

T Level Technical Qualification in Health (603/7066/X)

Core knowledge and understanding

Paper B

Paper number P00XXXX

Date Morning/Afternoon

Time allowed: 2 hours 30 minutes

Student instructions

- Use black or blue ink.
- Fill in the boxes at the bottom of this page.
- Answer **all** questions.
- Read each question carefully.
- You **must** write your responses in the spaces provided. There may be more space than you need.
- You may do rough work in this answer book. Cross through any work you do not wish to be marked.

Student information

- The marks available for each question are shown in brackets. This is to help you decide how long to spend on each question.
- The maximum mark for this paper is 118.
- In questions **7, 9, 14, 16(b), 20 and 21**, you will be assessed on your quality of written communication (QWC). Specifically, your ability to:
 - use good English
 - express and organise ideas clearly and logically
 - use appropriate technical terms.
- You may use a calculator.

Please complete the details below clearly and in BLOCK CAPITALS.

Student name _____

Provider name _____

Student number

Provider number

To be completed by the examiner			
Question	Mark	Question	Mark
1 (a)		13	
1 (b)		14	
2		15 (a)	
3		15 (b)	
4		16 (a)	
5		16 (b)	
6		17 (a)	
7		17 (b)	
8		17 (c)	
9		18	
10		19	
11		20	
12		21	
			TOTAL MARK

Section A: body systems 1

This section is worth 35 marks, plus 6 marks for the quality of written communication (QWC) and use of specialist terminology.

Answer **all** questions in the spaces provided.

1

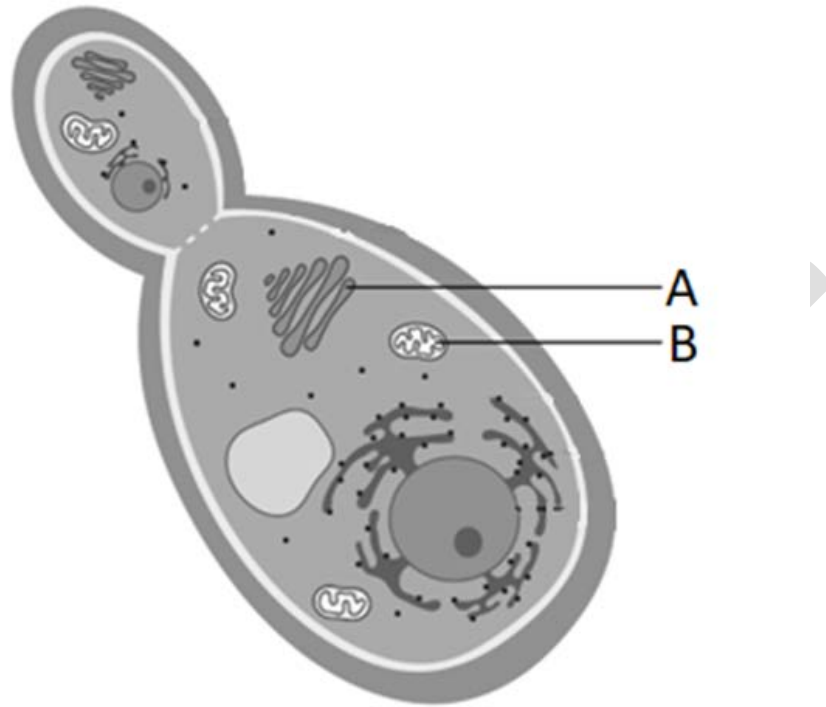


Figure 1 Structure of the microorganism

- (a) Referring to **Figure 1**, name the organelle labelled A found within this eukaryotic cell.

[1 mark]

A _____

- (b) Referring to Figure 1, what is the function of the organelle labelled B?

[1 mark]

2 A baby has the following symptoms following a children's birthday party at a small indoor soft play area:

- white spots in the inner cheeks
- white coating on the tongue
- some difficulty feeding.

A total of 35 children were in attendance throughout the day, where children shared the same play area, toys and eating area.

What is the likely cause of the illness in the baby?

[1 mark]

3 Identify **one** of the two stages of the body's response to injury.

[1 mark]

Please turn over for the next question

5 Spirometry is a simple way to test how well air can be moved into and out of the lungs.

The total volume exhaled indicates the functional size of the lungs.

Figure 2 shows the volume–time curves for two patients in comparison to a normal curve.

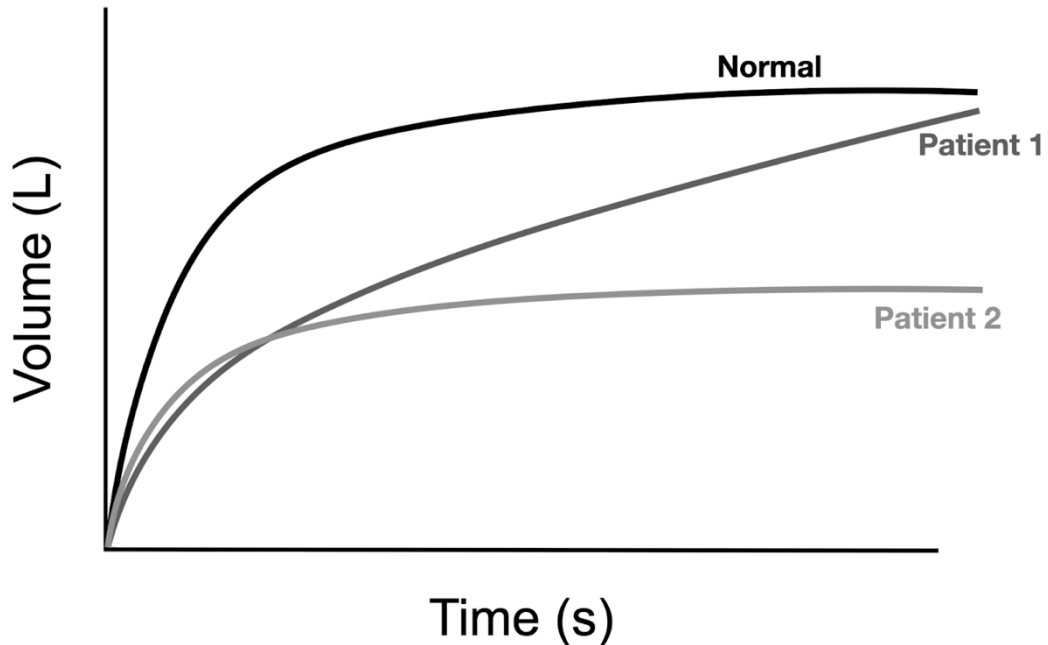


Figure 2 Volume-time curves for two pulmonology patients in comparison to a normal curve

One patient has chronic obstructive pulmonary disease (COPD). The other patient has pulmonary fibrosis, which is a restrictive disorder caused by scarring of the lungs that limits the volume the lungs can expand to.

Referring to **Figure 2**, identify which patient has COPD and explain **one** piece of evidence to support your decision.

[3 marks]

6 A patient has been a heavy smoker for a long time. They have been diagnosed with COPD, which causes shortness of breath and coughing especially when active. They use an inhaler but struggle with the build-up of mucus making it difficult to breathe. The doctor decides to prescribe them with some mucus-thinning medication.

Explain **one** reason why mucus-thinning medication may be prescribed.

[2 marks]

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7

Figure 3 Trends in deaths from COPD from 1980 to 2005

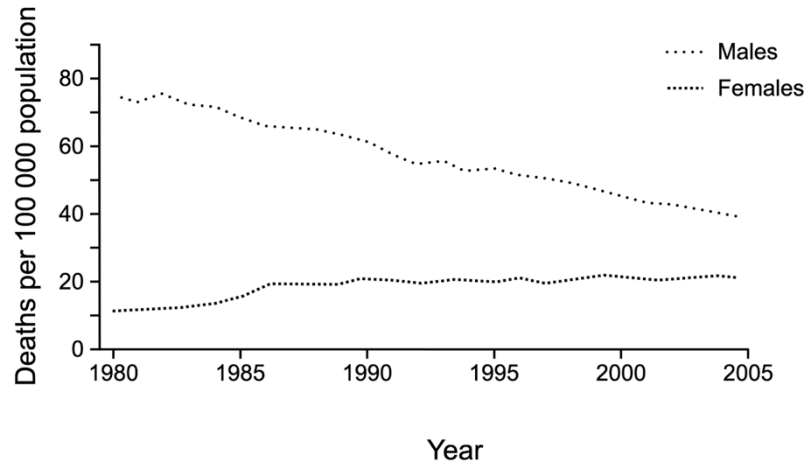
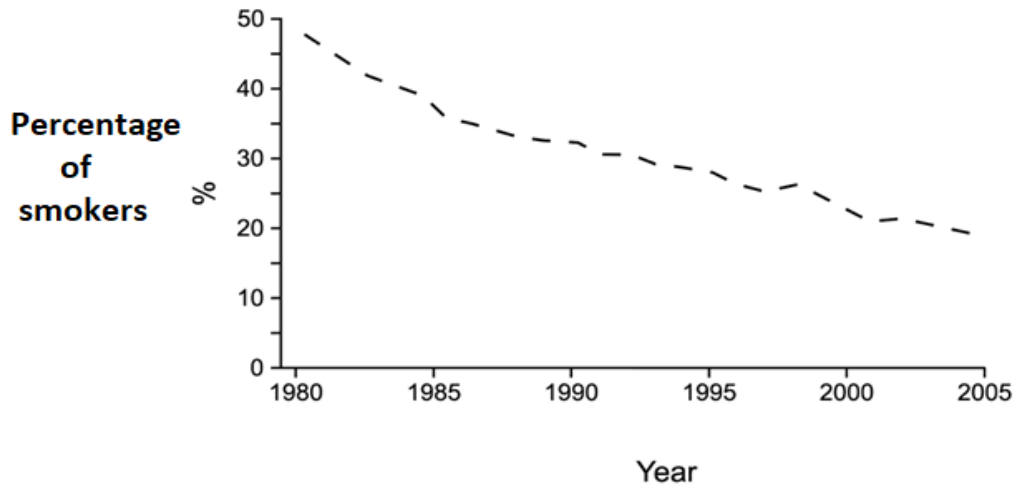


Figure 4 Trend in percentage of smokers from 1980 to 2005



A student claims that a decrease in the percentage of smokers, will result in a reduction in the number of cases of COPD by 2030, especially because the smoking ban that prevented people from smoking in public places came into practice in 2007.

Evaluate this statement using information in **Figure 3** and **Figure 4**.

[9 marks, plus 3 marks for QWC]

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8 The graph in **Figure 5** shows the arterial blood pressure changing during a 55-year-old man's cardiac cycle.

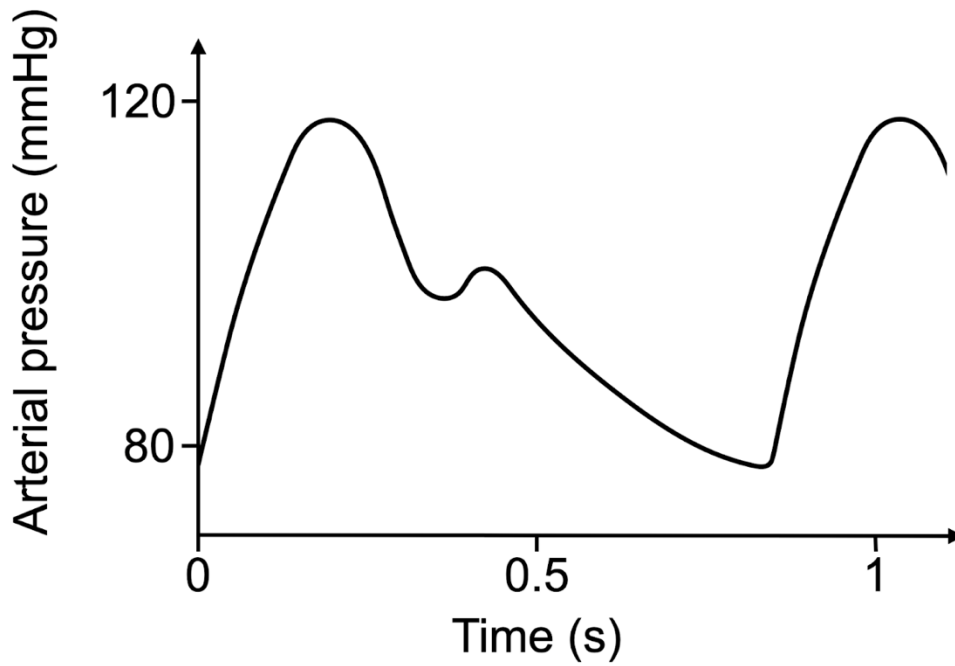


Figure 5 Arterial pressure during the cardiac cycle

Explain **one** way the information from the graph shows that his blood pressure is not a cause for concern.

Use approximate readings to support your answer.

[2 marks]

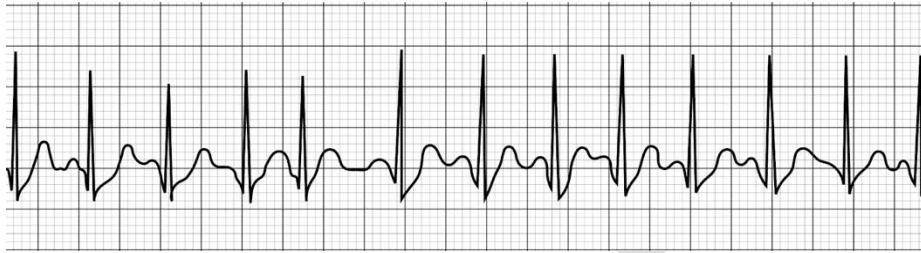
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9

Over one evening, three patients presented to accident and emergency with the same symptoms – chest pain, difficulty breathing and nausea. Their electrocardiograms (ECGs) are shown below.

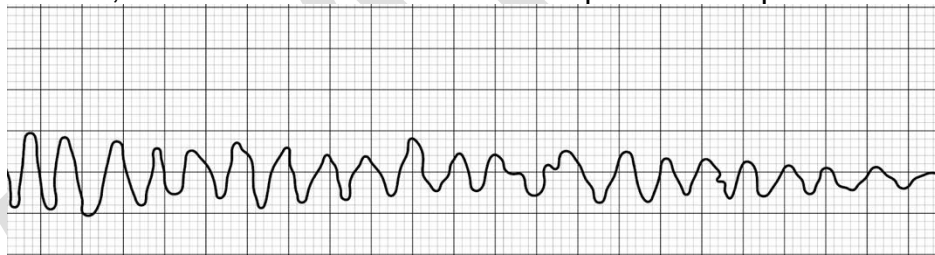
Patient 1: Male, 21. Non-smoker. Final year university student revising at onset of symptoms.



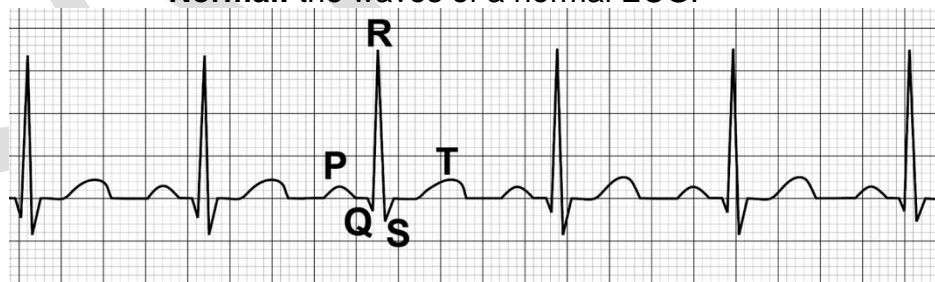
Patient 2: Female, 38. Smoker. Solicitor. In a bar for leaving drinks at onset of symptoms.



Patient 3: Male, 44. Non-smoker. A sudden collapse while supermarket shopping.



Normal: the waves of a normal ECG.



The triage team decides that patient 3 is the most seriously ill patient. Analyse their decision to prioritise patient 3's treatment.

Your response should demonstrate:

- understanding of the heart and the PQRST complex
- interpretation of the ECGs in terms of cardiac electrical activity
- consideration of the mechanical cardiac function in the different patients.

[9 marks, plus 3 marks for QWC]

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Section B: body systems 2

This section is worth 35 marks, plus 6 marks for the quality of written communication (QWC) and use of specialist terminology.
Answer **all** questions in the spaces provided.

10 Identify the product of the chemical digestion of proteins by protease. **[1 mark]**

11 **Figure 6** shows the organs of the digestive system.

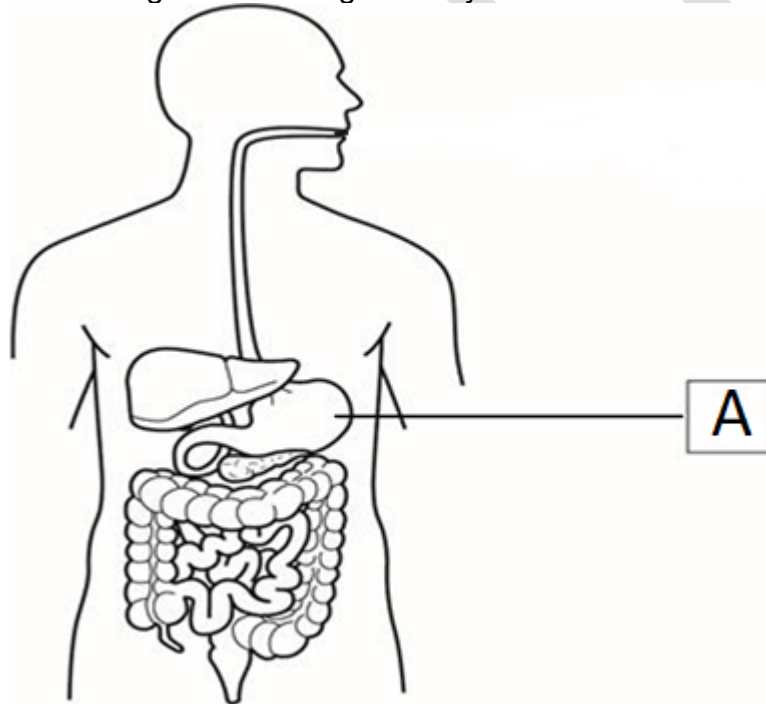


Figure 6 Human digestive system

Referring to **Figure 6**, explain **one** way in which physical digestion breaks down food at the point labelled A.

[2 marks]

Point A _____

12 Two patients decide to have a snack. Patient 1 ate a banana containing glucose and patient 2 ate a sandwich made with wholegrain bread that contained starch. After a few minutes, patient 1's blood sugar spiked quickly while patient 2's blood sugar increased more slowly.

Explain one reason why patient 2's blood sugar increased more slowly.

[2 marks]

13 A patient has experienced symptoms of chronic abdominal pain, nausea and digestive problems. The doctor has diagnosed them with gallstones, which have caused a blockage in the pancreatic duct.

Explain **one** reason why starch digestion is affected in patients with a blocked pancreatic duct.

[2 marks]

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SAMPLE

14

Crohn's disease is a medical condition that causes swelling of the lining of the intestines. Approximately 15% of people with Crohn's disease have a close relative who also has this disease. If one identical twin has Crohn's disease, there is a 70% probability that the other twin will also have this disease.

A patient has been diagnosed with Crohn's disease and is waiting to see the practice nurse for information and advice.

They say:

- Crohn's disease is caused by genetic factors.
- There is no treatment for Crohn's disease.

Evaluate to what extent patient 1's claims are correct.

[9 marks, plus 3 marks for QWC]

ANSWER AREA

15 (a) Some rare adrenal gland tumours often secrete testosterone and oestrogen.

High levels of sex hormones produce symptoms such as growth of body hair, breast growth and effects on the menstrual cycle.

Explain why adrenal tumours may be detected earlier in children under 10 than in adults.

[2 marks]

15 (b) Adrenal tumours can be benign or malignant and can be either functioning or non-functioning. Functioning tumours secrete hormones, while non-functioning tumours can become functioning over time. Adrenal tumours can secrete various hormones, including cortisol, oestrogen and testosterone.

The most common type of adrenal tumour is a benign adenoma, which may not require treatment, particularly if it is non-functional, but it will be closely monitored to ensure it does not become functioning.

Discuss the suitability of **two** different treatment options for adrenal tumours.

Your answer must include reasoned judgements and conclusions.

[6 marks]

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16 (a) The integumentary system supports temperature regulation, identify **two** additional functions of the system.

[2 marks]

16 (b)

	Reduction in sweating	Reported side effects
Anticholinergic gels	Nearly 75% of patients have ≥50% reduction in sweat production	31% experience skin reactions 24% experience dry mouth Other side effects include application site pain, dilated pupils, dry eye, dry throat, nasal dryness, throat pain, dry skin, constipation and headaches
Botulinum toxin injections	Nearly 90% reduction in sweat production two weeks after treatment 65% reduction in sweat production 6 weeks after treatment 50% reduction in sweat production 60 months after treatment	Insufficient evidence Short-term studies suggest that injection-site pain (at times severe) is likely. Headaches, muscle soreness of the shoulder, increased facial sweating and itchy armpit skin were also reported.

Stuart ME, Strite SA & Gillard KK. (2020) A systematic evidence-based review of treatments for primary hyperhidrosis. *Journal of Drug Assessment*. 210(1):35-50

A patient visits their doctor complaining of excessive sweating and sensitivity to touch on their skin. The doctor suspects that there may be a problem with the patient's integumentary system.

Evaluate the doctor's suspicion that the patient's symptoms indicate a problem with their integumentary system and the processes involved in temperature regulation.

[9 marks, plus 3 marks for QWC]

SAMPLE

Section C: body systems 3

This section is worth 30 marks, plus 6 marks for the quality of written communication (QWC) and use of specialist terminology.

Answer **all** questions in the spaces provided.

- 17 (a)** During the transcription process, deoxyribonucleic acid (DNA) is transcribed into messenger ribonucleic acid (RNA) using a sequence of base pairs.

Identify the missing base to complete the table below.

Deoxyribonucleic acid (DNA)	Ribonucleic acid (RNA)
Adenine	Adenine
Cytosine	Cytosine
Guanine	Guanine
Thymine	

[1 mark]

Missing base _____

- 17 (b)** Give **two** differences between the structure of DNA and the structure of RNA.

[2 marks]

17 (c) The complementary base-pairing found in DNA molecules is important during the copying of DNA during mitosis.

Suggest **two** reasons why.

[2 marks]

18 Mitochondrial myopathy is a term for a group of conditions caused by faulty mitochondria.

A healthcare assistant suggests that the symptoms of mitochondrial myopathy will be primarily muscle weakness, including weakness of arms and legs, exercise intolerance, difficulty moving the eyes and heart problems.

Justify the healthcare assistant's suggestion of muscle weakness being a common symptom of mitochondrial myopathy.

[3 marks]

19 Patient 1 is an overweight 68-year-old smoker who exercises less than 30 minutes per week. During this activity, they experience chest pains, are out of breath and feel exhausted.

Explain **two** reasons why they may be experiencing these symptoms.

[4 marks]

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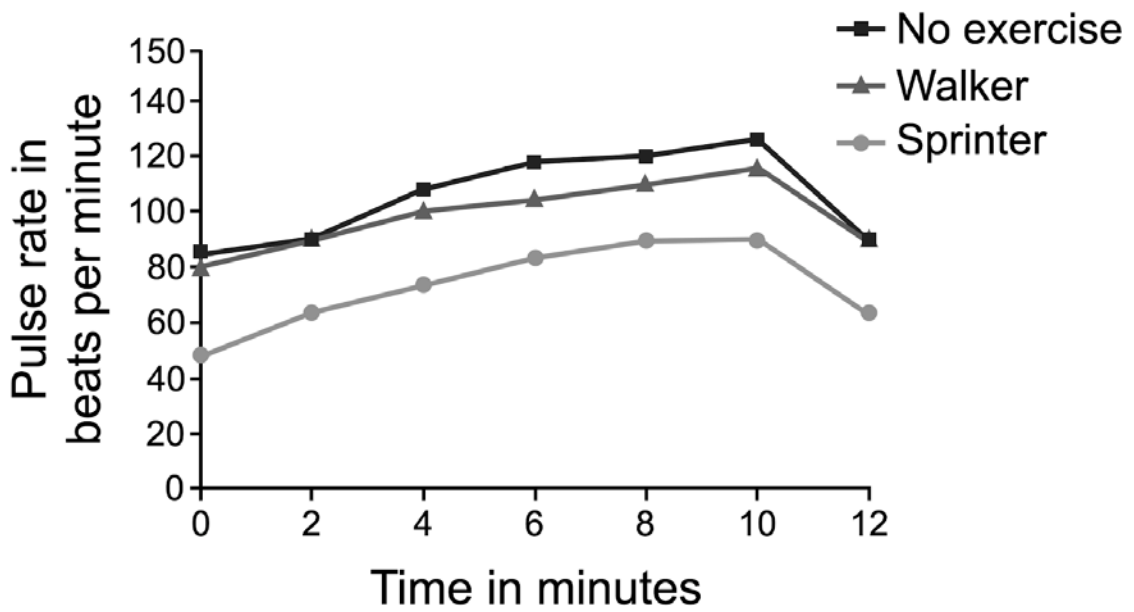


Figure 8 The effects of exercise on heart rate of three different patients

Figure 8 shows the recorded heart rates of three different patients with different fitness levels during a 10-minute brisk walk that is followed by a 2-minute period of rest. A sprinter is a person who runs a short distance at top speed.

Patient 1 says they think that sprinting is the best form of exercise as it makes your muscles work harder. However, patient 2 strongly disagrees, saying they believe that regular walking is much better.

Do you agree with patient 1 or patient 2?

Justify your answer using the information in the graph and your own knowledge.

[9 marks, plus 3 marks for QWC]

SAMPLE

21

A patient has been diagnosed with breast cancer. The cancer has spread to the lymph nodes, which is impacting the cardiovascular system, digestive system and respiratory system.

Evaluate the use of radiation in the treatment for the patient.

Your response should demonstrate an understanding of:

- the principles of the mechanism of therapeutic radiation
- considerations about the impact on normal function of the cardiovascular, digestive or respiratory system.

[9 marks, plus 3 marks for QWC]

This is the end of the external assessment.

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Owner: Head of Assessment Design

Change History Record

Version	Description of change	Approval	Date of Issue
v1.0	Published.	June 2023	26 June 2023
v1.1	Sample added as a watermark	November 2023	21 November 2023