Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
TOTAL	

General Certificate of Secondary Education
Foundation Tier
June 2013

Human Health and Physiology 44151F

Unit 1 Topics in Human Health and Physiology

Wednesday 26 June 2013 9.00 am to 11.00 am

For this paper you must have:
- a ruler
- a calculator.

Time allowed

A
- 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.

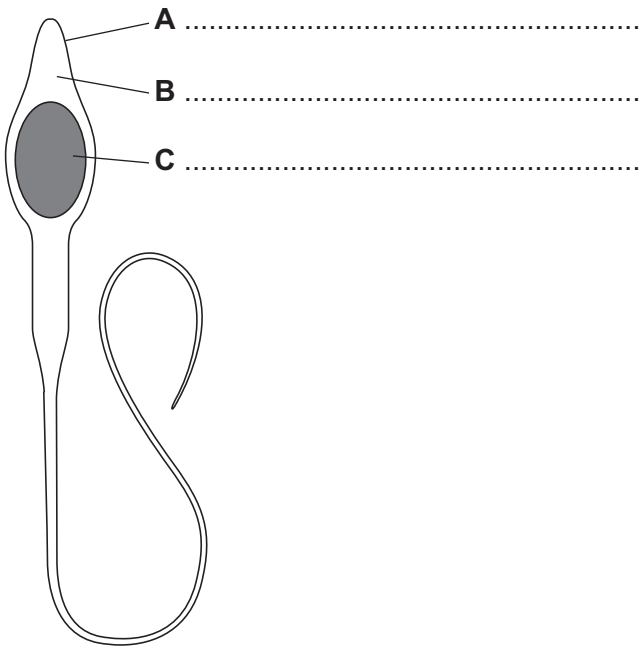
Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 120.
- You are expected to use a calculator where appropriate.
- In some questions you will be assessed on your ability to use good English, organise information clearly and use correct scientific words.

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

Do not write outside the box

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

1 The diagram shows a human sperm cell.



1 (a) On the diagram, use words from the box to name the parts labelled **A, B** and **C.**

cytoplasm	**cell wall**	**nucleus**	**cell membrane**

(3 marks)

Do not write outside the box

1 (b) Tick (✓) **one** box to answer each question.

1 (b) (i) Which organ produces sperm?

Penis ☐

Scrotum ☐

Testis ☐ *(1 mark)*

1 (b) (ii) Which structure helps a sperm swim towards the egg?

Cytoplasm ☐

Head ☐

Tail ☐ *(1 mark)*

1 (b) (iii) How many chromosomes are in a human sperm cell?

2 ☐

23 ☐

46 ☐ *(1 mark)*

1 (b) (iv) Which hormone does a male produce?

Oestrogen ☐

Progesterone ☐

Testosterone ☐ *(1 mark)*

7

Do not write outside the box

2 The photograph shows a health professional testing a patient's eyes.

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

The health professional is

- a cytologist.
- an optometrist.
- a physiotherapist.

(1 mark)

2 (b) Draw **one** line from each part of the eye to its function.

Part	Function
Retina	A tough coat for protection
Ciliary muscle	Controls how much light goes into the eye
Optic nerve	Takes nerve impulses to the brain
Iris	Has receptors which are sensitive to light
	Helps to change shape of lens

(4 marks)

Do not write outside the box

2 (c) People who look at computer screens for a long time may develop eye problems.

2 (c) (i) Give **two** eye problems people could get from looking at computer screens for a long time.

1 .....

2 .....

(2 marks)

2 (c) (ii) Suggest **two** pieces of advice that a health professional might give to avoid eye problems caused by looking at computer screens.

1 .....

.....

2 .....

.....

(2 marks)

9

Do not write outside the box

3 The table gives the Recommended Daily Intake of some nutrients for children in the UK.

	Age 4–6 years		**Age 7–10 years**		**Age 11–14 years**	
	Boys	**Girls**	**Boys**	**Girls**	**Boys**	**Girls**
Energy in kilocalories	1715	1545	1970	1740	2200	1845
Protein in grams	19.7	19.7	28.3	28.3	42.1	41.2
Iron in milligrams	6.1	6.1	8.7	8.7	11.3	14.8
Vitamin C in milligrams	30	30	30	30	35	35

3 (a) (i) What is the Recommended Daily Intake of energy for a boy aged 11–14 years?

Energy = ...kilocalories
(1 mark)

3 (a) (ii) How much **more** energy is recommended for a boy aged 11–14 years than a boy aged 4–6 years?

Show clearly how you work out your answer.

.....

.....

Energy = ...kilocalories
(2 marks)

3 (a) (iii) The Recommended Daily Intake of energy for a boy aged 11–14 years is greater than that for a boy aged 4–6 years.

Suggest **two** reasons why.

1 .....

.....

2 .....

.....
(2 marks)

Do not write outside the box

3 (a) (iv) A girl aged 14 years needs more iron than a boy aged 14 years.

Suggest **one** reason why.

.....

.....

(1 mark)

3 (b) Vitamin C is an essential nutrient.

3 (b) (i) Give **one** function in the body of vitamin C.

.....

(1 mark)

3 (b) (ii) If you do not have enough vitamin C, what deficiency disease can you get?

.....

(1 mark)

Question 3 continues on the next page

Do not write outside the box

3 (c) A student investigated the amount of vitamin C in fruit drinks.
The student used a blue dye called DCPIP.

DCPIP turns colourless when vitamin C is added.
The student:

- put 1 cm^3 of DCPIP in a test tube
- added one drop at a time of long life orange juice until the DCPIP went colourless
- repeated the test with blackcurrant squash, fresh orange juice and orange squash.

The table shows the student's results.

Fruit drink	**Number of drops of drink needed to decolourise 1 cm^3 DCPIP**
Long life orange juice	12
Blackcurrant squash	No colour change could be seen
Fresh orange juice	5
Orange squash	24

3 (c) (i) What was the independent variable in the student's investigation?

.....

(1 mark)

3 (c) (ii) Give **one** variable that the student controlled.

.....

(1 mark)

3 (c) (iii) Which fruit drink had the most vitamin C?

.....

(1 mark)

3 (c) (iv) There was no colour change when the student tested blackcurrant squash.
Suggest why.

.....

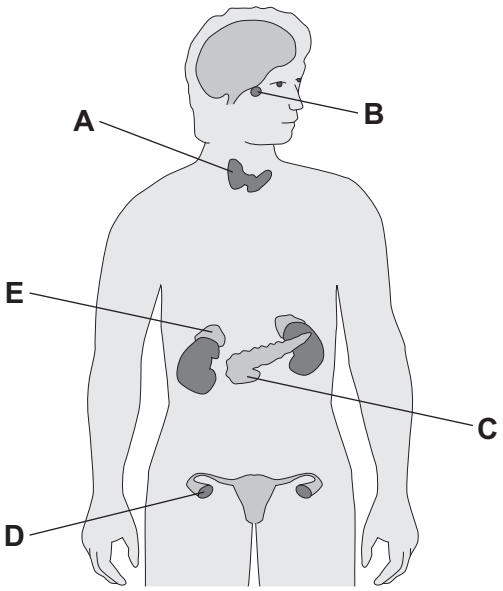
.....

(1 mark)

12

Do not write outside the box

4 The diagram shows the position of endocrine glands in the female body. Endocrine glands produce hormones.



4 (a) Complete the table. Look at the diagram to help you.

Gland	Hormone produced
D	.....
.....	Thyroxin
E	.....
.....	Glucagon

(4 marks)

4 (b) What is the function of thyroxin?

.....

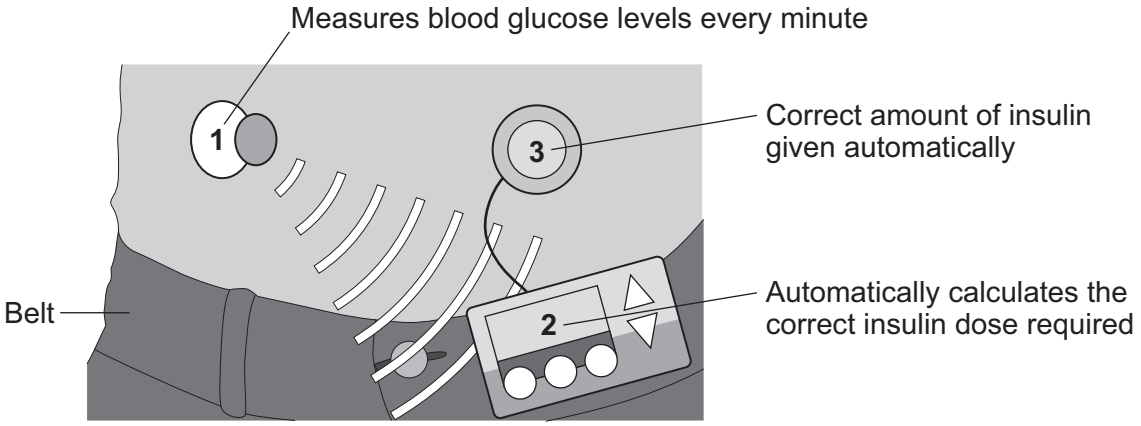
(1 mark)

Question 4 continues on the next page

Do not write outside the box

4 (c) The pancreas produces insulin. People who have Type 1 diabetes do not make enough insulin. They need regular insulin injections.
Scientists are testing an artificial pancreas.
People with diabetes wear the artificial pancreas attached to a belt around the waist.

The diagram shows how the artificial pancreas works.



The table gives information about two different types of treatment for diabetes.

Artificial pancreas	Insulin injections by the person with diabetes
Measures blood glucose levels automatically every minute	The person with diabetes takes a small blood sample and puts it into a machine to measure blood glucose level
Automatically calculates the correct dose of insulin required	The person with diabetes calculates how much insulin is needed from the glucose measurement in the machine
The correct amount of insulin is given automatically and with no pain	The person with diabetes uses an insulin pen to inject insulin
Keeps blood glucose levels constant	Blood glucose levels change throughout the day

Do not write outside the box

4 (c) (i) Give **two** disadvantages of insulin injections.

1 .....

.....

2 .....

.....

(2 marks)

4 (c) (ii) Despite these disadvantages, some people with diabetes still prefer to inject insulin.

Suggest **two** reasons why.

1 .....

.....

2 .....

.....

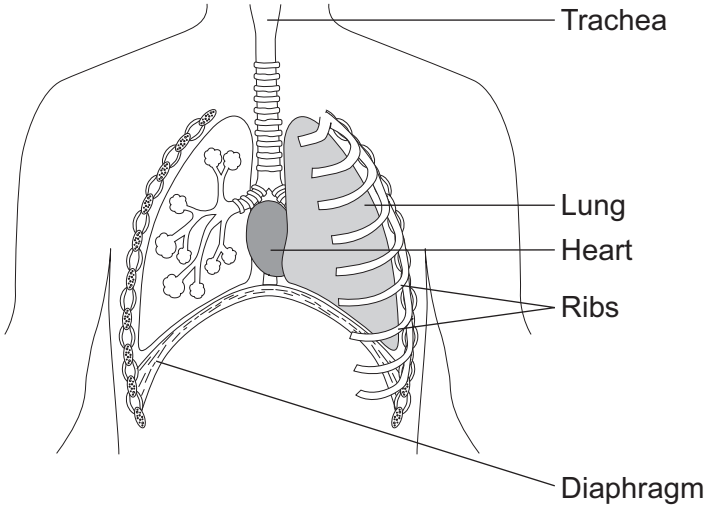
(2 marks)

9

Turn over for the next question

Do not write outside the box

5 Breathing moves air into and out of the lungs. The diagram below shows the respiratory system.



5 (a) Use words from the box to complete the sentences about inhalation (breathing in).

diaphragm	**heart**	**ribs**	**thorax**	**trachea**

Intercostal muscles pull the ..... upwards.

Other muscles pull the ..... downwards.

The two movements increase the volume of the ..... .

Air moves down the ..... and into the lungs.

(4 marks)

Do not write outside the box

5 (b) Draw a ring around the correct word(s) to complete each sentence.

5 (b) (i) Gases move from a region of high concentration to a region of

low concentration by

contraction.

diffusion.

osmosis.

(1 mark)

5 (b) (ii) The waste gas produced by body cells is

carbon dioxide.

nitrogen.

oxygen.

(1 mark)

5 (b) (iii) This waste gas is carried around the body mainly by

plasma.

platelets.

white blood cells.

(1 mark)

Question 5 continues on the next page

Do not write outside the box

5 (c) Tuberculosis (TB) is a bacterial infection that affects the lungs.
The disease is spread by breathing in tiny droplets of saliva containing the TB bacteria from the coughs or sneezes of an infected person.
The photograph shows a healthcare worker who is looking after a person with TB.

5 (c) (i) How is this healthcare worker trying to prevent the spread of TB?
Give **two** ways. Use information from the photograph to help you.

1 .....

2 .....

(2 marks)

5 (c) (ii) Diseases can spread by droplet infection.
Give **two** other ways diseases can spread.

1 .....

2 .....

(2 marks)

11

Do not write outside the box

6 Digestive enzymes break down food.

6 (a) Use words from the box to complete the word equations.

amino acids	**fatty acids**	**glycerol**	**minerals**	**sugars**	**vitamins**

6 (a) (i) Proteins —(Protease enzyme)→ .....

(1 mark)

6 (a) (ii) Starch —(Carbohydrase enzyme)→ .....

(1 mark)

6 (a) (iii) Fats —(Lipase enzyme)→ .....

and .....

(2 marks)

6 (b) Give **two** factors that affect the rate of enzyme action.

1 .....

2 .....

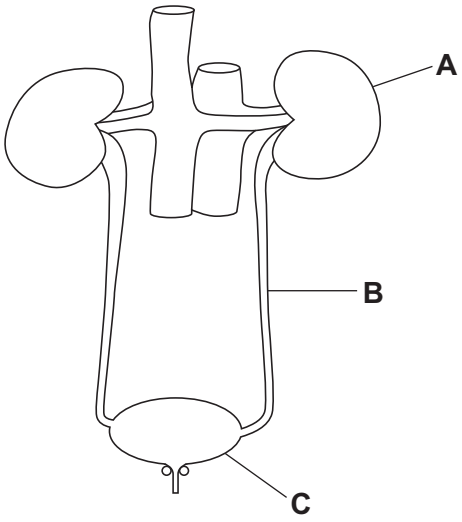
(2 marks)

6

Turn over for the next question

Do not write outside the box

7 The diagram shows some of the excretory organs.



7 (a) Name the parts labelled **A, B** and **C**.

A .....

B .....

C .....

(3 marks)

7 (b) (i) Urea is the main waste product in urine.

Which organ produces urea?

.....

(1 mark)

7 (b) (ii) Draw a ring around the correct word to complete the sentence.

A substance which is filtered by the kidneys and then totally reabsorbed into

the blood is

glucose.
urea.
water.

(1 mark)

Do not write outside the box

7 (c) Some alcohol is removed from the blood by the kidneys. Drinking too much alcohol can affect the body.

7 (c) (i) Give **two** short-term effects on the body of drinking alcohol.

1 .....

2 .....

(2 marks)

7 (c) (ii) Give **two** long-term effects on the body of drinking alcohol.

1 .....

2 .....

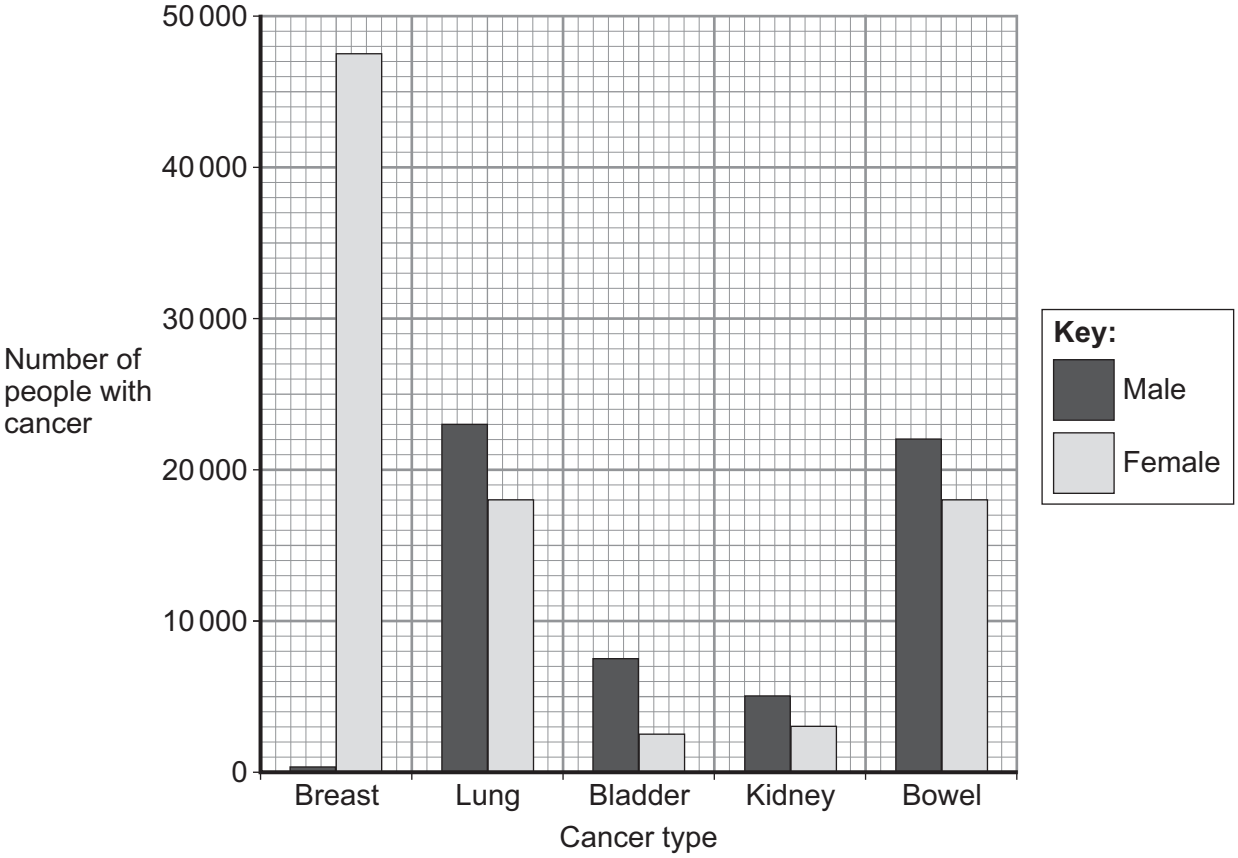
(2 marks)

9

Turn over for the next question

Do not write outside the box

8 The bar chart shows how many people had different types of cancer in the UK in 2008.



8 (a) (i) How many females had lung cancer?

.....

(1 mark)

8 (a) (ii) What proportion of the people suffering from bladder cancer were male?

.....

.....

(1 mark)

8 (a) (iii) Suggest **two** methods for treating breast cancer.

1 .....

2 .....

(2 marks)

Do not write outside the box

8 (b) Each type of cancer has risk factors which increase the chance of getting that cancer.

Draw a straight line from each cancer to its main risk factor.

Cancer	Main risk factor
Skin	Smoking tobacco
Lung	Low fibre diet
Bowel	Alcohol
	UV radiation

(3 marks)

8 (c) Give **two** ways in which cancers can be detected by health professionals.

1 .....

2 .....

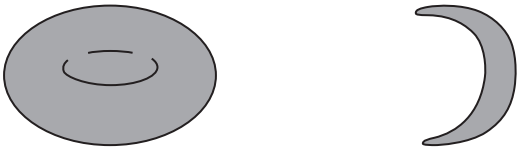
(2 marks)

9

Turn over for the next question

Do not write outside the box

9 Sickle-cell anaemia is an inherited condition. In this condition, the red blood cells become sickle shaped.
The diagrams show a normal red blood cell and a red blood cell affected by sickle-cell anaemia.



Normal shaped red blood cell

Sickle shaped red blood cell

9 (a) (i) What is the main function of a red blood cell?

.....

(1 mark)

9 (a) (ii) A person with sickle-cell anaemia may feel tired.

Suggest why.

.....

.....

.....

.....

.....

(2 marks)

Do not write outside the box

9 (b) Sickle-cell anaemia is caused by a recessive allele (r).

Two parents do **not** have sickle-cell anaemia.

They have two children, Karl and Lily.

Only Karl has sickle-cell anaemia.

9 (b) (i) Complete the Punnett square to show how Karl inherited sickle-cell anaemia.
Use the letter R for the dominant allele for normal red blood cells.

	R	**r**
R		
r		

(3 marks)

9 (b) (ii) In the Punnett square, draw a ring around Karl's alleles.

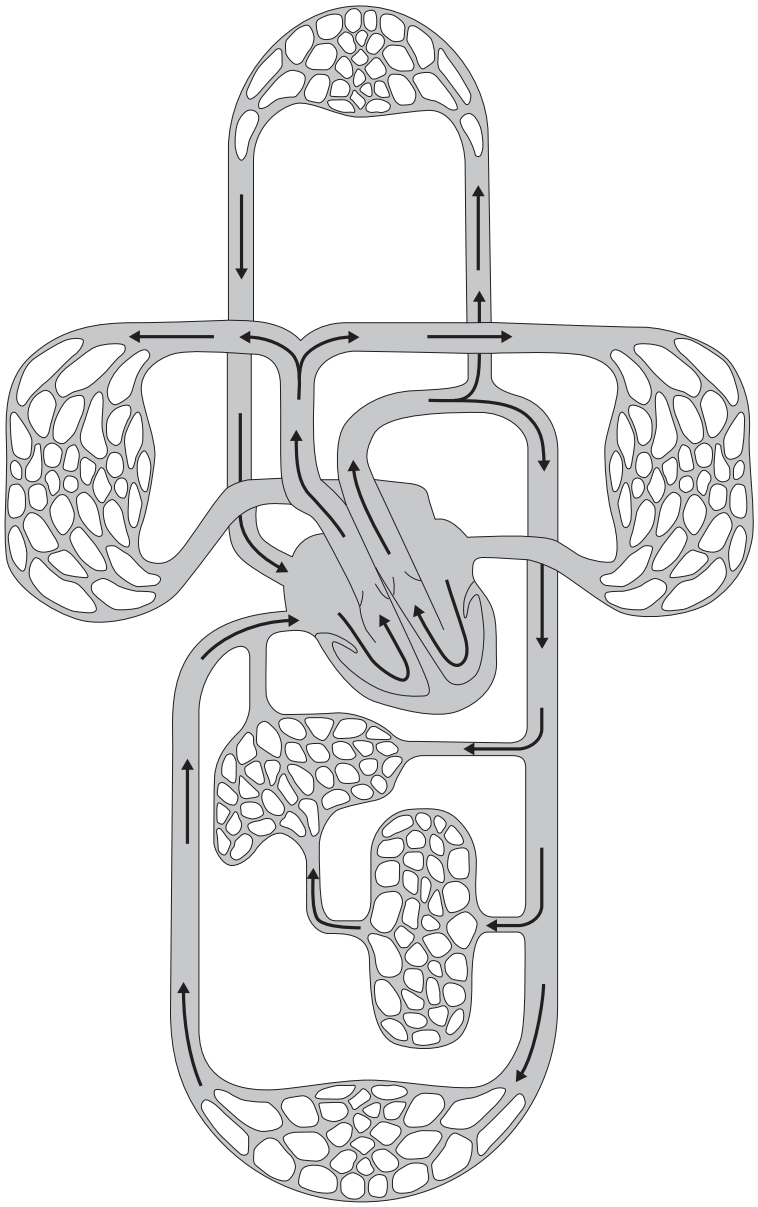
(1 mark)

7

Turn over for the next question

Do not write outside the box

10 The diagram shows the circulatory system.



Do not write outside the box

Describe how the heart and blood vessels circulate blood around the body.

You may use information from the diagram to help you.

In this question you will be assessed on your ability to use good English, organise information clearly and use correct scientific words.

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(5 marks)

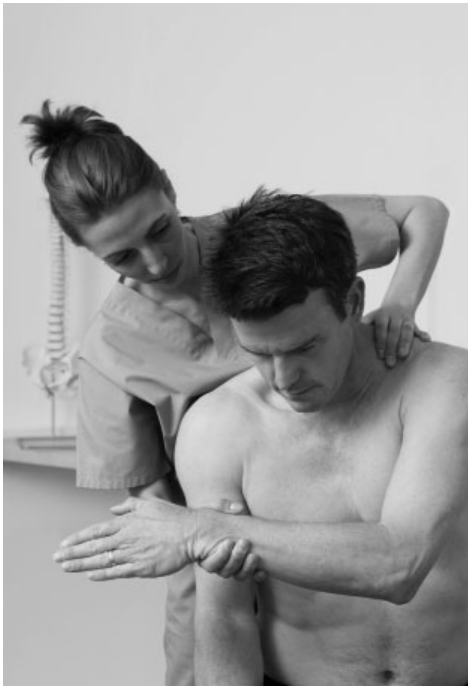
5

Turn over for the next question

Do not write outside the box

11 Many people have back pain.

The photograph shows a health professional manipulating a patient's spine to relieve back pain.

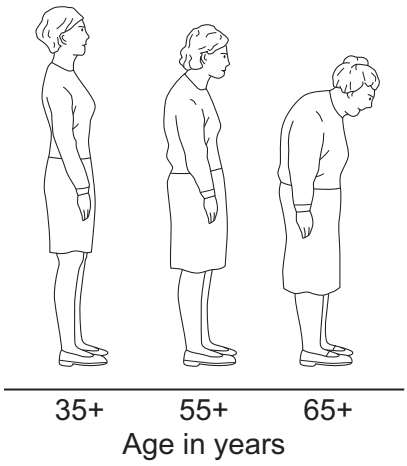


11 (a) Name **one** type of health professional who manipulates the spine.

.....

(1 mark)

The drawing shows changes in a woman's body caused by osteoporosis of the spine.



Do not write outside the box

11 (b) Describe the effect of osteoporosis on the woman's spine. Use information from the drawing to help you.

.....

.....

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.....

.....

(2 marks)

11 (c) The development of osteoporosis can be slowed down by attention to diet.

11 (c) (i) Which mineral ion is essential for keeping bones healthy?

.....

(1 mark)

11 (c) (ii) Name **two** foods that contain a lot of the mineral ion which is essential for keeping bones healthy.

1 .....

2 .....

(2 marks)

11 (d) There is a new drug which can help some people with osteoporosis.
Doctors are **not** allowed to give the new drug to everyone with osteoporosis.

Suggest **two** reasons why.

1 .....

.....

2 .....

.....

(2 marks)

8

Do not write outside the box

12 Midwives help women during labour.

12 (a) Describe the first **two** stages of labour.

.....

.....

.....

.....

.....

.....

.....

(3 marks)

12 (b) The photograph shows a midwife examining the *'after-birth'* which is pushed out during the third stage of labour.

12 (b) (i) Name structure **A**.

..... *(1 mark)*

Do not write outside the box

12 (b) (ii) Describe the main functions of structure **A**.

.....

.....

.....

.....

.....

(2 marks)

12 (c) Midwives tell women they should **not** drink alcohol when they are pregnant.

Suggest **two** reasons why.

1 .....

.....

2 .....

.....

(2 marks)

Question 12 continues on the next page

Do not write outside the box

12 (d) Midwives collected information about mothers who drank alcohol before and during pregnancy.

The table shows the results.

Age of mothers in years	Percentage (%) of mothers who		
	Drank alcohol before pregnancy	Drank alcohol during pregnancy	Stopped drinking alcohol during pregnancy
Under 20	87	53	39
20–24	84	54	36
25–29	87	59	33
30–34	88	64	27
35 and over	87	71	21

12 (d) (i) How does the percentage of mothers who drank alcohol **before** pregnancy change with age?

Tick (✓) **one** box.

The percentage of mothers who drank alcohol **before** pregnancy **increased** with age. ☐

The percentage of mothers who drank alcohol **before** pregnancy **decreased** with age. ☐

The percentage of mothers who drank alcohol **before** pregnancy did **not** change with age. ☐

(1 mark)

12 (d) (ii) Describe how the percentage of mothers who drank alcohol **during** pregnancy changed with age. Use data from the table to help you.

.....

.....

.....

.....

.....

(2 marks)

Do not write outside the box

12 (d) (iii) Suggest **one** reason for the relationship between age and drinking alcohol **during** pregnancy.

.....

.....

(1 mark)

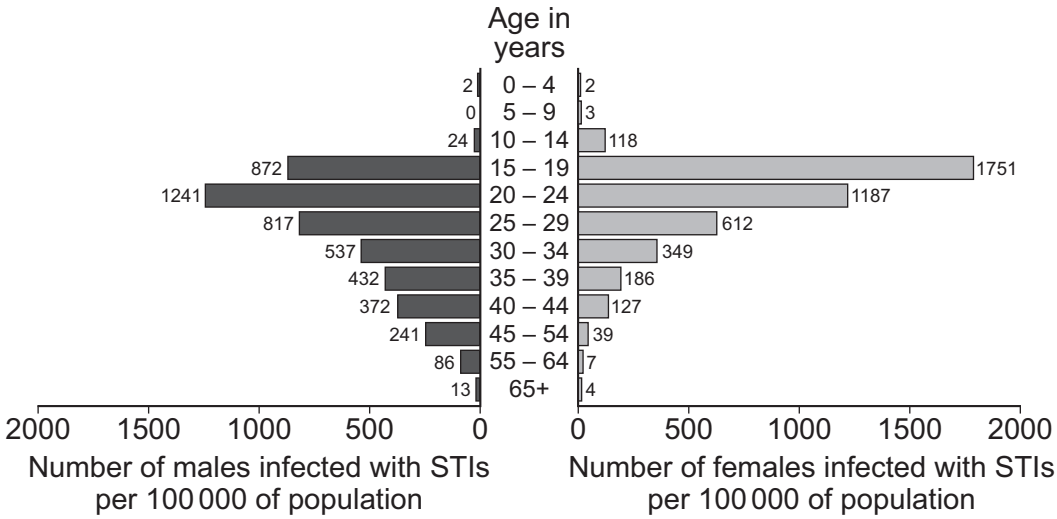
12

Turn over for the next question

Do not write outside the box

13 Chlamydia is a sexually transmitted infection (STI).

13 (a) The chart shows the numbers of people infected with STIs in a city.



13 (a) (i) How many people per 100 000 aged 15–24 years are infected with STIs in **this** city?

Show clearly how you work out your answer.

.....

.....

Number of people per 100 000 =.....

(2 marks)

Do not write outside the box

13 (a) (ii) The number of people infected with STIs is highest in the 15–24 years age group.

Suggest **two** reasons for the high numbers in this age group.

1 .....

.....

2 .....

.....

(2 marks)

13 (b) Chlamydia is caused by a bacterium. Some strains of the Chlamydia bacterium are resistant to antibiotics. This resistance makes the infection difficult to treat.

13 (b) (i) Populations of resistant strains of bacteria are becoming more common.

Explain why.

.....

.....

.....

.....

.....

(2 marks)

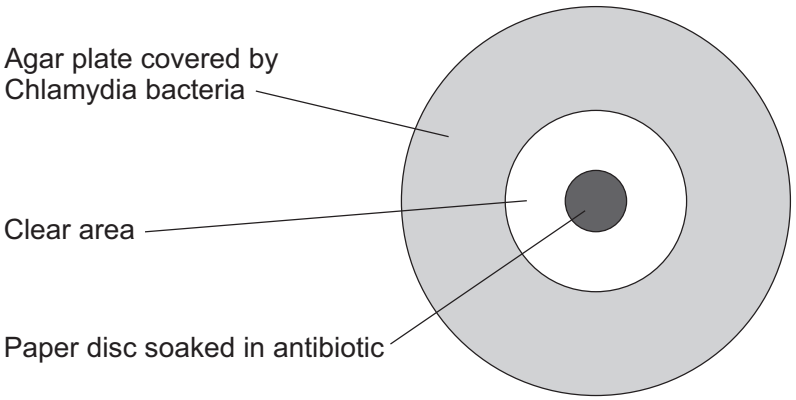
Question 13 continues on the next page

Do not write outside the box

The effectiveness of antibiotics can be tested by using discs of paper soaked in antibiotic.

A disc soaked in antibiotic is placed in the centre of an agar plate covered by bacteria.

A clear area forms around the disc if the antibiotic is effective.



A bacteriologist investigated the effect of four different antibiotics, **A**, **B**, **C** and **D**, on Chlamydia bacteria.

The table shows the results.

Antibiotic	Diameter of clear area in mm
A	30
B	37
C	32
D	33

13 (b) (ii) Which antibiotic, **A**, **B**, **C** or **D**, should the bacteriologist recommend for treating this strain of Chlamydia?

Antibiotic .....

Give the reason for your choice.

.....

.....

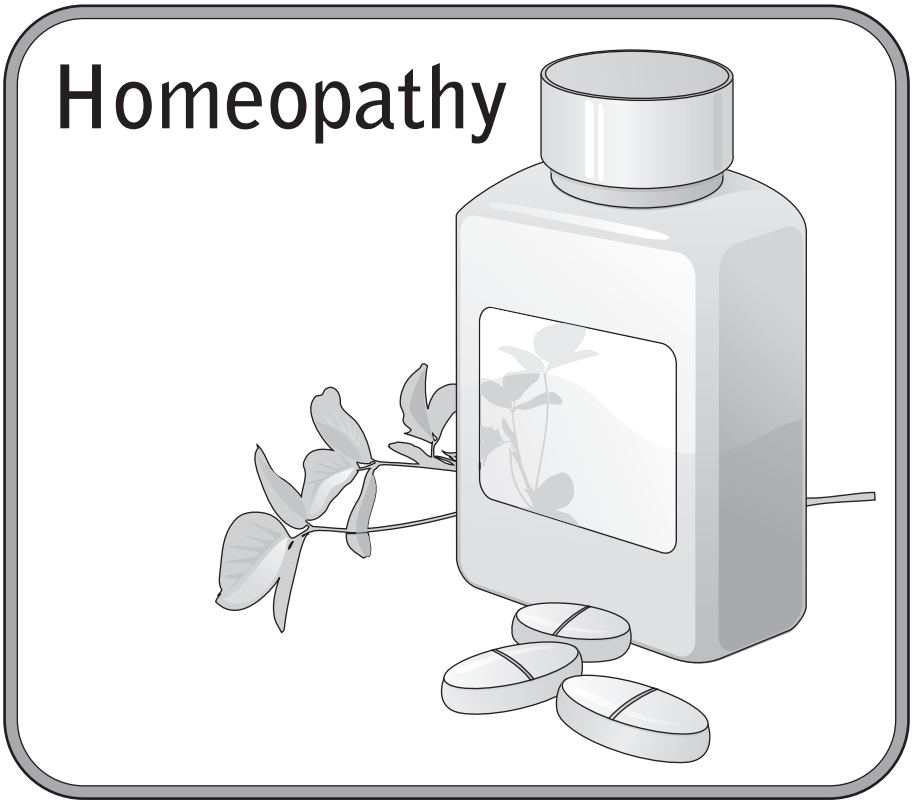
.....

(2 marks)

8

Do not write outside the box

14 The drawing shows an advert for homeopathy.



14 (a) Describe the principle of homeopathy.

.....

.....

.....

.....

.....

(2 marks)

Question 14 continues on the next page

Do not write outside the box

Rheumatoid arthritis makes joints become swollen and painful.

Doctors wanted to find out how effective homeopathy is in relieving the symptoms of rheumatoid arthritis.

- 112 patients with rheumatoid arthritis took part in a trial for 6 months.
- All the patients had been taking normal medication for rheumatoid arthritis before the trial.
- None of the patients took normal medication for rheumatoid arthritis during the trial.
- **Group 1** patients were all given the same homeopathic treatment for 6 months.
- **Group 2** was a control group.

14 (b) (i) Give **two** control variables in this trial.

1 .....

2 .....

(2 marks)

14 (b) (ii) Suggest what was given to **Group 2** patients for 6 months.

.....

.....

(1 mark)

14 (c) Here are the results of the trial.

- 58 patients finished the trial.
- 54 patients did not finish the trial.
- The 58 patients who finished the trial said that pain had reduced by an average of 18% by the end of the trial.
- Of the 54 patients who did not finish the trial, 31 changed back to normal medication and 10 became seriously ill.
- **Group 1**, the homeopathic group, and **Group 2**, the control group, both said they had a similar reduction in pain.

14 (c) (i) What conclusion can be made about how effective homeopathic treatment is for rheumatoid arthritis?

.....

.....

(1 mark)

14 (c) (ii) Why do you think the patients who finished the trial said that their pain had reduced?

.....

.....

(1 mark)

Do not write outside the box

14 (c) (iii) Why do you think that many patients did **not** complete the trial?

.....

.....

(1 mark)

8

END OF QUESTIONS

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