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

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

P002297

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Mark Scheme

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 creditworthy 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 reverse 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. You must also consider the relative weightings of the assessment

objectives, so as not to over/under credit a response. 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.

Qu	Mark scheme	Total marks

Section 1 **Total for this section: 8 marks**

1	**Which** one **of the following regions of the spine is positioned** directly above **the sacrum region?** Answer: **C** (Lumbar)	1 **AO1=1**
2	**Which type of joint is found at the hip?** Answer: **A** (Ball and socket)	1 **AO1=1**
3	**What is 'vital capacity'?** Answer: **C** (The maximum amount of air you can exhale after taking the deepest inspiration)	1 **AO1=1**
4	**Which** one **of the following occurs during vasoconstriction?** Answer: **A** (Narrowing of the blood vessels)	1 **AO1=1**
5	**What is 'stroke volume'?** Answer: **B** (The volume of blood that leaves the heart during each contraction)	1 **AO1=1**
6	**In the pathway of air through the respiratory system, which** one **of the following comes** after **the larynx when breathing in?** Answer: **D** (Trachea)	1 **AO1=1**
7	**Veins are one type of blood vessel in the human body.** **Which** one **of the following statements is true?** Answer: **B** (Veins contain valves to ensure blood flows in one direction)	1 **AO1=1**

8	**Which** one **of the following activities would be best suited to Type 2 muscle fibres?** Answer: **C** (Sprinting for 20 metres)	**1** **AO2=1**

Section 2 **Total for this section: 51 marks**

9	Figure 1 **shows a cross section of the heart.** **Identify the structures of the heart labelled** A, B **and** C **in** Figure 1**.** Award one mark for each of the following answers. A = Right Atrium (1). B = Pulmonary vein (1). C = Left ventricle (1).	**3** **AO1=3**

10 (a)	**Give** one **example of** each **of the following types of bones:** **1. flat** **2. irregular** **3. short.** Award one mark for each correct example. • Flat – scapula (1), sternum (1), ribs (1). • Irregular – vertebrae (1). • Short – carpals (1), tarsals (1). Credit other suitable responses.	**3** **AO1=3**

10 (b)	Figure 2 **shows a knee joint.** **Identify the structures of the knee joint labelled** A, B **and** C **in** Figure 2. Award one mark for each of the following answers. A = Femur / Bone (1). B = Synovial fluid (1). C = Articulating cartilage (1).	**3** **AO1=3**

10 (c)	**Identify** one **type of movement that occurs at the knee joint.** **Give** two **different examples from health and fitness activities of when this type of movement occurs.** Award one mark for a type of movement that occurs at the knee joint (AO1) and up to two marks for correct examples from health and fitness activities (AO2). • Flexion (1) – downward phase of a squat (1), bending the knee when running (1). • Extension (1) – upward phase of a squat (1), straightening the knee when running (1). Credit other suitable responses. **NB:** Marks can only be awarded for the movements from activities if they are examples of a correct movement type. Activities must be specific	**3** **AO1=1** **AO2=2**

11 (a)	Figure 3 **shows muscles in the human body.** **Identify the muscles labelled** A, B **and** C **in** Figure 3. Award one mark for each of the following answers. A = Deltoid (1). B = Hamstrings (1). C = Gastrocnemius (1).	**3** **AO1=3**

11 (b)	**Skeletal muscle is a type of muscle in the body.** **Name the** two other **types of muscles in the body.** **Explain how their function in the body supports an individual participating in health and fitness activities.** Award two marks for each type of muscle correctly stated and two further marks for explanations of their function in the body when participating in health and fitness activities. • Cardiac (1) aids blood flow through the heart, which provides the oxygen for the body to exercise (1). • Smooth (1) aids with digestion so that there is a supply of energy for exercise (1).	**4** **AO1=2** **AO2=2**
	Credit other suitable responses. **NB:** Explanation of the function must indicate how it helps an individual doing health and fitness activities.	

11 (c)

Table 1 **shows a type of muscle contraction.**

Complete the table to show two other **types of muscle contraction.**

Give one **example** and **justification for each.**

Award one mark for each correct response.

6

AO1=2

AO2=2

AO3=2

Table 1

Muscle contraction	Example of health and fitness activity	Justification
Concentric (1).	Upward phase of a bicep curl (1).	The bicep muscle shortens as it contracts to bend at the elbow (1).
Isometric (1).	Plank (1).	Many of the body's muscles are contracting but they remain the same length / aren't moving (1).

NB – if muscle contraction is incorrect or blank, no marks can be awarded for correct responses in columns 2 and 3.

Credit other suitable responses.

12

Define the following components of fitness:

1. **flexibility**
2. **muscular endurance**

6

AO1=3

AO2=3

	3. power. **Give** one **example of when you would use** each **in a health and fitness activity.** Award one mark for each correct definition and one mark for each correct example. • Flexibility – the range of movement around a joint (1) for example, performing a lunge in a fitness circuit (1). • Muscular endurance – the ability of a muscle (or muscle groups) to undergo repeated contractions avoiding fatigue (1) for example an individual completing 30 press-ups (1). • Power – the product of strength and speed (1) for example, an individual completing a sprint (1). Credit other suitable responses.	

13	**Identify the type of muscular strength that is needed when completing a standing long jump.** **Justify your choice**. Award one mark for identifying the type of muscular strength and two marks for the justification. • Explosive (1). • Strength needs to be exerted at speed (1). • Strength is being exerted at maximal force (1). Credit other suitable responses. **NB:** If 0 marks are awarded for responses relating to the type of strength, 0 marks can be awarded for the justification.	**3** **AO2=1** **AO3=2**

14	**State which energy system will be the main energy provider when swimming 800 m.** **Justify your choice.** Award one mark for identifying the main energy provider and two marks for the justification. • Aerobic (1). • It is a long duration activity (of more than 60 seconds) (1). • It is dependent on oxygen (1).	**3** **AO2=1** **AO3=2**

	Credit other suitable responses. **NB:** If 0 marks are awarded for responses relating to the energy provider, 0 marks can be awarded for the justification.	

15	**Identify a different health and fitness activity that each of the following body types may be suitable for:** **1. ectomorph** **2. endomorph** **3. mesomorph.** **Justify your choices.** Award one mark for each correct activity and one mark for the justification. Ectomorph • Activity - long distance running (1). • Justification - they have little body weight to carry around so it will make it easier for them to run long distances (1). Endomorph • Activity - weightlifting (1). • Justification - their large body size gives them the physical strength to lift heavy weights (1). Mesomorph • Activity - CrossFit (1). • Justification - they have muscular bodies which will be beneficial when carrying out the whole-body exercises in CrossFit (1). Credit other suitable responses. **NB:** Accept suitable sporting examples where learners provide these.	**6** **AO2=3** **AO3=3**

16	**An increase in flexibility and changing body shape are two long-term effects of exercise on the body.** **Identify** two other **long-term effects of exercise on the body.**	**4** **AO1=2** **AO2=2**

	Explain how each **long-term effect you have identified will help improve the performance of someone taking part in health and fitness activities.** Award one mark for each long-term effect and one mark for how each long-term effect helps improve performance of someone taking part in health and fitness activities. • Increased cardiovascular endurance (1) – which means they will be able to run further or longer or last longer in activities before fatiguing (1). • Improved efficiency to use oxygen (1) – therefore breathing will not increase as much so the onset of fatigue will be delayed (1). • Lower blood pressure (1) – heart is not having to work as hard when pumping out blood which makes exercising easier on the body (1). • Lower resting heart rate (1) – which means the heart is more efficient in pumping blood so will take longer to fatigue during exercise (1). • Greater muscular endurance (1) – which means an individual's muscles can work for longer in an activity without fatiguing (1). • Greater muscular strength (1) – so an individual could lift heavier weights as part of a weight training programme (1). • Muscle hypertrophy (1) – the heart can grow in size so it pumps more blood out per beat which means an individual will not be working as hard so early on in participation (1). • Increased number of red blood cells (1) – this increases oxygen carrying capacity of the blood and enables an individual to work harder for longer (1). Credit any other suitable responses.	

17	**Discuss the importance of posture when taking part in health and fitness activities.** Award one mark for each discursive point, up to a maximum of four marks. • Good posture allows your muscles to work efficiently so technique of an action will be of a high standard (1). • Good posture places your body in a position where the stress on supporting ligaments, tendons and muscles is limited (1).	**4** **AO3=4**

	• Poor posture means your muscles are unable to work properly which means an individual may develop an injury (1). • Good posture allows your muscles to work efficiently so they fatigue less quickly (1). Credit other suitable responses.	

Section 3 **Total for this section: 21 marks**

18 **Jacob can currently run 1 mile in 10 minutes.**

Explain how Jacob could use the FITT (Frequency, Intensity, Time and Type) principles to try and run 1 mile in a quicker time.

6

AO1=2

AO2=2

AO3=2

Level	Marks	Description
3	5–6	A wide range of relevant knowledge and understanding is shown, which is accurate and detailed. Subject specific terminology is used consistently throughout. Application of knowledge and understanding is appropriate, with clear relevance to the context. Analysis and evaluation are present and very effective. The conclusions drawn are fully supported by judgements.
2	3–4	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. Application of knowledge and understanding is mostly appropriate, but sometimes lacks clarity, and there may be a few errors. Analysis and evaluation are 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.
1	1–2	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. Application of knowledge and understanding is inappropriate, with any attempts showing fundamental errors. Analysis and evaluation, if present, are of limited effectiveness. Attempts to draw conclusions are seldom successful and likely to be irrelevant.
	0	No creditworthy material.

Indicative content

Frequency - refers to how often someone trains:

- to help improve fitness Jacob could increase the number of times per week that he trains for example, from 3 times to 4 times per week
- as Jacob's fitness improves his body will be able to cope with more training sessions per week
- this increased level of fitness could result in him running a faster time for 1 mile as his body can cope with running faster.

Intensity - refers to how hard someone trains:

- to help improve fitness Jacob could increase the intensity of his training sessions
- this could involve running at a faster pace / running further distances throughout sessions to develop aerobic fitness
- training at faster paces could lead to Jacob being able to then repeat this and run a faster time for 1 mile
- training at greater distances would then mean that Jacob would have no problem in coping with a 1 mile run so his time could improve.

Time - refers to how long someone trains for:

- to help improve fitness Jacob could increase the length of his training sessions for example, 30 minutes to 45 minutes

- this will allow Jacob's fitness to develop and cope with exercising for longer periods of time.

Type - refers to the type of training used:

- the training being carried out must be suitable to gain specific fitness benefits that are required
- Jacob could focus his training on continuous running, fartlek training, interval training or circuit training which improves aerobic fitness
- by developing aerobic fitness then Jacob's time for a 1 mile run could be reduced.

Credit other suitable responses.

19 **Jessica has been to the doctor and her blood pressure has been measured at 150/100 mmHg.**

Discuss whether this blood pressure level is healthy and **give reasons why it may be at this level.**

6

AO1=2

AO2=2

AO3=2

Level	Marks	Description
3	5–6	A wide range of relevant knowledge and understanding is shown, which is accurate and detailed. Subject specific terminology is used consistently throughout. Application of knowledge and understanding is appropriate, with clear relevance to the context. Analysis and evaluation are present and very effective. The conclusions drawn are fully supported by judgements.
2	3–4	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. Application of knowledge and understanding is mostly appropriate, but sometimes lacks clarity, and there may be a few errors.

		Analysis and evaluation are 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.
1	1–2	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. Application of knowledge and understanding is inappropriate, with any attempt showing fundamental errors. Analysis and evaluation, if present, are of limited effectiveness. Attempts to draw conclusions are seldom successful and likely to be irrelevant.
	0	No creditworthy material.

Indicative content

- The ideal blood pressure range is between 90/60 mmHg and 120/80 mmHg.
- A blood pressure of 150/100 mmHg is deemed as high.
- This is unhealthy and could lead to an individual suffering from many illnesses for example, heart disease.
- It will also mean that an individual will struggle to exercise as the strain of the blood pressure on the body is too great.
- Low physical activity levels:
  - people who are inactive tend to have higher resting heart rates. The higher your resting heart rate, the harder your heart must work with each contraction and the stronger the force on your arteries. Lack of physical activity also increases the risk of being overweight.

- Diet:
  - too much fat in your diet could cause narrowing of the arteries which increases blood pressure. The thinner vessels will have more pressure on them as blood is pumped through them
  - too much salt (sodium) in your diet can cause your body to retain fluid, which increases blood pressure

	- too little potassium in your diet. Potassium helps balance the amount of sodium in your cells. If you don't get enough potassium in your diet or retain enough potassium, you may accumulate too much sodium in your blood - a poor diet could have caused the individual to be overweight or obese. The more you weigh, the more blood you need to supply oxygen and nutrients to your tissues. As the volume of blood circulating through your blood vessels increases, so does the pressure on your artery walls. • Age: - the risk of high blood pressure increases as you age. Until about age 64, high blood pressure is more common in men. Women are more likely to develop high blood pressure after age 65. • Stress: - high levels of stress can lead to a temporary increase in blood pressure. If you try to relax by eating more, using tobacco or drinking alcohol, you may only increase problems with high blood pressure. Credit other suitable responses.	

20	**Support is one function of the skeleton.** **Analyse how the** other **functions of the skeletal system assist someone taking part in health and fitness activities.**			**9** **AO1=3** **AO2=3** **AO3=3**
	Level	**Marks**	**Description**	
	3	7–9	A wide range of relevant knowledge and understanding is shown, which is accurate and detailed. Subject specific terminology is used consistently throughout. Application of knowledge and understanding is appropriate, with clear relevance to the context. Analysis and evaluation are present and very effective. The conclusions drawn are fully supported by judgements.	
	2	4–6	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. Application of knowledge and understanding is mostly appropriate, but sometimes lacks clarity, and there may be a few errors. Analysis and evaluation are 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.
	1	1–3	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. Application of knowledge and understanding is inappropriate, with any attempt showing fundamental errors. Analysis and evaluation, if present, are of limited effectiveness. Attempts to draw conclusions are seldom successful and likely to be irrelevant.
		0	No creditworthy material.

Indicative content

Movement:

- muscles are attached to bones via tendons
- bones are connected in the skeleton by joints
- by bones and muscles working together at joints, movement occurs which allows an individual to participate in health and fitness activities.

Shape:

- the skeleton gives us our general shape, such as height and build
- tall people have longer bones, and larger vertebrae

	• people with a heavy build have larger clavicles and bigger pelvises • shape defines the type of somatotype an individual is • somatotype could affect which activities an individual participates in for example, mesomorph may be suited to CrossFit • shape or somatotype may help an individual to perform better in a particular activity for example, ectomorph may perform better at long distance running. Protection of vital organs: • certain parts of the skeleton surround and protect the body's organs from external forces for example, brain is protected by the cranium, heart and lungs are protected by the ribs • this helps individuals when they are taking part in contact activities for example, boxing / rugby • prevents serious injury which allows an individual to participate in these types of activities. Storage of minerals: • bone stores several minerals including calcium • calcium helps to keep bones strong which helps the body to keep its structure • strong bones allow the body to take part in vigorous and contact activities without the fear of breaking easily. Blood cell production: • the inner marrow of bones produce red and white blood cells • red blood cells are important in activities because they carry oxygen to the working muscles • this allows the body to take part in health and fitness activities for long periods of time • white blood cells are important to fight off infections to keep the body healthy • if an individual is free from illness, then they can participate in health and fitness activities more easily.	

	Credit other suitable responses.	

Assessment Objective Grid

Question	AO1	AO2	AO3	Total
1	1			1
2	1			1
3	1			1
4	1			1
5	1			1
6	1			1
7	1			1
8		1		1
9	3			3
10a	3			3
10b	3			3
10c	1	2		3
11a	3			3
11b	2	2		4
11c	2	2	2	6
12	3	3		6
13		1	2	3
14		1	2	3
15		3	3	6
16	2	2		4
17			4	4
18	2	2	2	6

19	2	2	2	6
20	3	3	3	9
Total	**36**	**24**	**20**	**80**