

Centre Number						Candidate Number				
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Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
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TOTAL	



General Certificate of Secondary Education
Foundation Tier
June 2012

Human Health and Physiology 44151F

Unit 1 Topics in Human Health and Physiology

Monday 25 June 2012 9.00 am to 11.00 am

For this paper you must have:

- a ruler
- a calculator.

Time allowed

- 2 hours

Instructions

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 120.
- You are expected to use a calculator where appropriate.
- In some questions you will be assessed on your ability to use good English, organise information clearly and use correct scientific words.

Advice

- In all calculations, show clearly how you work out your answer.



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M/Jun12/44151F

44151F

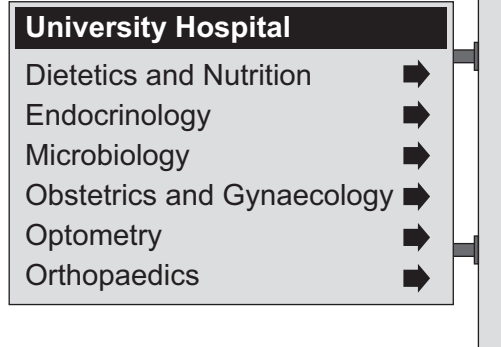
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Answer **all** questions in the spaces provided.

- 1 Hospitals have signs for directions like the one below.



Which of the departments on the sign would a person visit:

- 1 (a) to have a pressure test on the eyes? (1 mark)
- 1 (b) to have treatment for a broken wrist? (1 mark)
- 1 (c) to get a check up during pregnancy? (1 mark)
- 1 (d) to have the level of growth hormone checked? (1 mark)

4

Turn over for the next question

Turn over ▶



2 The health professional is looking at cancer cells.



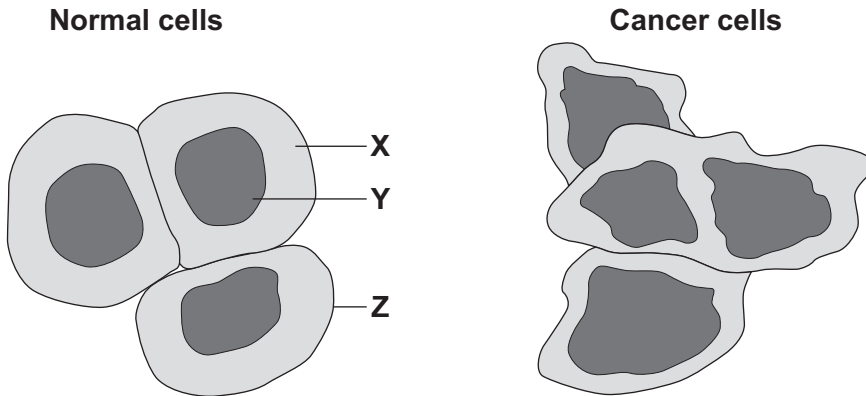
2 (a) Draw a ring around the correct word to complete the sentence.

Health professionals who identify cancer cells are called

- cytologists.
- dieticians.
- chiropractors.

(1 mark)

2 (b) The diagrams show normal cells and cancer cells.



2 (b) (i) Name the parts of the normal cell labelled X, Y and Z.

X

Y

Z

(3 marks)



2 (b) (ii) Compare the diagrams of normal cells and cancer cells.

Suggest **two** ways in which a scientist might recognise a cancer cell.

1

.....

2

.....

(2 marks)

2 (c) Give **two** causes of cancer.

1

2

(2 marks)

8

Turn over for the next question

Turn over ▶



3 Jamie Oliver campaigns for healthy school meals.

The photograph shows Jamie with one of his healthy school meals.

**3 (a)** The meal in the photograph is meat curry, rice, salad and an orange.

Draw a ring around the correct word to complete each sentence.

3 (a) (i) Lean meat is a good source of

carbohydrate.

fat.

protein.

(1 mark)

3 (a) (ii) Rice is a good source of

iron.

fat.

carbohydrate.

(1 mark)

3 (a) (iii) The orange is a good source of

vitamin A.

vitamin C.

vitamin D.

(1 mark)



3 (b) The salad in the school meal is a good source of calcium.

Give **two** reasons why schoolchildren need calcium in their diets.

1.....

.....

2.....

.....

(2 marks)

3 (c) Many children have 'fast food' for lunch.

Many 'fast foods' contain large amounts of salt and sugar.

Give **one** possible consequence of eating:

3 (c) (i) too much salt

.....

.....

(1 mark)

3 (c) (ii) too much sugar.

.....

.....

(1 mark)

7

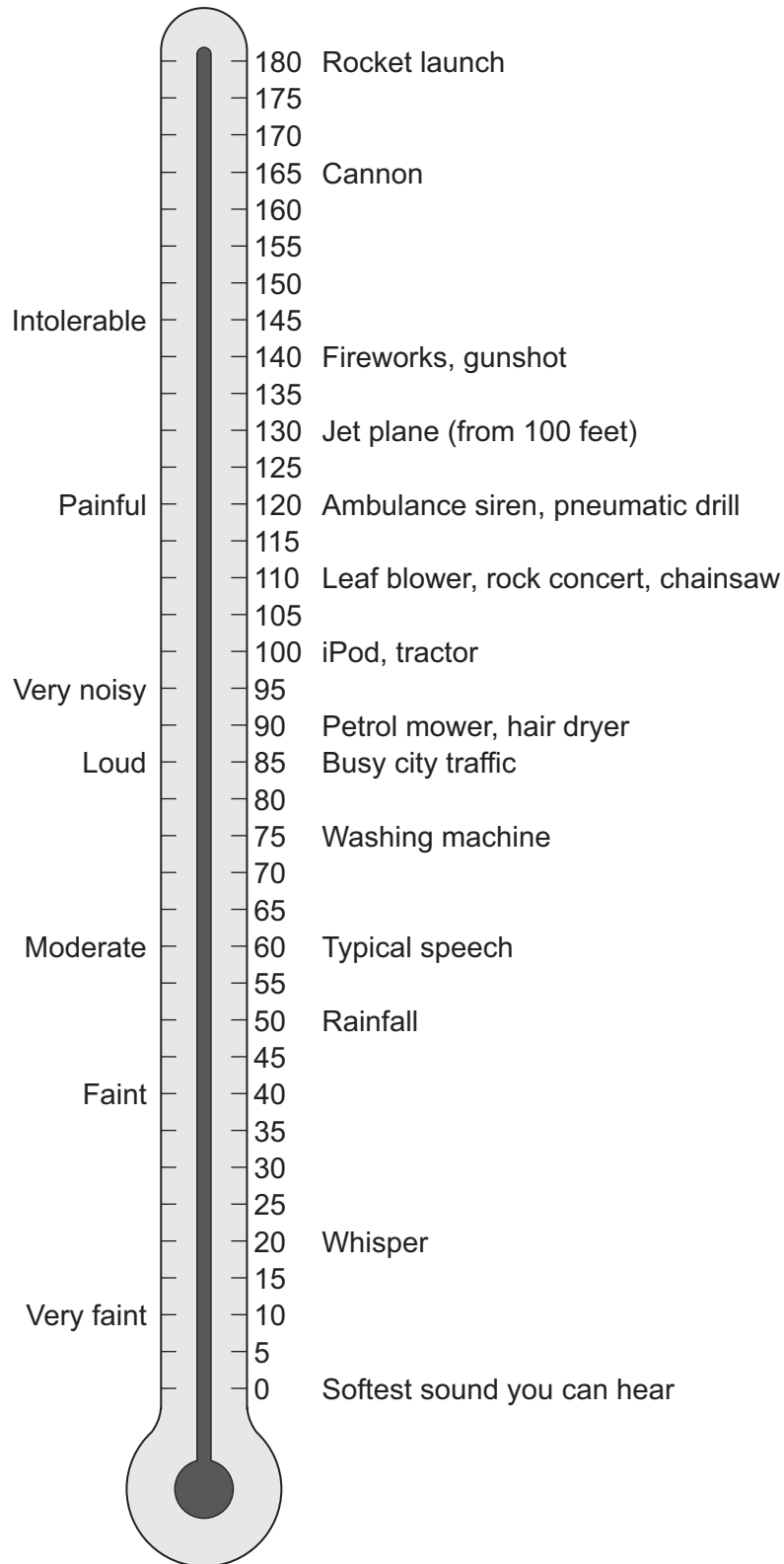
Turn over for the next question

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4 Loud noises can damage hearing.

The diagram shows approximate noise levels measured in decibels (dB).



4 (a) Use data from the diagram to:

4 (a) (i) give **one** example of a painful noise

.....
(1 mark)

4 (a) (ii) give the approximate number of decibels from an iPod.

AnswerdB
(1 mark)

4 (b) Health and Safety regulations state that employers must protect workers from sounds above 85dB.

Suggest **two** ways in which employers can protect workers from loud sounds.

1.....
.....
2.....
.....

(2 marks)

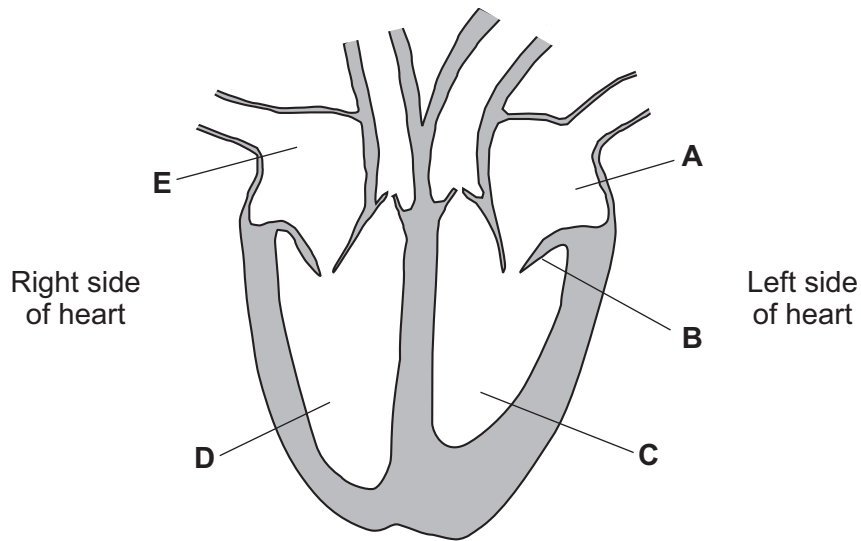
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5 The diagram shows a section through the human heart.



5 (a) Write the correct letter, **A**, **B**, **C**, **D** or **E**, in each box to label the following parts.

5 (a) (i) A valve

(1 mark)

5 (a) (ii) The part which pumps blood to the lungs

(1 mark)

5 (a) (iii) The part which pumps blood to the rest of the body

(1 mark)



5 (b) The photograph shows a technician using a monitor to check the activity of a patient's heart.

The monitor shows that the patient has had a heart attack.



5 (b) (i) A heart attack happens when blood stops flowing through the artery that supplies blood to part of the heart muscle.

What causes blood to stop flowing through the artery?

.....
.....

(1 mark)

5 (b) (ii) Give **two** factors which increase the risk of a heart attack.

1.....

2.....

(2 marks)

5 (b) (iii) The patient is told to see a physiotherapist. The physiotherapist helps the patient to recover from the heart attack.

Suggest **one** piece of advice that the physiotherapist might give to this patient to help his recovery.

.....
.....

(1 mark)

7

Turn over ▶



6 Smallpox was a very common disease in the UK in the eighteenth century.

A country doctor called Edward Jenner discovered a way of protecting people from smallpox.

- He noticed that milkmaids often caught cowpox from cows.
- He also noticed that the milkmaids did not catch smallpox.
- Jenner had the idea that cowpox gave people protection against catching smallpox.
- To test his idea, he collected the pus from cowpox sores and injected the pus into a healthy boy.
- He then injected the boy with smallpox.
- The boy did not develop smallpox.



6 (a) Draw a straight line from each sentence to the correct scientific term.

Jenner injected a boy with cowpox and then injected him with smallpox

hypothesis

Jenner's idea that cowpox gave protection against catching smallpox

experiment

Jenner noticed that milkmaids did not catch smallpox

observation

The boy did not develop smallpox

theory

result

(4 marks)



6 (b) Jenner's experiment was **not** ethical.

Suggest **one** reason why.

.....

.....

(1 mark)

6 (c) **A, B, C** and **D** are four stages in the modern production and testing of a vaccine.

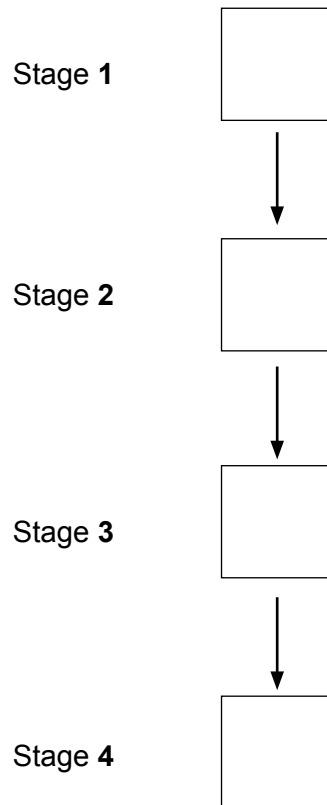
A – testing on thousands of volunteers

B – using tissue culture to test the vaccine

C – identifying the part of the organism to be used in the vaccine

D – animal testing.

Write the letter of each stage in the correct box so that the stages are in the correct order.



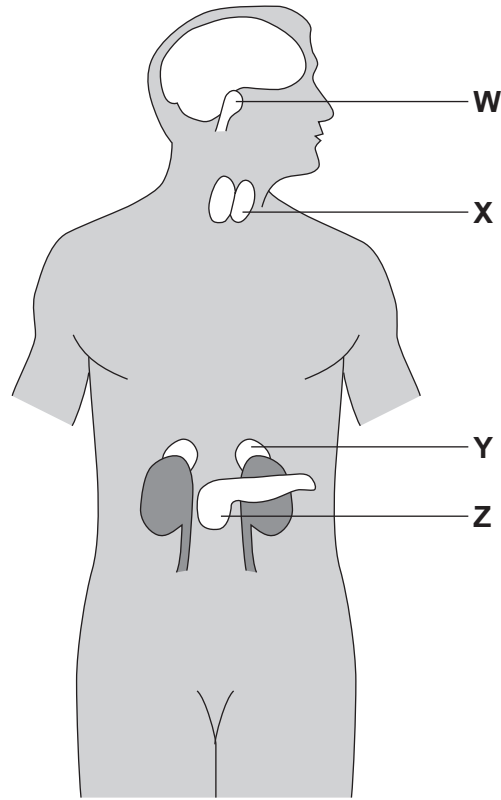
(3 marks)

8

Turn over ►



7 The diagram shows the position of some glands in the body.



adrenal ovary pancreas pituitary testes thyroid

7 (a) Use words from the box to name glands **W**, **X**, **Y** and **Z**.

W

X

Y

Z

(4 marks)



7 (b) Banting was a scientist who succeeded in extracting a hormone from the pancreas. Read the passage about his work.

Before Banting did his experiments, other scientists had not been able to extract the hormone from the pancreas. Banting realised that a digestive juice in a complete pancreas destroyed the hormone. He decided to tie off the pancreatic duct in healthy dogs. Tying the duct caused the cells that produce the digestive juice to wither away. The cells which were left were removed and mashed up. An extract from the mashed up cells was injected into diabetic dogs. These dogs no longer had symptoms of diabetes.

7 (b) (i) Name **one** enzyme in the digestive juice produced by the pancreas.

.....
(1 mark)

7 (b) (ii) The discovery made by Banting was very important to humans.

Give **one** reason why.

.....
.....
(1 mark)

7 (b) (iii) Some people do **not** agree with the experiments that Banting did.

Suggest **one** reason why.

.....
.....
(1 mark)

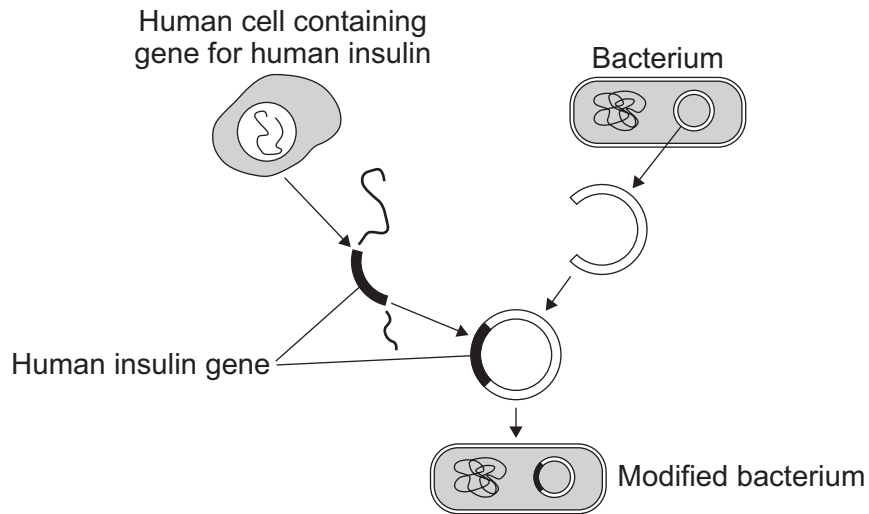
Question 7 continues on the next page

Turn over ▶



7 (c) Insulin is now made by genetic engineering.

The diagram shows this process.



Draw a ring around the correct word to complete each sentence.

7 (c) (i) The human insulin gene is cut out of a human

chromosome.
gamete.
embryo.

(1 mark)

7 (c) (ii) The human insulin gene is cut out using

an enzyme.
a hormone.
radiation.

(1 mark)

7 (c) (iii) The human insulin gene is inserted into the bacterial

mitochondrion.
nucleus.
DNA.

(1 mark)



Turn over for the next question

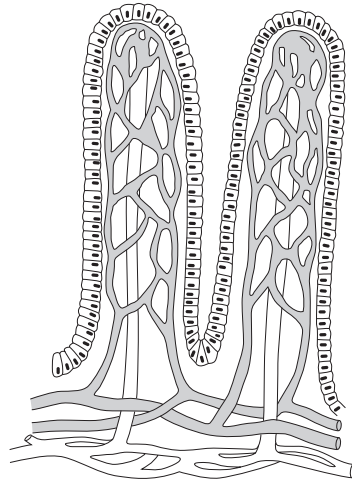
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8 Soluble food is absorbed in the small intestine.

8 (a) The diagram shows two villi from the human intestine.



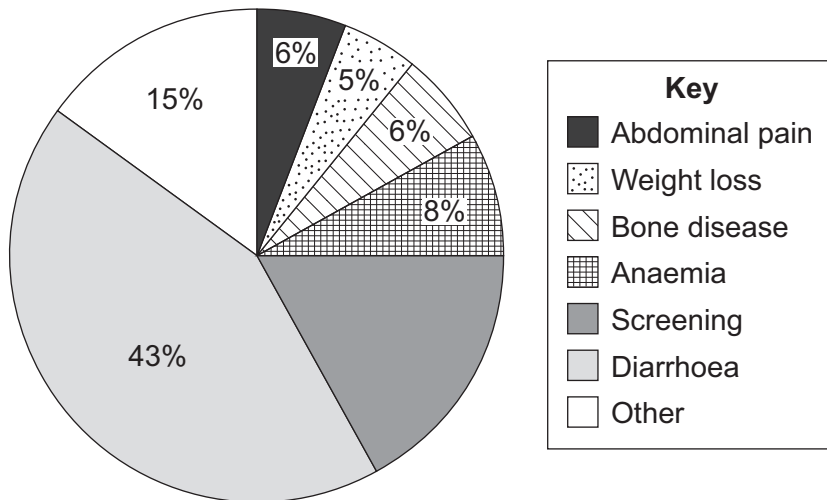
Complete the sentences.

The shape of the villi gives them a largefor absorbing soluble food.

Villi have a network of blood for absorbing soluble food. (2 marks)

8 (b) Some people have a condition called coeliac disease. These people have an abnormal lining in the small intestine.

The pie chart gives the main ways by which coeliac disease is diagnosed.



8 (b) (i) Which is the most common symptom by which coeliac disease is diagnosed?

.....
(1 mark)

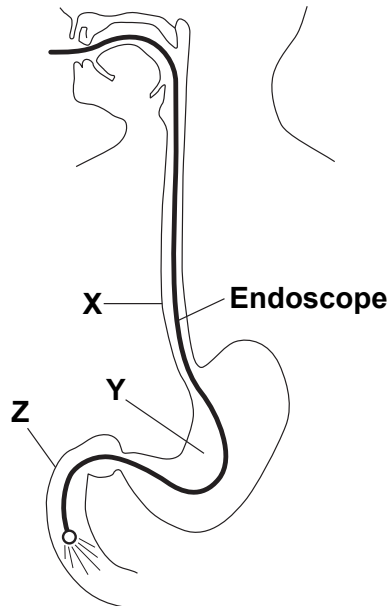
8 (b) (ii) What percentage of people were diagnosed with coeliac disease by screening?

.....
.....
Answer.....%
(2 marks)

8 (b) (iii) A hospital department diagnosed 50 people with coeliac disease in one year.
How many of these people are likely to be diagnosed through having anaemia?

.....
.....
Answer.....
(2 marks)

8 (c) The diagram shows how an endoscope is used to examine a person for coeliac disease.



Name the parts of the digestive system labelled X, Y and Z.

X

Y

Z

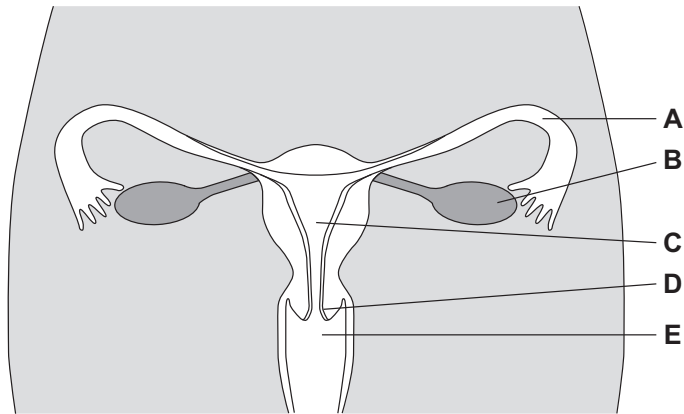
(3 marks)

10

Turn over ▶



9 The diagram shows part of the female reproductive system.



9 (a) Write the letter **A, B, C, D** or **E**, for the structure:

9 (a) (i) that produces the eggs (1 mark)

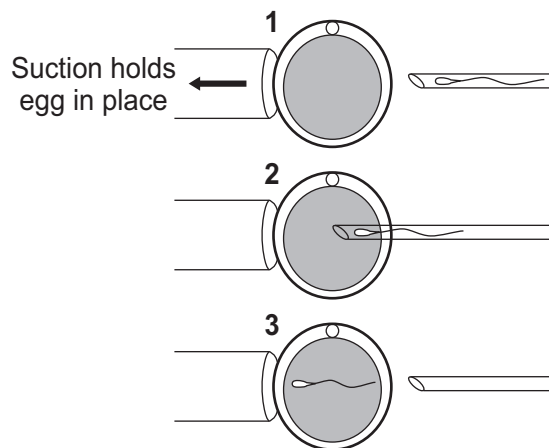
9 (a) (ii) where sperm are deposited during intercourse (1 mark)

9 (a) (iii) where fertilisation takes place (1 mark)

9 (a) (iv) where the fetus develops. (1 mark)

9 (b) The two main methods of treating infertility are IVF (In-vitro fertilisation) and ICSI (Intracytoplasmic sperm insertion).

- In IVF sperm and egg are mixed together in a dish.
- In ICSI a sperm is injected into an egg as shown in the diagram.

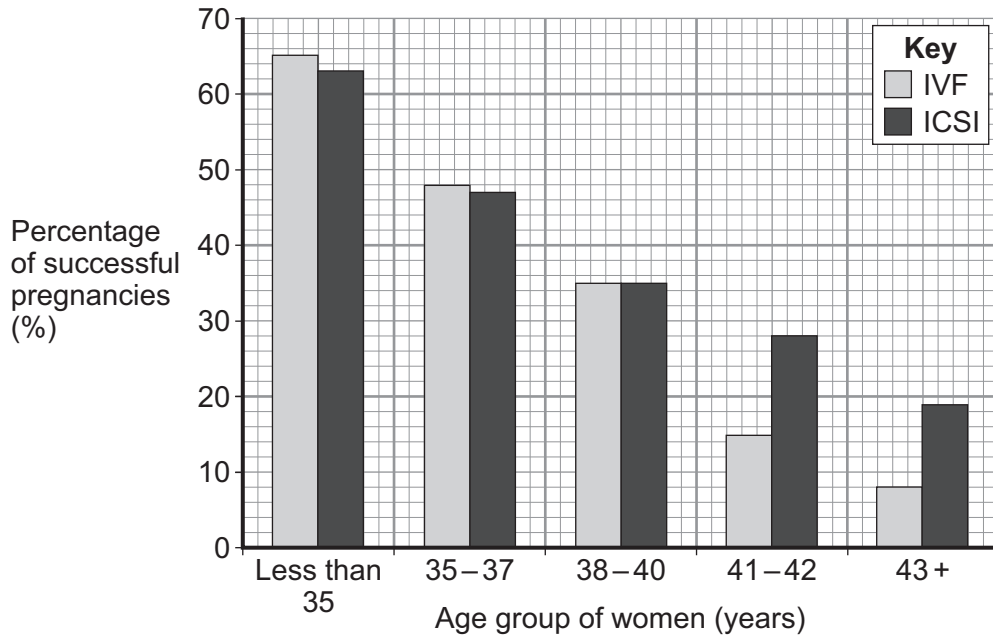


9 (b) (i) Suggest **one** advantage of ICSI over IVF.

.....
.....

(1 mark)

9 (b) (ii) The bar chart shows the percentage of successful pregnancies for the two fertility treatments.



Look at the bar chart.
Describe **two** patterns that you can see in the data.

1
.....
2
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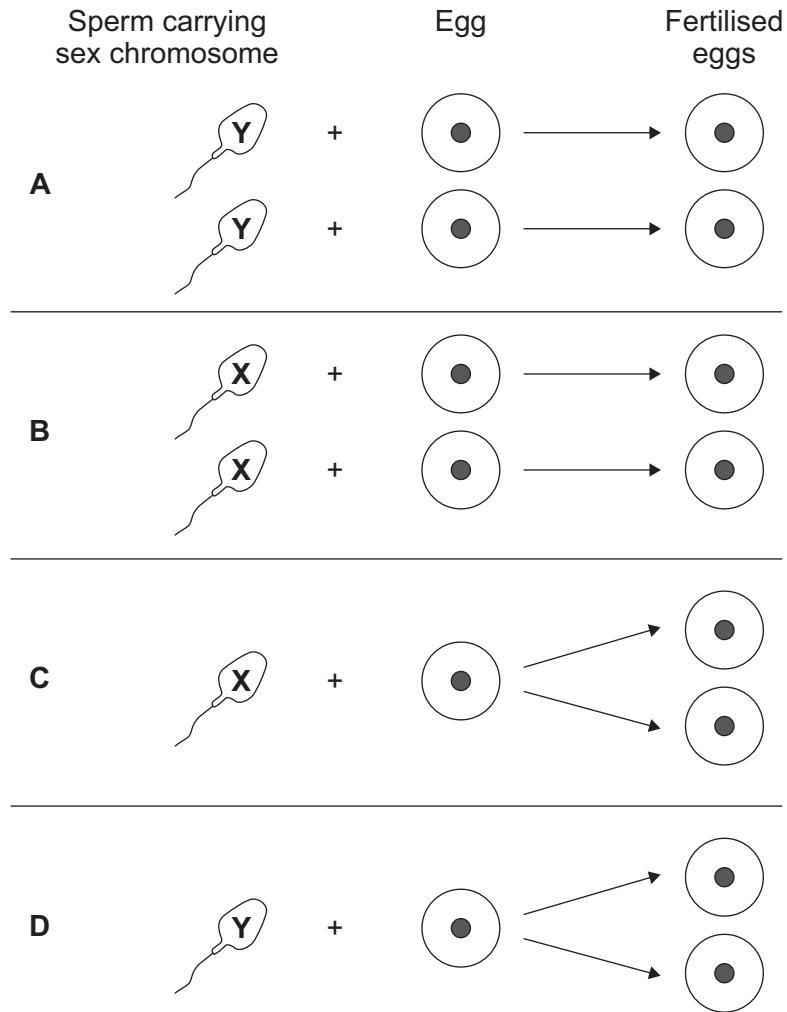
(2 marks)

7

Turn over ▶



10 (a) The diagrams show four ways in which human twins may be formed.



Which diagram, **A**, **B**, **C** or **D**, shows the formation of:

10 (a) (i) non-identical male twins?

(1 mark)

10 (a) (ii) identical female twins?

(1 mark)



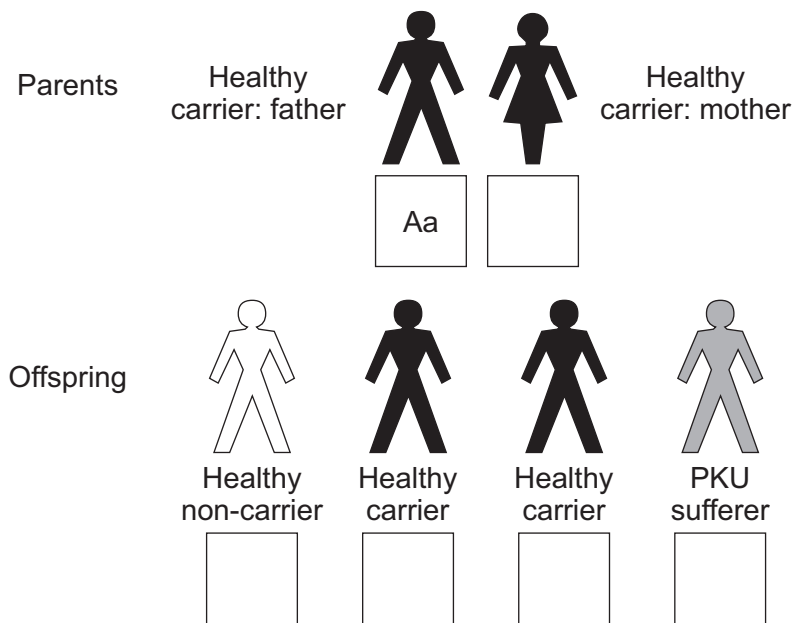
10 (b) PKU (phenylketonuria) is an inherited condition. Babies who inherit the condition cannot use the amino acid phenylalanine. Affected babies become seriously ill if they are not treated.

Technicians take blood from the heels of new born babies to screen them for PKU.



- PKU is caused by a recessive allele **a**
- Healthy people have the dominant allele **A**

The diagram shows the inheritance of PKU in a family.



10 (b) (i) Using the letters **AA**, **Aa**, or **aa**, write the genotype of each person in the boxes. (3 marks)

10 (b) (ii) The healthy non-carrier in the above diagram and his partner decide to have a child. They visit a genetic counsellor to find out the chance of the child having PKU.

What will the genetic counsellor tell them is the chance of their child having PKU?

.....
(1 mark)

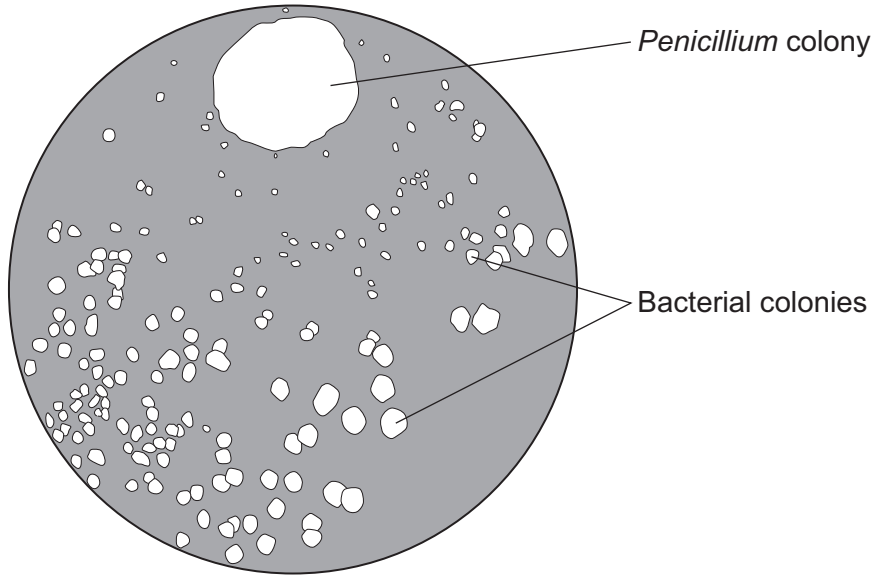
6

Turn over ▶



11 Sir Alexander Fleming was a bacteriologist. He noticed that one of his Petri dishes had been contaminated with a fungus called *Penicillium*.

The diagram shows the contaminated Petri dish.



11 (a) (i) Describe the observations you can make from the contaminated Petri dish.

.....
.....
.....
.....
.....
.....
.....

(3 marks)

11 (a) (ii) Explain the observations you made from the contaminated Petri dish.

.....
.....
.....
.....
.....

(2 marks)



11 (b) Explain why Fleming's observation was very important to human health.

.....

.....

.....

.....

.....

(2 marks)

7

Turn over for the next question

Turn over ▶



13 Pathogens cause diseases.

13 (a) Give **one** example of a disease:

13 (a) (i) caused by a virus

.....
(1 mark)

13 (a) (ii) caused by a bacterium

.....
(1 mark)

13 (a) (iii) caused by a fungus

.....
(1 mark)

13 (a) (iv) caused by a protoctistan.

.....
(1 mark)

13 (b) Describe **two** ways in which the body prevents the entry of pathogens.

1

.....

2

.....
(2 marks)

6

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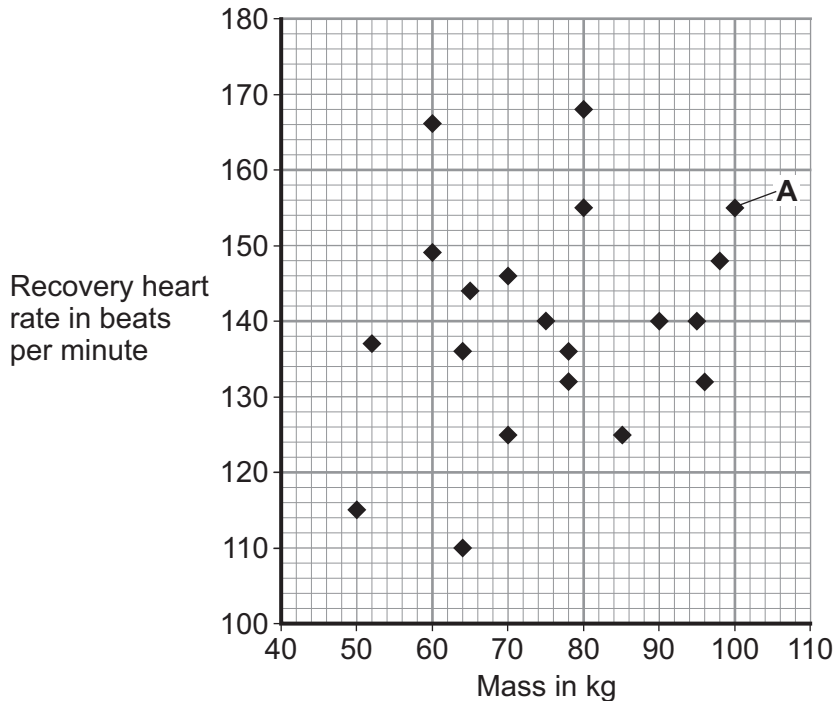
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14 Most colleges have a student health adviser. An adviser was concerned about the fitness of students in one class. She persuaded the students to take part in a fitness investigation.

- The students weighed themselves.
- Each student did 20 step-ups per minute for 5 minutes.
- The students then waited 1 minute before measuring their heart rates. The heart rate 1 minute after exercise is called the recovery heart rate.

The graph shows the students' results.



14 (a) Give **two** control variables in this investigation.

- 1.....
- 2.....
- (2 marks)*

14 (b) Name the type of graph that was used to present the students' data.

.....

(1 mark)

14 (c) **On the graph**, draw a ring around the plot for the fittest student. *(1 mark)*

14 (d) Give a conclusion to this investigation that can be drawn from the data in the graph.

.....

.....

(1 mark)



14 (e) Give **two** factors, other than mass, that might have affected recovery heart rate.

1.....
.....
2.....
.....
(2 marks)

14 (f) Heart rate increases during exercise.
Explain the advantage of this increase in heart rate to a person.

.....
.....
.....
.....
.....
.....
.....
.....
(3 marks)

14 (g) Give **two** recommendations that the health adviser might give to the student labelled **A** on the graph.

1.....
.....
2.....
.....
(2 marks)

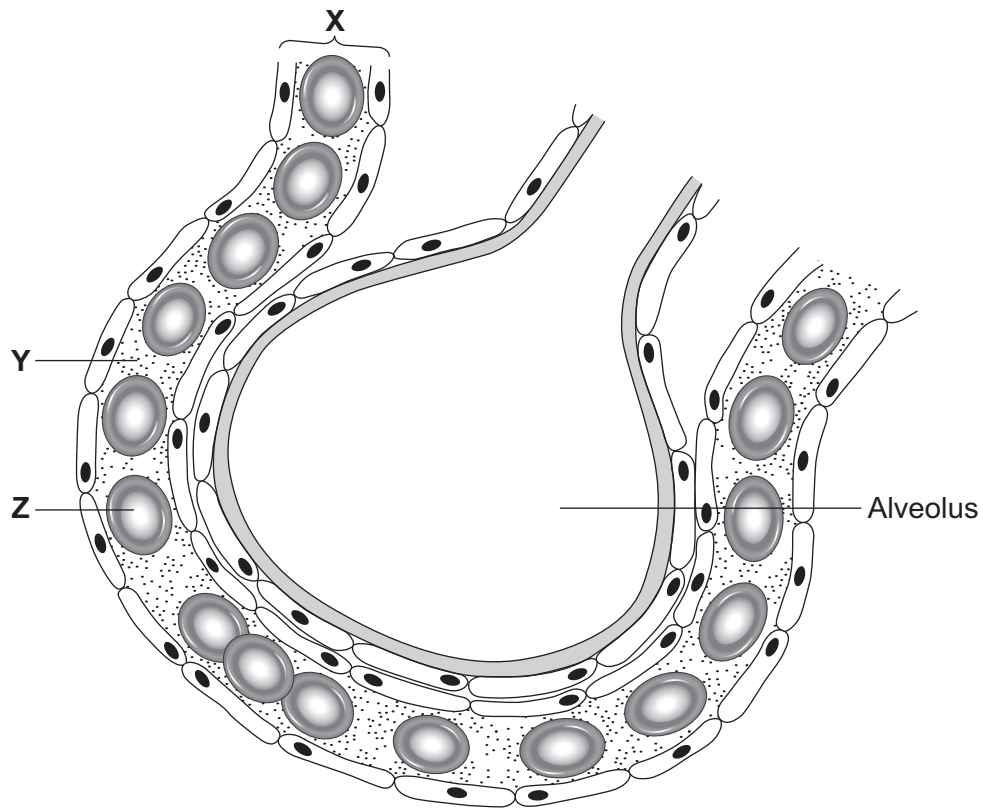
12

Turn over ▶



15 Gaseous exchange takes place in the alveoli.

The diagram shows a section through an alveolus.



15 (a) Name the parts labelled X, Y and Z on the diagram.

X

Y

Z

(3 marks)



The table shows the percentage of some gases in the air breathed in and out by a boy.

Gases	Air breathed in	Air breathed out
carbon dioxide	0.04%	4.0%
oxygen	20.0%	16.0%

15 (b)

Describe what happens in the lungs to change the levels of oxygen and carbon dioxide in this way.

.....

.....

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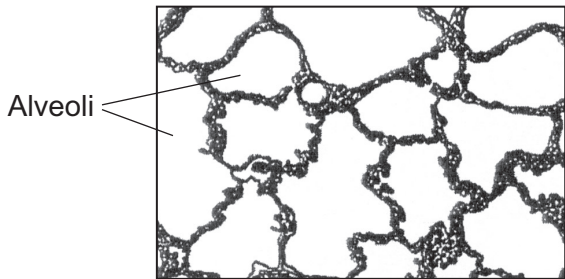
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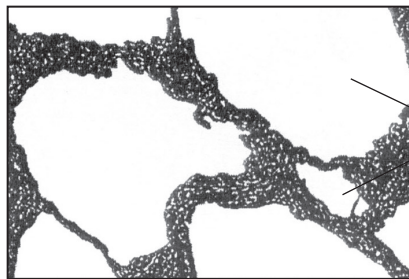
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(3 marks)

The diagrams below show lung tissue from a healthy person and lung tissue from a person with emphysema (a lung disease). The diagrams are drawn to the same scale.



Lung tissue from a healthy person



Lung tissue from a person with emphysema

15 (c)

Give **two** differences in structure between the lung tissue from the healthy person and the lung tissue from the person with emphysema.

1.....

.....

2.....

.....

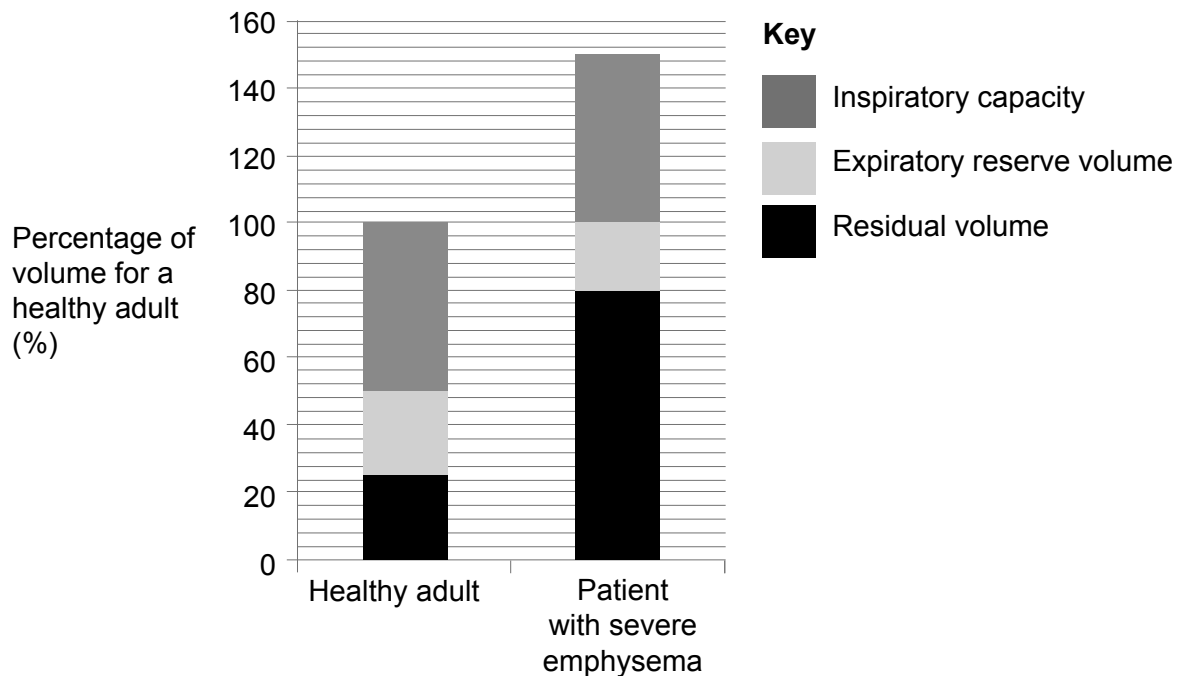
(2 marks)

Question 15 continues on the next page

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- 15 (d)** The photograph shows a technician using a spirometer to investigate lung function in a person with emphysema. The chart shows the effect of emphysema on breathing.



- Inspiratory capacity is the volume of air taken in during normal breathing.
- Expiratory reserve volume is the volume of additional air that can be pushed out after the end of normal breathing.
- Residual volume is the volume of air that is left in the lungs after forcing out as much air as possible.



15 (d) (i) Use information from the chart to give **two** effects of emphysema on breathing.

1

.....

2

.....

(2 marks)

15 (d) (ii) Patients with severe emphysema can only walk for a short distance before getting 'out of breath'.

Use information from the diagrams on page 31 and data from the chart to suggest an explanation for this shortage of breath.

.....

.....

.....

.....

.....

(2 marks)

12

Turn over for the next question

Turn over ▶



16 Back pain is estimated to cost the economy about £4.5 billion per year in the UK.

16 (a) Apart from the cost of treating back pain, suggest **one** other reason why the cost to the economy is so high.

.....

 (1 mark)

16 (b) Chiropractors and physiotherapists treat back pain in different ways.

16 (b) (i) How does a chiropractor treat back pain?

.....

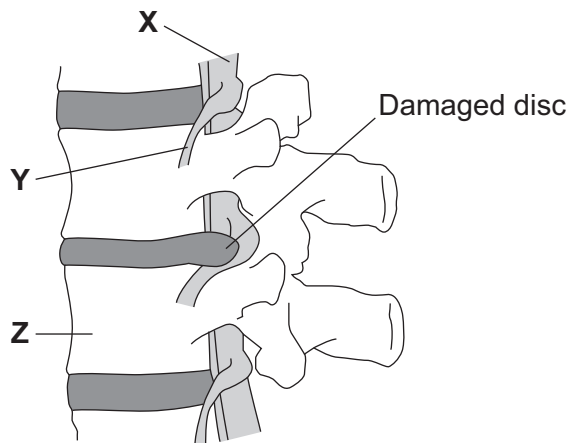
 (1 mark)

16 (b) (ii) How does a physiotherapist treat back pain?

.....

 (1 mark)

16 (c) The diagram shows a damaged disc in the spine.



16 (c) (i) Name the structures labelled **X**, **Y** and **Z** on the diagram.

X

Y

Z

(3 marks)



16 (c) (ii) The damaged disc causes severe pain.

Suggest **one** explanation for the severe pain.

.....
.....

(1 mark)

7

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