



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

Paper number: P001400
November 2021

Mark Scheme

v1.0 Pre-Standardisation

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 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. 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
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Section A

Total for this section: 8 marks

1	<p>Which one of the following muscles is located in the chest?</p> <p>Answer: C (Pectoralis major)</p>	<p>1</p> <p>AO1=1</p>
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2	<p>What is the function of a ligament at a joint?</p> <p>Answer: B (To hold bones in place)</p>	<p>1</p> <p>AO1=1</p>
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3	<p>Which one of the following occurs when breathing out?</p> <p>Answer: C (The diaphragm relaxes and the chest contracts)</p>	<p>1</p> <p>AO1=1</p>
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4	<p>Which one of the following is a long-term effect of exercise?</p> <p>Answer: B (Decreased resting heart rate)</p>	<p>1</p> <p>AO1=1</p>
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5	<p>Which one of the following regions is positioned at the top of the spine?</p> <p>Answer: A (Cervical)</p>	<p>1</p> <p>AO1=1</p>
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6	<p>Arteries are one type of blood vessel in the human body.</p> <p>Which one of the following statements is true?</p> <p>Answer: C (Arteries have thick, muscular, and elastic walls)</p>	<p>1</p> <p>AO1=1</p>
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7	<p>Which one of the following heart chambers receives deoxygenated blood from the right atrium?</p> <p>Answer: D (Right ventricle)</p>	<p>1</p> <p>AO2=1</p>
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8	<p>Tanveer is 23 years old.</p> <p>Which one of the following would be his predicted maximum heart rate (MHR)?</p> <p>Answer: A (197)</p>	<p>1</p> <p>AO2=1</p>
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Section 2

Total for this section: 51 marks

9 (a)	<p>Give one example of a short bone.</p> <p>Award one mark for the naming of a correct bone.</p> <ul style="list-style-type: none"> • Carpals (1) • Tarsals (1). <p>Credit other suitable responses.</p>	<p>1</p> <p>AO1=1</p>
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9 (b)	<p>State the main function of a short bone.</p> <p>Award one mark for stating the main function of a short bone.</p> <ul style="list-style-type: none"> • Provide support and stability with little movement (1). • Fine movements(1) – <i>however the response must include the word fine (or similar)</i> <p>Credit other suitable responses.</p>	<p>1</p> <p>AO1=1</p>
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9 (c)	<p>Complete Table 1 by describing each function of the skeletal system.</p> <p>Award one mark for a description of each skeletal system function, up to four marks.</p> <ul style="list-style-type: none"> • Blood cell production: Red and white blood cells are formed inside bone marrow (1) • Protection: The skeleton helps to protect vital organs by providing a shield around them (1) • Storage: Bones act as a storage place for minerals which are essential for growth and good health (1) • Support: Organs are supported by a network of tissues that are connected to the skeleton OR keeps the body upright (1). <p>Credit other suitable responses.</p>	<p>4</p> <p>AO1=4</p>
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<p>10 (a)</p>	<p>Figure 1 shows a diagram of the spine.</p> <p>State the postural condition shown.</p> <p>Kyphosis (1).</p>	<p>1</p> <p>AO3=1</p>
<p>10 (b)</p>	<p>An individual is taking part in health and fitness activities.</p> <p>Outline why posture is important.</p> <p>Award one mark for each correct point of why posture is important when taking part in health and fitness activities, up to four marks.</p> <ul style="list-style-type: none"> • 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) • 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). <p>NB If a learner relates their answer to one specific health and fitness action, credit correct answers where appropriate.</p> <p>Credit other suitable responses.</p>	<p>4</p> <p>AO3=4</p>
<p>11 (a)</p>	<p>Describe the term ‘health’.</p> <p>Award one mark for a correct description.</p> <ul style="list-style-type: none"> • A state of complete physical, mental, and social wellbeing (and not merely the absence of disease) (1). <p>Credit other suitable responses.</p>	<p>1</p> <p>AO1=1</p>
<p>11 (b)</p>	<p>Describe the term ‘fitness’.</p> <p>Award one mark for a correct description.</p> <ul style="list-style-type: none"> • The ability to cope with daily demands (without suffering undue fatigue) (1). <p>Credit other suitable responses.</p>	<p>1</p> <p>AO1=1</p>

<p>11 (c)</p>	<p>Define flexibility and reaction time and give one example of each in a health and fitness activity.</p> <p>Award one mark for a definition and one mark for an example.</p> <ul style="list-style-type: none"> Flexibility: the range of movement around a joint (1) for example, performing a lunge in a fitness circuit (1). Reaction time: the time taken to initiate a response to stimulus (1) for example, an individual reacting to the stimulus of a gun / whistle to start a race (1). <p>Credit other suitable responses.</p> <p>NB – if a sporting example is provided, it must be a specific example that is relevant. Identifying a sport e.g. gymnastics should not be awarded.</p>	<p>4</p> <p>AO1=2</p> <p>AO2=2</p>
<p>12 (a)</p>	<p>Explain what is meant by:</p> <ol style="list-style-type: none"> systolic blood pressure diastolic blood pressure. <p>Award one mark for each definition.</p> <ol style="list-style-type: none"> Systolic blood pressure: the higher blood pressure measurement that occurs when the heart beats, pushing blood through the arteries (1) Diastolic blood pressure: the lower blood pressure measurement that occurs when the heart rests between beats (1). 	<p>2</p> <p>AO1=2</p>
<p>12 (b)</p>	<p>State and describe two factors that affect blood pressure.</p> <p>Award one mark for each factor that is identified and one further mark for a description of that factor (2x2).</p> <ul style="list-style-type: none"> Activity levels (1): low levels of physical activity can lead to a higher resting heart rate and as a result a rise in blood pressure (1) Diet (1): high levels of salt or fat can cause fluid levels to rise in the body which may increase your blood pressure (1) Age (1): blood pressure increases as you get older (1) Stress (1): hormones released when stressed can increase your heart rate and make blood vessels narrow which causes blood pressure to increase (1). <p>NB Credit the opposite of these descriptions.</p> <p>Credit other suitable responses.</p>	<p>4</p> <p>AO1=2</p> <p>AO2=2</p>

13 (a)	<p>Define ‘body composition’.</p> <p>Award one mark for a correct definition.</p> <ul style="list-style-type: none"> • A comparison of the percentages of fat and muscle (water and bone) within the body (1). 	<p>1</p> <p>AO1=1</p>
13 (b)	<p>Describe a mesomorph body shape.</p> <p>Award up to two marks for describing a mesomorph body shape.</p> <ul style="list-style-type: none"> • Wide shoulder (1) • Narrow hips (1) • Muscular (1). <p>Credit other suitable responses.</p>	<p>2</p> <p>AO1=2</p>
13 (c)	<p>Identify a health and fitness activity suitable for the following body types:</p> <ol style="list-style-type: none"> 1. ectomorph 2. endomorph <p>Justify your answer.</p> <p>Award one mark for each correct activity and one mark for the justification.</p> <p>Ectomorph</p> <ul style="list-style-type: none"> • 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). <p>Endomorph</p> <ul style="list-style-type: none"> • Activity: weightlifting (1). • Justification: their large body size gives them the physical strength to lift heavy weights (1). <p>Credit other suitable responses. Accept suitable sporting examples where learners provide these.</p> <p>NB If 0 marks are awarded for the response for the health and fitness activity, 0 marks can be awarded for the justification.</p>	<p>4</p> <p>AO2=2</p> <p>AO3=2</p>
14 (a)	<p>Define the term ‘joint’.</p>	<p>1</p>

	<p>Award one mark for a correct definition.</p> <ul style="list-style-type: none"> • A joint is where two or more bones meet (1). <p>Credit other suitable responses.</p>	AO1=1
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14 (b)	<p>Give one example of each of the following types of joint:</p> <ol style="list-style-type: none"> 1. condyloid 2. pivot 3. saddle <p>Award one mark for each correct example.</p> <ul style="list-style-type: none"> • Condyloid: wrist (1), fingers (1) • Pivot: vertebrae (1), neck (1) • Saddle: thumb (1). <p>Credit other suitable responses.</p>	<p>3</p> <p>AO1=3</p>
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14 (c)	<p>Figure 2 shows two movements (A to B and B to C) that occur at the knee.</p> <p>Complete Table 2. Identify the joint action occurring at the knee from position A to B (lowering) and from B to C (raising).</p> <p>Identify the agonist muscle in the movement at the knee from position A to B (lowering) and from position B to C (raising).</p> <p>Award one mark for each of the following answers.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;"></th> <th style="width: 35%; text-align: center;">A to B</th> <th style="width: 35%; text-align: center;">B to C</th> </tr> </thead> <tbody> <tr> <td>Joint action</td> <td style="text-align: center;">Extension (1)</td> <td style="text-align: center;">Flexion (1)</td> </tr> <tr> <td>Agonist muscle</td> <td style="text-align: center;">Quadriceps (1)</td> <td style="text-align: center;">Hamstrings (1)</td> </tr> </tbody> </table>		A to B	B to C	Joint action	Extension (1)	Flexion (1)	Agonist muscle	Quadriceps (1)	Hamstrings (1)	<p>4</p> <p>AO2=4</p>
	A to B	B to C									
Joint action	Extension (1)	Flexion (1)									
Agonist muscle	Quadriceps (1)	Hamstrings (1)									

14 (d)	<p>Using Figure 2, identify the type of muscle contraction occurring at the agonist muscle from position A to position B.</p> <p>Justify your answer.</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 (quadriceps) is shortening (1). 	<p>2</p> <p>AO2=1</p> <p>AO3=1</p>
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	<p>Credit other suitable responses. NB If 0 marks are awarded for the muscle contraction, 0 marks can be awarded for the justification.</p>	
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<p>15 (a)</p>	<p>Cardiac muscle is one type of muscle in the body.</p> <p>State the other two types of muscles and explain how their function in the body helps an individual doing health and fitness activities.</p> <p>Award two marks for each type of muscle correctly stated and two further marks for descriptions of their function in the body when taking part in health and fitness activities.</p> <ul style="list-style-type: none"> • Skeletal (1) contract to move bones in our body during health and fitness activities (1) • Smooth (1) aids with digestion so that there is a supply of energy for exercise (1). <p>Credit other suitable responses.</p> <p>NB AO2 marks should only be awarded if a link to health and fitness activities is explained.</p> <p>If 0 marks are awarded for the muscle type, 0 marks can be awarded for the justification.</p>	<p>4</p> <p>AO1=2</p> <p>AO2=2</p>
<p>15 (b)</p>	<p>Identify the type of muscular strength that is needed when jogging for 10 minutes.</p> <p>Justify your answer.</p> <p>Award one mark for identifying the type of muscular strength and two marks for the justification.</p> <ul style="list-style-type: none"> • Dynamic (1) • Repeated contractions applied to propel the body (1) • Moving for a prolonged period of time (1). <p>Credit other suitable responses.</p> <p>NB If 0 marks are awarded for the type of muscular strength, 0 marks can be awarded for the justification</p>	<p>3</p> <p>AO2=1</p> <p>AO3=2</p>
<p>15 (c)</p>	<p>State which energy system will be the main energy provider when jogging for 10 minutes.</p> <p>Justify your answer.</p> <p>Award one mark for identifying the main energy provider and three marks for a justification.</p> <ul style="list-style-type: none"> • Aerobic (1) 	<p>4</p> <p>AO2=1</p> <p>AO3=3</p>

	<ul style="list-style-type: none"> • A 10-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) • Jogging is a low- to medium-intensity activity, which the aerobic system provides energy for (1). <p>Credit other suitable responses.</p> <p>NB If 0 marks are awarded for the identification of the main energy provider, 0 marks can be awarded for the justification.</p>	
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Section 3

Total for this section: 21 marks

16	<p>Oscar is trying to improve the number of star jumps he can perform in 30 seconds as part of a fitness circuit.</p> <p>Evaluate the importance of explosive strength and balance when Oscar is performing the star jumps.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">Level</th> <th style="width: 10%;">Marks</th> <th style="width: 80%;">Description</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">5–6</td> <td> <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> </td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">3–4</td> <td> <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</p> </td> </tr> </tbody> </table>	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</p>	<p>6</p> <p>AO1=2</p> <p>AO2=2</p> <p>AO3=2</p>
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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 creditworthy material

Indicative content:

Explosive strength

- Ability to exert a maximal amount of force in the shortest possible time interval
- Helps Oscar to perform the star jumps quickly
- Enables Oscar to get his body off the ground
- Enables Oscar’s arms and legs to get into star position and back to normal before he lands on the ground
- Quick movements will enable more star jumps to be completed in 30 seconds.

Balance

- The maintenance of the centre of mass over the base of support
- Balance is needed when the body lands after a jump so that Oscar doesn’t fall over
- If Oscar is balanced when he lands, he will be ready to start the next star jump quicker, which will mean he can increase the number of star jumps he can complete in 30 seconds
- Balance is needed when Oscar is in the air completing the star jump. If he leans forward or back too much it will mean his body isn’t over the centre of support. This could lead to more time being taken to start the next star jump leading to a lower number of star jumps completed.

Explosive strength and balance

- are both important for Oscar if he is trying to increase the number of star jumps he can complete in 30 seconds. They work in combination to help Oscar achieve his goal.

Credit other suitable responses.

17	Using your knowledge of muscle fibre types, evaluate why an individual who completes a long-distance run in a fast time may not be as effective at short-distance sprinting.	6 AO1=2 AO2=2 AO3=2															
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	<p>Indicative content:</p> <ul style="list-style-type: none"> • Type 1: slow-twitch muscle fibres <ul style="list-style-type: none"> - Muscle fibres are red in colour due to large amounts of oxygen - Slow to contract and slow to fatigue - Most suitable for long duration exercise - Long-distance running will use slow-twitch muscle fibres. • Type 2: fast-twitch muscle fibres <ul style="list-style-type: none"> - Muscle fibres are white in colour - Fast to contract and fatigue quickly - Most suitable for short duration exercise - A short-distance sprint will use fast-twitch muscle fibres. • An individual who is good at long-distance running will have a high number of slow-twitch muscle fibres • This will mean they will be able to run faster times over long distances as their muscles will not fatigue quickly • However, as their muscle fibres will be contracting slowly it will mean they are not suited to short-distance sprinting as their muscle fibres contract slowly • Individuals with high levels of fast-twitch fibres would be more suited to short-distance sprinting. <p>Credit other suitable responses.</p>	
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18	<p>Health and fitness activities can be designed to improve muscular endurance.</p> <p>Discuss the importance of the principles of training in designing these activities.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">Level</th> <th style="width: 10%;">Marks</th> <th style="width: 80%;">Description</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">7–9</td> <td> <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> </td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">4–6</td> <td>A range of relevant knowledge and understanding is shown, but may be lacking in sufficient detail, with a few errors. Subject</td> </tr> </tbody> </table>	Level	Marks	Description	3	7–9	<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	4–6	A range of relevant knowledge and understanding is shown, but may be lacking in sufficient detail, with a few errors. Subject	<p>9</p> <p>AO1=3</p> <p>AO2=3</p> <p>AO3=3</p>
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2	4–6	A range of relevant knowledge and understanding is shown, but may be lacking in sufficient detail, with a few errors. Subject									

		<p>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	1–3	<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 creditworthy material

Indicative content:

Muscular Endurance

- The ability of a muscle or muscle group to undergo repeated contractions avoiding fatigue.
- Can be improved by lifting light weights with lots of repetitions when doing weight training.
- Can be improved by doing activities such as plank, lunges, sit-ups.

Specificity

- The health and fitness activities need to be specific to the parts of the body where an individual wants to improve muscular endurance.
- Therefore, health and fitness activities need to be specific to improving muscular endurance

	<p>Progression</p> <ul style="list-style-type: none"> • The health and fitness activities need to gradually progress and become harder. • It is important that the activities do not increase too much, too fast. If this happens injury or burn out could occur. • Overload involves working harder than normal. <p>Improving muscular endurance can be achieved by:</p> <ul style="list-style-type: none"> • increasing the frequency (how many times a week you train) • increasing the intensity (how hard you train) • increasing the time (how long you train for). • all of these can be increased during health and fitness training activities so that an individual will see increased muscular endurance. • if the body does not work harder than normal then improvements in muscular strength may not occur. <p>Reversibility</p> <ul style="list-style-type: none"> • if training is stopped then any gains made through health and fitness activities will be lost. • there should be no long breaks in the activities otherwise muscular endurance will be lost. • this will mean that training might not be relevant to the muscular endurance of the individual. <p>Tedium</p> <ul style="list-style-type: none"> • the health and fitness activities need to be varied to prevent boredom. • the exercises should be changed regularly otherwise the individual may become demotivated due to boredom. • this may mean they give up/don't try as hard which will mean that muscular endurance will be lost. • It is important that all principles of training are applied to health and fitness activities to improve muscular endurance or it may not improve. • A suitable level of progression could be applied, but if the activities are not specific to the individual then it is irrelevant. • The activities could be specific to the individual, but if the overload that is applied is too little or too much then improvements in muscular endurance will not be seen. • Therefore, one principle of training is no more important than another as they are all linked together. <p>Credit other suitable responses.</p>	
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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
9a	1			1
9b	1			1
9c	4			4
10a			1	1
10b			4	4
11a	1			1
11b	1			1
11c	2	2		4
12a	2			2
12b	2	2		4
13a	1			1
13b	2			2
13c		2	2	4
14a	1			1
14b	3			3
14c		4		4
14d		1	1	2
15a	2	2		4
15b		1	2	3
15c		1	3	4
16	2	2	2	6
17	2	2	2	6
18	3	3	3	9
Total	36	24	20	80