



Oxford Cambridge and RSA

Level 3 Alternative Academic Qualification Cambridge Advanced National in Human Biology

H149 Unit F171: Health and disease

Sample Assessment Material (SAM)

Time allowed: 1 hour 15 minutes
XXX/XXXX

No extra materials are needed

Please write clearly in black ink. Do not write in the barcodes.

Centre number

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Candidate number

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First name(s)

Last name

Date of birth

D	D	M	M	Y	Y	Y	Y
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INSTRUCTIONS

- Use black ink.
- Write your answer to each question in the space provided. You can use extra paper if you need to, but you must clearly show your candidate number, the centre number and the question numbers.
- Where appropriate, your answer should be supported with working. Marks might be given for using a correct method, even if your answer is wrong.
- In the live exam there might be lined pages at the end of the question paper for you to use if you need extra space. Remember, you must clearly show the question numbers.
- Answer **all** the questions.

INFORMATION

- The total mark for this paper is **60**.
- The marks for each question are shown in brackets [].
- This document consists of **16** pages.

ADVICE

- Read each question carefully before you start your answer.

Answer **all** the questions.

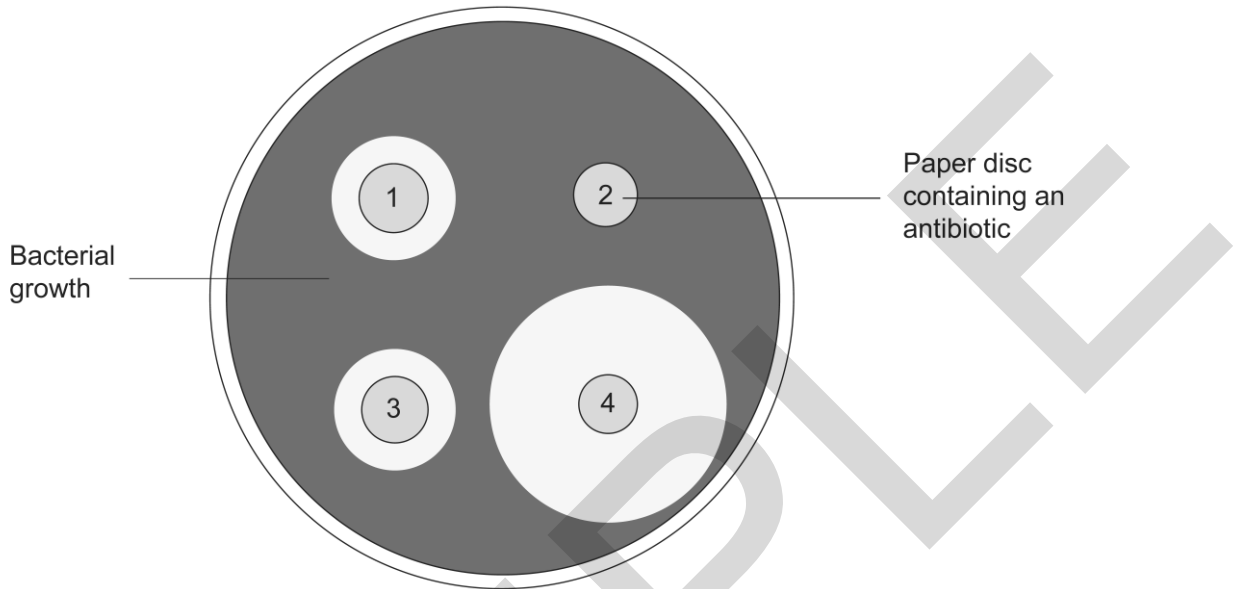
1
(a) What is a medical sign?
.....
..... [1]

(b) What is a disease?
.....
..... [1]

2
(a) Explain how smoking causes damage that leads to Chronic Obstructive Pulmonary Disease (COPD).
.....
.....
.....
..... [2]

(b) Explain how diet **and** exercise can improve the symptoms of COPD.
Diet
.....
Exercise
..... [2]

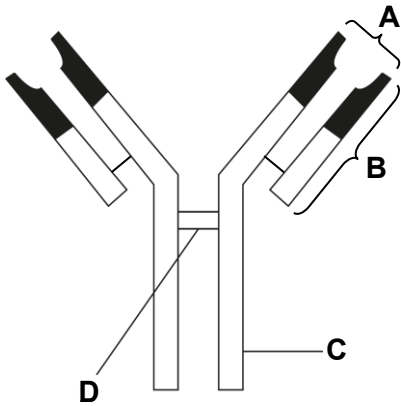
- 3 Amir is investigating the activity of different antibiotics in the control of bacterial-based diseases. Amir inoculates an agar plate with bacteria taken from an infected wound of a patient. He places discs 1 to 4 containing different antibiotics on the surface of the agar. Amir incubates the agar plate at 25 °C. After one week, the plate looks like this:



- (a) Explain which antibiotic on Amir's agar plate should be used to treat the infection.
- Antibiotic
- Explanation
- [2]
- (b) Explain what action Amir could take to ensure that he has chosen the most suitable antibiotic.
- Action
-
- Explanation
- [2]
- (c) Amir's investigation lacks a control.
- Explain how **one** control would make this agar plate test more valid.
-
-
- [2]

4 Antibodies contain different regions.

Identify regions **A**, **B**, **C** and **D** in the diagram of an antibody.



A

B

C

D

[4]

5

(a) Ben has made an appointment at a clinic.

Ben is a 63-year-old, with no pre-existing chronic conditions.

One test at the clinic involves measuring his blood pressure.

Ben's first reading is high at 150/93 mm Hg.

The health practitioner re-takes Ben's blood pressure two more times.

Ben is allowed to rest for 5 minutes between each test.

Identify **two** examples of good practice by the health practitioner.

1

.....

2

.....

[2]

(b) Ben's blood pressure is still high.

The health practitioner arranges for Ben to monitor his own blood pressure at home.

Ben measures his blood pressure for a week.

He has a choice of **two** options to monitor his blood pressure.

Option 1: Wear a device on his arm for 24-hour monitoring.

Option 2: Take his blood pressure twice a day with a portable device.

Select **the** option you would choose.

Outline **two** reasons for your choice.

Option

Reason 1

.....

Reason 2

.....

[2]

- 6 The process of analytics involves analysing raw data and looking for meaningful patterns.

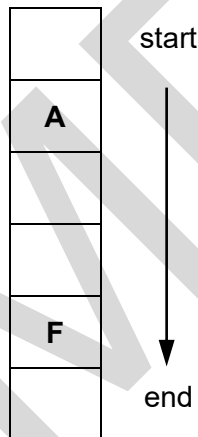
The table shows the **six** stages involved in this process.

The stages are **not** in the correct order.

Stage	Process
A	Interpretation
B	Analysis
C	Reporting
D	Data collection
E	Extraction
F	Transformation

Write a letter for each stage in each box to show the **correct** order.

Two stages (**A** and **F**) have been done for you.



[3]

7 A group of patients are anaemic.

They have regular blood tests to monitor the number of platelets in their blood.

The results of the blood tests are in the table below.

Patient	Platelet count
1	105
2	92
3	81
4	86
5	110
6	98
7	101
8	92
9	92
10	83
11	102

Calculate the mean of the platelet count in the table.

Give your answer to 2 significant figures.

mean = [2]

8 Eve is invited to a clinic to be observed using her peak flow meter.

The health practitioner is concerned that Eve is not using her peak flow meter correctly when monitoring her asthma and recording her results at home.

The health practitioner observes the following stages in the procedure:

- 1 Eve moves the marker to the starting position.
- 2 She sits on a chair and leans forward to do the test.
- 3 She takes the deepest breath possible.
- 4 She positions her mouth around the mouthpiece without creating a tight seal with her lips.
- 5 She blows hard and fast into the peak flow meter.
- 6 She takes the reading and repeats the procedure twice more.
- 7 The highest reading of the three attempts is recorded.

Identify **two** stages showing bad practice by Eve and explain why.

Stage

Explanation
.....

Stage

Explanation
.....

[4]

9 Sara and Ali are going on a walking holiday in May through an area of countryside.

- Ticks are becoming more common in the area they are visiting.
- Ticks live on the surface of plants.
- Ticks cannot fly or jump but can easily climb onto passing objects.
- Ticks may carry the bacteria causing Lyme disease.

Identify **four** preventative measures for Sara and Ali to take to reduce their risk of Lyme disease.

1

2

3

4

[4]

10 Zac is an active 12-year-old.

He has fallen off his skateboard.

Zac has broken a bone in his left forearm.

The doctor has decided to give Zac a fibreglass cast to support his arm.

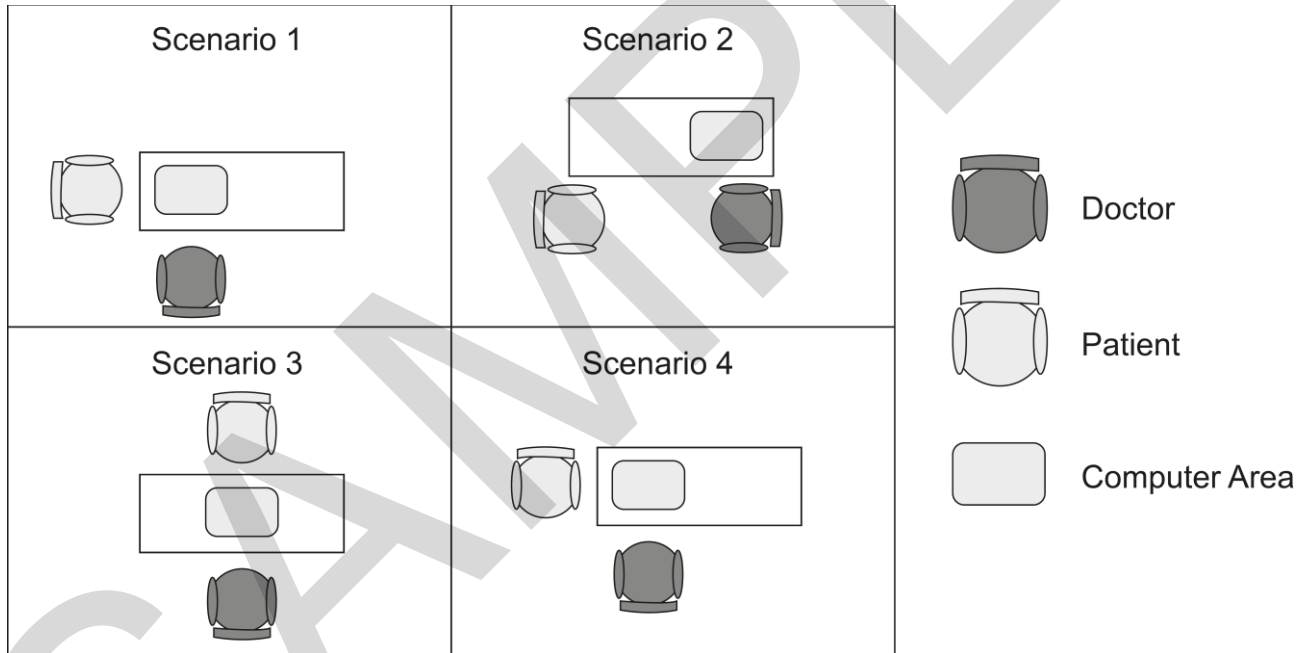
Outline **two** reasons why the doctor would choose to give Zac a fibreglass cast rather than a plaster cast.

1

2

[2]

11 The layout of a doctor's consulting room can affect the consultation experience.



Identify **three** reasons why Scenario 2 is **most likely** to give the best consultation experience.

1

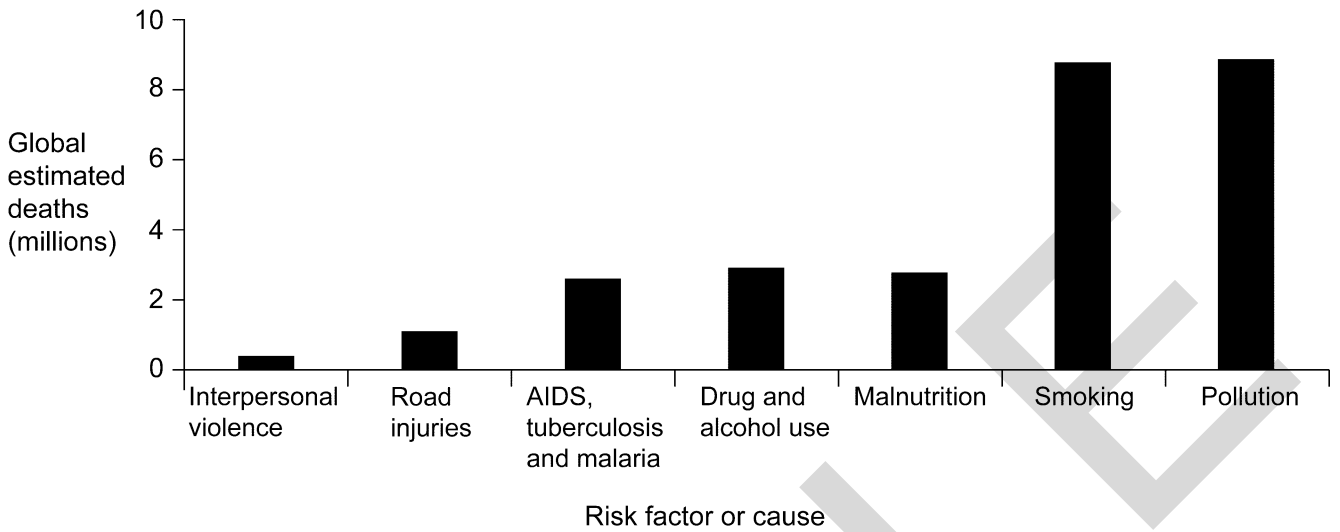
2

3

[3]

12 Global estimated deaths can be classified by major risk factor or cause.

The bar chart shows some data obtained for this type of research.



Identify **three** observations from the bar chart.

1

.....

2

.....

3

.....

[3]

13 Nina is a 60-year-old woman.

She takes hormone replacement therapy (HRT) medication.

Nina has missed her mammogram appointment for breast screening.

She self-examines her breasts and finds a lump in her left breast.

Nina visits her doctor for a consultation.

Explain **two** different actions the doctor may take as a result of the consultation.

1

.....

2

.....

[4]

15 The team at a general practice surgery are trying to decide if they should change from **manual to electronic** health records.

The surgery has a number of issues which the team are trying to balance. The issues include:

- an increasing number of patients
- patient consultations limited to 10 minutes
- lack of space within the surgery
- a renewed focus on patient privacy
- an increased awareness of sustainability practices
- a need to communicate with a range of other medical professionals
- ongoing staff training
- a challenging financial budget.

Discuss whether the surgery should change to an **electronic** health records system.

In your answer you **must** write about:

- any **benefits** of the electronic health records system for the general practice surgery
- any **limitations** of the electronic health records system for the general practice surgery
- whether you would recommend that the general practice surgery use electronic health records **and** your reasons.

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END OF QUESTION PAPER

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SAMPLE

SAMPLE

This is sample assessment material for our specification. It is to help show how the live assessment materials will look. During the lifetime of the qualification you might see small adjustments to the assessment materials. This is part of continuous improvement, designed to help you and your students. We recommend you look at the most recent set of past papers where available.

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**Level 3 Alternative Academic Qualification Cambridge
Advanced National in Human Biology**

Unit F171: Health and disease

Sample Assessment Material (SAM)

Mark Scheme

This document has 11 pages.

SAMPLE

MARKING INSTRUCTIONS

Crossed-out answers

If a student has crossed out an answer and written a clear alternative, do **not** mark the crossed-out answer.

If a student has crossed out an answer and **not** written a clear alternative, give the student the benefit of the doubt and mark the crossed-out answer if it's readable.

Multiple choice question answers

When a multiple choice question has only one correct answer and a student has written two or more answers (even if one of these answers is correct), you should **not** award a mark.

When a student writes more than one answer

1. Questions that ask for a set number (including 1) of short answers or points

If a question asks for a set number of short answers or points (e.g. **two** reasons for something), mark only the **first set number** of answers/points.

First mark the answers/points against any printed numbers on the answer lines, marking the **first** answer/point written against each printed number. **Then**, if students have not followed the printed numbers, mark the answers/points from left to right on each line and **then** line by line until the set number of answers/points have been marked. Do **not** mark the remaining answers/points.

2. Questions that ask for a single developed answer

If a student has written two or more answers to a question that only requires a single (developed) answer, and has **not** crossed out unintended answers, mark only the first answer.

3. Contradictory answers in points-based questions

When a student has written contradictory answers, do **not** award any marks, even if one of the answers is correct.

Levels of Response marking

1. To determine the level start at the highest level and work down until you reach the level that best describes the answer

2. To determine the mark within the level, consider the following:

Quality of the answer	Award mark
Consistently meets the criteria for this level	At the top of the level (6 and 9 mark questions)
Meets the criteria but with some inconsistency	At the middle of the level (9 mark questions)
On the borderline of this level and the one below	At the bottom of the level (6 and 9 mark questions)

MARK SCHEME

1 (a)	
Max mark	1 (PO1)
Answer	Any one from: <ul style="list-style-type: none"> • An observable indication of a disease/injury/medical condition • Detected during physical examination or using medical instruments • Measurable indicator detected by healthcare professional <p>Credit any other appropriate response</p>
Guidance	

1 (b)	
Max mark	1 (PO1)
Answer	<ul style="list-style-type: none"> • An abnormal condition that affects the structure or function of all or part of a patient (1) <p>Credit any other appropriate response</p>
Guidance	Do not accept: <ul style="list-style-type: none"> • reference to injury

2 (a)	
Max mark	2 (PO1)
Answer	Up to two marks for explanations of how smoking causes damage that leads to Chronic Obstructive Pulmonary Disease (COPD), e.g.: <ul style="list-style-type: none"> • chemicals in smoke damage alveoli and airways which reduces surface area for gas exchange/oxygen absorption (emphysema) • smoke irritates/inflames airways which swells and narrows the airways (bronchitis) • smoke damages cilia and immune cells of the airways which makes them less effective at clearing the mucus/more infections <p>Credit any other appropriate response.</p>
Guidance	1 mark for each correct explanation

2 (b)	
Max mark	2 (PO1)
Answer	<p>Up to one mark for explanation of how diet can improve the symptoms of COPD. Up to one mark for explanation of how exercise can improve the symptoms of COPD.</p> <p>Diet:</p> <ul style="list-style-type: none"> • Breathing requires more energy for people with COPD so diet should provide adequate supply (1) • Being over and underweight can worsen COPD symptoms so diet to regulate weight is important (1) • Processed, sugary and fatty foods can contribute to inflammation and exacerbate COPD symptoms (1) • Hydration is crucial for thinning mucus and making it easier to cough up (1) <p>Exercise</p> <ul style="list-style-type: none"> • Regular exercise strengthens the diaphragm and respiratory muscles making breathing more efficient (1) • Strengthens heart and improves blood circulation (1) • Exercise maintains muscle mass and strength to reduce fatigue (1)
Guidance	<p>1 mark for each correct answer.</p> <p>Max 1 mark for how diet can improve symptoms. Max 1 mark for how exercise can improve symptoms.</p>

3 (a)	
Max mark	2 (PO2)
Answer	<p>One mark for identifying the correct antibiotic. One mark for explaining why that antibiotic should be used.</p> <p>Antibiotic: 4 (1)</p> <p>Explanation:</p> <ul style="list-style-type: none"> • It has the largest zone of inhibition/clear area around the disc/antibiotic. (1) • The other discs/antibiotics have smaller or no zones of inhibition. (1)
Guidance	<p>One mark for identifying the correct antibiotic. Maximum one mark for explaining why that antibiotic should be used.</p>

3 (b)	
Max mark	2 (PO2)
Answer	<p>One mark for identifying action specific to the context. One mark for explaining the action taken.</p> <p>Action:</p> <ul style="list-style-type: none"> Repeat the experiment at 25 °C (1) Repeat the experiment using the same type of agar (1) Repeat with the antibiotic discs at the same concentration of antibiotics (1) <p>Explanation:</p> <ul style="list-style-type: none"> Reduces the effect of errors by maintaining this variable (1) Allows Amir to check that antibiotic 4 is the most appropriate to use (1) Improves the accuracy of the results through the repetition keeping the variable the same (1). <p>Credit any other appropriate response</p>
Guidance	Maximum one action.

3 (c)	
Max mark	2 (PO2)
Answer	<ul style="list-style-type: none"> Including a disc without antibiotic / containing sterilised water only (1) To establish any inhibition is a result of the antibiotic and not the disc. (1)
Guidance	1 mark for each correct answer.

4	
Max mark	4 (PO2)
Answer	<p>A Antigen-binding site (1) B Light chain (1) C Heavy chain (1) D (disulfide) Bridge/bond (1)</p>
Guidance	1 mark for each correct answer. Accept incorrect spellings if the word is recognisable.

5 (a)	
Max mark	2 (PO2)
Answer	<p>Any two from:</p> <ul style="list-style-type: none"> Allowing Ben to rest between each reading (1) Taking more than one/several readings (1) <p>Credit any other appropriate response</p>
Guidance	1 mark for each correct answer.

5 (b)	
Max mark	2 (PO2)
Answer	Up to two marks for each reason for choosing the option chosen Option 1 – possible reasons <ul style="list-style-type: none"> • Continuous recording (1) • You don't have to remember to take recordings (1) • Recording should be more accurate (1) • Value recorded is less affected by personal judgement (1) OR Option 2 – possible reasons <ul style="list-style-type: none"> • Not having to wear something uncomfortable that could interfere with everyday activities (1) • Reduced/no risk of getting the equipment wet/damaged (1) Credit any other appropriate response
Guidance	Up to two marks for each valid reason identified. Maximum two reasons. Reason must be applicable to the option chosen.

6	
Max mark	3 (PO1)
Answer	D (A) C E (F) B
Guidance	1 mark for 1 correct answer. 2 marks for 2 or 3 correct answers. 3 marks for 4 correct answers. Answers must be in the correct order. Correct answers only.

7	
Max mark	2 (PO2)
Answer	$1042 \div 11$ (1) $= 95$ (2sf) (1)
Guidance	Look for the correct answers first . If the correct answers are both present, award full marks and ignore anything else that is written in the answer space Otherwise: 1 mark for $1042 \div 11$ 1 mark for 94.73 (correct working but answer not given to 2sf)

8	
Max mark	4 (PO2)
Answer	Up to two marks for each stage. One mark for identifying the incorrect stage. One mark for explaining how the stage shows bad practice. Stage: 2 (1) (She sits on a chair and leans forward to do the test) Explanation: Lung capacity is limited by compression/restriction of rib cage. (1) Stage: 4 (1) (She positions her mouth around the mouthpiece without creating a tight seal with her lips) Explanation: Some of the expired air volume will not be measured as it will escape into the surroundings. (1)
Guidance	Up to two marks for each incorrect stage identified. Maximum two stages. The correct stage number will be sufficient without the description of the stage.

9	
Max mark	4 (PO2)
Answer	Any four from: <ul style="list-style-type: none"> • Keep to well defined paths (1) • Avoid brushing against vegetation (1) • Wear long trousers (1) • Wear trousers tucked into socks (1) • Wear long sleeved shirts (1) • Use repellent on bare skin/clothing (1) • Keep cuffs fastened (1) • Carry a tick removal tool (1) Credit any other appropriate response
Guidance	1 mark for each correct answer. Do not accept answers referring to how to remove the tick once it is attached as these are not precautions.

10	
Max mark	2 (PO2)
Answer	Any two from: <ul style="list-style-type: none"> • Lighter for a young child (1) • More waterproof/water resistant for an active child (1) • More breathable/less irritation of skin (1) • Zac would be able to choose a coloured/patterned cast (1) • More durable for an active child (1) • More easily penetrated by X-rays if regular monitoring needed (1) • Fibreglass cast sets quicker so faster to put on a 12-year-old (1) Credit any other appropriate response
Guidance	1 mark for each correct answer.

11	
Max mark	3 (PO2)
Answer	Any three from: <ul style="list-style-type: none"> • No physical barrier/desk between the doctor and patient (1) • Allows good eye contact between the doctor and patient (1) • Visible computer screen gives patient access to their medical information (1) • Visible computer screen gives patient access to what is being recorded during the interaction (1) • No face-to-face obstruction by any part of the computer (1) • Signs of patient illness more readily recognised by the doctor (1) <p>Credit any other appropriate response</p>
Guidance	1 mark for each correct answer.

12	
Max mark	3 (PO2)
Answer	Any three from: <ul style="list-style-type: none"> • Pollution is one of the largest risk factors for disease and premature death globally (1) • Number of deaths caused by pollution are on par with those caused by smoking (1) • The impact of pollution on health is much greater than that of violence, drugs, and alcohol combined (1) • The impact of pollution is roughly three times greater than that of malnutrition (1) • The impact of smoking is much greater than that of road injuries, violence and malnutrition combined (1) <p>Credit any other appropriate response</p>
Guidance	1 mark for each correct answer. Accept any reference to approximately how many times pollution is greater than any of the individual risks named.

13	
Max mark	4 (PO2)
Answer	Up to two marks for each action. One mark for identifying the action. One mark for explaining why the doctor may take that action. e.g. <ul style="list-style-type: none"> • The doctor may carry out a breast examination/palpation (1) that given the experience/training of the doctor may establish if the lump is benign or needs further investigation (1) • The doctor may refer Nina to a consultant for a mammogram (1) because the doctor feels the breast symptoms need further investigation by a specialist (1) • The doctor may refer Nina to a consultant for a biopsy (1) because this may be the only way to ensure that the lump is cancerous/stage the cancer is at (1) <p>Credit any other appropriate response.</p>
Guidance	Up to two marks for each valid [action] identified. Accept any other appropriate answers.

14	
Max mark	6 (PO3)
Levels of Response	<p>Level 3 (high) 5-6</p> <p>A thorough analysis, which includes:</p> <ul style="list-style-type: none"> • identification of a range of characteristics or elements • detailed knowledge and understanding in the context of the question • clear explanation • consistent use of appropriate subject terminology. <p>Level 2 (mid) 3-4</p> <p>An adequate analysis, which includes:</p> <ul style="list-style-type: none"> • identification of some characteristics or elements • sound knowledge and understanding in the context of the question • adequate explanation • some use of appropriate subject terminology. <p>Level 1 (low) 1-2</p> <p>A basic analysis, which includes:</p> <ul style="list-style-type: none"> • identification of at least one characteristic or element • limited knowledge and understanding in the context of the question • basic explanation • use of appropriate subject terminology is limited. <p>0 marks Answer is not worthy of credit.</p>
Indicative content	<p>Answers can include some of the following:</p> <p>Possible contributions of supportive therapies:</p> <ul style="list-style-type: none"> • Slows the disease process – exercise has a preventative and maintenance role, important because Parkinson’s Disease is chronic and progressive with no known cure and Orla is at an early stage in the disease process. • Exercise prolongs independent functioning by improving mobility, strength and flexibility which allows Orla, who lives alone, to maintain her independence for longer. • Exercise will improve her balance and reduce the risk of injury and hospitalisation. It will reduce the risk of falls, as Orla lives alone and she could be left unattended for quite a while. • Exercise can build muscle strength and flexibility, which can reduce fatigue and inflammation, and decrease pain. This means Orla will be less reliant on pain medication and their possible side effects. • Social well-being through exercise could be promoted to reduce the risk of depression by increasing social interaction directly through activity, particularly if the activity is with fellow patients. • Exercise promotes positive and significant effects on mild to moderately impaired patients like Orla, early diagnosis of cognitive impairment is associated with increased risk of dementia. • Mental well-being is promoted – exercise should ease Orla’s depression and reduces the likelihood of making her Parkinson’s Disease worse. This may mean less reliance on more medication and side effects.

	<ul style="list-style-type: none"> At this early stage it is possible that physiotherapy is the dominant therapy for Orla, which may include dancing, yoga or Nordic walking given the benefits of exercise to early stage Parkinson’s Disease. Speech therapy may not be necessary in early stage Parkinson’s Disease as there is no mention of Orla having speech problems at this time. As Orla can manage day to day activities, occupational therapy may not be necessary at this point. Some form of cognitive therapy may be useful to address Orla’s depression. Less reliance on more medication and their side effects. <p>Possible contributions of medication:</p> <ul style="list-style-type: none"> Medication can be used to improve Orla’s symptoms of shaking (tremors) and movement problems. Orla’s early stage Parkinson’s Disease may not require medication at this time. Some medications may not suit Orla, because they may have negative side effects on her health and well-being. <p>Possible contributions of surgery:</p> <ul style="list-style-type: none"> May involve deep brain stimulation but not usually necessary in early stage Parkinson’s Disease as medication is the preferred option. <p>Credit other relevant analysis, points and examples.</p>
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15	
Max mark	9 (PO3)
Levels of Response	<p>Level 3 (high) 7-9 marks</p> <p>A thorough discussion which shows detailed evaluation, which includes:</p> <ul style="list-style-type: none"> a range of points from both sides of the argument a detailed analysis in the context of the question a clear conclusion(s) with detailed reasons/justifications consistent use of appropriate subject terminology <p>Level 2 (mid) 4-6 marks</p> <p>An adequate discussion which shows sound evaluation, which includes:</p> <ul style="list-style-type: none"> some points from both sides of the argument some analysis in the context of the question an adequate conclusion(s) with relevant reasons/justifications some use of appropriate subject terminology <p>Level 1 (low) 1-3 marks</p> <p>A basic discussion which shows limited evaluation, which includes:</p> <ul style="list-style-type: none"> a few of points from the argument a limited analysis in the context of the question a brief conclusion(s) with limited reasons/justifications use of appropriate subject terminology is limited <p>0 marks Answer is not worthy of credit.</p>

<p>Indicative content</p>	<p>Answers can include some of the following:</p> <p>Benefits of electronic health records system:</p> <ul style="list-style-type: none"> • System takes up less space - important as the surgery is experiencing increased number of patients; will also allow room for storage of other items such as vital medical equipment. • More accurate and complete data - easier to update and modify important features which is vital for the integrity of patient medical history. • Faster to access and retrieve - important when GP contact time with patients is limited to 10 minutes. • Better privacy of patients' medical history within practice as information can be password protected and access limited to authorised members of staff. • Records do not require duplication as if uploaded to the cloud they can be shared with other medical professionals. • Less time to record documentation – giving more time to patients within the consultation period. • More environmentally friendly – patient records can use up thousands of pages of paper. <p>Limitations of electronic health records system:</p> <ul style="list-style-type: none"> • High upfront costs which the GP surgery must take into consideration. • Disruption to workflow of medical and clerical staff during transition. A temporary loss of productivity as staff learn the new system. This may lead to patients receiving a less efficient service during this period. • Cybersecurity may be an issue if insufficient layers of security are not in place if data is uploaded to the cloud to allow other medical professionals to access it. There is the danger of hacking. • Technical errors occurring and no back up then all medical records could be lost. • Doctors may end up focussing on the computer and not the patient – potentially missing signs of illness. <p>Whether you would recommend that the general practice surgery use electronic health records and your reasons:</p> <ul style="list-style-type: none"> • Electronic health records might be recommended as they, for example, maximise space at the surgery, have more accurate data which is easier to update and faster to access, provide better privacy, are more environmentally friendly. • Electronic health records might not be recommended as they, for example, have high upfront costs, disrupt the workflow, have cybersecurity concerns, can have technical issues, may lead to doctors not focussing properly on patients. <p>Credit other relevant conclusions, points and examples.</p>
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