

FACTFILE: GCE HEALTH & SOCIAL CARE

A2 2: BODY SYSTEMS AND PHYSIOLOGICAL DISORDERS



Monitoring Physiological Status

Students should be able to:

- identify normal ranges for breathing and pulse rates and investigate possible causes of deviation;
- take steps to ensure the safety and well-being of participants when monitoring including:
 - informed consent;
 - fitness to participate; and
 - safety of the environment.
- safely monitor the circulatory and respiratory systems before and after exercise, using the following measuring techniques:
 - recording the pulse rate for the circulatory system; and
 - counting breaths per minute for the respiratory system.
- present the results of measurements by using an appropriate format;
- analyse the results obtained; and
- assess the accuracy and reliability of the measurements.



Course Content



Most adults have a resting heart rate of 60-100 beats per minute (bpm). The fitter you are, the lower your resting heart rate is likely to be. For example, athletes may have a resting heart rate of 40-60 bpm or lower.

In order to keep adequate oxygenation of the muscles when exercising, the heart has to beat faster. Simultaneously, the respiratory rate increases to bring more oxygen into the system and the heart beats faster in order to transport that oxygen. Health experts recommend that exercise should increase the heart rate to between 75 and 80 percent of its maximum rate. To determine this, take 220 beats per minute (a human's

maximum heart rate), and subtract your age. For instance, a 40-year-old has a maximum heart rate of approximately 180 beats per minute during exercise.

A range of factors can affect an individual's resting heart rate, including their age, stress, their BMI, any medication they might be on and their overall state of health. In general, the heartbeat gets slower with age and slower as someone becomes more physically fit.

How to check pulse rate

Ask the participant to hold his or her hand out, palm up. Use two fingers (index and middle) to locate the pulse on the wrist at the base of the thumb. The pulse feels like a rhythmic thumping. Count the beats using a clock or watch with a second hand, time yourself counting the pulsating beats for 15 seconds.

Calculate the pulse rate. Multiply the pulses you counted in 15 seconds by 4 to get the pulse rate which is always measured per minute. Never use your thumb to take a pulse. In most people, there is a pulse in the thumb that can interfere with the one you are trying to feel. The pulse in the wrist is called the radial pulse, but pulses can also be felt in the neck, upper arm, groin, ankle and foot.

The following website is useful for further guidance on checking pulse rate
<http://www.nhs.uk/chq/Pages/2024.aspx?CategoryID=52>

How to check breathing rate

There are many factors that affect breathing/respiratory rate such as age, gender, size and weight, exercise, anxiety, smoking and pain. A normal breathing/respiratory rate for a man is about 14 to 18 breaths per minute and about 16 to 20 breaths per minute for a woman. However it is important to know what is normal for the individual.

- Try to count breaths/respirations without the person knowing. If they know, they may try to control their breathing. This can give a false respiratory rate.
- Use a watch with a second hand and count the breaths for 15 seconds. Multiply the breaths you counted in 15 seconds by 4 to get the respiration rate which is always measured per minute.



Steps to ensure the safety and well-being of participants

- Informed consent- this is the idea that participants should understand what they are agreeing to take part in. This can be achieved with a brief statement on what the activity is about and how the results gathered will be shared. Participants should be informed of their right to withdraw from the activity at any time.
- Fitness to participate - It is important that the individuals selected to participate in the exercise activity are fit to do so. It is the responsibility of students to ensure that the health and well-being of participants is not in any way compromised as a result of involvement in the activity. Individuals with



health problems such as high blood pressure or heart disease should therefore not be selected.

- Safety of the environment – it is important to ensure that participants are safe during the activity. If the activity takes place in a gym then equipment should be checked prior to use and clear instructions on how to use it should be given. If participants are undertaking the activity outside, then recognised walk routes which are safely lit should be used and all participants should be advised regarding appropriate clothing and footwear.

Presenting and interpreting results

Graphs and charts condense large amounts of information into easy to understand formats that clearly and effectively communicate important points. In selecting how best to present data, think about the purpose of the graph or chart and what exactly is being presented. Line graphs are commonly used to track changes over short and long periods of time and are popular in health care to capture changes in variables such as pulse rate, body temperature and respiration rates.

A line graph displays the relationship between two types of information, such as the number of heart beats in a minute. They are useful in illustrating trends over time. Line graphs are drawn so that the independent data are on the horizontal x-axis (e.g. time) and the dependent data are on the vertical y-axis (heart rate).

Graphs should be simple and present only essential information. If a graph or chart is too complex or contains too much information, it will not clearly communicate the important points.



Graphs or charts should have a clear title to convey the purpose and time and effort should be spent on this. The title should provide the reader with the overall message being conveyed. The use of different colours may help the reader to fully and easily understand the graph or chart. Results should be analysed accurately and succinctly.

The accuracy and reliability of measurements

The accuracy and reliability of the results gathered from the monitoring activity depend on the skill of the person taking the measurements. If a mistake is made the measurement may be inaccurate and thus unreliable.

Sound knowledge of the circulatory and respiratory systems including the normal ranges for both body systems and the factors such as age, physical activity, and weight that can impact on these systems make it easier to spot something that seems strange. Students need to be able to understand what the results of monitoring are likely to be and it is a good idea for students to predict how participants might perform in the activity.

Activity 1

Try this activity to find out how your heart rate and breathing rate responds to exercise. You will need to work in pairs.

1. First measure your pulse and respiration rates at rest and record these 'resting' results in the table below.
2. Now do 5 minutes 'on the spot' jogging or go for a 5 minute brisk walk.
3. Rest for one minute after the exercise activity and then measure your pulse rate and respiration rates and record the results in the table below. Continue monitoring every minute until your pulse and respiration rates return to their resting rate. Record your results and display them on a graph. A line graph is the most suitable format for displaying changes over time. You will need to ensure the x and y axis are properly labelled and that the title given to your graph/s is an accurate reflection of what it represents.

	Heart rate in beats per minute	Breathing rate in breaths per minute
At rest		
1 minute after completing exercise		
2 minutes after completing exercise		
3 minutes after completing exercise		
4 minutes after completing exercise		

(You can extend your table as required)

Explain what happened, as a result of exercise, to your:

- pulse rate; and
- respiration rate.

You should start with your pre-exercise readings and then go on to discuss what they were following the exercise activity and explain why they changed. You should note how long it took for your body to return to resting rates following the exercise activity – this will give you an indication of how fit you are.

Activity 2

- Examine your results and then draw up a list of the factors that are likely to have influenced your performance in this activity.
- Were you surprised by your results or were you expecting them? Discuss.

