Rewarding Learning

General Certificate of Secondary Education
2015

Physical Education

[G9741]

FRIDAY 15 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	For example, reading. Award **[0]** for an answer not worthy of credit. Award **[1]** for a clear example of a leisure activity that is not a sport and does not involve physical activity. (2 × [1]) [2]	2
2	**(a)** Sports facilities are the **buildings or amenities** that allow organised sport and physical activities to take place, Award **[0]** for an answer not worthy of credit. Award **[1]** for a clear explanation of the term sports facility. [1]	
	(b) The existence of facilities in an area may affect participation. For example, if there is a swimming pool in the area then anyone with an interest in swimming will use the pool. There will probably be a swimming club. The pool will also be used by recreational swimmers and people who take part in other water-based activities. However, if there is no swimming pool nearby people will be reluctant to travel great distances in order to swim. Award **[0]** for an answer not worthy of credit. Award **[1]** for a limited to moderate explanation as to how the **existence** of sporting facilities in an area may influence participation in that sport. If an area has a swimming pool then anyone with an interest in swimming will use the pool. There will probably be a swimming club. The pool will also be used by recreational swimmers and people who take part in other water-based activities **or** If there is no swimming pool in the area then people will be reluctant to travel great distances in order to swim. Award **[2]** for a clear and detailed explanation as to how the **existence** of sporting facilities in an area may influence participation in that sport. If an area has a swimming pool then anyone with an interest in swimming will use the pool. There will probably be a swimming club. The pool will also be used by recreational swimmers and people who take part in other water-based activities **and** if there is no swimming pool in the area then people will be reluctant to travel great distances in order to swim. [2]	3
3	An athlete could be physically fit to win a gold medal at putting the shot in athletics because the task requires strength, but be unfit to win a gold medal in a 10,000 m track race because the task requires endurance **or** a footballer could be fit to play a full game as a goalkeeper but unfit to play a full game as a midfield player. Award **[0]** for an answer not worthy of credit. Award **[1]** for an example that clearly shows that the candidate understands that physical fitness is a relative concept. [1]	1
4	When the term **exercise** is used, it refers to developing **physical health**. When the term **training** is used, it refers to developing **physical fitness**. Award **[0]** for an answer not worthy of credit. Award **[1]** when the correct link is made. (2 × [1]) [2]	2

		AVAILABLE MARKS
5	Examples: metabolism; age; body size; body composition; gender; climate or physical activity levels. Award **[0]** for an answer not worthy of credit. Award **[1]** for a significant factor that can affect the daily energy needs of a person. (2 × [1]) [2]	2
6	**(a)** Nicotine: • constricts the blood vessels; • raises the heart rate; • raises blood pressure; • speeds up metabolism; • affects mood and behaviour; • combined with carbon monoxide, leads to clotting of the blood and clogging of the arteries. Award **[0]** for an answer not worthy of credit. Award **[1]** for a correct effect that nicotine has on the body. (2 × [1]) [2]	
	(b) **(i)** Aerobic performances are less effective because the carbon monoxide takes the place of oxygen in the red blood cells, therefore there is less oxygen available to the muscles. Award **[0]** for an answer not worthy of credit. Award **[1]** for a clear explanation as to why the carbon monoxide in tobacco smoke adversely affects aerobic performances. [1]	
	(ii) As a result of less oxygen being available to the muscles, the heart has to beat faster than before to get the required amount of oxygen to the muscles. Award **[0]** for an answer not worthy of credit. Award **[1]** for a clear explanation of what the body has to do to overcome the effect of there being less oxygen. [1]	4
7	**(a)** Eating spicy and acidic foods before a person goes to bed can cause heartburn and indigestion and therefore affects the quality of sleep. Award **[0]** for an answer not worthy of credit. Award **[1]** for a limited to moderate explanation as to how the content of some foods can affect a person's quality of sleep. E.g. Eating spicy and acidic foods before a person goes to bed can affect the quality of sleep. Award **[2]** for a clear and detailed explanation as to how the content of some foods can affect a person's quality of sleep. E.g. Eating spicy and acidic foods before a person goes to bed can cause heartburn and indigestion and therefore affects the quality of sleep. [2]	

		AVAILABLE MARKS
(b)	Alcohol in spirits, wines and beers etc. induces light sleep but impairs the deeper and more restorative stages of sleep. Drinks can contain stimulants such as caffeine, for example coffee. Stimulants such as caffeine can prevent a person from getting to sleep. Award **[0]** for an answer not worthy of credit. Award **[1]** for a limited to moderate explanation as to how the content of some drinks can affect a person's quality of sleep. E.g. Alcohol induces light sleep or alcohol prevents deep sleep. Award **[2]** for a clear and detailed explanation as to how the content of some drinks can affect a person's quality of sleep. E.g. Alcohol induces light sleep but impairs the deeper and more restorative stages of sleep. [2]	4
8	Examples: • Most people today do not have to do physical work compared to most people in the 1800s. Many are seated at desks. • Most people today do not have to physically walk to work or to events compared to most people in the 1800s. Cars, buses, trains and planes are used. • Most people today have and eat a lot more food compared to what most people had and ate in the 1800s. Award **[0]** for an answer not worthy of credit. Award **[1]** for a difference that would correctly account for many people today having to plan sufficient and appropriate physical activity into their lives in order to keep their bodies healthy and in good working order. (3 × [1]) [3]	3
9	If an older person is fit and healthy from participation in regular and appropriate exercise then his/her body will be in good working order and therefore s/he continues to be able to perform everyday physical tasks with ease. If a younger person doesn't exercise at all s/he loses his/her capability to perform everyday tasks with ease. Award **[0]** for an answer not worthy of credit. Award **[1]** for a clear explanation as to why regular and appropriate exercise can make older people cope better with everyday physical tasks **OR** for a clear explanation as to why those who are younger and not active at all may have some difficulty in coping with everyday physical tasks. Award **[2]** for a clear explanation as to why regular and appropriate exercise can make older people cope better with everyday physical tasks **and** a clear explanation as to why those who are younger and not active at all may have difficulty in coping with everyday physical tasks. [2]	2

AVAILABLE MARKS

10 **(a)** **Anaerobic** energy is produced **without** oxygen. [1]
Aerobic energy is produced **with** oxygen. [1]

(b) *Muscular power* enables a person's muscles to produce maximum force, or a considerable force, with speed in an explosive effort.

Award **[0]** for an answer not worthy of credit.
Award **[1]** for a limited to moderate understanding of what muscular power enables a person's muscles to do.
E.g. *Muscular power* enables a person's muscles to produce a maximum or considerable force.

Award **[2]** for a clear and detailed understanding of what muscular power enables a person's muscles to do.
Muscular power enables a person's muscles to produce maximum force, or a considerable force, with speed in an explosive effort. [2]

(c) *A person's muscular endurance is determined by* the ability of a muscle or group of muscles to work for long periods of time at less than maximum effort.

Award **[0]** for an answer not worthy of credit.
Award **[1]** for a limited to moderate understanding of what determines muscular endurance.
A person's muscular endurance is determined by the ability of a muscle or group of muscles to work for long periods of time.

Award **[2]** for a clear and detailed understanding of what determines muscular endurance.
A person's muscular endurance is determined by the ability of a muscle or group of muscles to work for long periods of time at less than maximum effort. [2] 6

11 **(a)** Fartlek training involves going for a 30-minute run/cycle/swim, during which you break into bursts of fast running/cycling/swimming for varying lengths of time – anything from ten seconds to two minutes. After a burst of fast running you continue to run/cycle/swim slowly, enabling you to recover for the next burst. The **intensities** of the bursts and the **times** for which they are maintained are **decided during the training**, depending on how you feel.

Award **[0]** for an answer not worthy of credit.
Award **[1]** for a limited to moderate understanding of what fartlek training involves.

Fartlek training involves **going for a 30-minute run**, during which you break into **bursts of fast running for varying lengths of time** – anything from ten seconds to two minutes.

Award **[2]** for a moderate to competent understanding of what fartlek training involves.

Fartlek training involves **going for a 30-minute run**, during which you break into **bursts of fast running for varying lengths of time** – anything from ten seconds to two minutes. **After a burst** of fast running you continue to **run slowly, enabling you to recover for the next burst.**

Award **[3]** for a clear, competent and detailed understanding of what fartlek training involves.

AVAILABLE MARKS

Fartlek training involves **going for a 30-minute run**, during which you **break into bursts of fast running for varying lengths of time** – anything from ten seconds to two minutes. **After a burst** of fast running you continue to **run slowly, enabling you to recover for the next burst.** The **intensities** of the bursts and the times for which they are maintained are **decided during the training,** depending on how you feel. [3]

(b) Isometric training involves a muscle or group of muscles working against a resistance but no movement of body parts takes place.

Award **[0]** for an answer not worthy of credit.
Award **[1]** for a moderate understanding of what isometric training involves.
E.g. Isometric training involves no movement of body parts.
Award **[2]** for a clear and competent understanding of what isometric training involves.
Isometric training involves a muscle or group of muscles working against a resistance but no movement of body parts takes place. [2]

(c) Different training methods for developing flexibility are **static flexibility training,** performed actively or passively, and **active/ballistic** or **dynamic flexibility training.**

Award **[0]** for an answer not worthy of credit.
Award **[1]** for naming a correct method of training for developing flexibility.
(2 × [1]) [2] 7

12 (a) The principle of peaking is normally applied at the end of the training programme **or** before a major competition. (accept either answer) [1]

(b) You perform much less work than you were doing, but what work you do is at a high intensity.

Award **[0]** for an answer not worthy of credit.
Award **[1]** for a moderate understanding of what normally happens in the peaking phase.
E.g. You perform much less work than you were doing.
Award **[2]** for a clear and competent understanding of what normally happens in the peaking phase.
You perform much less work than you were doing, but what work you do is at a high intensity. [2]

Some days before the competition you ease right off or taper off with your training to allow your muscles complete recovery and your fuel stores to be full

Award **[0]** for an answer not worthy of credit.
Award **[1]** for a moderate understanding of what normally happens in the peaking phase.
E.g. Some days before the competition you ease right off or taper off with your training.
Award **[2]** for a clear and competent understanding of what normally happens in the peaking phase.
Some days before the competition you ease right off or taper off with your training to allow your muscles complete recovery and your fuel stores to be full. [2] 5

		AVAILABLE MARKS
13	Examples: • The heart develops more coronary arteries. This helps improve performance because the heart can get a greater supply of blood bringing oxygen and nutrients. • The heart becomes larger with thicker and stronger muscular walls. This helps improve performance because the chambers can be emptied more fully on each contraction. This will get a greater supply of blood bringing oxygen and nutrients. • The heart chambers become larger. This helps improve performance because the heart chambers can hold more blood for each contraction. This means the muscles will get a greater supply of blood bringing oxygen and nutrients. • The arteries become larger and more elastic. This helps improve performance because the arteries are more efficient in carrying the increased blood supply during exercise. This means the muscles will get a greater supply of blood bringing oxygen and nutrients. • More blood capillaries develop in the muscles. This helps improve performance because the muscles get a greater supply of blood bringing oxygen and nutrients. • More venules develop in the muscles. This helps improve performance because the muscles are more able to get rid of waste products more efficiently. • More red blood cells are produced in the large bones of the body. This helps improve performance because more oxygen can be carried by the blood. Award **[0]** for an answer not worthy of credit. Award **[1]** for stating a correct physical change that takes place in the heart or circulatory system as a result of regular and appropriate exercise. The quality of written communication is moderate. A range of specialist terms is used with facility and spelling, punctuation and grammar are reasonably good. Award **[2]** for stating a correct physical change that takes place in the heart or circulatory system as a result of regular and appropriate exercise **and** how this change helps improve performance. The quality of written communication is very good. A wide range of specialist terms is used adeptly and spelling, punctuation and grammar are almost faultless. (3 × [2]) [6]	6
14	Examples: • If a person is suffering from a viral infection (such as the flu) then s/he shouldn't exercise until s/he has recovered. • When exercising, a person should stop if s/he feels pain, or feels dizzy, unusually tired, or sick. If the symptoms do not go away, or come back later, then s/he should go and see a doctor. • If a person has an injury and the person's particular type of exercise would make it worse or would slow his/her recovery, then s/he should stop this exercise and get treatment until the injury has gone. • If a person has an injury and s/he can do an alternative exercise that does not make the injury worse or slow the recovery, then s/he should do this exercise until the injury has gone. Award **[0]** for an answer not worthy of credit. Award **[1]** for a moderate understanding of an action that a person should take to deal with sickness and/or injury when training and competing in sport so that no further harm occurs to the person. Award **[2]** for a clear and competent understanding of an action that a person should take to deal with sickness and/or injury when training and competing in sport so that no further harm occurs to the person. (2 × [2]) [4]	4

AVAILABLE MARKS

15 **(a)** I would choose **Food C.** [1]

(b) I would choose **Food A.** [1]
This is because fat contains twice as much energy as carbohydrate or protein. With this being the case it means that Food A (when you do basic calculations) will have the most energy or kilojoules/kilocalories. [1] [2]

(c) This part of the food label also provides information on, for example,
vitamins;
minerals;
dietary fibre;
energy. [1] 4

16 **(a)** **Fig. 1** shows the relationship between the intensity of the performance, shown as a percentage and the time shown in seconds **or**
Fig. 1 shows that the athlete was working anaerobically (for a period of 30 seconds).

Fig. 1 shows that the intensity of the performance was maintained at 95% for a period of 30 seconds, then the exercise/activity stopped within five seconds.

Award **[0]** for an answer not worthy of credit.
Award **[1]** for one general acceptable and correct interpretation of what **Fig. 1** shows about the performance of the athlete.
Award **[2]** for one general and one specific acceptable and correct interpretation of what **Fig. 1** shows about the performance of the athlete. [2]

(b) **Fig. 2** shows the relationship between the intensity of the performance, shown as a percentage and the time shown in minutes **OR**
Fig. 2 shows that the athlete was working aerobically (for a period of 40 minutes).

Fig. 2 shows that the intensity of the performance was maintained at 70% for a period of 40 minutes then the exercise/activity stopped within five minutes.

Award **[0]** for an answer not worthy of credit.
Award **[1]** for one general acceptable and correct interpretation of what **Fig. 1** shows about the performance of the athlete.
Award **[2]** for one general and one specific acceptable and correct interpretation of what **Fig. 1** shows about the performance of the athlete. [2] 4

17 The choices to achieve an effective interval training workout for a twenty-year-old male would be:

Average heart rate for work periods (beats per minute)	160
Time of work periods (seconds)	60 or 70
Recovery time between work periods (seconds)	60 (1:1 ratio or less)
Number of repetitions	10
Number of sets (3 minute rest between sets)	3

(5 × [1]) [5] 5

		AVAILABLE MARKS
18	Award **[0]** for an answer not worthy of credit. Award **[1]** for identifying an appropriate type of exercise and giving sound advice on where it will be done, when it will be done and for how long it will be done. (4 × [1]) [4]	4
19	The test results cannot be considered reliable to track accurately the development of aerobic fitness because: • the venues were not the same. There is a difference between doing the test indoors in a school gym and doing it outdoors on grass; • the weather conditions were not the same. One was done indoors and the other outdoors on a cold, but dry day. This could be a disadvantage in that in one the athlete could be too hot or in the other too cold; • the teacher stepped out the 20 metres when setting-up the test outside on the grass. This means the measurement may not be as accurate and therefore not fair; • there was no warm-up done for the indoor test but there was a warm-up done for the outdoor test. This is a difference, therefore there could be an advantage. • the protocol for doing the test was not the same for the indoor test as it was for the outdoor test on the grass. Indoors the athlete had an advantage in that the athlete had to cross the line with one foot only and s/he could push off the wall; • the instructions as to when the test finished were not the same. Indoors you finished if you missed a beep; outdoors it was when you missed two consecutive beeps • the results were recorded differently. Indoors it was the number of lengths whereas outdoors it was laps completed. This could mean lengths, however, it could also be interpreted as out and back as one lap. Because of each of the above differences between the two occasions when the tests were performed, it is unfair to compare the results and therefore judgements made would be unreliable. Award **[0]** for an answer not worthy of credit. Award **[1]** for a competent explanation as to why the fitness test results are not reliable for tracking accurately the development of aerobic fitness. The quality of written communication is good. A range of specialist terms is used with facility and spelling, punctuation and grammar are reasonably good. (6 x [1]) [6]	6
20 (a)	In this case, where the workout is to focus on general health-related fitness, the exercises chosen should cover the major muscles of the body, so there will be exercises for the legs, trunk and arms/shoulders. There should be a wide variety of circuit training exercises to cover all the major muscles in these areas. The exercises should be geared towards developing muscular endurance and aerobic fitness as these are most appropriate for general health-related fitness. Award **[0]** for an answer not worthy of credit. Award **[1]** for a moderate understanding of the principles underlying the range of exercises that should be included in the circuit training workout. Award **[2]** for a clear and competent understanding of the principles underlying the range of exercises that should be included in the circuit training workout. [2]	

AVAILABLE MARKS

(b) Generally the exercises for the different parts of the body are done in rotation. For example, an exercise for the arms or chest is followed by an exercise for the trunk, which is followed by an exercise for the legs, and so on. The principle is to allow the muscles of one area to recover before they are worked again.

Award **[0]** for an answer not worthy of credit.
Award **[1]** for a moderate understanding of the principles underlying what order the exercises should normally be done in the circuit training workout.
Award **[2]** for a clear and competent understanding of the principles underlying what order the exercises should normally be done in the circuit training workout. [2]

(c) It is better to have a time that everyone does each exercise for. This means that everyone starts and finishes the exercises at the same time and therefore all move to the next exercise in the circuit at the same time. This method prevents congestion from occurring.
Choosing a time also allows people of different fitness level to work to their level. The fit will do many repetitions in the time and the less fit will not do as many repetitions.
As the circuit is to improve general health-related fitness it is best to have exercises that develop muscular endurance and aerobic fitness therefore the time to be spent at each exercise should be between 15 seconds and 45 seconds.

Award **[0]** for an answer not worthy of credit.
Award **[1]** for a moderate understanding of the principles underlying the choice of a suitable time for performing each of the exercises in the circuit training workout rather than a number of repetitions to be done.
Award **[2]** for a clear and competent understanding of the principles underlying the choice of a suitable time for performing each of the exercises in the circuit training workout rather than a number of repetitions to be done. [2]

(d) The principle is the harder you work – the longer the recovery time. As the circuit is to develop general health-related fitness with the exercises geared towards developing muscular endurance and aerobic fitness then the emphasis will be on doing exercises of moderate to high intensity for 15–45 seconds. In this case the recovery period should be short and if possible with the people moving and being ready to start the next exercise within 10 seconds.

Award **[0]** for an answer not worthy of credit.
Award **[1]** for a moderate understanding of the principles underlying what recovery period should be given between the exercises in the circuit training workout.
Award **[2]** for a clear and competent understanding of the principles underlying what recovery period should be given between the exercises in the circuit training workout. [2]

(e) The variables that could be adjusted or changed so that three full circuits could be completed in a set time are:
- the number of exercises in the circuit
- the work-time for each exercise
- the recovery time between each exercise
- the recovery time between each circuit

Award **[0]** for an answer not worthy of credit.
Award **[1]** for a clear and competent understanding of a variable.
2 × [1] [2] 10

21 Benefits of choosing exercises using the 'fixed weight machines' in the gym for people who have not done weight training before:

- Fixed weight machines usually show people how to use the machine and show what muscles the machine exercises. You have to find this out yourself if you use 'free weights'.
- Fixed weight machines usually allow the exercise to be tried without any weight and therefore the person can learn the lifting technique safely.
- With fixed weight machines there are no weights to load onto or take off bars. The weight is mostly selected simply by the placement of a pin. With no weights to be loaded or taken off bars there is less risk of injuries occurring.
- With fixed weight machines you do not have to change everything (e.g. bar and weights) for the next exercise, you simply move to another fixed weight machine. This saves time.
- Fixed weight machines offer a wide range of resistances and a suitable resistance can be found safely for most people by experimentation. In using 'free-weights' there is a greater risk of injury occurring with experimentation.
- When a weight becomes too heavy to lift the fixed weight machine usually allows the weight to be returned safely to its stack without causing injury. This means the person can usually lift alone when using fixed weight machines.

Award **[0]** for an answer not worthy of credit.
Award **[1]** for an acceptable benefit for using exercises with 'fixed weight machines' with people who have not done weight training before.
The quality of written communication is moderate. A range of specialist terms is used with facility and spelling, punctuation and grammar are reasonably good.
Award **[2]** for an acceptable benefit with a clear and competent explanation as to why exercises using fixed weight machines should for used with people who have not done weight training before.
The quality of written communication is very good. A wide range of specialist terms is used adeptly and spelling, punctuation and grammar are almost faultless.

(3 × [2]) [6] 6

AVAILABLE MARKS

22 (a)

Phases of the training programme	Repetition Maximum (RM)	Number of Repetitions	Number of Sets
Weeks 1–3	12RM	10	3
Weeks 4–6	10RM	8	3
Weeks 7–9	8RM	6	3
Weeks 10–12	7RM	6	3
Weeks 13–15	6RM	5	3

RM	Range of Repetitions
12RM	9–12
11RM	8–11
10RM	7–10
9RM	7–9
8RM	6–8
7RM	5–7
6RM	5–6

Award **[0]** for an answer not worthy of credit.
Award **[1]** for an appropriate and sound application of progressive overload that will develop muscular strength over the five phases of the training programme (candidate must use three different RMs).
(5 × [1]) [5]

(b) The RM of 12 for weeks 1–3 is within the accepted range for developing muscular strength (6RM–12RM). As this is the first phase of the training programme, 12RM was chosen as the weight to be lifted. This will be much lighter than 6RM and it is better to start with this relatively lighter weight and change to lower RMs which will be much heavier weights. Therefore, in moving through the phases 10RM, 8RM and 6RM were used. Over the five phases decreasing RMs were used but all remained within the accepted range for developing muscular strength.

Award **[0]** for an answer not worthy of credit.
Award **[1]** for a limited but acceptable explanation as to how the RMs chosen will develop muscular strength over the five phases of the training programme.
Award **[2]** for an acceptable explanation as to how the RMs chosen will develop muscular strength over the five phases of the training programme.
Award **[3]** for a clear, competent and sound explanation as to how the RMs chosen will develop muscular strength over the five phases of the training programme. [3]

AVAILABLE MARKS

		AVAILABLE MARKS
(c)	Repetition Maximum (RM) is the maximum weight that can be lifted that number of repetitions. In weeks 1–3 the RM chosen was 12RM. The number of repetitions at 10 is less that the 12 maximum but still challenging thus developing muscular strength. This principle is maintained for the other phases. Award **[0]** for an answer not worthy of credit. Award **[1]** for an acceptable explanation as to how the number of repetitions chosen are suitable for the RMs over the five phases of the training programme. Award **[2]** for a clear, competent and sound explanation as to how the number of repetitions chosen are suitable for the RMs over the five phases of the training programme. [2]	10
	Total	**100**