2 minutes doing each mobility exercise is excessive and not necessary. Mobility exercises are to loosen up the joints and are associated with a warm-up in preparation for the workout. The workout is over and the joints would have already been put under pressure. This section should not be part of the cool-down and should be removed.

Do static flexibility exercises to stretch the major muscles of the body. Hold each stretch for 20–30 seconds. Repeat each exercise once.

This is suitable for inclusion in a cool-down. After doing the weight training exercises, it is good to do static flexibility exercises to stretch the muscles to counteract the muscle fibres becoming tighter and shorter and leading to a restriction in movement. It is good that the major muscles of the body are stretched as this will cover the muscles that were worked in the workout. Holding each stretch for 20–30 seconds is suitable as it allows the exercise to be effective and to develop flexibility. The same can be said for repeating each exercise once.

Award **[0]** for an answer not worthy of credit.
Award **[1]** for a statement relating to each section of the cool-down in relation to suitability and whether it should remain as part of the cool-down.
Award **[2]** for a statement relating to each section of the cool-down in relation to suitability and whether it should remain and **to a fair degree explains why**.
Award **[3]** for a statement relating to each section of the cool-down in relation to suitability and whether it should remain and **competently explains why**.
(4 × [3]) [12] 12

25 **(a)** The type of exercise must be **running**. This is because the event is a 10 km run and therefore it is best to be **specific for the event**. It would not really make sense to start swimming or other types of exercise as preparation for the 10 km run. Also, there is a target time to be achieved and there is only six weeks of training to prepare for the 10 km charity run.

The most **appropriate method of training** would be **continuous steady pace training**. The friend has set a realistic target of 50 minutes for the race. The friend has therefore got to **get used to running at 5 minutes per kilometre pace for the 10 km**. To prepare, the workouts over the six weeks should contain running at a faster pace over a shorter distance; running at race pace and running slower than race pace but over a longer distance.

The friend should start **with three runs in the week but not go above five runs per week during the six weeks**. The three runs will allow fitness for the 10 km run to develop but also allow sufficient time to recover between runs. The frequency of runs should be increased to four or five per week. This overload will further **develop fitness but still allow for recovery**. The frequency can depend on the intensity and times of the runs. The harder the run, the more recovery time is needed. Full recovery is also required in the last week of training in preparation for the charity run.

AVAILABLE MARKS

There is a target time of 50 minutes for this 10 km run. That is a **pace of 5 minutes per kilometre**. The friend must become capable of running at this pace (intensity) for the 10 km. To prepare them, some runs should be at a **faster pace than this but over a shorter distance; some runs should be at race pace, and some runs should be slower than race pace but over a longer distance than 10 km**. There must be appropriate balances between the intensities and the distances/times for the runs and the frequency of runs in the week depending on the week of the training programme.

The friend has to complete the **10 km run in 50 minutes**. That is a pace of 5 minutes per kilometre. The friend must become capable of running at this pace (intensity) for the 10 km. To prepare them, some runs should be at a faster pace than this but for a shorter time/distance, e.g. 20–30 minutes; some runs should be at a race pace, for a shorter to similar time/distance, e.g. 40–50 minutes and some runs should be slower than race pace but over a longer time/distance than 10 km, e.g. 60–90 minutes. There must be appropriate balances between the times/distances for the runs and the intensities and the frequency of runs in the week depending on the week of the training programme.

Level 1 ([1]–[3])
The answer provides limited to moderate advice and explanations for the areas. The quality of written communication is basic. There is limited use of specialist terms and the spelling, punctuation and grammar are weak.

Level 2 ([4]–[7])
The answer provides moderate to competent advice and explanations for the areas. The quality of written communication is moderate to good. A range of specialist terms is used with facility and the spelling, punctuation and grammar are reasonably good.

Level 3 ([8]–[10])
The answer provides competent to highly competent advice and explanations for the areas. The quality of written communication is very good. A wide range of specialist terms is used with facility and the spelling, punctuation and grammar are almost faultless. [10]

(b) Level 1 ([1]–[3])
The answer provides limited to moderate understanding of the practical application of the appropriate advice to the training programme for this specific situation.

For example, in addition to running, other types of exercise are included in the training programme (cycling; swimming etc.); a training method is not mentioned or in addition to 'Continuous Steady Pace' other training methods are included (interval; circuit etc.); the frequencies, intensities and times are not relevant as other types of exercise other than running have been used or there is limited understanding shown in the practical decisions made to provide an appropriate balance between the frequency, intensities and times of the runs from week one to week six.

Level 2 ([4]–[6])
The answer provides moderate to competent understanding of the practical application of the appropriate advice to the training programme for this specific situation.

For example, running is the type of exercise that is nearly always used in the training programme; 'Continuous Steady Pace' is the training method mostly used over the six weeks of the training programme; there is moderate to competent understanding shown in the practical decisions made to provide an appropriate balance between the frequency, intensities and times of the runs from week one to week six. (It is expected that the frequency of runs start at no less than three days per week but do not go over five days per week over the six weeks; the intensities and the duration of the runs for the intensities are suitable over the six weeks, but the intensities are presented as a percentage of maximum heart rate).

Level 3 ([7]–[9])
The answer provides competent to highly competent understanding of the practical application of the appropriate advice to the training programme for this specific situation.

For example, running is the type of exercise that is always used in the training programme; 'Continuous Steady Pace' is the training method mostly or nearly always used over the six weeks of the training programme; there is a competent to highly competent understanding shown in the practical decisions made to provide an appropriate balance between the frequency, intensities and times of the runs from week one to week six (it is expected that the frequency of runs start at no less than three days per week but do not go over five days per week over the six weeks; the intensities and times are practical, relevant and helpful for the friend in preparing them for the 10 km charity run in the target time. The information for the workouts should make it clear what distances are to be run and the pace and/or time they are to be run in). [9]

AVAILABLE MARKS
19
100

Total

An example of a Level 3 answer.

Weeks	Sun.	Mon.	Tue.	Wed.	Thu.	Fri.	Sat.
Week 1			Run 8 km; CSP; 5 min 30 second pace/km; 44 min.		Run 5 km; CSP; 5 min pace/km; 25 min.		Run 10 km; CSP; 6 min pace/km; 60 min.
Week 2		Run 8 km; CSP; 5 min 30 second pace/km; 44 min.	Run 5 km; CSP; 5 min pace/km; 25 min.		Run 10 km; CSP; 5 min 30 second pace/km; 55 min.		Run 16 km; CSP; 5 min 30 second pace/km; 88 min.
Week 3		Run 8 km; CSP; 5 min pace/km; 40 min.	Run 8 km; CSP; 5 min 30 second pace/km; 4 min.		Run 10 km; CSP; 5 min 30 second pace/km; 55 min.		Run 16 km; CSP; 5 min 30 second pace/km; 88 min.
Week 4		Run 8 km; CSP; 5 min pace/km; 40 min.	Run 8 km; CSP; 5 min pace/km; 40 min.		Run 8 km; CSP; 5 min pace/km; 40 min.		Run 10 km; CSP; 5 min 30 second pace/km; 55 min.
Week 5		Run 5 km; CSP; 4 min 30 second pace/km 22 min.	Run 8 km; CSP; 5 min pace/km; 40 min.		Run 8 km; CSP; 5 min pace/km; 40 min.		Run 10 km; CSP; 5 min 30 second pace/km; 55 min.
Week 6		Run 8 km; CSP; 5 min pace/km; 40 min.	Run 5 km; CSP; 5 min pace/km; 25 min.		Run 5 km; CSP; 5 min 30 second pace/km; 27 min.		**10 km CHARITY RUN** 5 min pace.km; 50 min.