

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										



General Certificate of Secondary Education
Foundation Tier
June 2011

Human Health and Physiology 44151F

Monday 27 June 2011 1.30 pm to 3.30 pm

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.

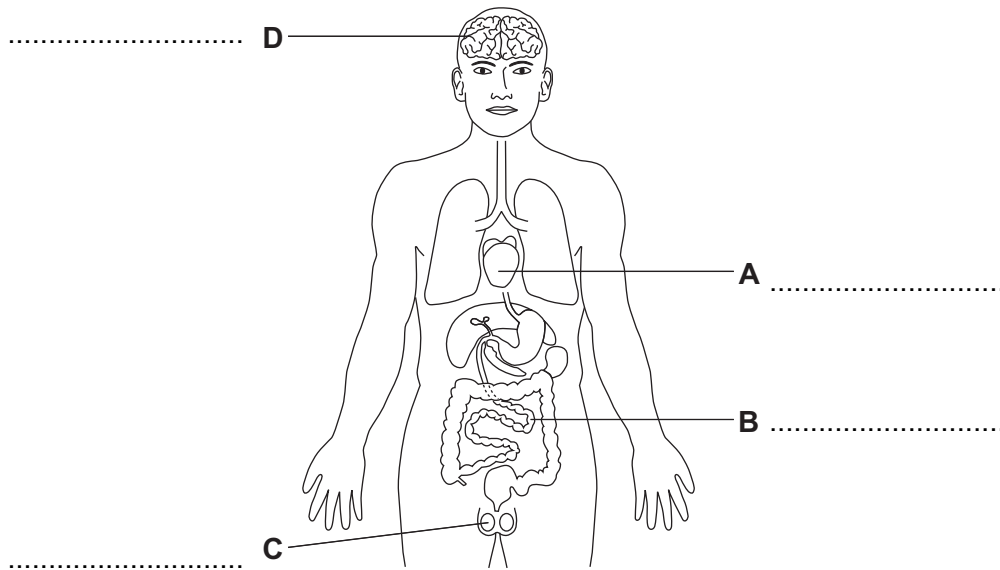
For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
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4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
TOTAL	



J U N 1 1 4 4 1 5 1 F 0 1

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

1 The drawing shows some of the organs in the human body.



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

- | | | | | |
|-------|-------|-----------|-------|--------|
| brain | heart | intestine | liver | testis |
|-------|-------|-----------|-------|--------|

(4 marks)

1 (b) Draw **one** line from each organ to its correct function.

Organ	Function
Brain	Digests food
Intestine	Co-ordinates the body's activities
Testis	Absorbs oxygen from the air
	Produces sperm

(3 marks)

7



2 The National Health Service employs many different health professionals.

Draw **one** line from each health professional to the correct photograph of the health professional at work.

Health professional

Health professional at work

Heart Specialist



Midwife



Optometrist



Physiotherapist



(4 marks)

4

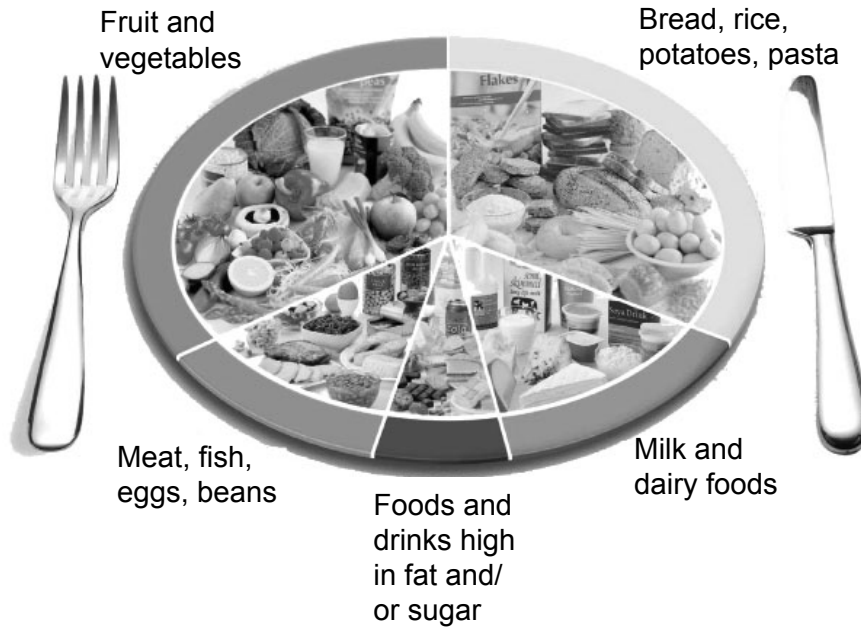
Turn over ▶



- 3 The poster, produced by the Food Standards Agency, shows the 'eatwell plate'. The 'eatwell plate' gives advice about diet.

The eatwell plate

Use the eatwell plate to help you get the balance right. It shows how much of what you eat should come from each food group.



Use information from the poster to answer each question.

- 3 (a) In each question tick (✓) **one** box to complete the sentence.

- 3 (a) (i) Your diet should contain the smallest proportion of

fruit and vegetables.

foods and drinks high in fat and / or sugar.

meat, fish, eggs and beans.

(1 mark)

- 3 (a) (ii) Your diet should contain about 30%

bread, rice, potatoes and pasta.

meat, fish, eggs and beans.

milk and dairy foods.

(1 mark)



3 (b) In each question tick (✓) **one** box.

3 (b) (i) Which group of foods on the 'eatwell plate' contains most starchy foods?

bread, rice, potatoes and pasta

fruit and vegetables

milk and dairy foods

(1 mark)

3 (b) (ii) Which group of foods on the 'eatwell plate' contains most protein?

bread, rice, potatoes and pasta

meat, fish, eggs and beans

milk and dairy foods

(1 mark)

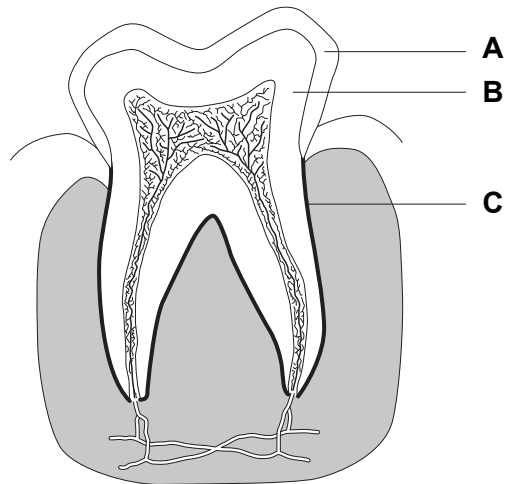
4

Turn over for the next question

Turn over ▶



- 4 The diagram shows a section through a human tooth.



cement	dentine	enamel	pulp cavity
--------	---------	--------	-------------

- 4 (a) (i) Use words from the box to name the structures labelled **A**, **B** and **C**.

A

B

C

(3 marks)

- 4 (a) (ii) Draw a ring around the correct word to complete the sentence.

The type of tooth shown in the above diagram is

a canine.

an incisor.

a molar.

(1 mark)



4 (b) Dental Hygienists help to improve dental health by removing calculus.

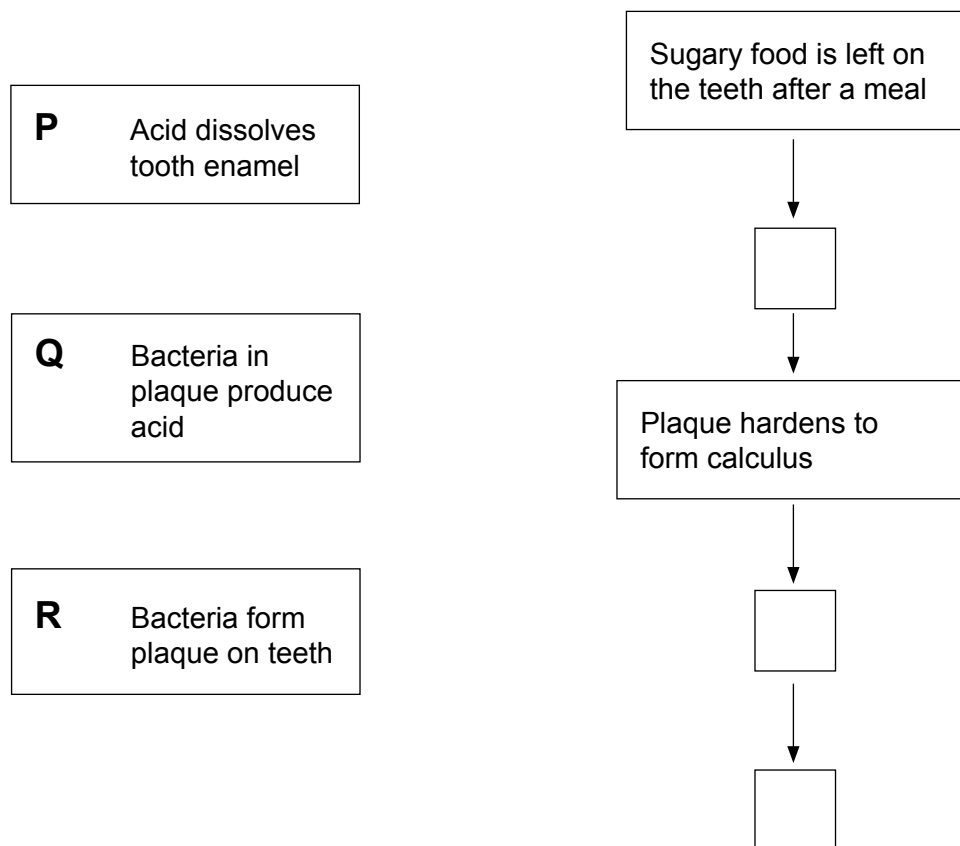


The flow chart shows the stages in tooth decay.

Boxes **P**, **Q** and **R** describe the missing steps in the process.

Write the letters **P**, **Q** and **R** into the correct boxes to complete the flow chart.

Flow chart



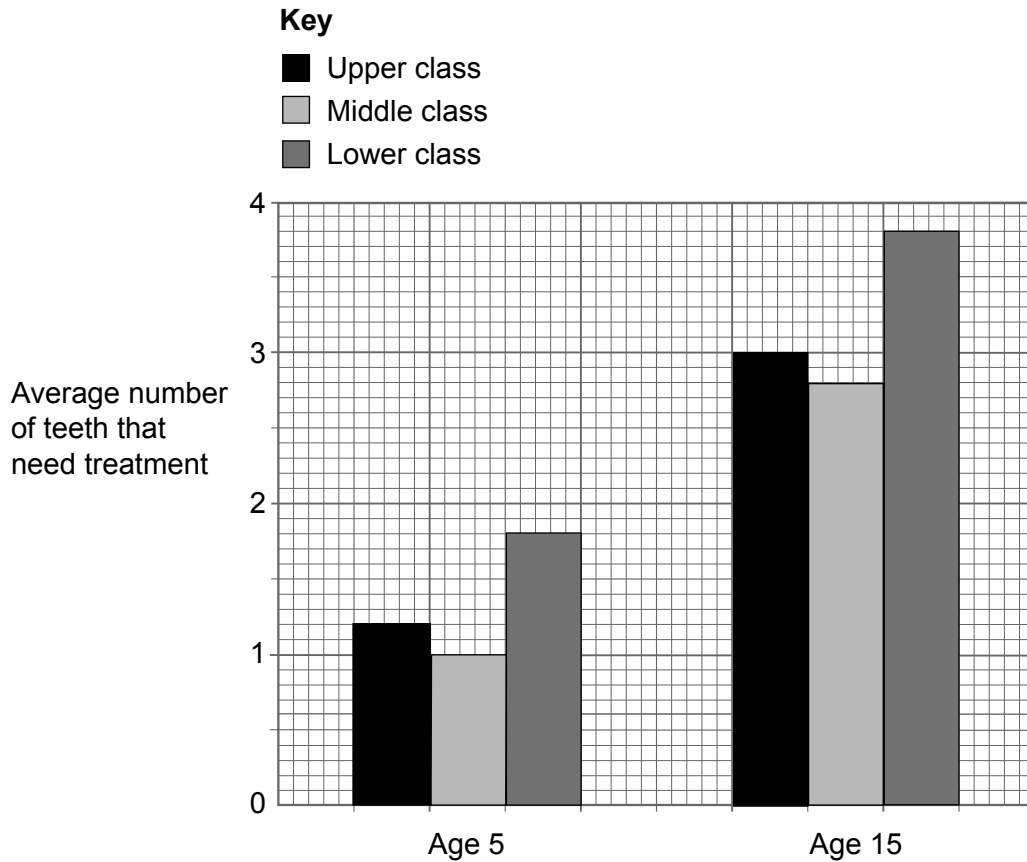
(2 marks)

Question 4 continues on the next page

Turn over ►



- 4 (c)** The bar chart shows the average number of teeth that need dental treatment in children of different social classes.



- 4 (c) (i)** In which social class do children have the largest number of teeth that need treatment?

.....
(1 mark)

- 4 (c) (ii)** In middle class children, what is the increase in the average number of teeth needing treatment between age 5 and age 15?

Show clearly how you work out your answer.

.....
.....

Increase
(2 marks)



4 (c) (iii) The children of upper class parents have a different number of teeth needing dental treatment than the children of lower class parents.

Suggest **two** reasons for this difference.

1

.....

.....

2

.....

.....

(2 marks)

11

Turn over for the next question

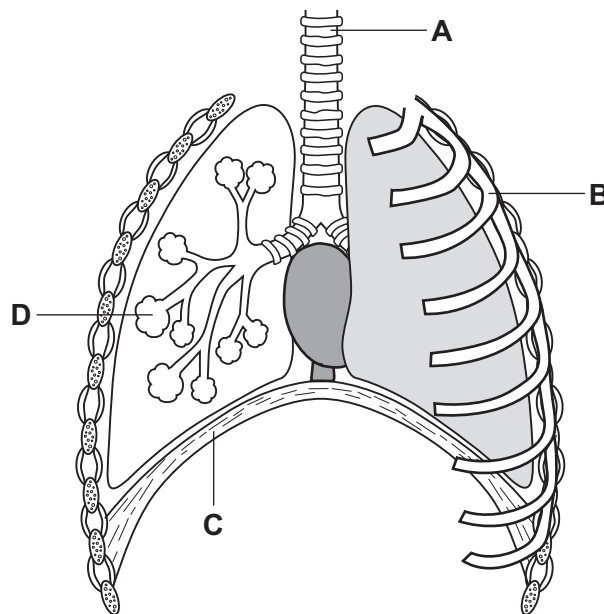
Turn over ▶



- 5** Paramedics arrive at the scene of many car crashes to find people suffering from ‘crush’ injuries. This means that their chests have been squashed.



The diagram shows part of the human breathing system.



- 5 (a)** Which part of the breathing system, **A**, **B**, **C** or **D**,

5 (a) (i) is the trachea? (1 mark)

5 (a) (ii) is where oxygen enters the blood? (1 mark)

- 5 (b)** In an accident the trachea may become completely squashed. This needs immediate treatment by a paramedic. Why?

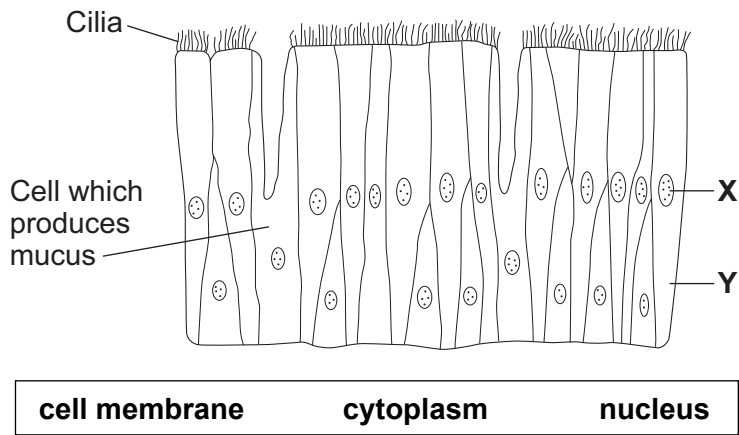
.....

.....

(1 mark)



5 (c) The diagram shows cells which line the trachea.



5 (c) (i) Use words from the box to name the structures labelled

X

Y

(2 marks)

5 (c) (ii) Give the function of the mucus produced by the cells.

.....
.....

(1 mark)

5 (c) (iii) Give the function of the cilia on the cells.

.....
.....

(1 mark)

7

Turn over for the next question

Turn over ▶



6 The excretory system removes waste materials.

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

bladder	liver	lungs	skin	urethra
----------------	--------------	--------------	-------------	----------------

Carbon dioxide is removed by the

Urine contains urea.

Urea is made in the

Urine is stored in the

Urine leaves the body via the (4 marks)

6 (b) The kidneys remove waste materials from blood plasma.

The table shows the concentration of certain substances

- in the blood plasma
- in the liquid that has just been filtered from the blood in the kidneys
- in the urine.

Substance	Concentration as percentage		
	In the blood plasma	In the filtered liquid	In the urine
Protein	7.0	0	0
Mineral ions	0.35	0.35	0.5
Glucose	0.1	0.1	0
Urea	0.03	0.03	2.1



6 (b) (i) Which substance does **not** pass out of the blood plasma into the filtered liquid?

.....
(1 mark)

6 (b) (ii) Which substance passes into the filtered liquid and is then completely reabsorbed?

.....
(1 mark)

6 (b) (iii) Urea is **not** reabsorbed from the filtered liquid.

By how many times is the concentration of urea in the urine greater than the concentration of urea in the blood plasma?

Show clearly how you work out your answer.

.....
.....
..... times greater
(2 marks)

6 (b) (iv) Urea is **not** reabsorbed from the filtered liquid.

Suggest **one** advantage of this to the body.

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

Question 6 continues on the next page

Turn over ▶



6 (c) Patients with kidney failure can be treated by dialysis.

The photographs show two different types of dialysis treatment.



Peritoneal dialysis



Dialysis machine

In peritoneal dialysis fluid enters the abdomen. When the fluid leaves the abdomen it contains waste materials.

The table gives information about these treatments.

Peritoneal dialysis	Dialysis machine
Treatment takes place at home	Treatment takes place in hospital
Treatment done by patient	Treatment done by technicians
Significant risk of infection	Small risk of infection
Treatment takes 45 minutes 4 times per day	Treatment takes 4 hours, 3 times per week
Patient can have a normal diet	Patient needs a special diet
Large quantities of dialysis fluid have to be stored at home	Hospital has special storage rooms for dialysis fluid



Use information from the photographs and from the table to answer this question.

Which treatment is most convenient for a patient?

Draw a ring around your answer. Peritoneal dialysis / Dialysis machine

Give **three** reasons for your answer.

1

.....

.....

2

.....

.....

3

.....

.....

(3 marks)

12

Turn over for the next question

Turn over ▶



7 Ann and Ben have been attending a clinic to find out why Ann cannot have a baby. The gynaecologist found out that Ann has a blockage in her reproductive system.

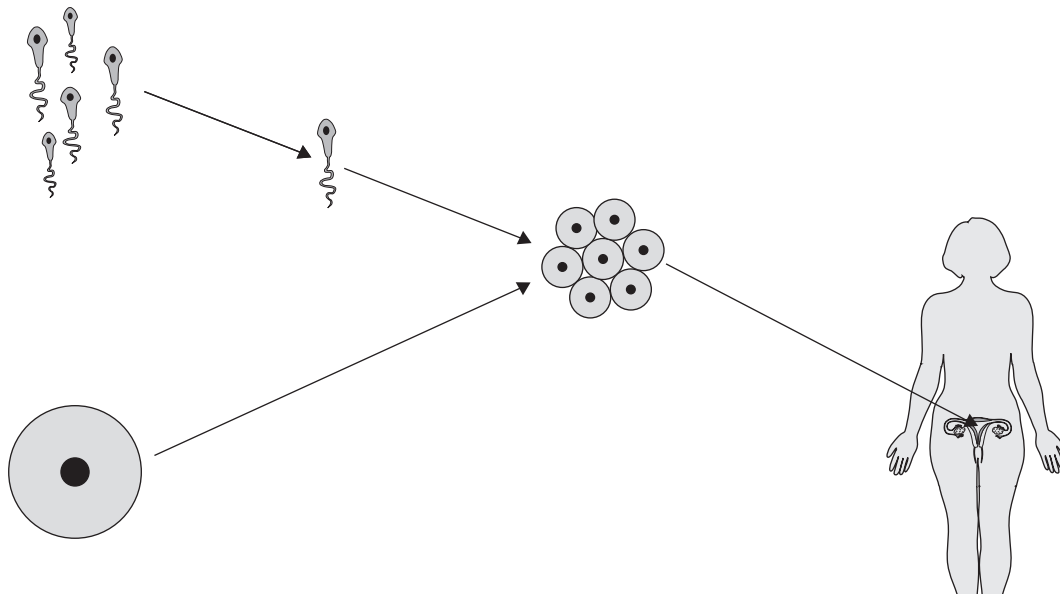
7 (a) Draw a ring around the correct word to complete the sentence.

Sperm are prevented from reaching an egg by a blockage in Ann's

- fallopian tube.
- ovary.
- urethra.

(1 mark)

7 (b) The gynaecologist suggested that Ann should try IVF (in-vitro fertilisation) treatment. The diagram shows some of the stages in IVF treatment.



Use information from the diagram to describe the process of IVF treatment.

.....

.....

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.....

(4 marks)



- 7 (c)** Clinics measure the success rate of IVF treatment by calculating the percentage of women who become pregnant after treatment.

Table 1 shows the success rate for all women given IVF treatment in the UK in 2007.

Table 1

Age in years of women given IVF treatment	Percentage success rate
under 35	32
36 – 37	28
38 – 39	19
40 – 42	12
43 – 44	3
over 44	3

Describe fully what happened to the success rate as the age of the women given IVF treatment increased.

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.....

.....

(2 marks)

Question 7 continues on the next page

Turn over ▶



7 (d) Ann and Ben decide that Ann will have IVF treatment.

The gynaecologist gives them the information shown in **Table 2**.

Table 2

Age in years of women given IVF treatment	Clinic A		Clinic B	
	Percentage success rate	Percentage of multiple births (twins and triplets)	Percentage success rate	Percentage of multiple births (twins and triplets)
35	28	10	27	14
36	19	8	22	14
37	18	10	19	10
38	15	9	14	14
39	13	10	10	12
40	12	9	9	10

Ann is 39 years old.

Which clinic should Ann and Ben choose?

Draw a ring around your answer. Clinic **A** / Clinic **B**

Give **two** reasons for your answer.

- 1
-
- 2
-

(2 marks)

9



8 The photograph shows a nurse setting up a transfusion of whole blood.



8 (a) Blood collected from donors is tested for pathogens.

Why is the blood tested?

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

(1 mark)

8 (b) Suggest **one** reason why a person might need a transfusion of whole blood.

.....
.....

(1 mark)

8 (c) The nurse needs to know a patient's blood group before she starts the transfusion.
Give **one** reason why.

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

(1 mark)

Question 8 continues on the next page

Turn over ▶



8 (d) Which type of blood can be transfused into any patient?

Tick (✓) **one** box.

Group A

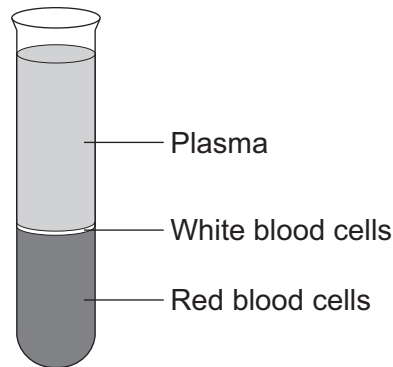
Group AB

Group B

Group O

(1 mark)

8 (e) The diagram shows a tube of blood that has been spun at high speed to separate it into its different parts.



8 (e) (i) Which part makes up approximately 55% of the blood?

Tick (✓) **one** box.

Plasma

Red blood cells

White blood cells

(1 mark)

8 (e) (ii) In this blood sample what is the approximate ratio of red blood cells to white blood cells?

Tick (✓) **one** box.

1:1

6:1

40:1

(1 mark)



8 (f) The symptoms of anaemia are caused by a shortage of red blood cells.

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

8 (f) (i) One symptom of anaemia is

coughing.
diarrhoea.
tiredness.

(1 mark)

8 (f) (ii) The mineral ion needed to prevent anaemia is

calcium.
iodine.
iron.

(1 mark)

8 (f) (iii) Red blood cells mainly transport

carbon dioxide.
nitrogen.
oxygen.

(1 mark)

8 (f) (iv) Haemoglobin is found in

platelets.
red blood cells.
white blood cells.

(1 mark)

10

Turn over for the next question

Turn over ▶



9 There are many causes of damage to parts of the knee joint.

9 (a) Draw **one** line from each part of the knee joint to its function.

Part of the knee joint

Function

Cartilage

Lubricates the joint

Ligament

Reduces friction in the joint

Tendon

Connects a muscle to a bone

Connects a bone to another bone

(3 marks)

9 (b) (i) What is the most likely cause of a torn ligament in the knee?

Tick (✓) **one** box.

Arthritis

Sports injury

Vitamin D deficiency

(1 mark)

9 (b) (ii) What is the most likely cause of brittle leg bones in an elderly woman?

Tick (✓) **one** box.

Arthritis

Dislocation

Osteoporosis

(1 mark)



9 (c) Damaged knee joints can be treated by keyhole surgery.



Read the information about keyhole surgery on the knee.

- The operation leaves very small scars.
- Surgeons need extra training.
- Recovery time is very short.
- The operation can be done under local anaesthetic.
- The equipment is very expensive.

Use **only** the above information to answer these questions.

9 (c) (i) Give **two** advantages of keyhole surgery.

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

(2 marks)

9 (c) (ii) Give **two** disadvantages of keyhole surgery.

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

(2 marks)

Question 9 continues on the next page

Turn over ▶



9 (d) A surgeon decides to replace the worn out surfaces in a knee joint.

The list gives features of materials that might be used in repairing joints.

- hard
- transparent
- brittle
- smooth

Use words from the above list to complete the sentence.

Materials used to replace worn out surfaces in joints should be and

.....

(2 marks)

11



10

Describe the different ways in which infectious diseases may be passed from person to person.

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

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(5 marks)

5

Turn over for the next question

Turn over ▶



- 11 A doctor advises Laura to see a dietician.



The dietician first calculates Laura's Body Mass Index (BMI).

BMI is calculated by $\text{mass} \div \text{height}^2$.

The dietician finds that Laura has a mass of 85 kg and a height of 1.5 m.

- 11 (a) (i) Calculate Laura's Body Mass Index.

Show clearly how you work out your answer.

.....

BMI =
 (2 marks)

- 11 (a) (ii) The table shows Body Mass Index Categories.

Body Mass Index	Category
Below 16.5	Severely underweight
16.5 – 18.4	Underweight
18.5 – 24.9	Healthy weight
25 – 29.9	Overweight
30 or above	Obese

Which category is Laura?

.....
 (1 mark)



11 (b) The dietician gives Laura two pieces of advice about diet.

What should these **two** pieces of advice be?

1

.....

2

.....

(2 marks)

11 (c) Jane lives in Britain and has a Body Mass Index of 15. She is not eating enough food.

Name **one** dietary disease Jane may have.

.....

(1 mark)

11 (d) Some diets lead to an increased risk of heart attacks.

11 (d) (i) Explain the link between diet and heart attacks.

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

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(4 marks)

Question 11 continues on the next page

Turn over ▶



11 (d) (ii) Give **one** way in which a physiotherapist can help a patient to recover from a heart attack.
Do **not** include advice about diet in your answer.

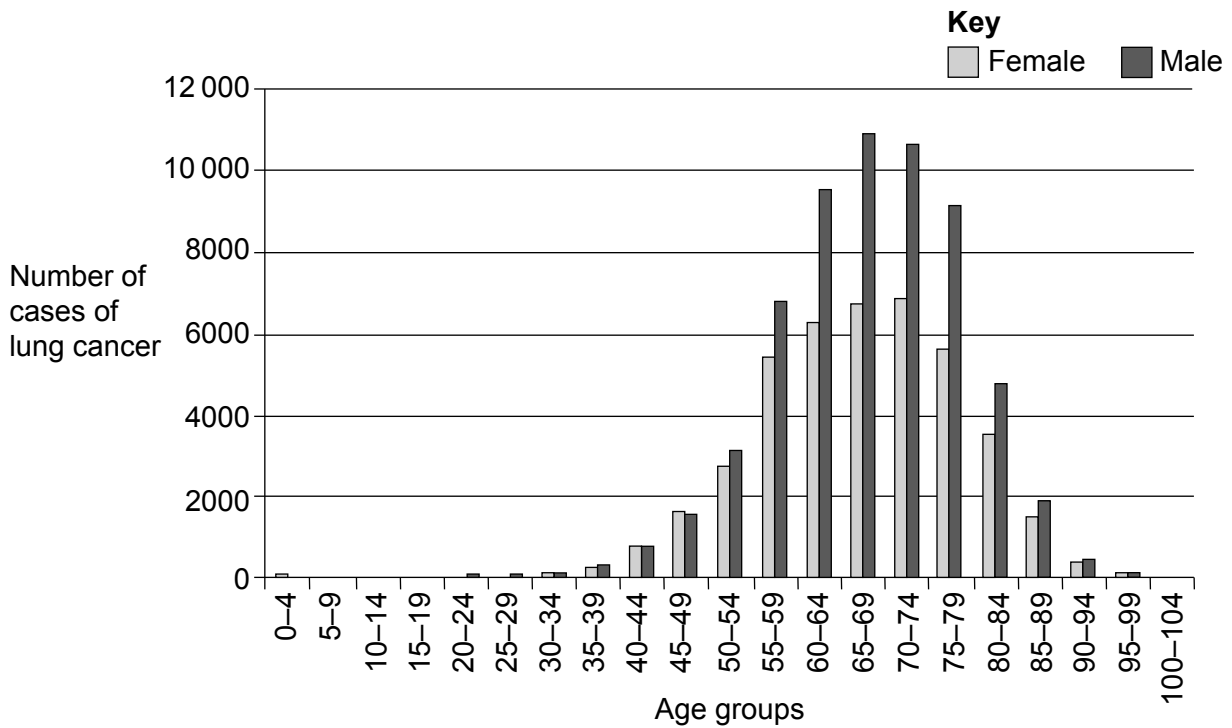
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(1 mark)

11

12 The NHS collects statistics on the number of people treated in hospitals for different diseases.

The graph shows the number of cases of lung cancer in males and females treated in hospitals in the UK in 2007.



12 (a) Give **two** conclusions from the data in the graph.

1

.....

2

.....

(2 marks)



12 (b) Suggest **one** reason why the NHS needs to know the number of cases of lung cancer treated in hospitals.

.....
.....

(1 mark)

12 (c) (i) Suggest **one** method of diagnosing lung cancer.

.....
.....

(1 mark)

12 (c) (ii) Which health service professional would use the equipment for the method you have given in part (c) (i)?

.....
.....

(1 mark)

12 (d) Suggest **two** methods of treating lung cancer.

1.....

.....

2.....

.....

(2 marks)

7

Turn over for the next question

Turn over ▶



13 Acupuncture is an alternative therapy for many conditions.

13 (a) Describe how acupuncture is carried out.

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.....

.....

(2 marks)

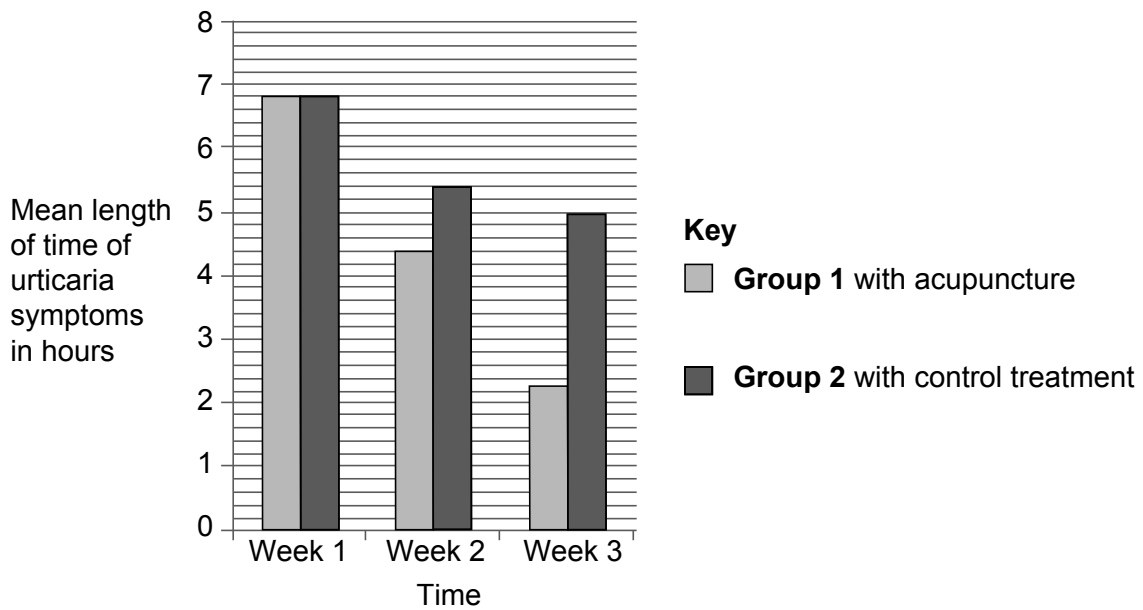
Urticaria is a condition which produces an itchy rash on the skin. The rash appears for a few hours and then disappears. In some people, urticaria does not respond to conventional treatment. Doctors investigated the effectiveness of acupuncture in relieving the symptoms of urticaria in these patients.

- 40 patients whose urticaria did not respond to conventional treatment took part in the investigation.
- **Group 1** was given acupuncture treatment daily for three weeks.
- **Group 2** was given a control treatment daily for three weeks.
- The table shows the composition of each group.

Characteristic	Group 1 given acupuncture treatment	Group 2 given control treatment
Male	8	8
Female	12	12
Mean age in years	30	30
Mean length of time patients had suffered from urticaria in years	12	11



The bar chart shows the results of the investigation.



13 (b) (i) Give **two** control variables that were used in this investigation.

1

.....

2

.....

(2 marks)

13 (b) (ii) Give the dependent variable in this investigation.

.....

(1 mark)

13 (c) There was some improvement in the patients in **Group 2**.

Suggest **one** explanation for this.

.....

.....

(1 mark)

13 (d) Why would it be better to show all the results rather than the mean length of time of the urticaria symptoms?

.....

.....

(1 mark)

Question 13 continues on the next page

Turn over ▶



13 (e) A patient with urticaria that does not respond to conventional treatments visits a consultant dermatologist (skin specialist).

Based on the results of this investigation, what advice would you expect the dermatologist to give to the patient about acupuncture treatment.

Explain the reason for your answer.

.....

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.....

.....

(2 marks)

9



14 The poster encourages girls to be vaccinated against cancer of the cervix (cervical cancer).

Cervical cancer is caused by the human papillomavirus (HPV) which is transmitted by sexual intercourse.



14 (a) Describe **one** way in which the female body prevents the HPV from invading cells in the reproductive system.

.....

.....

.....

.....

.....

.....

(2 marks)

Question 14 continues on the next page

Turn over ▶



14 (b) If cervical cancer is not detected early it may become malignant.

14 (b) (i) Give **one** way in which cancer cells differ from normal cells.

.....

.....

(1 mark)

14 (b) (ii) Malignant tumours are very dangerous.

Explain why.

.....

.....

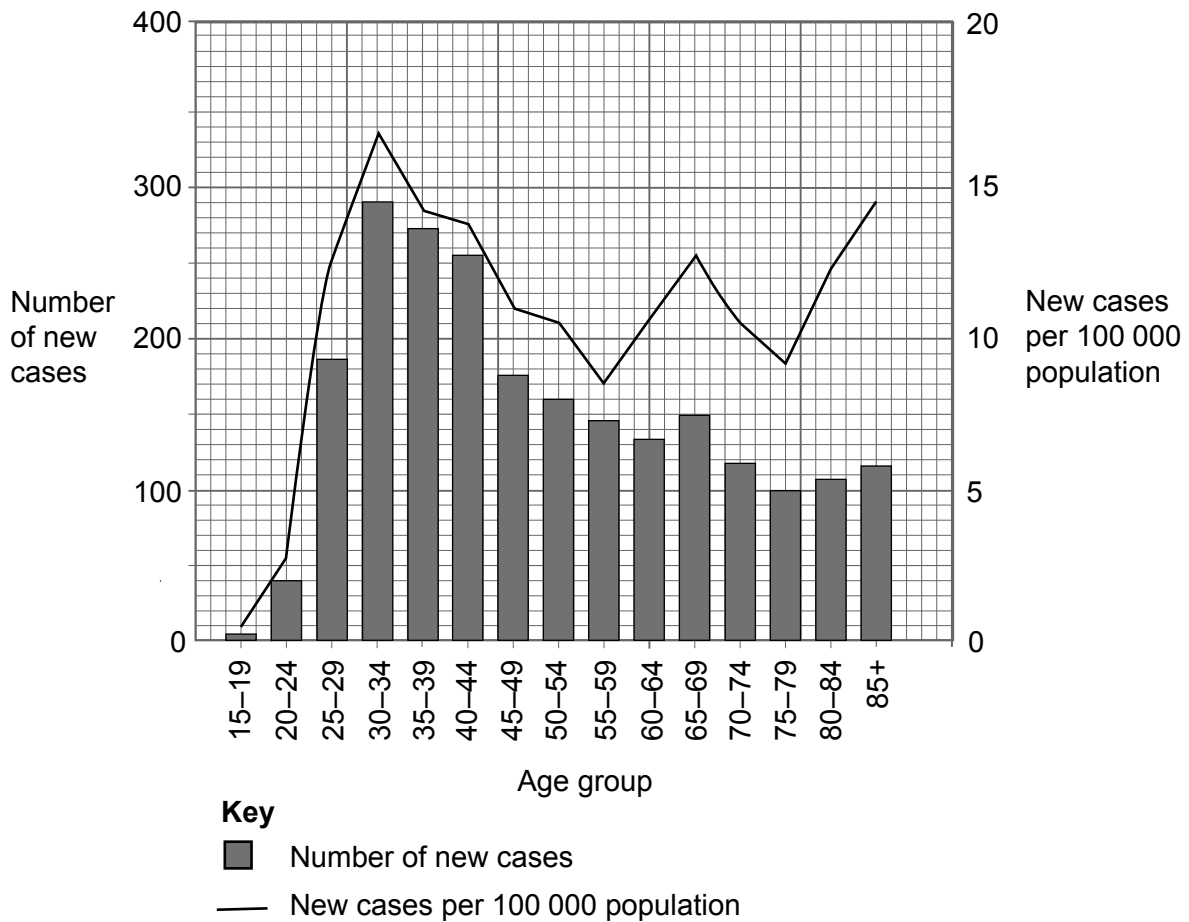
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(2 marks)

The graph shows the number of new cases of cervical cancer in England in 2005.



Source: Office for National Statistics



14 (c) (i) Describe the relationship between the number of new cases of cervical cancer and age.

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

(2 marks)

14 (c) (ii) A city has 500 000 inhabitants.
How many new cases of cervical cancer in women aged 25–29 would you expect in one year in this city?
Show clearly how you work out your answer.

.....
.....

Number of cases.....

(2 marks)

14 (c) (iii) The NHS is targeting girls aged 13 for vaccination against the HPV.
Using data from the graph, suggest an explanation for the NHS choosing this age group.

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

(2 marks)

14 (d) Many parents are uneasy about their daughters being vaccinated against the HPV.
Suggest **two** reasons why.

1

.....

2

.....

(2 marks)

END OF QUESTIONS



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