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<tr>
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<tr>
<td>MB3</td>
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<td>Marking commentary on MB3 sample learner work</td>
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<tr>
<td>Why it was awarded MB3 not MB2</td>
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<tr>
<td><strong>Learning Objective 3</strong> – Be able to assess the short-term effects of physical activity on the musculo-skeletal and cardio-respiratory systems</td>
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<td>Marking commentary on MB3 sample learner work</td>
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<tr>
<td>Why it was awarded MB3 not MB2</td>
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<td>31</td>
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</tbody>
</table>
Learning Objective 4 – Be able to assess the long-term effects of physical activity on the musculo-skeletal and cardio-respiratory systems

MB3

Marking commentary on MB3 sample learner work
Why it was awarded MB3 not MB2
INTRODUCTION

This is a guide for teachers so that you can see how we would mark work. Cambridge Nationals are designed to give the learners the project and let them create the work.

The guide contains sample learner work for this unit and covers all learning objectives, graded at Marking Band 1 (MB1) and Marking Band 3 (MB3).

The accompanying commentary explains why each piece of work was awarded its grade.

For MB1 graded work, additional guidance has been added to suggest improvements that could be made to make it an MB2 graded piece of work.

For MB3 graded work, additional guidance has been added to explain why it was awarded that grade and not the lower grade of MB2.

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Learning Objective 1 – Know the key components of the musculo-skeletal and cardio-respiratory systems, their functions and roles

MB1

The skeletal system

Identify the basic parts of the skeletal system:

(1) __________________________________________
(2) __________________________________________
(3) __________________________________________
(4) __________________________________________
(5) __________________________________________
(6) __________________________________________
(7) __________________________________________
(8) __________________________________________
(9) __________________________________________
(10) __________________________________________
(11) __________________________________________
(12) __________________________________________
(13) __________________________________________
(14) __________________________________________

Above is a diagram of the skeletal system. The bones are:
1 – skull; 2 – clavicle; 3 – scapula; 4 – ribs; 7 – humerus; 8 – vertebra; 9 - ulna
10 – radius; 11 – pelvis; 12 – femur; 13 – tibia; 14 – fibia
Muscular system evidence is on the witness statement.

**Synovial joints** – there are different types of joints there is the ball and socket joint which is at the hip. There is the hinge joint which is at the knee. There is the gliding joint which are in the hands. There is the pivot joint which is in the neck. There is the saddle joint which is in the thumb. There is the candyloid joint which is in the wrist.

**The Heart** – the parts of the heart

I have labelled the diagram with five labels.
Respiratory System

Arrow top left – nasal cavity
Arrow middle left – bronchioles
Arrow 1 right - pharynx
Arrow 2 right - larynx
Arrow 3 right - trachea
Arrow 4 right - bronchi
Arrow 5 right - lung
Arrow at bottom - diaphragm

The Heart – the heart carries oxygenated blood to the muscles then gets de-oxygenated blood and takes it to the lungs for oxygenation and then the heart pumps the blood to the working muscles. Men have 5 – 6 litres of blood. Women have 4 – 5 litres of blood. Veins are blood vessels that carry the blood to the heart. They are very thin. When the body exercises the demand for oxygen increases and the blood containing oxygen needs to flow to meet the demand. The increase in stroke volume and heart rate means that there is an increase in cardiac output. Blood must also be redistributed this is known as the vascular shunt mechanism.
The role of the musculo-skeletal system in producing movement

Types of movement

- **Abduction** – this is when movement happens away from the centre an example of this is when you spread your fingers apart
- **Adduction** – this is when there is a movement towards the centre an example of this is when you bring your fingers together
- **Extension** – this is where one muscle is retracted and another is extended an example of this is when you lift your arm when lifting a weight your bicep will retract and the tricep extends
- **Flexion** – this is when you move between the anterior-posterior plane an example of this is when you move your head forward towards the chest
- **Rotation** – this is when you turn part of the body around the longitudinal axis an example of this is when you turn the hand to spin the ball when bowling in cricket.

Functions of connective tissue

- **Ligaments** – this is the tissue that connects bone to bone this allows us to move our body into certain positions and allows us to walk. If we tear a ligament that means that a part of our body will no longer work
- **Tendons** – these join muscles to bone tendons enable us to lift things and to walk
- **Cartilage** – this between bones it is found in the ear and in our nose.

Muscular contractions

- **Isometric** – this is a static exercise where there is no movement at the joint an example of this would be holding a static position like a headstand
- **Isotonic** – there are two types concentric and excentric one shortens the muscle the other lengthens the muscle like a bicep curl.

The role of the cardio-respiratory system during physical activity

- **Heart rate** – when we exercise our pulse rate will rise as we exercise then when we stop exercising our pulse rate will return to normal depending on how fit we are depends on how long that takes
- **Blood pressure** – when we exercise our blood pressure will rise for a short time and when you stop exercising it will soon return to normal depending on how fit you are
- **Vascular shunt mechanism** – this process ensures that the blood is moved from parts of the body which don’t need it to parts of the body that do when we are exercising
- **Breathing mechanism** – when you increase your activity by exercising your breathing rate will increase you will inhale at a faster rate
- **Internal respiration** – this is where the gases in the air are transported to the lungs and the blood. This involves oxygen coming into the lungs and carbon dioxide coming out
- **Aerobic and anaerobic respiration** – this is where you need oxygen to do aerobic exercise and you can exercise for a short period of time without oxygen which is anaerobic exercise.
**Witness Statement – Task 1 and 2**

<table>
<thead>
<tr>
<th>LEARNER NAME</th>
<th>Kiera</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASSESSOR NAME</td>
<td>G.M. Knowles</td>
</tr>
<tr>
<td>Date</td>
<td>15/11/14</td>
</tr>
<tr>
<td>Unit</td>
<td>R043 The body’s response to physical activity</td>
</tr>
<tr>
<td>LO1 &amp; 2</td>
<td>Know the key components of the musculo-skeletal and cardio-respiratory systems, their functions and roles</td>
</tr>
<tr>
<td></td>
<td>Understand the importance of the musculo-skeletal and cardio-respiratory systems in health and fitness</td>
</tr>
</tbody>
</table>

**ASSESSOR FEEDBACK** – please give detail of how learners have met the criteria for the grade awarded.

<table>
<thead>
<tr>
<th>Please tick</th>
<th>MB1</th>
<th>3 &amp; 5</th>
<th>MB2</th>
<th>MB3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assessor comments</strong></td>
<td>Kiera was able to locate and identify some of the key components of the musculo-skeletal system on blank outlines given to her. Her description of the key components and functions of the cardio-respiratory system is basic.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>There was a skeleton of the human body in the classroom and Kiera was able to locate the following muscles on the skeleton by pointing at the position they are on the skeleton:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• biceps – at the front of the arm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• triceps - at the back of the arm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• deltoids - on the shoulder</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• pectoralis - at the shoulder</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• abdominis - front of the body</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• femur - at the leg front.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Kiera has outlined the role of the musculo-skeletal system in producing movement.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Kiera has outlined the role of the cardio-respiratory system in physical activity.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Understand the importance of the musculo-skeletal and cardio-respiratory systems in health and fitness

<table>
<thead>
<tr>
<th>Please tick</th>
<th>MB1</th>
<th>4</th>
<th>MB2</th>
<th>MB3</th>
</tr>
</thead>
</table>
| Assessor comments | Kiera has identified some benefits of the cardio-respiratory fitness, muscular strength and endurance and muscular flexibility supported with few examples.

### AREAS FOR IMPROVEMENT/GENERAL COMMENTS

All information provided needs to be in more depth in order to improve the marks. Kiera was provided with blank outlines of the various systems which she has labelled.

### RECORD OF QUESTIONS/ANSWERS

**ASSESSOR QUESTION 1**

**LEARNER RESPONSE 1**

**ASSESSOR QUESTION 2**

**LEARNER RESPONSE 2**

**ASSESSOR QUESTION 3**

**LEARNER RESPONSE 3**

**ASSESSOR SIGNATURE:** G. M. Knowles  
**DATE:** 15/11/14

**LEARNER SIGNATURE:** Kiera  
**DATE:** 15/11/14
Marking commentary on MB1 sample learner work

Diagrams need to contain more information. There should be diagrams of the synovial joints and the description needs to contain more information about the joints. There needs to be information on the arteries; blood and the functions of the cardio-respiratory system; this has resulted in the centre awarding 3 marks. There needs to be more information on the functions of connective tissue. The rest of the subsections in the specification have been outlined with relevant sporting examples. The centre has awarded 5 marks due to there only being an outline. Please note: candidates would be expected to label blank outlines of the musculo-skeletal system and the cardio-respiratory system themselves and a witness statement should accompany this.

Suggested improvements to progress sample learner work to MB2

More bones need to be identified on the skeletal system. More muscles need to be correctly identified on the muscular system – a diagram should be included which is correctly labelled. Connective tissue; the functions of the musculo-skeletal system; blood and the functions of the cardio-respiratory system need to be included. There needs to be a more in-depth description of all of the roles of the musculo-skeletal system in providing movement and the supporting sporting examples need to be expanded. There needs to be a more in-depth description of the role of the cardio-respiratory system in physical activity and the supporting sporting examples need to be expanded.
Learning Objective 2 – Understand the importance of the musculo-skeletal and cardio-respiratory systems in health and fitness

MB1

We should do some exercise so that our body systems work.

**Benefits of cardio-respiratory fitness in everyday life**

We need to do exercise and this makes sure that our cardio-respiratory system works. The system gets oxygen to the muscles and sends the blood to the parts of the body that need it when we exercise. We should do some exercise four times a week for 40 minutes. If we do that we will get fitter and this will be good for us we will be able to do things all the time. If you have not done any exercise for a long time you should see the doctor first in case you could have heart trouble.

**Heart disease**

We need to do exercise so that our heart has some work to do. If we do some exercise our heart will work better and we might not get heart disease. If we do not work the heart fat will clog our arteries and we will stand a higher chance of getting heart disease.

**Obesity**

Children are getting fatter in this country. If we are very big we are called obese. This is going to be a big problem here. The government is trying to make everyone do exercise especially children. They want children to do more PE and sport after school. They also want them to walk to school and not play computer games. If we do more exercise we will not be obese and this will be good for us.

**Some cancers**

If we are fat and don't exercise we might get cancer. If we exercise we burn up calories and this means we won't get fat and then we might not get cancer.

**Benefits of muscular strength and flexibility**

If you lift weights then your muscles will be strong. If you do exercises which keep you flexible then this will be good for you as you will be able to keep doing everyday jobs.

**Complete everyday tasks with ease**

By doing exercise 4 times a week for 40 minutes this will keep us fit and able to do everyday tasks easily. We need to do exercises that build up our muscles and makes sure we stay flexible. We will be able to pick up things, carry heavy things and walk up the stairs without getting out of breath. Mums if they are fit will be able to run after their children when they run away from them if we have muscular strength and flexibility.

**Avoid injury**

Doing exercise regularly will help us avoid injury as when we stretch if we haven't exercised for a long time we might pull a muscle which might mean we have difficulty walking. If you haven't done any exercise for a long time and are weak and not very flexible it might be dangerous for you to start exercising too quickly as you might sprain something like your ankle.
SAMPLE LEARNER WORK

**Benefits of muscular endurance**

**Increased stamina for work-based tasks**
If we exercise 4 times a week for 40 minutes and keep doing that for a few weeks we will build up our muscular endurance which will mean that we will be able to do things for longer without getting tired. You will be able to do the gardening and in particular the digging if you have a vegetable garden. You will be able to walk up the stairs instead of using the lift and this will help with your fitness.

**Improved sport skill performance**
To be good at some sports you need to have muscular endurance. If you play certain positions in rugby you need to be strong. If you are doing a sport where you have to keep running, maybe even in short bursts, you will need muscular endurance as you will need strong legs. If you have muscular endurance you will be able to play sport for longer. This would be useful if you have to play extra time in a game of football.

**Marking commentary on MB1 sample learner work**
Not all of the sub-headings have been included for all three systems. However, in the content of the sub-headings that have been mentioned the benefits have been identified. The centre has awarded 4 marks as only some of the benefits of the three systems have been mentioned and the benefits are supported with a few examples.

**Suggested improvements to progress sample learner work to MB2**
The following sub-headings need to be included in the section on the benefits of cardio-respiratory fitness: - stress and strokes. The following sub-headings need to be included in the section on the benefits of muscular strength and flexibility: - Improve posture and prevent joint problems and osteoporosis in later life. The links to the systems also need to be more clearly defined and need to have more examples.
Learning Objective 3 – Be able to assess the short-term effects of physical activity on the musculo-skeletal and cardio-respiratory systems

MB1

The effects on the musculo-skeletal and cardio-respiratory systems of short term exercise are:

**Vascular shunt mechanism** – when we exercise the body demands more oxygen from the muscles. This increase is dramatic; more oxygenated blood must flow to the muscles quickly to meet this demand. The increase in heart rate and stroke volume helps to increase the cardiac output this in turn increases the oxygen supply. This needs to happen at the same time as the blood is redistributed to the muscles that are being used. This means that less blood goes to other organs. This is known as the vascular shunt mechanism.

**Internal respiration** – this is when we exercise at a comfortable, steady rate. When we do this the cardiovascular system can supply the muscles with all the oxygen they need. This is when aerobic respiration takes place.

**External respiration** – this is when external air is sucked into the body in order to supply the lungs with oxygen. Carbon dioxide is then breathed out from the lungs to remove it from the body.

**Heart rate** – this is the number of beats our heart does in a minute (bpm).

**Stroke volume** – this is the volume of blood that is pumped from one ventricle of the heart to another when our heart beats.

**Cardiac output** – this is the amount of blood that is pumped round the body by the heart in one heartbeat.

**Flexibility** – the short term effects of physical activity on flexibility are you can get more flexible and you will increase your blood circulation as you exercise the ligaments warm up and become more flexible.

**Muscle size and strength** – the short term effect of physical activity on muscle size and strength is that your muscles will get bigger and stronger the muscles will also get warmer as you exercise.

**Muscle fatigue** – the short term effect of exercise on muscles will be muscle fatigue the muscles will become tired very quickly and they will become sore.

**Breathing rate**

Your breathing rate is the amount of breaths you take in a minute when you are not moving. The resting breathing rate for adults is usually between 12 and 20. For a person of my age it is usually 16.

The short term effect of physical activity on my breathing rate is that it will increase so that the carbon dioxide can be removed out of the blood and be replaced by oxygen. When I exercised for three minutes on the running machine my breathing rate increased as I needed more oxygen to get to my muscles. My breathing rate increased to 50.

<table>
<thead>
<tr>
<th>Exercise on running machine</th>
<th>Resting Breathing rate</th>
<th>Directly after exercise</th>
<th>1 minute after exercise</th>
<th>2 minutes after exercise</th>
<th>3 minutes after exercise</th>
<th>4 minutes after exercise</th>
<th>5 minutes after exercise</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>16</td>
<td>50</td>
<td>43</td>
<td>33</td>
<td>27</td>
<td>20</td>
<td>16</td>
</tr>
</tbody>
</table>
Heart Rate + Recovery Rate

Your heart rate is how many times the heart beats in a minute.

Your recovery rate is how long it takes for your heart to return to its resting heart rate.

Doing running on an exercise machine and recording heart rate is a way of measuring and recording the short term effects of physical activity.

<table>
<thead>
<tr>
<th>Exercise on running machine</th>
<th>Breathing rate</th>
<th>Directly after exercise</th>
<th>1 minute after exercise</th>
<th>2 minutes after exercise</th>
<th>3 minutes after exercise</th>
<th>4 minutes after exercise</th>
<th>5 minutes after exercise</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Resting</td>
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<td></td>
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<tr>
<td></td>
<td>rate</td>
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<tr>
<td></td>
<td>64</td>
<td>91</td>
<td>84</td>
<td>78</td>
<td>75</td>
<td>65</td>
<td>64</td>
</tr>
</tbody>
</table>

The average resting heart rate of a person my age is between 60 – 65. From the above you can see that I fit into the average for a 16 year old with a resting heartbeat of 64. I know that the lower your heart rate is the fitter you are. If one of my classmates takes more than 5 minutes to return to their resting heart rate and I can return to mine in 5 minutes that means that I am fitter than them.

Musculo-skeletal system

The short term effect of physical activity on the musculo-skeletal system is that your muscles get tired, your body temperature increases and you will start to sweat. As the body temperature rises your face often goes red.

Cardio-respiratory system

The short term effect of physical activity on the cardio-respiratory system is that your breathing rate increases and this gets rid of the carbon dioxide and you intake more oxygen to the blood and to the working muscles.
Cooper test

Another way to measure and record the short-term effects of physical activity is by doing the Cooper test.

The Cooper test is running as far as possible in 12 minutes. The Cooper test is a test of physical fitness. It can be used to test and improve your cardiovascular system. Below is a table which tells you how fit you are this is based on your age, your sex and how far you have run.

<table>
<thead>
<tr>
<th>Age</th>
<th>Very good</th>
<th>Good</th>
<th>Average</th>
<th>Bad</th>
<th>Very bad</th>
</tr>
</thead>
<tbody>
<tr>
<td>13-14</td>
<td>M 2700+ m</td>
<td>2400 - 2700 m</td>
<td>2200 - 2399 m</td>
<td>2100 - 2199 m</td>
<td>2100- m</td>
</tr>
<tr>
<td></td>
<td>F 2000+ m</td>
<td>1900 - 2000 m</td>
<td>1600 - 1899 m</td>
<td>1500 - 1599 m</td>
<td>1500- m</td>
</tr>
<tr>
<td>15-16</td>
<td>M 2800+ m</td>
<td>2500 - 2800 m</td>
<td>2300 - 2499 m</td>
<td>2200 - 2299 m</td>
<td>2200- m</td>
</tr>
<tr>
<td></td>
<td>F 2100+ m</td>
<td>2000 - 2100 m</td>
<td>1700 - 1999 m</td>
<td>1600 - 1699 m</td>
<td>1600- m</td>
</tr>
<tr>
<td>17-20</td>
<td>M 3000+ m</td>
<td>2700 - 3000 m</td>
<td>2500 - 2699 m</td>
<td>2300 - 2499 m</td>
<td>2300- m</td>
</tr>
<tr>
<td></td>
<td>F 2300+ m</td>
<td>2100 - 2300 m</td>
<td>1800 - 2099 m</td>
<td>1700 - 1799 m</td>
<td>1700- m</td>
</tr>
<tr>
<td>20-29</td>
<td>M 2800+ m</td>
<td>2400 - 2800 m</td>
<td>2200 - 2399 m</td>
<td>1600 -2199 m</td>
<td>1600- m</td>
</tr>
<tr>
<td></td>
<td>F 2700+ m</td>
<td>2200 - 2700 m</td>
<td>1800 - 2199 m</td>
<td>1500 -1799 m</td>
<td>1500- m</td>
</tr>
<tr>
<td>30-39</td>
<td>M 2700+ m</td>
<td>2300 - 2700 m</td>
<td>1900 - 2299 m</td>
<td>1500 - 1899 m</td>
<td>1500- m</td>
</tr>
<tr>
<td></td>
<td>F 2500+ m</td>
<td>2000 -2500 m</td>
<td>1700 - 1999 m</td>
<td>1400 - 1699 m</td>
<td>1400- m</td>
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<tr>
<td>40-49</td>
<td>M 2500+ m</td>
<td>2100 - 2500 m</td>
<td>1700 -2099 m</td>
<td>1400 -1699 m</td>
<td>1400- m</td>
</tr>
<tr>
<td></td>
<td>F 2300+ m</td>
<td>1900 - 2300 m</td>
<td>1500 - 1899 m</td>
<td>1200 -1499 m</td>
<td>1200- m</td>
</tr>
<tr>
<td>50+</td>
<td>M 2400+ m</td>
<td>2000 - 2400 m</td>
<td>1600 -1999 m</td>
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<td></td>
<td>F 2200+ m</td>
<td>1700 - 2200 m</td>
<td>1400 - 1699 m</td>
<td>1100 - 1399 m</td>
<td>1100- m</td>
</tr>
</tbody>
</table>

When I first did the Cooper test I covered 1,800 in 12 minutes which as I am a 16 year old female came into the average column. When I was doing the Cooper test I got breathless and got very red in the face this was due to me sweating. My muscles ached at the end of the test and there was a build-up of lactic acid.

Some teacher support was required in planning and setting up the two activities.

This Learning objective draws upon skills, knowledge and understanding from unit R042.
Marking commentary on MB1 sample learner work

The short term effects of physical activity on the musculo-skeletal and cardio-respiratory systems have been identified. There have been two activities mentioned – exercising on a running machine where the heart rate was recorded and discussed and the ‘Cooper Test’ where the results were recorded and there was a brief explanation of the effects on the body systems. Details of the adaptations have been recorded and described and basic suggestions have been made as to why they occurred. Some teacher support was needed. The centre has awarded 6 marks.

Suggested improvements to progress sample learner work to MB2

There needs to be more direct reference to the short term effects of physical activity on the two body systems. More activities need to be undertaken and results recorded so that the results can be used to better describe the short term effects of exercise. There needs to be less teacher support in planning and setting up suitable activities. There needs to be a more detailed description and a better explanation of the adaptations recorded and why they have occurred.
Learning Objective 4 – Be able to assess the long-term effects of physical activity on the musculo-skeletal and cardio-respiratory systems

MB1

The effects on the musculo-skeletal and cardio-respiratory systems of long term exercise are:

**Flexibility** – the long term effects of physical activity on flexibility are by being more flexible you can reduce the risk of getting a heart attack and you will be more healthy overall.

**Muscle size and strength** – the long term effect of physical activity on muscle size and strength is that all your muscles will get stronger; bigger; healthier and fitter.

**Long term effects of physical activity on the musculo-skeletal and cardio-respiratory systems.**

- Your muscles increase in size and strength.
- Your heart increases in size and strength. It pumps the same amount of blood around the body in less than a heartbeat.
- Your training heart rate decreases.
- You will be able to recover quicker. This means your heart rate will be able to return to its resting heart rate quicker than if you had not done any long term exercise.

**Breathing rate**

Your breathing rate is the amount of breaths you take in a minute when you are not moving. The resting breathing rate for adults is usually between 12 and 20. For a person of my age it is usually 16.

The long term effect of physical activity on my breathing rate is that my breathing rate would decrease when I exercise for three minutes on the running machine as my body will have adapted to the intense pressures on my body systems and they will be stronger. Muscles like the heart will be stronger and that means that more oxygen will be taken in by each breath. When I had been exercising over a long time my breathing rate increased to 40 which is 10 down on what it was when I did short term exercise.

<table>
<thead>
<tr>
<th>Exercise on running machine</th>
<th>Resting Breathing rate</th>
<th>Directly after exercise</th>
<th>1 minute after exercise</th>
<th>2 minutes after exercise</th>
<th>3 minutes after exercise</th>
<th>4 minutes after exercise</th>
<th>5 minutes after exercise</th>
</tr>
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<tr>
<td>16</td>
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<td>35</td>
<td>30</td>
<td>24</td>
<td>19</td>
<td>16</td>
<td></td>
</tr>
</tbody>
</table>

**Musculo-skeletal system**

The long term effect of physical activity on the musculo-skeletal system is that your muscles will become bigger and stronger. This reduces your risk of getting injuries. For example if you are playing hockey your legs will become stronger which means you can run for longer without your legs getting tired. Also if I am going to shoot towards the goal my shot will be more powerful. I could also shoot from further out. Also the more flexible I am the easier it is to get to the hockey ball and the easier it is for me to turn round and pass to someone else.

**Cardio-respiratory system**

The long term effect of physical activity on the cardio-respiratory system is that the heart will become bigger and stronger because it has been trained. The heart also will take less beats to move oxygen around the body to the muscles where it is needed so that the muscles work better when needed.
**Resting heart rate**
The average resting heart rate of a person my age is between 60 – 65. This depends on your fitness levels. If you have taken part in physical exercise for a long period of time you will have become fitter and your resting heart rate will be lower. After I have been exercising for a long period of time my resting heart rate is now 40.

**Training heart rate**
The long term effects on the training heart rate is that there will be an increase in the stroke volume this will result in a lowering of blood pressure and an increase in cardiac output.

**Recovery heart rate**
The long term effects on the recovery heart rate is that the heart rate will take a shorter time to return to the resting heart rate which will be a good indication that you are fitter.

**Heart Rate + Recovery Rate**
Your heart rate is how many times the heart beats in a minute and your recovery rate is how long it takes for your heart to return to its resting heart rate. These are my results after I have done the running on the exercise machine for 6 weeks.

<table>
<thead>
<tr>
<th></th>
<th>Resting heart rate</th>
<th>Directly after exercise</th>
<th>1 minute after exercise</th>
<th>2 minutes after exercise</th>
<th>3 minutes after exercise</th>
<th>4 minutes after exercise</th>
<th>5 minutes after exercise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise on running machine</td>
<td>40</td>
<td>70</td>
<td>64</td>
<td>57</td>
<td>51</td>
<td>47</td>
<td>40</td>
</tr>
</tbody>
</table>

**Reduction in muscle soreness**
Muscle soreness can occur when you do exercise for a short period of time. By doing exercise for a long period of time you will reduce your muscle soreness this is because your muscles will be stronger therefore they won’t be so tender they will also be able to do a hard workout without getting sore muscles. If you warm up and cool down when you do exercise this will also reduce muscle soreness.

**Increased lung capacity**
By doing exercise for a long period of time your lung capacity will increase which will make it easier to exercise and will mean you will be able to do everyday tasks easier.
Ways to measure and record the long-term effects of physical activity on the musculo-skeletal and cardio-respiratory systems

Cooper test
The Cooper test is running as far as possible in 12 minutes. The Cooper test is a test of physical fitness. It can be used to test and improve your cardiovascular system. Below is a table which tells you how fit you are this is based on your age, your sex and how far you have run:

<table>
<thead>
<tr>
<th>Age</th>
<th>Very good</th>
<th>Good</th>
<th>Average</th>
<th>Bad</th>
<th>Very bad</th>
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<tbody>
<tr>
<td>13-14</td>
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<td>2200 - 2399 m</td>
<td>2100 - 2199 m</td>
<td>2100- m</td>
</tr>
<tr>
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<td>1500 - 1599 m</td>
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<tr>
<td>15-16</td>
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<td>2300 - 2499 m</td>
<td>2200 - 2299 m</td>
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<tr>
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<td>1600 - 1699 m</td>
<td>1600- m</td>
</tr>
<tr>
<td>17-20</td>
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<td>2300 - 2499 m</td>
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<tr>
<td></td>
<td>F 2300+ m</td>
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<td>1800 - 2099 m</td>
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<tr>
<td>20-29</td>
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<td></td>
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<td>2000 -2500 m</td>
<td>1700 - 1999 m</td>
<td>1400 - 1699 m</td>
<td>1400- m</td>
</tr>
<tr>
<td>40-49</td>
<td>M 2500+ m</td>
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<td>1700 -2099 m</td>
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<td></td>
<td>F 2300+ m</td>
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<tr>
<td>50+</td>
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<td>1600 -1999 m</td>
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<td>1700 - 2200 m</td>
<td>1400 - 1699 m</td>
<td>1100 - 1399 m</td>
<td>1100- m</td>
</tr>
</tbody>
</table>

When I first did the Cooper test I covered 1,800 in 12 minutes which as I am a 16 year old female came into the average column. After I had done exercise regularly for 6 weeks I re-did the Cooper test and I covered 2,005 in 12 minutes which means that I now come in the good column.

Some teacher support was required in planning and setting up the two activities.
Marking commentary on MB1 sample learner work

The long term effects of physical activity on the musculo-skeletal and cardio-respiratory systems have been identified. There have been two activities mentioned – exercising on a running machine where the heart rate was recorded and discussed and the ‘Cooper Test’ where the results were recorded and there was a brief explanation of the effects on the body systems. Details of the adaptations have been recorded and described and basic suggestions have been made as to why they occurred. Some teacher support was needed. The centre has awarded 6 marks.

Suggested improvements to progress sample learner work to MB2

There needs to be more direct reference to the long term effects of physical activity on the two body systems. More activities need to be undertaken and results recorded so that the results can be used to better describe the short term effects of exercise. There needs to be less teacher support in planning and setting up suitable activities. There needs to be a more detailed description and a better explanation of the adaptations recorded and why they have occurred.
Learning Objective 1 – Know the key components of the musculo-skeletal and cardio-respiratory systems, their functions and roles

Major bones

The major bones of the body are cranium, scapula, clavicle, humerus, radius, ulna, sternum, pelvic girdle (ilium), femur, tibia, fibula, patella, ribs, carpals, tarsals, metatarsals, metacarpals - these are all labelled on the diagram below. The vertebrae are the bones that make up the spine.

Skeletal muscle groups

The skeletal muscle groups are - biceps, triceps, abdominals, pectorals, gluteals, latissimus dorsi, deltoids, trapezius, gastrocnemius, hamstrings, soleus, quadriceps - these are all labelled on the diagram below.
Synovial joints

The six synovial joints are called:

**Ball and socket joint** – can be found in your shoulder and your hip this joint is the most moveable joint because it can move in any direction.

**Hinge joint** – can be found in your knee and your elbow and they only move in two ways bend and straighten.

**Gliding joint** – can be found in your carpel bone these type of joint are between the surfaces of two flat bones they allow movement in a range of movements.

**Pivot joint** – can be found in the neck it can only be rotational. For example it will allow you to move your head from side to side.

**Saddle joint** – can be found in your thumb it will allow the joint to move in two planes backwards and forwards.

**Condyloid joint** – can be found in your wrist it will allow movement in two planes and will allow you to bend it and straighten it (ellipsoid joint).

Connective tissue

**Cartilage** – cartilage is flexible it allows bones to slid over one another. Cartilage does not have a blood supply. Damaged cartilage takes a long time to get better.

**Ligaments** – a ligament is a fibrous tissue. Ligaments connect bones to other bones.

**Tendons** – a tendon is a tough connective cord which can be found all over the body but the main one that people usually know is the Achilles this is in the ankle. The tendon will attach the muscle to the bone. You can injure tendons by playing different sports like football. If a football player was to hurt his tendons in a bad tackle he could be out of football for a long time. Tendons attach to the bone which moves the bone and muscles to create movement.
**Functions of the musculo-skeletal system**

**Support** – the skeleton helps support the soft tissue as it shapes a strong framework to support our muscles, tendons and ligaments.

**Movement** – the bones are levers which are pulled together by the muscles to cause movement.

**Protection** – protection of the skeleton is the cranium which protects the skull, the ribs also provide protection to vital organs of the body.

**Blood formation** – inside bones such as femur and humerus, there is bone marrow which creates new blood cells.

**Key components of cardio-respiratory system and its function**

The main function of the cardio-respiratory system and respiratory system is that it gives nutrients and oxygen to the organs and other parts of the body through your blood and this helps you stay healthy.

**Heart** – the heart is a specialised organ and the only one in the body made of cardiac muscle. The function of the heart is to keep blood flowing throughout the body. The heart is controlled by involuntary areas of the brain. The heart is made of four parts, 2 atria and 2 ventricles. Values prevent the blood from flowing backwards.
**Respiratory system** – the function of the lungs is to oxygenate the blood so that it can be sent round the body via the heart. The bronchioles are airways of the lungs. When a person takes in air the air travels into the larynx – known as the voice box then into the trachea which is the main passageway into the lungs. The trachea which connects the nose and the mouth to the lungs divides into a right and left main bronchus. Each major bronchus then subdivides into smaller airways as the airway passages make their way to the lungs they become smaller and eventually turn into small collections of air sacs known as alveoli which is where the actual exchange of CO₂ and oxygen occur. The diaphragm is a muscle underneath the lungs.

**Arteries** – these carry blood away from the heart. Arteries carry bright red blood. The pulmonary artery transport deoxygenated blood to the right and left lungs. The aorta is the largest artery in the body. The aorta is connected to the left ventricle of the heart and goes down to the abdomen. The aorta transports oxygenated blood to all parts of the body. The head and neck are supplied with oxygenated blood by the carotid arteries.

**Blood** – blood cells are suspended in blood plasma which is a liquid. Blood is made up of white and red cells. There are more red cells than white cells. Blood also contains platelets these mean that blood will clot and we don’t bleed for a long time when we injure ourselves.

**Blood vessels and exercise**
- Arteries – these blood vessels carry blood away from the heart.
- Arterials – these blood vessels are smaller blood vessels that are smaller and directly take the blood to the muscles.
- Capillaries (running) – these blood vessels take the oxygenated blood and put it into the running man’s legs. In the running man’s legs is carbon dioxide which comes out of these capillaries and into the venuals.
- Venuals – these blood vessels take the de-oxygenated blood from the capillaries and put it into the veins.
- Veins – these blood vessels take the de-oxygenated blood back to the heart.
Functions of the cardio-respiratory system – the five main functions of this are:

- Transporting oxygen and removing carbon dioxide.
- Transporting nutrients and removing wastes.
- Fighting disease.
- Transporting hormones.
- Regulating body temperature.

The role of the musculo-skeletal system in producing movement

Types of movement – there are different types of synovial joints and these allow different kinds of movement. There are 6 basic types of movement.

- Flexion – this is a movement that decreases the angle of a joint by bending or flexing a limb for example the leg can be flexed at the knee. Sporting example taking a free kick in football.
- Extension – straightening or extending a limb to increase the angle of two joints of the body for example the arm can be extended at the elbow. Sporting example taking a set shot in basketball.
- Adduction – this is one body part coming towards another one or moving a limb towards the centre line of the body for example the arm can be moved towards the centre of the body at the shoulder. Sporting example is a star jump as part of a circuit.
- Abduction – this is a movement away from the body or moving a limb away from the centre line of the body for example the leg can be moved away from the centre of the body at the hip. Sporting example standing on one leg and swinging the other leg out to the side and return to the body as in a warm up exercise or doing a crucifix on the rings in gymnastics.
- Rotation – this is a movement which is a circular motion around the axis. This is a turning or rotational movement of a limb or body part for example the head can be rotated at the neck. Sporting example hip movement during a two handed tennis shot and hip action during a swing in golf.
- Circumduction – the ability of a limb to be moved in circles for example the arm can move in circles at the shoulder. Sport example arm circles in a gymnastics routine.

Functions of connective tissue – the functions are to join together tissues of the body and provide cushioning this makes the body more flexible and able to exercise

- Ligaments – these are long stretchy tissues that connect bone to bone. They enable us to move joints.
- Tendons – these are a tough tissue which connects the bone to muscle the most famous tendon is the Achilles tendon.
- Cartilage – this is a flexible and strong tissue. It stops our bones from rubbing together and is found within the synovial joint. Noses and ears are made of cartilage.

Muscle contractions

- Isometric – this is when the length of the contracting muscle does not change. Sporting example is holding a badminton racket.
- Isotonic – this is when contractions make the muscle change length as it contracts making a body part move. Sport example is doing a press up or doing a bicep curl.
The role of the cardio-respiratory system during physical activity

Heart rate – heart rate is the amount of beats the heart does. This is usually measured in how many times the heart beats in a minute. To do this a person’s pulse is found and this is timed over a minute. Often people who exercise will measure their heart rate when they are not doing anything – before exercise – then they will measure it after the exercise has finished. An adult resting heart rate is usually between 60–80 beats per minute.

Blood pressure - your stroke volume is the amount of blood that leaves both ventricles. Before your ventricles contract you would normally have approximately 120ml of blood in your ventricles. When your ventricles contract about 70ml leaves the ventricles leaving you with about 50ml in reserve. That 50ml reserve is for when you exercise. When you exercise you might not use all of the 50ml but you probably will. When you have reached your maximum stroke volume that is when your heart rate will begin to increase. The heart will try to deal with your body’s demand for blood with a normal heart rate via stroke volume but once your stroke volume has reached its limit then your heart rate will increase to meet the demand for blood your body requires.

Vascular shunt mechanism – this is when the blood flow is reallocated when we exercise. When we are not doing anything the muscles do not get much blood as they are not doing anything. When we exercise a lot more blood is needed so that the muscles can move.

The mechanism of breathing and changes that occur during exercise

When we breathe out the diaphragm flattens and moves downwards and the intercostal muscles move the rib cage upwards and out. What this is basically doing is making our lungs as big as possible to allow us to breathe in as much oxygen as possible.

When we exhale the diaphragm and intercostal muscles relax and return to resting positions. This reduces the size of the thoracic cavity, increasing the pressure and forcing air out of the lungs.

When we are asleep we do this unconsciously but while awake we have control over breathing even when we hold our breath after so long we will feel the need to breathe.

When we are exercising the rate in which we breathe increases this is our heart trying to deal with the increase in demand for blood around the body. In order to pump the blood round the body the heart relies on the lungs to fill the blood with oxygen. This means that the intercostal muscles and diaphragm have to work at a faster rate to help the lungs keep up the hearts demand for blood.

After you have done exercise your heart rate returns to what it was before exercise the time it takes for this to happen is called the recovery rate. Your recovery rate can tell you how strong your heart is as the quicker it returns to your normal rhythm the stronger your heart is.

Aerobic and Anaerobic respiration - Aerobic is a steady exercise over a long period of time using repetitive movements that work larger muscle groups and especially the heart and lungs. You take in oxygen as you exercise and this is used as fuel by the body when it is exercising. Anaerobic exercise uses your muscles at a high density for a short period of time. This is where you don't take in any oxygen as you perform the exercise so you will be making use of the oxygen you will have stored in the body before you exercise. Aerobic training means that the exercise is done in circumstances where there is plenty of oxygen available in the muscles using this method will improve your endurance fitness. During aerobic exercise you repeatedly move large muscles in your arms legs and hips. You will be taking on oxygen as you exercise.

Aerobic exercise is anything which is not too fast and steady for example walking at a steady pace, jogging; swimming long distances; cross country skiing; tour canoeing; sailing and cycling. Anaerobic training is when there isn’t enough oxygen so all the waste products will pile up in the muscles. If you do anaerobic training it can help develop stronger muscles improve your VO2 max and this will improve your cardiovascular fitness. Anaerobic exercise will improve your endurance and your speed. Anaerobic training is anything which involves short fast bursts of exercise for example interval training (short bursts of fast running); weight lifting as part of a circuit; sprint start and acceleration training; short circuit speed skating and sprint swimming.
Marking commentary on MB3 sample learner work

Most of the key components of the musculo-skeletal system have been located and identified. The functions of the musculo-skeletal system have been described. There is a description of the key components and functions of the cardio-respiratory system. The centre has awarded 7 marks the functions could have been more comprehensively described to improve the mark. Diagrams could have been included as part of the second section of the learning outcome which would have aided the descriptions. Isometric and Isotonic could be described as part of the functions of connective tissues and there could be more sporting examples this is why the centre has awarded 10 marks.

Why it was awarded MB3 not MB2

Both the role of the musculo-skeletal system in producing movement and the role of the cardio-respiratory system in physical activity have been comprehensively described and a sporting example has been included where appropriate. Please note: candidates would be expected to label blank outlines of the musculo-skeletal system and the cardio-respiratory systems themselves and a witness statement should accompany this.
Learning Objective 2 – Understand the importance of the musculo-skeletal and cardio-respiratory systems in health and fitness

MB3

It is important that we do some sport and exercise as it is good for our body if we do this. It is good for our muscular, cardiovascular and respiratory systems.

Benefits of cardio-respiratory fitness in everyday life

Cardiorespiratory fitness is about how the circulatory and respiratory systems supply oxygen to the muscles in the body when we are doing exercise. If we exercise regularly then these systems get better they can make our heart get bigger and pump more blood round the body which is good. When we exercise we breathe in and out more often and this can also improve the respiratory system as we get more oxygen into our bodies. It is recommended that we exercise 3-5 times per week for 40 minutes at a time making sure we get out of breath so that our cardio-respiratory fitness gets better. This will make us feel good and will make us fitter. If you are over 40 or if you are obese you need to check with your doctor before you start any exercise if you haven’t done any for a long time as you need to see you haven’t got any medical problems and that it is safe for you to exercise.

Heart disease

If we exercise this will mean that our heart is healthy and might get bigger this will mean that we might not get heart disease. If we do not do exercise our heart would not be healthy. Fatty deposits can build up in our arteries which will mean our blood does not flow easily and it could stop altogether. By doing exercise we can make sure we don’t get heart disease and this will not happen. If you do exercise you do not have such a high risk of heart disease. If people have had heart disease they are often told to do some light exercise. People who have had a heart attack can go back to doing as much exercise as they want if they start slowly.

Obesity

If you are fat that is not good for you. It will put a strain on your heart and you will have problems breathing when you try to run. If you do exercise then your body uses energy and you will lose weight by burning up fat. If you have a lot of fat you can get heart disease, high blood pressure, you could have a stroke or you could become a diabetic. If you are diabetic you can also exercise as this may help your diabetes. If you do exercise and change what you eat you can lose weight and this will be good for your body. If we exercise this will mean that we will not put on a lot of weight this will mean that we will not become obese. Obesity is a big problem in this country as children spend too much time on computers and do not do enough exercise. Children are being encouraged to exercise and schools have been told to provide more PE and games opportunities so that children do not get obese. Children can walk to school instead of going in the car and this will help.

Some cancers

The world cancer research fund says that ‘About a third of the most common cancers could be prevented through eating a healthy diet, being physically active and maintaining a healthy weight’

Research has been done which shows that being overweight means that you are more likely to get cancer of the bowel, oesophagus, breast and kidney. By doing exercise you burn up calories so that you can be more healthy and not have so much fat so that you might not get cancer. You don’t have to go to a fitness suite or play team games to get fit you can just walk at a fast pace or go jogging. You need to build up slowly so that your body can adjust to doing the exercise.
Strokes

A stroke is when something happens to the blood supply to the brain. If you exercise regularly then this can help against getting a stroke. Aerobic exercise is the best to do to prevent a stroke. This is because aerobic exercise is all about breathing and increasing your heart rate as you exercise. Aerobic exercise increases the flow of oxygen filled blood to your body. You should take part in 30 minutes of moderate exercise 4 days a week and this will help you not get a stroke. You could do fast walking or go on a bike ride. You should do the exercise as a speed where you are sweating slightly.

Stress

If you are stressed this can be bad for you as it will lead to health problems. Stress can cause cancer, problems with indigestion, weight gain and diabetes. Exercise can reduce the effects of stress as if you exercise the body and mind will have a feel good factor and doing exercise might mean you do not have time to think about the things that are making you feel stressed. Endorphins are released if you do cardio-respiratory exercise and these make you feel good which means the stress will go away for a bit. If you are stressed you will feel better if you go for even a short walk as being outside is good for you.

Benefits of muscular strength and flexibility

If you exercise by doing what is known as weight bearing activities this can make your bones grow. Weight bearing exercise is doing running and walking as you are not sitting down but bearing your own weight. Doing exercise as you get older means your bones don't get thin too quickly.

A lot of your body makes up the musculoskeletal system. This is your muscles bones, joints, ligaments and tendons. If you want to keep all of these healthy you need to exercise all the time and you will maintain your muscular strength and you will still be flexible to some degree. If you are flexible this will mean that you might not get osteoporosis and you should not get injuries doing everyday tasks like lifting things up or even like unscrewing a top on a bottle.

Complete everyday tasks with ease

If you do regular exercise it will help keep you joints supple and will allow you to still do things when you get older like going up stairs. If you do regular exercise you will be able to walk to the shops and not get out of breath you will be able to lift things and carry things. Older people have problems getting out of the bath if they have not got any strength in their arms and legs. People who have young children need to keep fit so that they can play with the children and run after them if they run away.

Avoid injury

It is important to warm up the muscles before you start any exercise as if you don't and you haven't exercised for a long time you might get injured. Warming up loosens the muscles and the joints so that they are not stiff. If you want to lose weight you might want to do too much too soon and this can lead to injury as you might start weight lifting with weights that are too heavy. If you are lifting weights you need to make sure you are doing in correctly or you could hurt your back. You also need to cool down at the end of the session so that you allow the body to get back to its resting heart rate so you don't get injured.

Improve posture

Exercise can help you with your posture. Very tall people need to stand up straight or they will have a stoop. By playing sport like basketball or high jump where their height is important they will have confidence to walk tall and this will help their posture. Bad posture causes backache and muscle strain. If you have strong muscles you will be able to sit in a correct position which will mean that you might not get backache. If you have poor posture you might have back problems as you get older.
Prevent joint problems and osteoporosis in later life

If you do weight training it puts stress on your bones which means that if you do it for a long time the bones will get stronger. If you do exercise at a young age like running and jumping then this will help you get strong bones. If you have strong bones by keeping exercising you might not get osteoporosis in later life which is where the bones are brittle. If you have strong bones through exercise this might help when you get old as you might not break so many bones if you fall. Your joints also keep more mobile if you use them regularly by doing exercise. They will keep more flexible which is good when you get old.

Benefits of muscular endurance

Increased stamina for work-based tasks

If the muscles are worked regularly during exercise this will increase stamina. If you have increased stamina it improves your lifestyle. It means that you do not get tired so easily so you can work for longer. It also means that you will not get injured so easily. It means that you will not be tired walking up stairs also if you work to increase your stamina you will lose weight and raise your heart rate. If you have increased stamina you put less strain on your heart, your joints and your back. You will also need less effort to do anything.

Improved sport skill performance

Sporting examples of working the muscles to improve stamina are doing tug-of-war, running, swimming and rugby. If you build up your stamina level you will be able to play sport longer. When you play a sport like tennis you do not know how long the match will last so you need a great deal of stamina or you might lose the match. If you are able to play sport for longer because you have more stamina you will be able to improve your skill as you will be able to train for longer.

Conclusion

- If you do any sort of exercise it is good for your health
- When you exercise you need to make the heart beat faster so that you start to sweat
- Exercise should be fun so do something you like
- If you do some exercise you will feel better
- Being fit and healthy will reduce your risk of getting some cancers and having a heart attack
- If you do exercise you will lose weight and fat
- More oxygen will get to the brain
- You will have more energy to do everyday things
- If you are fit and healthy you will sleep better
- Go out and do some exercise now!!!
## Witness Statement – Task 1 and 2

<table>
<thead>
<tr>
<th>LEARNER NAME</th>
<th>Sherwin</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASSESSOR NAME</td>
<td>G.M. Knowles</td>
</tr>
<tr>
<td>Date</td>
<td>15/11/14</td>
</tr>
<tr>
<td>Unit</td>
<td>R043 The body’s response to physical activity</td>
</tr>
</tbody>
</table>
| LO1 & 2      | Know the key components of the musculo-skeletal and cardio-respiratory systems, their functions and roles  
Understand the importance of the musculo-skeletal and cardio-respiratory systems in health and fitness |

### ASSESSOR FEEDBACK – please give detail of how learners have met the criteria for the grade awarded.

#### Know the key components of the musculo-skeletal and cardio-respiratory systems, their functions and roles

<table>
<thead>
<tr>
<th>Please tick</th>
<th>MB1</th>
<th>MB2</th>
<th>MB3</th>
<th>7 &amp; 10</th>
</tr>
</thead>
</table>
| **Assessor comments** | Sherwin was able to locate and identify most of the key components of the musculo-skeletal system on blank outlines given to him. His description of the key components and functions of the cardio-respiratory system is comprehensive.  
Sherwin has comprehensively described the role of the musculo-skeletal system in producing movement supported with a wide range of examples.  
Sherwin has comprehensively described the role of the cardio-respiratory system in physical activity supported with a wide range of examples. |

#### Understand the importance of the musculo-skeletal and cardio-respiratory systems in health and fitness

<table>
<thead>
<tr>
<th>Please tick</th>
<th>MB1</th>
<th>MB2</th>
<th>MB3</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assessor comments</strong></td>
<td>Sherwin has explained accurately and in detail a wide range of benefits of the cardio-respiratory fitness, muscular strength and endurance and muscular flexibility supported with clear and relevant examples.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
SAMPLE LEARNER WORK

AREAS FOR IMPROVEMENT/GENERAL COMMENTS

The examples related to sport could have been expanded in order to gain full marks. Sherwin was provided with blank outlines of the various systems which he has labelled.

RECORD OF QUESTIONS/ANSWERS

ASSESSOR QUESTION 1

LEARNER RESPONSE 1

ASSESSOR QUESTION 2

LEARNER RESPONSE 2

ASSESSOR QUESTION 3

LEARNER RESPONSE 3

ASSESSOR SIGNATURE: G. M. Knowles DATE: 15/11/14

LEARNER SIGNATURE: Sherwin DATE: 15/11/14

Marking commentary on MB3 sample learner work

There is an accurate explanation of the benefits of cardio-respiratory fitness; muscular strength and endurance and muscular flexibility. All aspects have been described and then related specifically to the benefits they have to fitness, sport and everyday tasks. The centre has awarded 8 marks as there needs to be a more detailed explanation and a wider range of relevant examples.

Why it was awarded MB3 not MB2

All of the sub-headings in the content of the learning outcome have been described in detail and then related to an aspect of fitness; everyday life and sport. There is not just an explanation of what the sub-headings are which is often what candidates produce without relating it to how beneficial the musculo-skeletal and cardio-respiratory systems are in health and fitness.
Learning Objective 3 – Be able to assess the short-term effects of physical activity on the musculo-skeletal and cardio-respiratory systems

Ways to measure and record the short-term effects of physical activity on the musculo-skeletal and cardio-respiratory systems

Suitable activities to produce short-term effects

In order to find out the short term effects of physical activity a person has to take part in activities where the effects can be recorded. These activities could be shuttle runs in the form of the ‘Cooper’ test; the hand grip test; sit ups; press ups; sit and reach and the Illinois agility test. Activities which might be in a circuit training programme are some of the best for measuring the effects of exercise on musculo-skeletal and cardio-respiratory systems.

Cooper test

The Cooper test is running as far as possible in 12 minutes. The Cooper test is a test of physical fitness. It can be used to test and improve your cardiovascular system. Below is a table which tells you how fit you are this is based on your age, your sex and how far you have run.

<table>
<thead>
<tr>
<th>Age</th>
<th>Very good</th>
<th>Good</th>
<th>Average</th>
<th>Bad</th>
<th>Very bad</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>F</td>
<td>M</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>13-14</td>
<td>2700+ m</td>
<td>2000+ m</td>
<td>2400 - 2700 m</td>
<td>1900 - 2000 m</td>
<td>2100 - 1999 m</td>
</tr>
<tr>
<td>15-16</td>
<td>2800+ m</td>
<td>2100+ m</td>
<td>2500 - 2800 m</td>
<td>2000 - 2100 m</td>
<td>2300 - 2299 m</td>
</tr>
<tr>
<td>17-20</td>
<td>3000+ m</td>
<td>2300+ m</td>
<td>2700 - 3000 m</td>
<td>2100 - 2300 m</td>
<td>2500 - 2499 m</td>
</tr>
<tr>
<td>20-29</td>
<td>2800+ m</td>
<td>2700+ m</td>
<td>2400 - 2800 m</td>
<td>2200 - 2400 m</td>
<td>2300 - 2399 m</td>
</tr>
<tr>
<td>30-39</td>
<td>2700+ m</td>
<td>2500+ m</td>
<td>2300 - 2700 m</td>
<td>2200 - 2399 m</td>
<td>2100 - 2199 m</td>
</tr>
<tr>
<td>40-49</td>
<td>2500+ m</td>
<td>2300+ m</td>
<td>2100 - 2500 m</td>
<td>2000 - 2200 m</td>
<td>1900 - 1999 m</td>
</tr>
<tr>
<td>50+</td>
<td>2400+ m</td>
<td>2200+ m</td>
<td>2000 - 2400 m</td>
<td>1700 - 1999 m</td>
<td>1400 - 1699 m</td>
</tr>
</tbody>
</table>

When I first did the Cooper test I covered 2,800 in 12 minutes which as I am a 15 year old male came into the good column.
• **Hand grip test**

The purpose of this test is to measure the maximum isometric strength of the hand and forearm muscles. Hand grip strength is important for any sport in which the hands are used for catching, throwing or lifting. A hand grip dynamometer is used for this test. Also as a general rule people with strong hands tend to be strong elsewhere so this test is often used as a general test of strength.

<table>
<thead>
<tr>
<th>Rating*</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(lbs)</td>
<td>(kg)</td>
</tr>
<tr>
<td>excellent</td>
<td>&gt;141</td>
<td>&gt;64</td>
</tr>
<tr>
<td>very good</td>
<td>123-141</td>
<td>56-64</td>
</tr>
<tr>
<td>above average</td>
<td>114-122</td>
<td>52-55</td>
</tr>
<tr>
<td>average</td>
<td>105-113</td>
<td>48-51</td>
</tr>
<tr>
<td>below average</td>
<td>96-104</td>
<td>44-47</td>
</tr>
<tr>
<td>poor</td>
<td>88-95</td>
<td>40-43</td>
</tr>
<tr>
<td>very poor</td>
<td>&lt;88</td>
<td>&lt;40</td>
</tr>
</tbody>
</table>

When I first did the hand grip test I got a result of 41kg which is in the poor column.

• **Sit ups in 30 seconds**

Sit ups in 30 seconds are a test of your muscular endurance as you are pushing yourself to get as many as possible within a set time.

When I first did the sit up test I got a result of 25 in 30 seconds.

• **Sit and reach test**

Sit and reach is sitting down on the floor with your feet against a box with measurements. Then with your legs straight you reach out as much as possible and take the score down. This measures flexibility.

When I first did the sit and reach test I got a result of 4 inches.

• **Illinois agility test**

The Illinois test is running in and out of a series in cones in a range of ways and directions. This test shows how good your agility is.

When I first did the Illinois test I completed it in 21 seconds.
Methods to measure the short-term effects

The main way to find out the short term effects of exercise is to record heart rate. This is done by recording your heart rate before you start exercise; at some point during the exercise; immediately after the exercise and then a short time after you have stopped exercising so that you can see how long it takes for your heart rate to return to what it was before you started exercising. If you can’t measure your own heart rate, by taking your pulse, you can work with a partner and record each other’s heart rates (pulse rates). You count the pulse over 1 minute.

Recording the outcomes

There are a few ways you can record the short term effect of exercise on musculo-skeletal and cardio-respiratory systems. You can count the pulse over 1 minute or over 30 seconds then multiply by 2 to get the pulse rate over a minute; you would record this in a table for the various stages to be measured.

When someone exercises you will notice that they will start sweating and this will increase the more exercise they do – this is the body’s way of regulating its temperature. It would be difficult to decide how much sweating someone has done compared with someone else.

Some people go red in the face when they exercise – this is also the body’s way of regulating its temperature. It would be difficult to decide how red in the face someone was compared with someone else.

If you exercise for a long period of time in one session you will get fatigue in the muscles this would be difficult to record and compare from person to person. Below are the results that I recorded when I did the tests and there are comments relating to the effects of short term exercise on the body systems.

<table>
<thead>
<tr>
<th>Test/measure</th>
<th>Result/comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooper test</td>
<td>2800 = good</td>
</tr>
<tr>
<td>Hand grip test</td>
<td>41kg = poor</td>
</tr>
<tr>
<td>Sit ups</td>
<td>25 in 30 seconds = average</td>
</tr>
<tr>
<td>Sit and reach</td>
<td>4 inches (10cms) = average</td>
</tr>
<tr>
<td>Illinois agility test</td>
<td>21 seconds = poor</td>
</tr>
<tr>
<td>Pulse rate</td>
<td>Pulse rose from 60 bpm (beat per minute) to 80 bpm after exercise then returned to 60 bpm after 5 minutes rest – these recording were made when I used the bike in the fitness suite</td>
</tr>
<tr>
<td>Breathing rate</td>
<td>Breathing rose from 16 breaths per minute to 40 breaths per minute when I was exercising then returned to 16 5 minutes after the exercise finished – these recording were made when I did the Cooper test</td>
</tr>
<tr>
<td>Sweating</td>
<td>Sweating took place during exercise and stopped after exercise ceased</td>
</tr>
<tr>
<td>Redness in face</td>
<td>Face was very red immediately after exercise returned to normal after the cool down</td>
</tr>
</tbody>
</table>
Different short-term effects of physical activity on the musculo-skeletal and cardio-respiratory systems and reasons for these

Changes in the range of movement around joints
Short term effects in the range of movement around joints are:

• If you do a warm up before you start your main activity this will warm the muscles and ligaments up and make them more flexible and less likely to tear.
• There is an increase in the volume of blood flow to the muscles during exercise.
• There will be increased flexibility around the joints.
• There will be a rise in muscle temperature.
• As we exercise there is an increase in the amount of synovial fluid we produce. The synovial fluid becomes more watery and is able to lubricate the joints more easily.

Changes in heart rate, stroke volume and cardiac output
Short term effects in heart rate, stroke volume and cardiac output are:

• The increase of cardiac output. The cardiac output is the volume of blood that the heart pumps in a period of one minute. During exercise it increases from the typical 5 litres per minute to up to 40 litres per minute which is during strenuous exercise.
• Blood pressure increases.
• Your heart rate will begin to rise before you even start to exercise. Your brain realizes you are going to work out and releases adrenaline to speed up your heart in preparation. This is called the ‘anticipatory response’. Heart rate will continue to rise in direct proportion to the intensity of exercise until maximum heart rate is reached.
• Your body will need more oxygen when you exercise.
• Release of adrenaline causes the heart rate to rise.
• The intensity that you do the exercise reflects on how hard your heart works.

Changes to breathing rate
Short term effects on breathing rate are:

• Decreased oxygen levels – this is why we start to breathe fast to cope with the demand of oxygen.
• The intercostal muscles, diaphragm and other muscles which aid the expansion of the thoracic capacity work harder to further increase the expansion of the lungs during inhalation to draw in more air.
• When you exercise you breathe faster and heavier and your heart beats faster.
• Doing exercise means that there is an increase of carbon dioxide in the blood. This means that you breathe heavier and this is to lower the amount of carbon dioxide in the blood and exchange it with oxygen.
• When you exercise there is a change in the energy requirements of oxygen to your muscles as your muscle cells are affected by how you exercise. How long you exercise is about how good your cardiorespiratory fitness level is.

Changes in temperature
Short term effects on temperature are:

• When you exercise your internal body temperature rises.
• During exercise your metabolic rate increases as heat is produced.
• When large muscles groups are used in exercise this increases body temperature.
**Muscle fatigue**
Short term effects on muscle fatigue are:

- Increase in lactate acid
- As you do your exercise your muscle will break down and will come back stronger
- When you exercise your muscles feel tired
- When our muscles want energy fast they get this by generating energy anaerobically. This is when energy comes from glucose. Glucose is broken down and becomes pyruvate. When the body doesn’t have enough oxygen the pyruvate is turned into lactic acid. When there are high levels of lactic acid the muscle does not work so well and becomes sore.

I used these tests and their results when I did R042: Applying principles of training – learning objective 3 (Be able to conduct fitness tests).

This learning objective draws upon skills, knowledge and understanding from unit R042.

Planning and setting up of suitable activities were done independently.

**Marking commentary on MB3 sample learner work**

The short term effects of physical activity on the musculo-skeletal and cardio-respiratory systems have been identified, measured and recorded precisely. The majority of activities mentioned were from R042 with the addition of the use of the exercise bike for recording the pulse rate. Planning and setting up of the activities was carried out independently. The adaptations were recorded and an explanation of why they occurred was included. The centre has awarded 12 marks. In order to gain more marks there needs to be a more detailed explanation of the adaptations relating the information more to the effects on the musculo-skeletal and cardio-respiratory systems. This should also include recording the outcomes – subjective measures.

**Why it was awarded MB3 not MB2**

The planning and setting up of suitable activities were carried out independently. The effects on the body systems were recorded precisely. The adaptations to the musculo-skeletal and cardio-respiratory systems of short term activity were explained using data from the activities as well as using visual observation. There was a detailed explanation of why the adaptations occurred.
Learning Objective 4 – Be able to assess the long-term effects of physical activity on the musculo-skeletal and cardio-respiratory systems

MB3

**Long-term effects of physical activity on the musculo-skeletal and cardio-respiratory systems and reasons for these**

**Changes in muscle size and strength**

When we exercise for a long time our muscles will gradually become bigger. When your muscles get bigger your strength increases. We might not notice this to look at but we will notice it when we find our strength increases. If we get stronger we will notice it when we play our sport for example if we get stronger arm muscles then our serve will improve in tennis as it will be more powerful. The muscles, bones and ligaments become stronger to cope with the stresses and impact put through them and the muscles are capable of storing a larger amount of glycogen for energy. You will be able to exercise for longer as you will have more muscle endurance.

**Changes in resting heart rate**

When we exercise for a long time our resting heart rate will lower. This is because the heart will become more efficient. The stroke volume will increase which means that the cardiac output will increase. An example of this is that the average person has a resting heart rate of 60 – 100 bpm whereas an elite athlete will have a resting heart rate of 40 – 60 this is because they have exercised and the heart has become more efficient. The resting heart rate decreases because the cardiovascular system has become stronger.

**Changes in training heart rate**

When we exercise for a long time our training heart rate will lower. Our muscles and heart will become more developed and more efficient. Our arterial walls become more elastic which allows greater tolerance of changes in blood pressure.

**Changes in heart rate recovery**

When we exercise for a long time our heart rate recovery will lower. Your recovery rate is the time in which your heart takes to get back to its normal rhythm after exercise. Your recovery rate can determine how strong your heart is. The faster your heart recovers the stronger it is. By doing regular exercise your heart rate will be stronger. A sporting example of this is if you are playing a tennis rally and it lasts a long time if you have trained over a long period of time you will be able to recover quickly between points so that you are ready to play the next point quickly.

**Changes in flexibility**

When we exercise for a long time then we will no longer be stiff when we have exercised. We will be more flexible and will have a greater amount of movement at the joints. We should also notice that our arms and legs have a better range of movement.

**Changes in muscle recovery**

When we exercise for a long time our muscles will be stronger and will be able to cope with the pressures of sustained exercise. The cardiac muscles surrounding the heart hypertrophies, resulting in thicker stronger walls and therefore increases the heart volume. The more blood pumped around the body per minute the faster oxygen is delivered to the working muscles the quicker they can recover. The number of red blood cells increases improving the body’s ability to transport oxygen to the muscles for aerobic energy production. Your muscles will get stronger and you will be able to exercise for longer. This means you won’t get tired so quickly.
Changes in lung capacity

When we exercise for a long time the respiratory muscles increase in strength. This results in larger respiratory volumes which allow more oxygen to be diffused into the blood flow. (Respiratory volumes are the amount of air inhaled, exhaled and stored within the lungs at any given time).

Recording the outcomes

I recorded Chris’s heart rate; muscle size and breathing at various times when doing the exercises. Below is a table which shows how Chris’s muscles increased in size as a result of doing an exercise programme over 6 weeks.

<table>
<thead>
<tr>
<th>Area</th>
<th>Pre-training programme</th>
<th>Week 2</th>
<th>Week 4</th>
<th>Week 6 - Post programme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper arm</td>
<td>19 cm</td>
<td>19.25 cm</td>
<td>19.5 cm</td>
<td>19.75 cm</td>
</tr>
<tr>
<td>Lower arm</td>
<td>15 cm</td>
<td>15.25 cm</td>
<td>15.25 cm</td>
<td>15.5 cm</td>
</tr>
<tr>
<td>Upper leg</td>
<td>42 cm</td>
<td>42.25 cm</td>
<td>42.5 cm</td>
<td>42.75 cm</td>
</tr>
<tr>
<td>Lower leg</td>
<td>25 cm</td>
<td>25.25 cm</td>
<td>25.25 cm</td>
<td>25.5 cm</td>
</tr>
</tbody>
</table>

Below is a table which shows how Chris’s heart rate changed as a result of doing an exercise programme over 6 weeks. The readings were taken when he was doing the session on the exercise bike as part of his training programme.

<table>
<thead>
<tr>
<th></th>
<th>Pre-training programme</th>
<th>Week 2</th>
<th>Week 4</th>
<th>Week 6 - Post programme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resting heart rate</td>
<td>65 bpm</td>
<td>65 bpm</td>
<td>60 bpm</td>
<td>60 bpm</td>
</tr>
<tr>
<td>Training heart rate</td>
<td>90 bpm</td>
<td>85 bpm</td>
<td>82 bpm</td>
<td>77 bpm</td>
</tr>
<tr>
<td>Time to return to resting heart rate</td>
<td>5 minutes</td>
<td>5 minutes</td>
<td>4 minutes</td>
<td>4 minutes</td>
</tr>
</tbody>
</table>

Below is a table which shows how Chris’s breathing rate changed as a result of doing an exercise programme over 6 weeks. The readings were taken when he was doing the session on the exercise bike as part of his training programme.

<table>
<thead>
<tr>
<th></th>
<th>Resting breathing rate</th>
<th>Directly after exercise</th>
<th>1 minute after exercise</th>
<th>2 minutes after exercise</th>
<th>3 minutes after exercise</th>
<th>4 minutes after exercise</th>
<th>5 minutes after exercise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-training</td>
<td>16</td>
<td>40</td>
<td>35</td>
<td>30</td>
<td>24</td>
<td>19</td>
<td>16</td>
</tr>
<tr>
<td>2 weeks</td>
<td>16</td>
<td>39</td>
<td>33</td>
<td>28</td>
<td>23</td>
<td>18</td>
<td>16</td>
</tr>
<tr>
<td>4 weeks</td>
<td>16</td>
<td>38</td>
<td>31</td>
<td>27</td>
<td>23</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>6 weeks - post</td>
<td>16</td>
<td>37</td>
<td>30</td>
<td>25</td>
<td>20</td>
<td>16</td>
<td>16</td>
</tr>
</tbody>
</table>
Ways to measure and record the long-term effects of physical activity on the musculo-skeletal and cardio-respiratory systems

Suitable long-term activity to bring about adaptations

In order to improve Chris’s results I need to devise a 6 week programme which gets progressively more difficult week by week so that Chris will have a long term training plan and I will be able to see how he has improved. (The 6 week training programme is at the end of this piece of work).

Methods to measure the long-term effects

To measure the long term effects of exercise Chris redid the tests he had done 6 weeks ago to see if his results had improved.

Cooper test

The Cooper test is running as far as possible in 12 minutes. The Cooper test is a test of physical fitness. It can be used to test and improve your cardiovascular system.

When Chris first did the Cooper test he covered 2,800 in 12 minutes which as he is a 15 year old male came into the good column. After a 6 week training programme he managed to improve his distance by 100m to 2,900 which puts him in the very good column. This shows that he has increased his aerobic capacity.

Hand grip test

The purpose of this test is to measure the maximum isometric strength of the hand and forearm muscles. Hand grip strength is important for any sport in which the hands are used for catching, throwing or lifting. A hand grip dynamometer is used for this test. Also as a general rule people with strong hands tend to be strong elsewhere so this test is often used as a general test of strength.

When Chris first did the hand grip test he got a result of 41kg which is in the poor column. After a 6 week training programme he managed to improve his result to 45 which is in the below average column. This shows that he has increased his hand strength.

Sit ups in 30 seconds

Sit ups in 30 seconds is a test of your muscular endurance as you are pushing yourself to get as many as possible within a set time.

When Chris first did the sit up test he got a result of 25 in 30 seconds. After a 6 week training programme he managed to improve his result in the sit up test to 29. This shows that he has increased his muscular endurance.

Sit and reach

Sit and reach is sitting down on the floor with your feet against a box with measurements. Then with your legs straight you reach out as much as possible and take the score down. This measures flexibility.

When Chris first did the sit and reach test he got a result of 4 inches. After a 6 week training programme he managed to improve his result to 5 inches. This shows that he has increased his flexibility.
Illinois agility test

The Illinois test is running in and out of a series in cones in a range of ways and directions. This test shows how good your agility is.

When Chris first did the Illinois test he completed it in 21 seconds. After a 6 week training programme he managed to improve his result to 18 seconds. This shows that he has increased his agility.

Recording the outcomes

I would record Chris’s heart rate at various times when doing the exercises. He will feel the benefits when he is playing sport as he will have more stamina.

Other long term effects

- Increased bone density
- Reduced risk of bone diseases such as osteoporosis
- Increased joint stability
- Risk of arthritis due to overuse
- There will be an increase in your bone width and your bones will become denser
- There will be more flexibility in your joints.

The 6 week training programme I have devised for Chris:

<table>
<thead>
<tr>
<th>Week</th>
<th>Monday</th>
<th>Week 2</th>
<th>Week 3</th>
<th>Week 4</th>
<th>Week 5</th>
<th>Week 6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10 minutes on exercise bike. 1 minute flat out 1 minute gentle cycling.</td>
<td>10 minutes on exercise bike. 1 minute flat out 1 minute gentle cycling.</td>
<td>12 minutes on exercise bike. 1 minute flat out 1 minute gentle cycling.</td>
<td>12 minutes on exercise bike. 1 minute flat out 1 minute gentle cycling.</td>
<td>14 minutes on exercise bike. 1 minute flat out 1 minute gentle cycling.</td>
<td>14 minutes on exercise bike. 1 minute flat out 1 minute gentle cycling.</td>
</tr>
<tr>
<td></td>
<td>Ladders repeated 3 times.</td>
<td>Ladders repeated 3 times.</td>
<td>Ladders repeated 4 times.</td>
<td>Ladders repeated 4 times.</td>
<td>Cross trainer 5 minutes as fast as you can.</td>
<td>Cross trainer 5 minutes as fast as you can.</td>
</tr>
<tr>
<td></td>
<td>Skipping 30 seconds 3 times.</td>
<td>Skipping 30 seconds 3 times.</td>
<td>Skipping 30 seconds 4 times.</td>
<td>Skipping 30 seconds 4 times.</td>
<td>Squats 3 sets of 1 minute.</td>
<td>Squats 3 sets of 1 minute.</td>
</tr>
<tr>
<td></td>
<td>Squats 3 sets of 10.</td>
<td>Squats 4 sets of 10.</td>
<td>Squats 4 sets of 10.</td>
<td>Squats 4 sets of 10.</td>
<td>Sit ups 3 sets of 20 catching a medicine ball and holding for 2 seconds.</td>
<td>Sit ups 3 sets of 20 catching a medicine ball and holding for 2 seconds.</td>
</tr>
</tbody>
</table>
### Week 1

**Tuesday Lunchtime**
- Skipping: 3 sets of 30 seconds.
- Squats: holding medicine ball out in front 3 sets of 10.
- Sit ups: holding medicine ball 3 sets of 20.

**Tuesday After School**
- 12 minutes on treadmill.
  - 1 minute sprint,
  - 1 minute walk.
- Ladders: repeated 8 times gentle jog back each time.

**Wednesday**
- Hockey Training
  - 10 minutes of rowing machine.
    - 1 minute at fastest pace,
    - 1 minute light pace.
    - Jumping over a bar side to side 3 sets of 20.
    - Burpees: 3 sets of 10.

**Thursday**
- 10 minutes of rowing machine.
- 12 minutes of rowing machine.
- 12 minutes of rowing machine.
- 12 minutes of rowing machine.
- Jumping over a bar side to side 3 sets of 20.
  - Burpees: 3 sets of 10.

### Week 2

**Tuesday Lunchtime**
- Skipping: 3 sets of 30 seconds.
- Squats: holding medicine ball out in front 3 sets of 10.
- Sit ups: holding medicine ball 3 sets of 20.

**Tuesday After School**
- 12 minutes on treadmill.
  - 1 minute sprint,
  - 1 minute walk.
- Ladders: repeated 8 times gentle jog back each time.

**Wednesday**
- Hockey Training
  - 10 minutes of rowing machine.
    - 1 minute at fastest pace,
    - 1 minute light pace.
    - Jumping over a bar side to side 3 sets of 20.
    - Burpees: 3 sets of 10.

**Thursday**
- 10 minutes of rowing machine.
- 12 minutes of rowing machine.
- 12 minutes of rowing machine.
- 12 minutes of rowing machine.
- Jumping over a bar side to side 3 sets of 20.
  - Burpees: 3 sets of 10.

### Week 3

**Tuesday Lunchtime**
- Skipping: 4 sets of 30 seconds.
- Squats: holding medicine ball out in front 4 sets of 10.
- Sit ups: holding medicine ball 4 sets of 20.

**Tuesday After School**
- 12 minutes on treadmill.
  - 1 minute sprint,
  - 1 minute walk.
- Ladders: repeated 8 times gentle jog back each time.

**Wednesday**
- Hockey Training
  - 10 minutes of rowing machine.
    - 1 minute at fastest pace,
    - 1 minute light pace.
    - Jumping over a bar side to side 3 sets of 20.
    - Burpees: 3 sets of 10.

**Thursday**
- 12 minutes of rowing machine.
- 12 minutes of rowing machine.
- 12 minutes of rowing machine.
- 12 minutes of rowing machine.
- Jumping over a bar side to side 4 sets of 20.
  - Burpees: 4 sets of 10.

### Week 4

**Tuesday Lunchtime**
- Skipping: 4 sets of 30 seconds.
- Squats: holding medicine ball out in front 4 sets of 10.
- Sit ups: holding medicine ball 4 sets of 20.

**Tuesday After School**
- 14 minutes on treadmill.
  - 1 minute sprint,
  - 1 minute walk.
- Ladders: repeated 10 times running back each time.

**Wednesday**
- Hockey Training
  - 12 minutes of rowing machine.
    - 1 minute at fastest pace,
    - 1 minute light pace.
    - Jumping over a bar side to side 4 sets of 20.
    - Burpees: 4 sets of 10.

**Thursday**
- 14 minutes of rowing machine.
- 12 minutes of rowing machine.
- 12 minutes of rowing machine.
- 12 minutes of rowing machine.
- Jumping over a bar side to side 3 sets of 30.
  - Burpees: 3 sets of 20.

### Week 5

**Tuesday Lunchtime**
- Skipping fast pace for 30 seconds slow for 10 repeat 3 times.
- Squats: holding medicine ball out in front 4 sets of 10.
- Sit ups: holding medicine ball with side twists 3 sets of 20.

**Tuesday After School**
- 14 minutes on treadmill.
  - 1 minute sprint,
  - 1 minute walk.
- Ladders: repeated 10 times running back each time.

**Wednesday**
- Hockey Training
  - 14 minutes of rowing machine.
    - 1 minute at fastest pace,
    - 1 minute light pace.
    - Jumping over a bar side to side 3 sets of 20.
    - Burpees: 3 sets of 20.

**Thursday**
- 14 minutes of rowing machine.
- 12 minutes of rowing machine.
- 12 minutes of rowing machine.
- 12 minutes of rowing machine.
- Jumping over a bar side to side 3 sets of 30.
  - Burpees: 3 sets of 20.
Marking commentary on MB3 sample learner work

The long term effects of physical activity on the musculo-skeletal and cardio-respiratory systems have been identified, measured and recorded precisely. The majority of activities mentioned were from R042 with the addition of the use of the exercise bike for recording the pulse rate. Planning and setting up of the activities was carried out independently. The adaptations were recorded and an explanation of why they occurred was included. The centre has awarded 12 marks in order to gain more marks there needs to be a more detailed explanation of the adaptations relating the information more to the effects on the musculo-skeletal and cardio-respiratory systems. This should also include recording the outcomes – subjective measures.

Why it was awarded MB3 not MB2

The planning and setting up of suitable activities were carried out independently. The effects on the body systems were recorded precisely. The adaptations to the musculo-skeletal and cardio-respiratory systems of long term activity were explained using data from the activities. There was a detailed explanation of why the adaptations occurred.

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