



**NCFE Level 1/2 Technical Award in Health and Fitness
(603/2650/5)**

Sample 2018

Unit 01 Introduction to body systems and
principles of training in health and fitness

Mark Scheme

v1.0

SAMPLE

This mark scheme has been written by the Assessment Writer and refined, alongside the relevant questions, by a panel of subject experts through the external assessment writing process and at standardisation meetings.

The purpose of this mark scheme is to give you:

- examples and criteria of the types of response expected from a learner
- information on how individual marks are to be awarded
- the allocated assessment objective(s) and total mark for each question.

Marking guidelines

General guidelines

You must apply the following marking guidelines to all marking undertaken throughout the marking period. This is to ensure fairness to all learners, who must receive the same treatment. You must mark the first learner in exactly the same way as you mark the last.

- The mark scheme must be referred to throughout the marking period and applied consistently. Do not change your approach to marking once you have been standardised.
- Reward learners positively giving credit for what they have shown, rather than what they might have omitted.
- Utilise the whole mark range and always award full marks when the response merits them.
- Be prepared to award zero marks if the learner's response has no relevant material.
- Do not credit irrelevant material that does not answer the question, no matter how impressive the response might be.
- The marks awarded for each response should be clearly and legibly recorded in the grid on the front of the question paper.
- If you are in any doubt about the application of the mark scheme, you must consult with your Team Leader or the Chief Examiner.

Guidelines for using extended response marking grids

Extended response marking grids have been designed to award a learner's response holistically and should follow a best-fit approach. The grids are broken down into levels, with each level having an associated descriptor indicating the performance at that level. You should determine the level before determining the mark.

When determining a level, you should use a bottom up approach. If the response meets all the descriptors in the lowest level, you should move to the next one, and so on, until the response matches the level descriptor. Remember to look at the overall quality of the response and reward learners positively, rather than focussing on small omissions. If the response covers aspects at different levels, you should use a best-fit approach at this stage, and use the available marks within the level to credit the response appropriately.

When determining a mark, your decision should be based on the quality of the response in relation to the descriptors. Standardisation materials, marked by the Chief Examiner, will help you with determining a mark. You will be able to use exemplar learner responses to compare to live responses, to decide if it is the same, better or worse.

You are reminded that the indicative content provided under the marking grid is there as a guide, and therefore you must credit any other suitable responses a learner may produce. It is not a requirement either, that learners must cover all of the indicative content to be awarded full marks.

Assessment objectives

This unit requires learners to:

AO1	Recall knowledge and show understanding.
AO2	Apply knowledge and understanding.
AO3	Analyse and evaluate knowledge and understanding.

The weightings of each assessment objective can be found in the qualification specification.

SAMPLE

Section 1

Total for this section: 8 marks

Question number	Marking guidance	Total marks
1	Which one of the following bones is located in the upper leg? Answer: A (Femur)	1 AO1=1
2	What type of bone is the sternum? Answer: A (Flat)	1 AO1=1
3	Which one of the following is a long-term effect of exercise? Answer: C (Increased flexibility)	1 AO1=1
4	Which one of the following is a skill-related component of fitness? Answer: C (Coordination)	1 AO1=1
5	Which one of the following muscles causes extension at the knee? Answer: C (Quadriceps)	1 AO1=1
6	Noah is returning to training after an injury. Before his injury he could perform 20 squats in a row, on his return to training, he can perform 15 squats in a row. Which one of the following principles of training has occurred? Answer: B (Reversibility)	1 AO2=1
7	Air flows through the nose/mouth , the pharynx , the larynx and then the... Answer: D (Trachea)	1 AO1=1

8	Which one of the following muscles can be located in the lower leg? Answer: D (Soleus)	1 A01=1
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SAMPLE

Section 2

Total for this section: 51 marks

Question number	Marking guidance	Total marks
9	<p>The human skeleton can be divided into two.</p> <p>Name two bones that can be found in the axial skeleton.</p> <p>Award one mark for each bone.</p> <ul style="list-style-type: none"> • Cranium (1) • Sternum (1) • Ribs (1) • Vertebrae (1) <p>Credit other suitable responses.</p>	<p>2</p> <p>AO1=2</p>
10	<p>Identify and describe two functions of the skeletal system.</p> <p>Award one mark for each function that is identified and one further mark for a description of that function (2x2).</p> <ul style="list-style-type: none"> • Support (1) – Organs are supported by a network of tissues that are connected to the skeleton (1). • Movement (1) – Muscles attach to the skeleton and pull on the bones to produce movement (1). • Protection (1) – The skeleton helps to protect delicate parts of the body by providing a shield around them (1). • Storage of minerals (1) – Bones act as a storage place for mineral which are essential for growth and good health (1). • Blood cell production (1) – Red and white blood cells are formed inside bone marrow (1). • Shape (1) – The skeleton provides a framework to give the body its shape (1). <p>Credit other suitable responses.</p>	<p>4</p> <p>AO1=4</p>
11 (a)	<p>Define the term ‘antagonist’.</p> <p>Award one mark for a correct definition of antagonist.</p> <p>The antagonist is the muscle that relaxes/lengthens (1).</p> <p>Credit other suitable responses.</p>	<p>1</p> <p>AO1=1</p>

<p>11 (b)</p>	<p>Using Figure 1, complete Table 1 by showing the joint action occurring at the elbow from position A to position B (raising) and from position B to position C (lowering) and the agonist muscle that causes this action.</p> <p>Award one mark for each of the following answers.</p> <table border="1" data-bbox="359 450 1209 562"> <tr> <td>Joint action</td> <td>Flexion (1)</td> <td>Extension (1)</td> </tr> <tr> <td>Agonist muscle</td> <td>Bicep (1)</td> <td>Tricep (1)</td> </tr> </table>	Joint action	Flexion (1)	Extension (1)	Agonist muscle	Bicep (1)	Tricep (1)	<p>4</p> <p>AO2=4</p>
Joint action	Flexion (1)	Extension (1)						
Agonist muscle	Bicep (1)	Tricep (1)						
<p>11 (c)</p>	<p>Identify the type of muscle contraction occurring at the agonist from position B to position C. Justify your choice.</p> <p>Award one mark for the identification of the type of muscle contraction and one mark for the justification.</p> <ul style="list-style-type: none"> • Concentric (1) • The agonist (tricep) is contracting/shortening. (1) 	<p>2</p> <p>AO2=1 AO3=1</p>						
<p>12 (a)</p>	<p>Identify the structures of the heart labelled A, B and C.</p> <p>Award one mark for each of the following answers.</p> <p>A = Pulmonary artery (1) B = Ventricle (1) C = Pulmonary vein (1)</p>	<p>3</p> <p>AO1=3</p>						
<p>12 (b)</p>	<p>Outline the structure of capillaries and explain how the structure helps them perform their function.</p> <p>Award two marks for an outline of the structure and two marks for an explanation of how the structure helps the function.</p> <p>Capillaries are the smallest blood vessels in the body (1) and have very thin walls (one cell thick) (1).</p> <p>This helps them assist with gaseous exchange at the lungs (1) as it allows oxygen and carbon dioxide to be diffused more easily (1).</p> <p>Credit other suitable responses.</p>	<p>4</p> <p>AO1=2 AO3=2</p>						

<p>13 (a)</p>	<p>Identify the type of muscular strength that is needed to perform a plank. Justify your choice.</p> <p>Award one mark for identifying the type of strength and one mark for the justification.</p> <p>Static (1)</p> <p>There is no movement occurring in the plank. (1) The muscles are not changing in length. (1)</p> <p>Credit other suitable responses.</p>	<p>2</p> <p>AO2=1 AO3=1</p>
<p>13 (b)</p>	<p>Define flexibility and muscular endurance and give one example of when you would use each in a health and fitness activity.</p> <p>Award one mark for a definition and one mark for an example.</p> <p>Flexibility – the range of movement round a joint (1) for example, a swimmer rotating their arms during front crawl (1).</p> <p>Muscular endurance – the ability of a muscle to repeatedly exert force against resistance (1) for example, doing lunges for 1 minute (1).</p> <p>Credit other suitable responses.</p>	<p>4</p> <p>AO1=2 AO2=2</p>
<p>14 (a)</p>	<p>Analyse the data in Table 2 to identify whose blood pressure is within the ideal range. Justify your choice.</p> <p>Award one mark for identifying whose blood pressure measurement within the ideal range and one mark for the justification.</p> <p>Chris (1)</p> <p>The ideal range is between 90/60 mmHg and 120/80 mmHg. (1)</p> <p>Credit other suitable responses.</p>	<p>2</p> <p>AO3=2</p>

<p>14 (b)</p>	<p>Analyse one factor that could cause an individual’s blood pressure classification to move from ideal to high.</p> <p>Award one mark for an analysis of one factor that could cause a person’s blood pressure classification to move from ideal to high.</p> <ul style="list-style-type: none"> • Activity levels – if an individual goes from active to inactive (1), this will mean that their heart will have to work harder (1), and therefore their blood pressure will increase (1). • Diet – if an individual increases the amount of salt they eat (1), this will mean that they will retain more water (1), and therefore their blood pressure will increase (1). <p>Credit other suitable responses.</p>	<p>3</p> <p>AO3=3</p>
<p>15 (a)</p>	<p>Calculate Lisa’s maximal heart rate (MHR).</p> <p>Award one mark for identifying the MHR equation and two marks for a correct calculation.</p> <p>MHR = 220 – AGE (1)</p> <p>Lisa’s MHR = 220 – 39 (1) = 181 (1) bpm</p> <p>NB Learners do not need to state the unit for heart rate (bpm) for the mark to be awarded.</p>	<p>3</p> <p>AO1=1 AO2=2</p>
<p>15 (b) (i)</p>	<p>Identify and briefly explain what will happen to Lisa’s heart rate once she starts to run.</p> <p>Award one mark for identifying what will happen to Lisa’s heart rate once she starts to run and one mark for a brief explanation.</p> <p>Lisa’s heart rate will increase (1) because the working muscles will need more oxygen (1).</p> <p>Credit other suitable responses.</p>	<p>2</p> <p>AO2=1 AO1=1</p>

<p>15 (b) (ii)</p>	<p>After completing her health and fitness training programme, Lisa's resting heart rate is 68 beats per minute (bpm).</p> <p>Identify and explain what has happened to Lisa's resting heart rate.</p> <p>Award one mark for identifying what has happened to Lisa's resting heart rate and two marks for an explanation about why this has happened.</p> <p>Lisa's resting heart rate has decreased (1).</p> <p>This is because:</p> <ul style="list-style-type: none"> • her heart has become more efficient at pumping blood around her body (1) • her stroke volume has increased (1) • her heart has hypertrophied/increased in size (1). <p>Credit other suitable responses.</p>	<p>3</p> <p>AO3=1 AO1=2</p>
<p>15 (c)</p>	<p>Is the energy produced for Lisa's 20 minute run aerobic or anaerobic? Justify your answer.</p> <p>Award one mark for identifying how energy is produced and two marks for a justification.</p> <p>Aerobic (1)</p> <ul style="list-style-type: none"> • A 20 minute run is a long duration activity and long duration activities of more than one minute use energy produced aerobically (1). • There will be sufficient oxygen available for energy to be produced aerobically (1). <p>Credit other suitable responses.</p>	<p>3</p> <p>AO2=1 AO3=2</p>
<p>15 (d) (i)</p>	<p>Describe the four principles of FITT.</p> <p>Award one mark for a description of frequency, intensity, time and type.</p> <ul style="list-style-type: none"> • Frequency – how often you train (1). • Intensity – how hard you train (1). • Time – how long you train (1). • Type – the methods of training you use (1). 	<p>4</p> <p>AO1=4</p>

<p>15 (d) (ii)</p>	<p>Describe how Lisa could use the principles of FITT to improve her health and fitness programme.</p> <p>Award one mark for each description of how Lisa could use the principles of FITT to improve her health and fitness programme.</p> <ul style="list-style-type: none"> • Frequency – she could increase her running from two to three times a week (1). • Intensity – she could add intervals of high intensity to her run (1). • Time – she could increase her run to 30 minutes (1). • Type – rather than running, she could go swimming (1). <p>Credit other suitable responses. Responses must use the principles of FITT to improve Lisa’s health and fitness programme.</p>	<p>4</p> <p>AO2=4</p>
<p>16</p>	<p>The individual in Figure 4 has kyphosis of the spine.</p> <p>Is this statement true or false?</p> <p>Award one mark for the correct response.</p> <ul style="list-style-type: none"> • False (1) 	<p>1</p> <p>AO3=1</p>

Section 3

Total for this section: 21 marks

17	Discuss whether an individual who is described as fit, can also be described as healthy.		6 AO1=2 AO2=2 AO3=2
	Level	Marks	Description
	3	5 – 6	<p>A wide range of relevant knowledge and understanding is shown, which is accurate and detailed. Subject specific terminology is used consistently throughout.</p> <p>Application of knowledge and understanding is appropriate, with clear relevance to the context.</p> <p>Analysis and evaluation is present and very effective. The conclusions drawn are fully supported by judgements.</p>
	2	3 – 4	<p>A range of relevant knowledge and understanding is shown, but may be lacking in sufficient detail, with a few errors. Subject specific terminology is used, but not always consistently.</p> <p>Application of knowledge and understanding is mostly appropriate, but sometimes lacks clarity, and there may be a few errors.</p> <p>Analysis and evaluation is present and effective, but may be lacking appropriate development. There are attempts to draw conclusions, which are supported by judgements, but it is likely that some will be irrelevant.</p>
	1	1 – 2	<p>A limited range of relevant knowledge and understanding is shown, but is often fragmented. Subject specific terminology, if used, is often inappropriate and a lack of understanding is evident.</p> <p>Application of knowledge and understanding is inappropriate, with any attempt showing fundamental errors.</p> <p>Analysis and evaluation, if present, is of limited effectiveness. Attempts to draw conclusions are seldom successful and likely to be irrelevant.</p>
		0	No relevant material

<p>17 cont'd</p>	<p>Indicative content</p> <ul style="list-style-type: none"> • Health – the condition of the body and the degree to which it is free from illness • Health – a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity • Fitness – the condition of being physically fit and being able to meet the demands of the environment • You can be fit, but not physically healthy, for example a person could have a cold and play in a full football match. • You can be fit, but have poor mental health, for example a person may suffer from depression but goes to the gym regularly. • You can be healthy, but not fit, for example a person could be free from illness, but only manage to play half a netball match because they are tired and not able to play effectively. • You can be fit and healthy, for example a person could be free from illness and play well in a full football match. <p>Other suitable responses must be awarded credit.</p>	
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18	<p>Jasmine is performing a timed sprint drill which requires her to go in and out of cones. Jasmine completes the sprint drill in 23 seconds.</p> <p>Evaluate the importance of cardiovascular endurance and agility when Jasmine is performing the sprint drill.</p>	<p>6</p> <p>AO1=2</p> <p>AO2=2</p> <p>AO3=2</p>												
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<p>Indicative content</p> <ul style="list-style-type: none"> • Cardiovascular endurance – the ability to exercise the whole body for long periods of time. • Agility – the ability to quickly change body position or direction of the body. • This sprint drill does not require cardiovascular endurance because it is a short duration activity. • This sprint drill requires agility because Jasmine needs to change direction quickly to go in and out of the cones. • Agility is important for this drill as Jasmine will be able to change her body position and direction quickly, to get in and out of the cones. • If Jasmine has good agility she may achieve a quicker time. • The need to work for a long period of time is not needed but having a good level of cardiovascular endurance fitness may give Jasmine the foundation of fitness for training for such a drill. • Agility is more important than cardiovascular endurance for a sprint drill, but perhaps not as important as speed and coordination. <p>Other suitable responses must be awarded credit.</p>			

19	Using your knowledge of muscle fibre types and specificity of training, evaluate why an individual who completes a short distance sprint in a quick time may not be as effective at long distance running.	9 AO1=3 AO2=3 AO3=3															
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	<p>Indicative content</p> <ul style="list-style-type: none"> • Type 1 – slow twitch muscle fibres. • Type 1 muscle fibres are red in colour due to large amounts of oxygen, slow to contract and slow to fatigue. • Type 2 – fast twitch muscle fibres. • Type 2 muscle fibres are white in colour, fast to contract and fast to fatigue. • Specificity – training should match the needs of the physical activity in order to bring about improvements • A short distance sprint will use fast twitch muscle fibres. • Fast twitch muscle fibres are quick to fatigue and most suitable for short duration exercise. • Long distance running will use slow twitch muscle fibres. • Slow twitch muscle fibres are slow to fatigue and most suitable for long duration exercise. • An individual who is good at sprinting will have a high number of fast twitch muscle fibres. • An individual who is good at sprinting will train specifically for the key requirements for sprinting rather than the key requirements for long distance running. • Sprint training will train fast twitch muscle fibre types as the duration of sprinting is shorter and therefore will not need oxygen to perform and requires fast bursts of power. • Fast twitch muscle fibres are not suitable for long duration activities, such as long distance running, as they fatigue quickly. • An individual who is good at sprinting will probably have a lower number of slow twitch muscle fibres. • To be effective at long distance running an individual would need to have more slow twitch muscle fibres. • If an individual who was good at sprinting wanted to get better at long distance running, they would need to change their training to concentrate on developing slow twitch muscle fibre types. This is a long term effect. <p>Other suitable responses must be awarded credit.</p>	
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Assessment Objective Grid

Question	AO1	AO2	AO3	Total
Section 1				
1	1			1
2	1			1
3	1			1
4	1			1
5	1			1
6		1		1
7	1			1
8	1			1
Total	7	1	0	8
Section 2				
9	2			2
10	4			4
11 (a)	1			1
11 (b)		4		4
11 (c)		1	1	2
12 (a)	3			3
12 (b)	2		2	4
13 (a)		1	1	2
13 (b)	2	2		4
14 (a)			2	2
14 (b)			3	3
15 (a)	1	2		3
15 (b) (i)	1	1		2
15 (b) (ii)	2		1	3
15 (c)		1	2	3
15 (d) (i)	4			4
15 (d) (ii)		4		4
16			1	1
Total	22	16	13	51
Section 3				
17	2	2	2	6
18	2	2	2	6
19	3	3	3	9
Total	7	7	7	21
Paper Total	36	24	20	80