

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										



General Certificate of Secondary Education
Foundation Tier
Specimen Paper

Human Health & Physiology 44151F

Date: XXXX

F

For this paper you must have:

- a ruler

You may use 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 space provided. Answers written in margins or on blank pages will not be marked.
- 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 using good English, organising information clearly and using specialist terms where appropriate.

Advice

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

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

There are no questions printed on this page

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ANSWER IN THE SPACES PROVIDED**

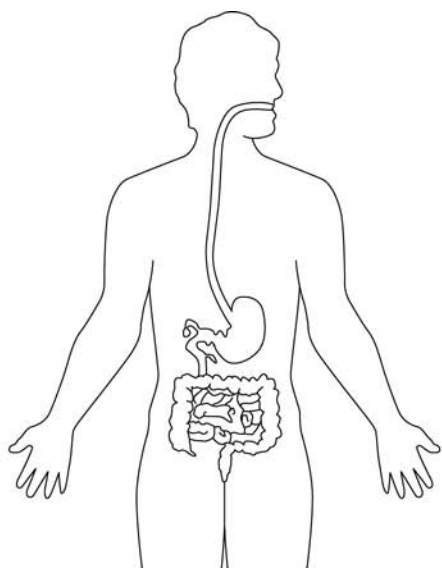


Answer **all** questions in the spaces provided.

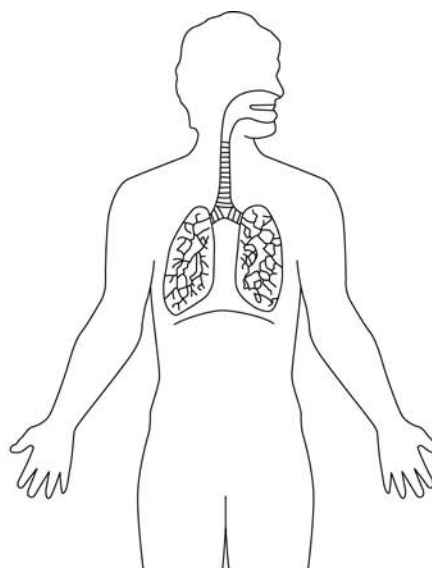
1 The drawings show four human organ systems.

On the drawings, use words from the box to name each of the organ systems.

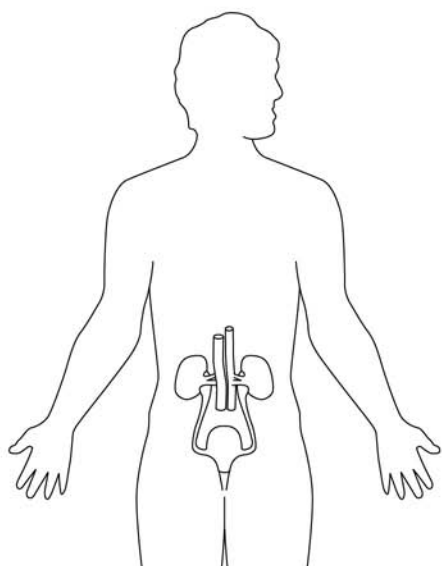
breathing circulation digestive nervous reproductive urinary



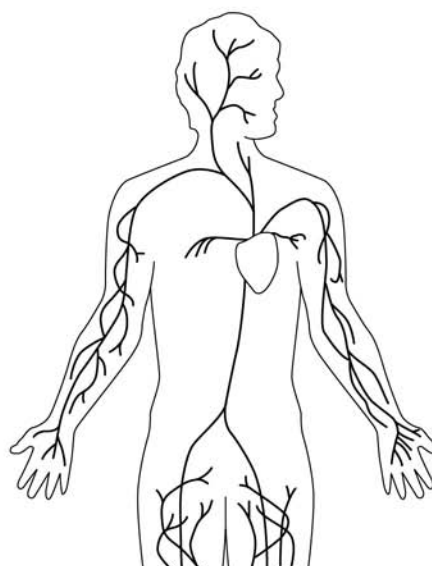
The system



The system



The system



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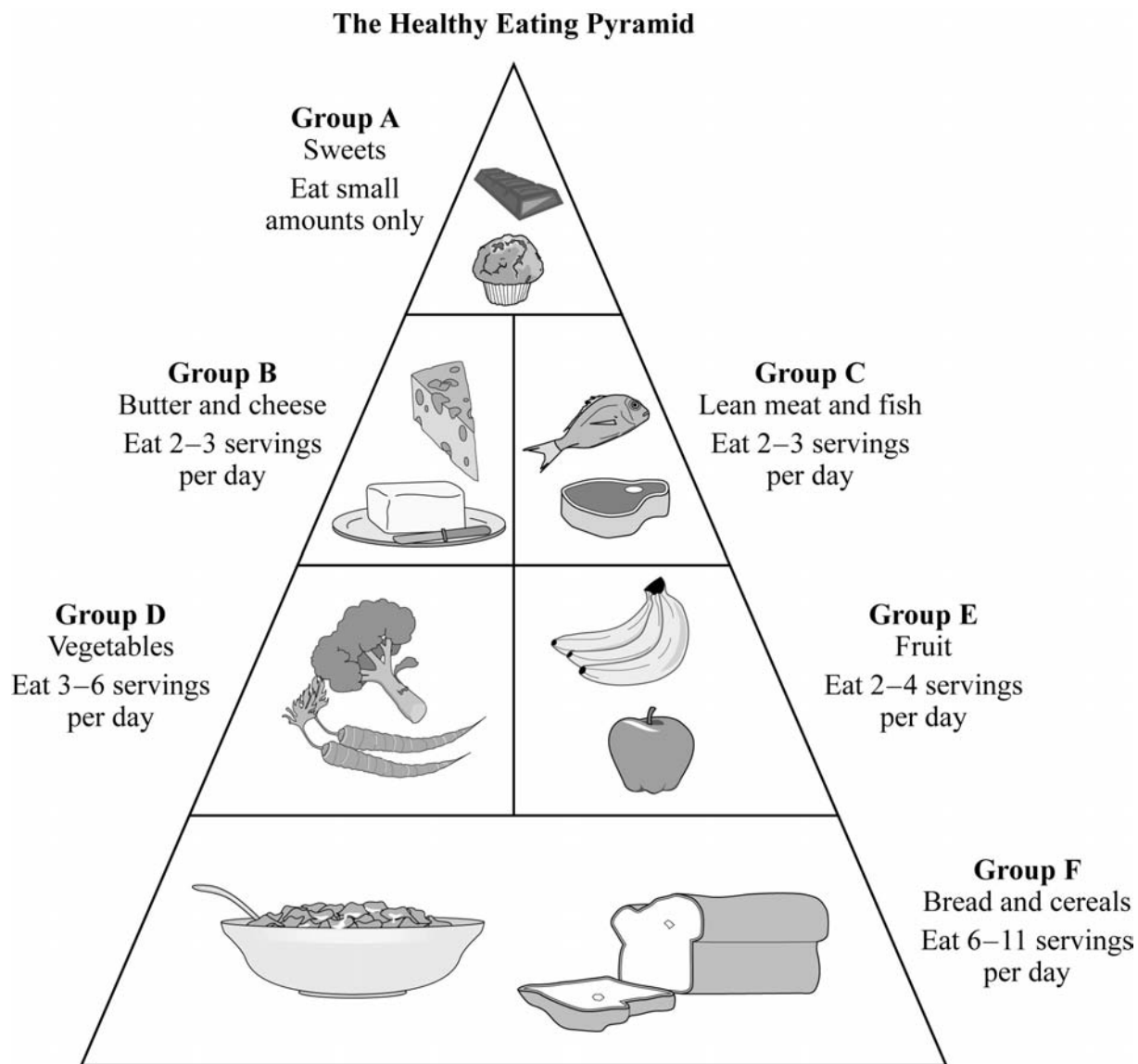
(4 marks)

4



Barcode

2 The drawing shows an extract from a leaflet about healthy eating.



2 (a) Which group **A, B, C, D, E** or **F**

2 (a) (i) is the main source of carbohydrate in this diet

Group

(1 mark)

2 (a) (ii) is the best source of protein in this diet

Group

(1 mark)

2 (a) (iii) contains foods with the highest energy content?

Group

(1 mark)

2 (b) Suggest **three** pieces of advice that a dietician might give to an overweight teenager.

In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate

.....

.....

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.....

.....

(4 marks)

7



Barcode

3 The drawing shows a decayed tooth.



3 (a) Use words from the box to describe how tooth decay is caused.

acid

bacteria

enamel

food

.....

.....

.....

.....

.....

.....

.....

(3 marks)

3 (b) The photograph shows a dental hygienist treating a child.



3 (b) The dental hygienist helps the child to have healthy teeth.

Suggest **two** ways in which he does this.

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

(2 marks)

5

4 The circulatory system has several functions.

4 (a) On the diagram, draw a straight line from each part of the blood to its function.

Name of part of blood

Function of part of blood

red cell

fights bacteria

platelet

carries starch around the body

plasma

carries dissolved urea

white cell

transports oxygen around the body

helps blood to clot

(4 marks)

Question 4 continues on the next page



Barcode

Turn over ►

- 4 (b) Medical technicians can measure the total volume of blood in your body.

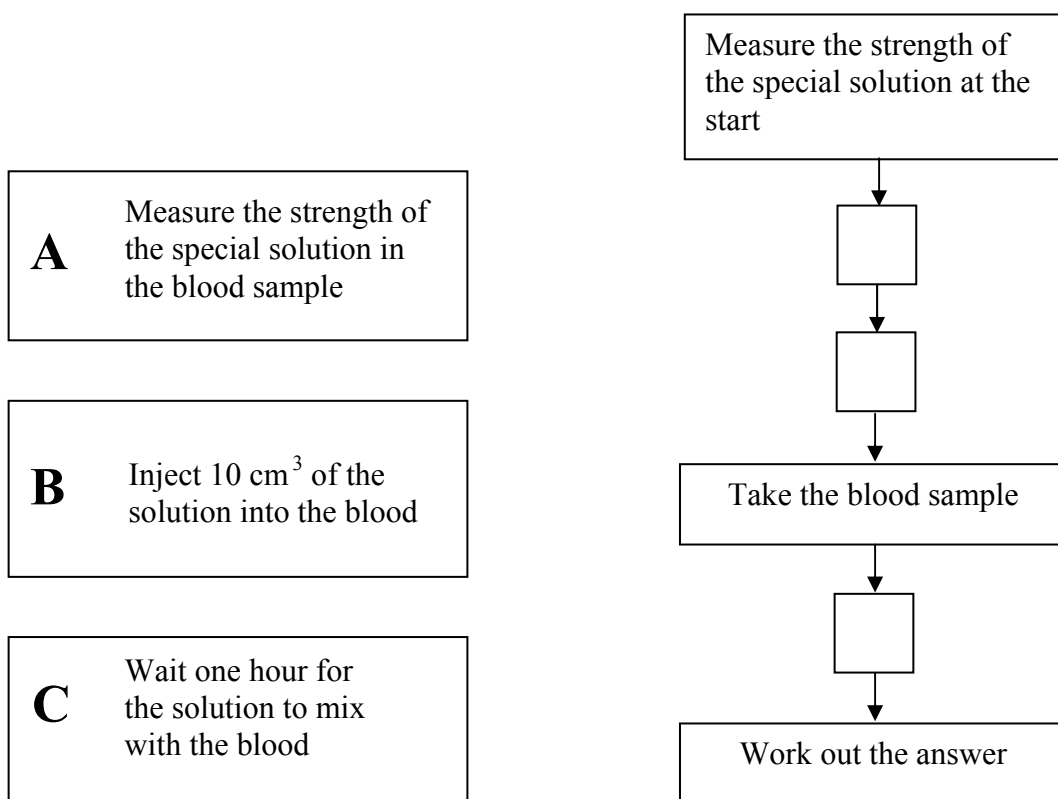


To do this the technician:

- first injects a special solution into your blood
- takes a sample of your blood one hour after the injection
- then works out how much the solution has been diluted by the blood.

- 4 (b) (i) Part of what the technician does is shown in the flow chart.
Boxes **A**, **B** and **C** describe the missing steps in the process.

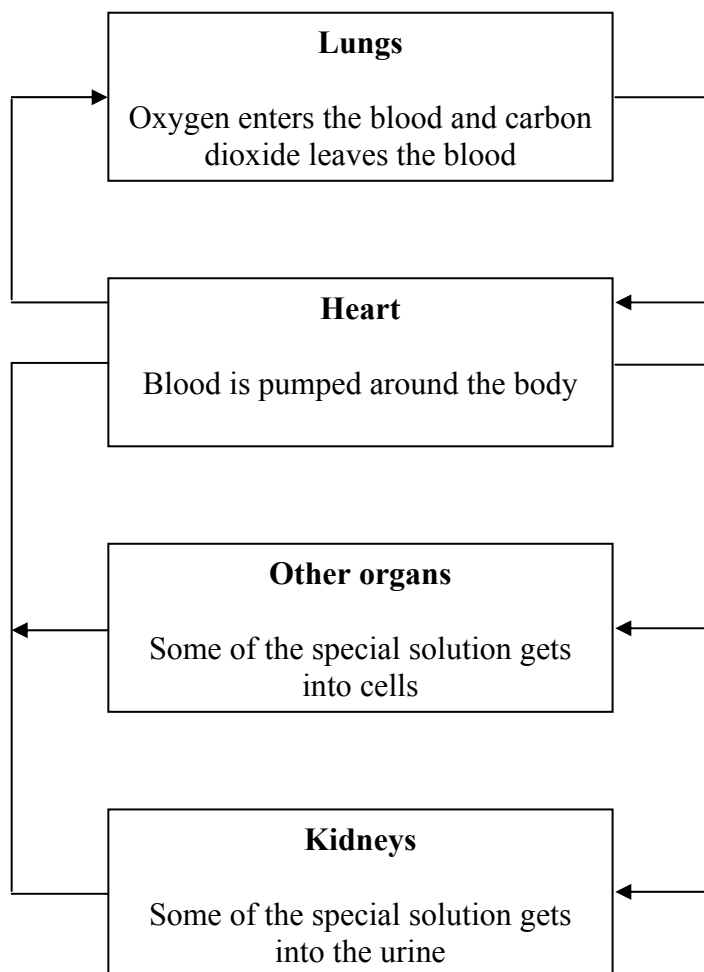
Write the letters **A**, **B** and **C** into the correct boxes to complete the flow chart.



(3 marks)



4 (b) (ii) The diagram shows the blood circulation in the human body.



Using information from the diagram, suggest **two** reasons why this method of measuring the total volume of the blood does not give exactly the right answer.

1

.....

2

.....

(2 marks)

Question 4 continues on the next page

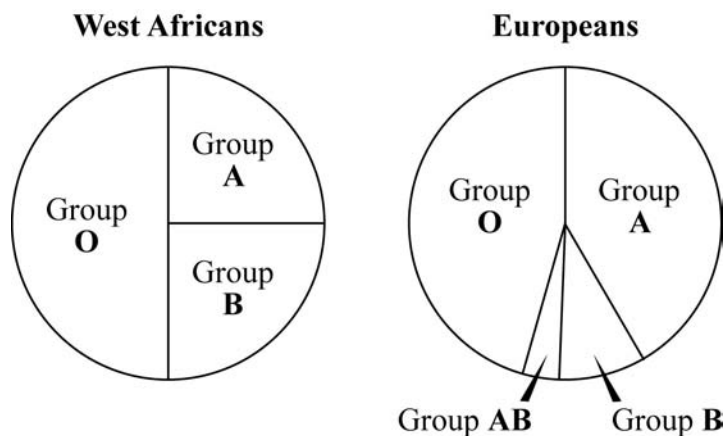


Barcode

Turn over ►

4 (c) Everyone in the world belongs to one of four blood groups: **A**; **B**; **AB** or **O**.

The pie-charts show the percentages of West Africans and Europeans in each blood group.



4 (c) (i) Give **two** differences between the distribution of blood groups in West Africans and Europeans.

1

.....

2

.....

(2 marks)

4 (c) (ii) Why is it important for a doctor to know a person's blood group before giving them a blood transfusion?

.....

.....

.....

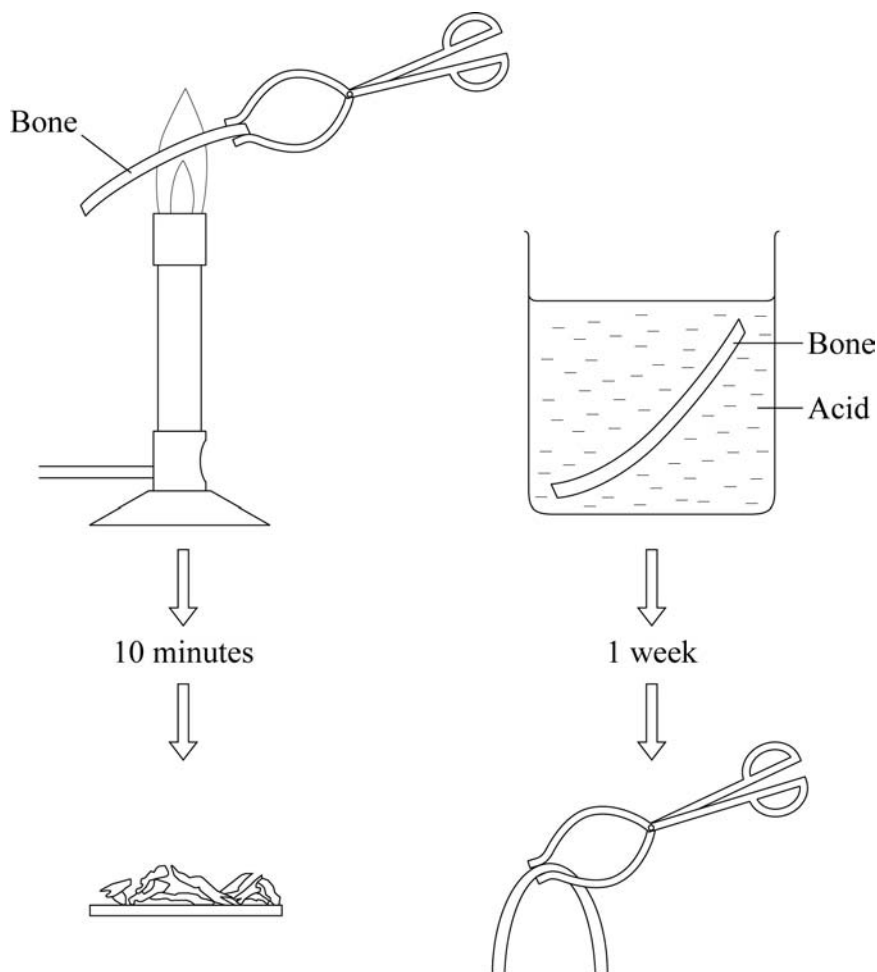
.....

(2 marks)



5 The skeleton helps to support the body.

5 (a) Pieces of bone were treated as shown in the diagrams.



5 (a) (i) After heating, the piece of bone was dropped on a tile. It broke into pieces.

Why did the heated bone become brittle?

.....

(1 mark)

5 (a) (ii) Why did the bone that was soaked in acid become soft?

.....

(1 mark)

Question 5 continues on the next page

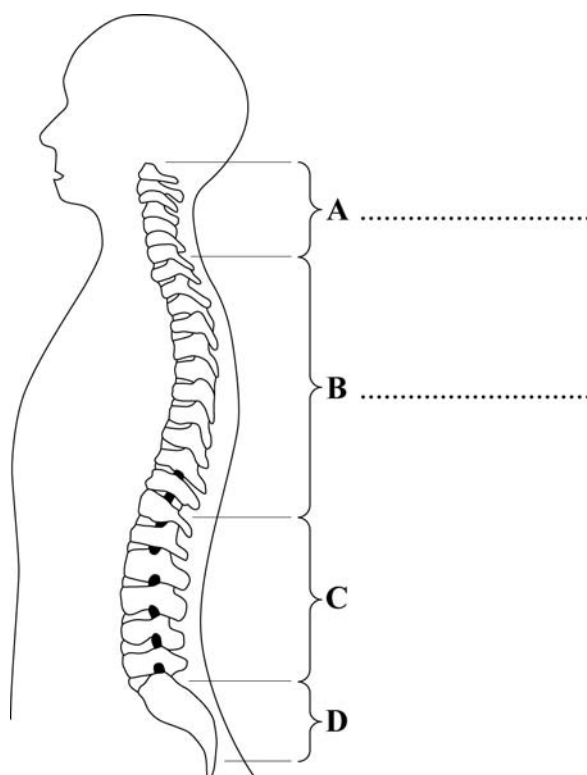


Barcode

Turn over ►

5 (b) The diagram shows the vertebral column.

The main regions are labelled **A**, **B**, **C** and **D**.



5 (b) (i) Use words from the box to label regions **A** and **B** on the diagram.

cervical lumbar sacral thoracic

(2 marks)

5 (b) (ii) The table shows some features of the regions of the vertebral column.

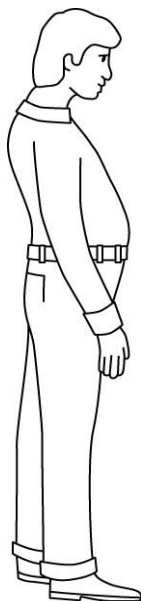
Use letters **A**, **B**, **C** or **D** from the diagram to complete the table.
One has been done for you.

Features of region	Letter
Strongest vertebrae with large processes for muscle attachment.	
Vertebrae are small and loosely attached for movement in many directions.	A
Only a little movement between vertebrae. Form attachment for ribs.	

(2 marks)



- 5 (c) The man shown in the diagram went to an osteopath complaining of back pain.



- 5 (c) The osteopath told the man that his back pain was caused by poor posture.

Suggest **two** pieces of advice that the osteopath could give to the man to improve his posture.

1.....

.....

2.....

.....

(2 marks)

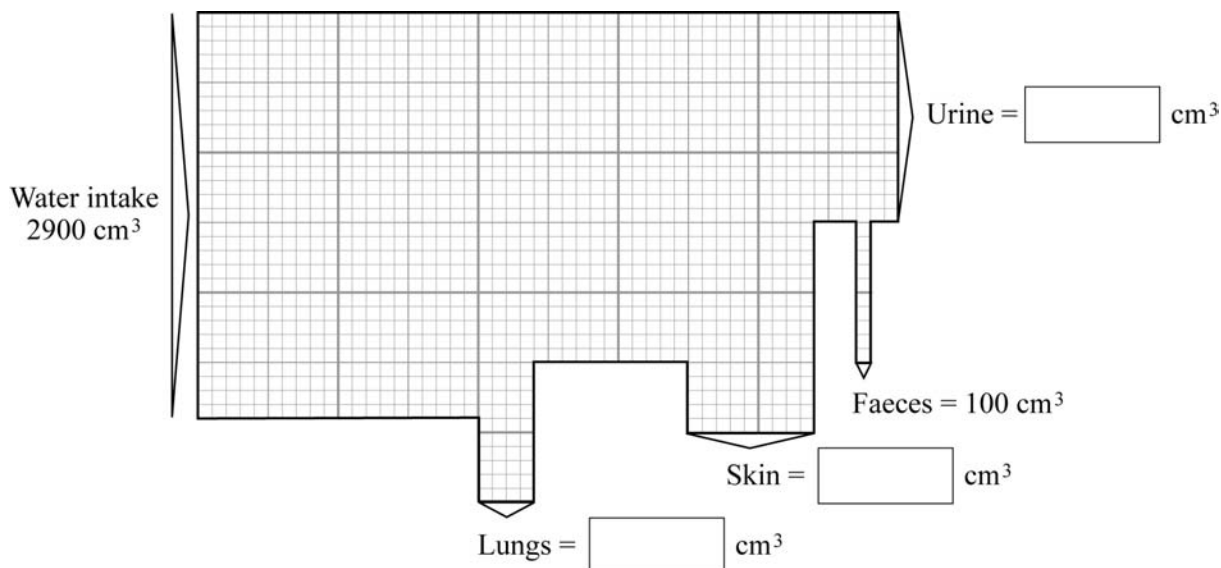
Turn over for the next question

8



6 Our kidneys control the amount of water in our bodies.

The diagram shows the amount of water lost by an adult in one day.
The width of the arrows shows how much water is lost in each way.



6 (a) Work out from the diagram the water loss for urine, skin and lungs.

Write the correct figures in the boxes on the diagram.

(3 marks)

6 (b) When it is hot, much more water is lost from the skin as sweat.

6 (b) (i) Why do we produce more sweat on a hot day?

.....

(1 mark)

6 (b) (ii) How will this extra loss of sweat affect the volume of urine produced?

.....

(1 mark)

- 6 (c) People suffering from kidney failure are treated by using dialysis (a ‘kidney machine’) or by having a kidney transplant.

The tables give information about these treatments.

Dialysis (kidney machine)
Most expensive
Need own machine or share machine in hospital
Restricted life – special diet, must return to machine
Can be used while patient waits for transplant

Kidney transplant
Very expensive but cheaper than dialysis
New kidney from relative or from donor
Independent
Transplant may be rejected

- 6 (c) Using **only** information from the table.

- 6 (c) (i) Give **two** advantages of a kidney transplant over dialysis.

1

.....

2

.....

(2 marks)

- 6 (c) (ii) Give **two** possible disadvantages of having a kidney transplant.

1

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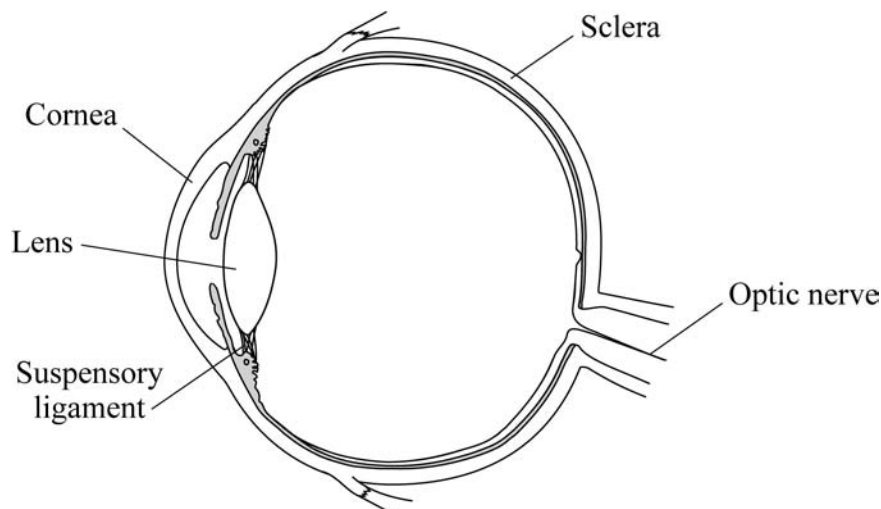
2

.....

(2 marks)



7 The diagram shows a cross section through a human eye.



7 (a) Draw a straight line from each structure to its function.

lens	holds the lens in position
optic nerve	produces a clear image on the retina
cornea	allows light to enter the eye
sclera	contains light-sensitive cells
suspensory ligament	is the tough, white outer layer of the eye
	carries information about an image to the brain

(5 marks)



7 (b) The photograph shows an optician examining a patient's eyes.



7 (b) (i) Name the blood vessels that the optician is looking at.

.....
(1 mark)

7 (b) (ii) Suggest what might happen to the patient if these tiny blood vessels began to lose a little blood.

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

7 (c) The optician put some drops onto the patient's eyes before examining her.

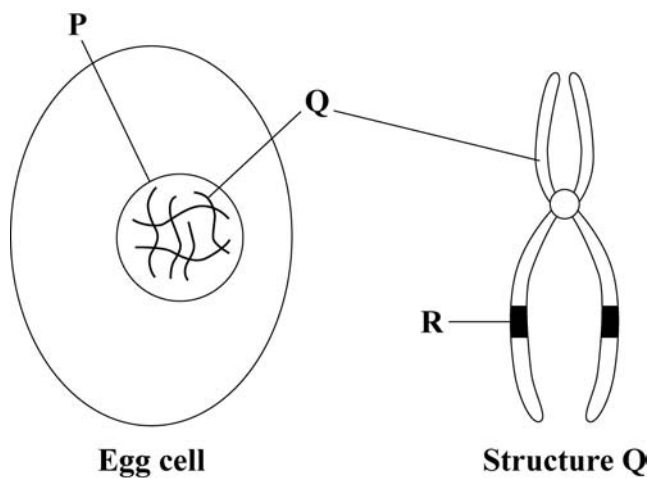
These drops make the pupil wider.

Suggest **one** reason why this was helpful to the optician.

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



8 The diagram shows some of the parts of an egg cell. There is also an enlarged view of structure Q.



8 (a) Use words from the box to name the structures labelled P, Q and R.

cell membrane chromosome cytoplasm gene nucleus

P

Q

R

(3 marks)

8 (b) Use words from the box to complete the sentences about hormones.

antibiotic	contraceptive	fertility	ovary	stomach	uterus
-------------------	----------------------	------------------	--------------	----------------	---------------

Hormones control the release of eggs from the

Hormones also control the thickness of the lining of the.....

Hormones that stimulate the release of eggs can be used as

..... drugs.

Hormones that prevent the release of eggs can be used as

..... drugs.

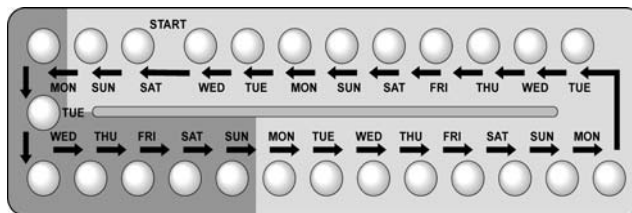
(4 marks)

Question 8 continues on the next page



Barcode

8 (c) The picture shows some birth control (contraceptive) pills for women.



These are some facts about using birth control pills:

- birth control pills are 99 per cent effective in preventing pregnancy
- the hormones in the pills have some rare but serious side effects
- this method of birth control gives no protection against sexually transmitted diseases
- the hormones in the pills give protection against some women’s diseases
- the woman has to remember to take a pill every day
- the woman’s monthly periods become more regular.

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

8 (c) (i) Give **two** advantages of using birth control pills.

1

.....

2

.....

(2 marks)

8 (c) (ii) Give **two** disadvantages of using birth control pills.

1

.....

2

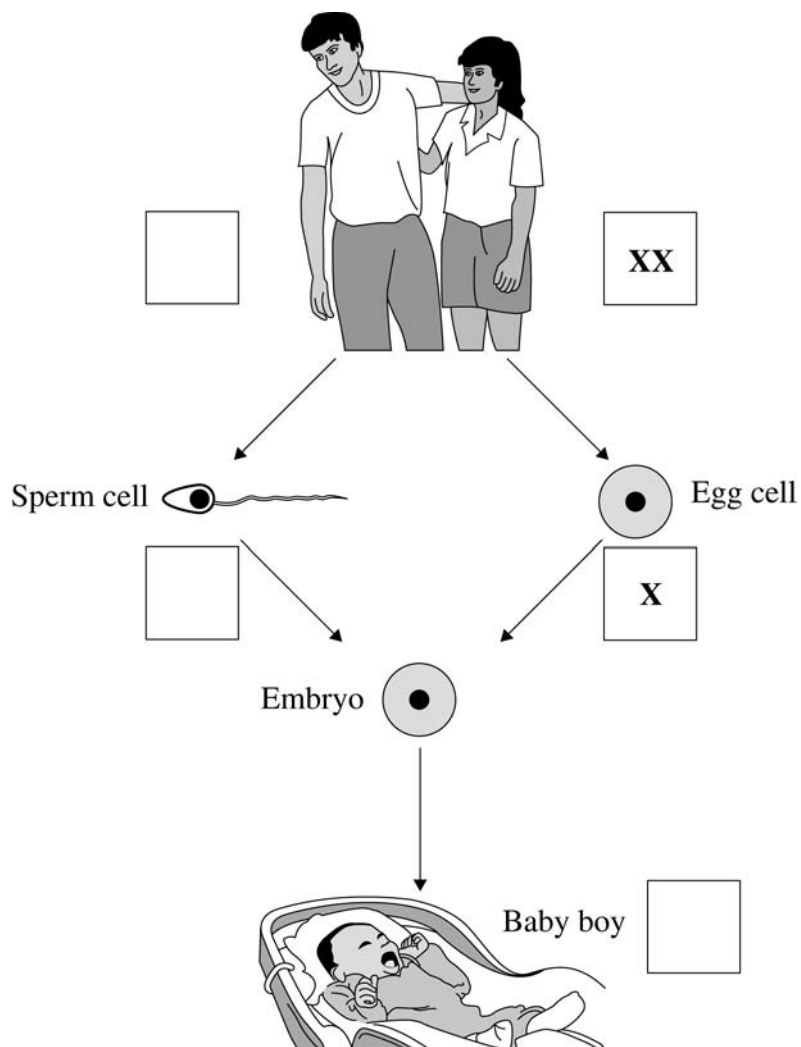
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(2 marks)



8 (d) A couple decide to have a baby.

The diagram shows how the gender of their baby is determined.



8 (d) The boxes for the woman and egg cell show the sex of the chromosomes.

On the diagram, write the sex chromosomes which should be in the **three** empty boxes.
(3 marks)

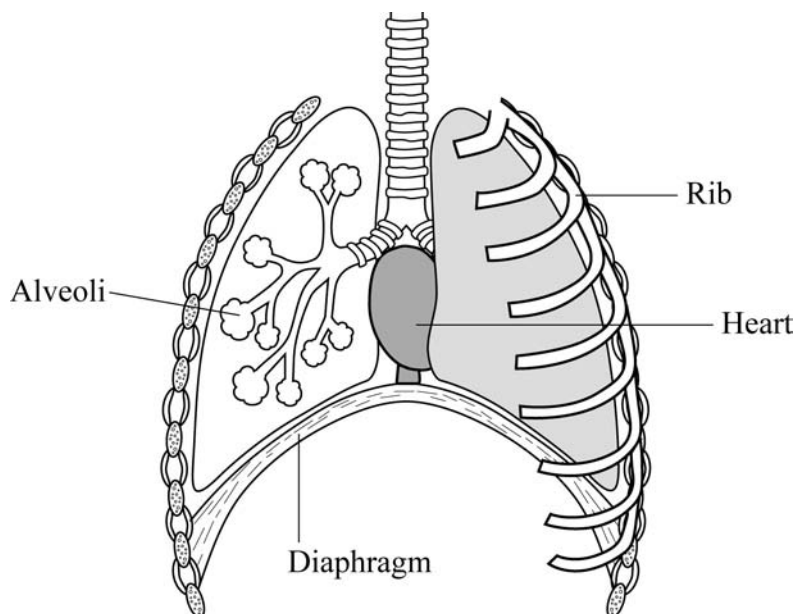
14



Barcode

Turn over ►

9 The diagram shows some structures in the thorax.



9 (a) Draw a straight line from each structure to its function.

Structure	Function
rib	pumps blood to the lungs
heart	flattens to make us breathe in
diaphragm	protects the lungs
alveoli	where CO ₂ leaves the blood

(3 marks)



- 9 (b) The lining of the breathing passages changes the air that we breathe in.

Draw a straight line from each feature of a breathing passage to the way it changes the air.

**Feature of the
breathing passage**

Mucous membrane is moist

Mucous membrane is well
supplied with blood vessels

The lining of air passage has
cilia

How the air is changed

Makes air breathed in warm

Makes air breathed in moist

Makes air breathed in clean

(2 marks)

Question 9 continues on the next page



Barcode

9 (c) The photograph shows a student undergoing a fitness test.

The apparatus measures the volume of air that he breathes and its composition.



9 (c) (i) Before starting exercise, the student breathed out through the apparatus 5 times.

The total volume of air breathed out during the five breaths was 3000 cm^3 .

Calculate the volume of one breath.

Show clearly how you work out your answer.

.....
.....

Volume of one breath..... cm^3
(2 marks)

9 (c) (ii) Complete the sentences.

The air the student breathed in would contain more.....
than the air the student breathed out.

The air the student breathed out would contain more
than the student breathed in.

(2 marks)

- 9 (c) (iii) The student then did some exercise on the apparatus for two minutes.

The volume breathed out in five breaths was again measured. This time it was 9000 cm³.

What does this tell you about the effect of exercise on breathing?

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

(1 mark)

- 9 (d) (i) Name the chemical process that releases energy when it takes place in the cells of the body.

.....

(1 mark)

- 9 (d) (ii) Name the **two** substances produced by this process.

..... and

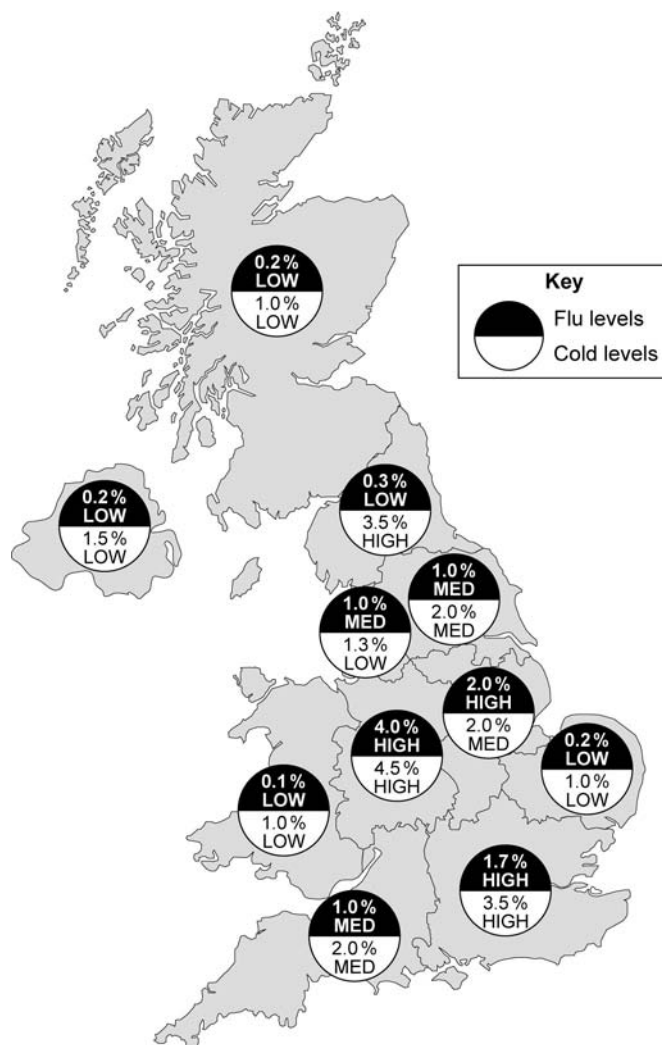
(2 marks)

Turn over for the next question



- 10** The Health Protection Agency (HPA) collects information to identify outbreaks of infectious diseases.

The drawing shows the percentage of people who were affected by colds and flu in different parts of the UK in November 2007.



10 (a) What was the highest percentage of people suffering from colds?

.....%
(1 mark)

10 (b) (i) Suggest how the HPA collected the data shown on the map.

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

10 (b) (ii) The highest percentages of people with colds or flu were found in cities.

Suggest and explain a reason for this.

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

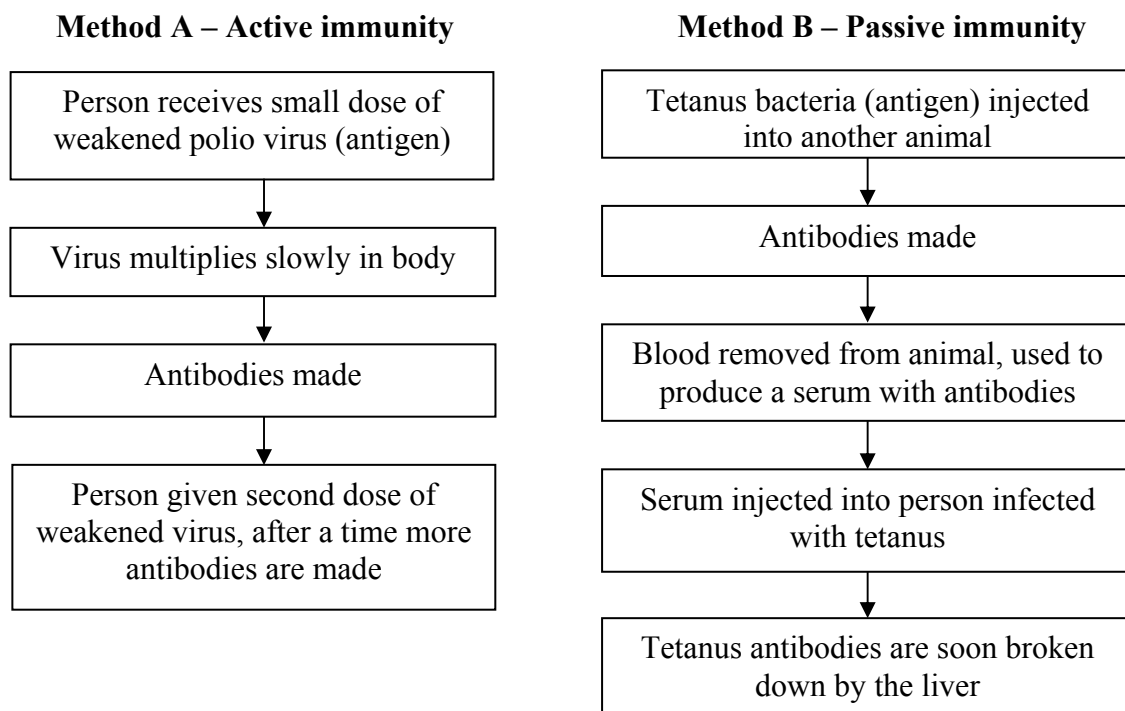
Question 10 continues on the next page



Barcode

Turn over ►

- 10 (c)** The diagram shows two methods which are used to give humans protection against infectious disease.
Method A can be used against polio. **Method B** is often used against tetanus.



- 10 (c) (i)** Name the substances produced by the body which destroy harmful viruses and bacteria.

.....
(1 mark)

- 10 (c) (ii)** Explain why **Method A** gives long lasting protection against polio.
In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.

.....

(4 marks)



10 (c) (iii) Why does **Method B** not give long lasting protection against tetanus?

.....
.....

(1 mark)

10 (c) (iv) In immunisation against polio a second dose of the weakened virus is given, this is known as a booster.

Suggest why this booster is necessary.

.....
.....

(1 mark)

10 (c) (v) **Method A** would **not** be helpful for a person who had just been infected with tetanus bacteria.

Explain the reason for this.

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

(2 marks)

10 (c) (vi) Why is **Method B** very good for dealing quickly with an infection of tetanus?

.....
.....

(1 mark)

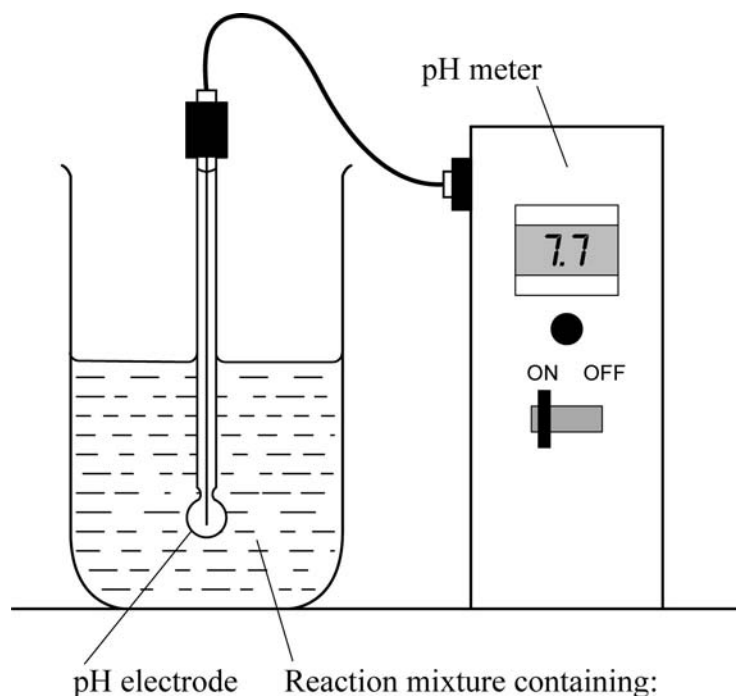


- 11** The diagram shows the apparatus used to investigate the digestion of milk fat by an enzyme. The reaction mixture contained milk, sodium carbonate solution (an alkali) and the enzyme. The pH meter was attached to a data recorder.

In Experiment 1, bile was also added.

In Experiment 2, an equal volume of water replaced the bile.

In each experiment, the pH was recorded at 2-minute intervals.



Experiment 1

10 cm³ milk (contains fat)
2 cm³ sodium carbonate solution
1 cm³ bile
1 cm³ enzyme

Experiment 2

10 cm³ milk (contains fat)
2 cm³ sodium carbonate solution
1 cm³ water
1 cm³ enzyme

- 11** (a) (i) Name the dependent variable in this investigation.

.....
(1 mark)

- 11** (a) (ii) Name **two** control variables in this investigation.

1

2

(2 marks)



The results of the two experiments are given in the table.

Time in minutes	pH	
	Experiment 1: with bile	Experiment 2: no bile
0	9.0	9.0
2	8.8	9.0
4	8.7	9.0
6	8.1	8.8
8	7.7	8.6
10	7.6	8.2

- 11 (b) Milk fat is a type of lipid.

Name the enzyme which catalyses the breakdown of lipids.

.....
(1 mark)

- 11 (c) What was produced in each experiment to cause the fall in pH?

.....
(1 mark)

- 11 (d) (i) For **Experiment 1**, calculate the average rate of fall in pH per minute, between 4 minutes and 8 minutes.

Show clearly how you work out your answer.

.....
.....

.....pH units per minute
(2 marks)

Question 11 continues on the next page



Barcode

11 (d) (ii) Why was the fall in pH faster when bile was present?

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

11 (e) Suggest **two** reasons why it is better to use a pH meter attached to a data recorder rather than pH paper in this investigation.

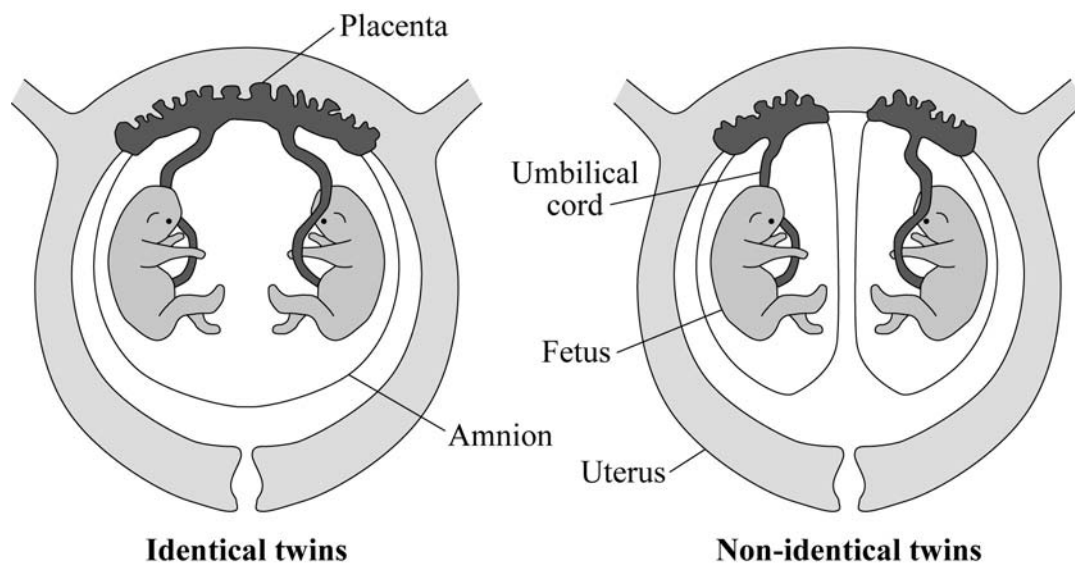
1.....
.....
2.....
.....
(2 marks)

10



12 A fetus develops in its mother's uterus.

12 (a) The diagrams show identical and non identical twins developing in the uterus.



Using the information in the diagrams, give **two** ways in which the development of non-identical twins is different from that of identical twins.

1.....

 2.....

(2 marks)

Question 12 continues on the next page



Barcode

Turn over ►

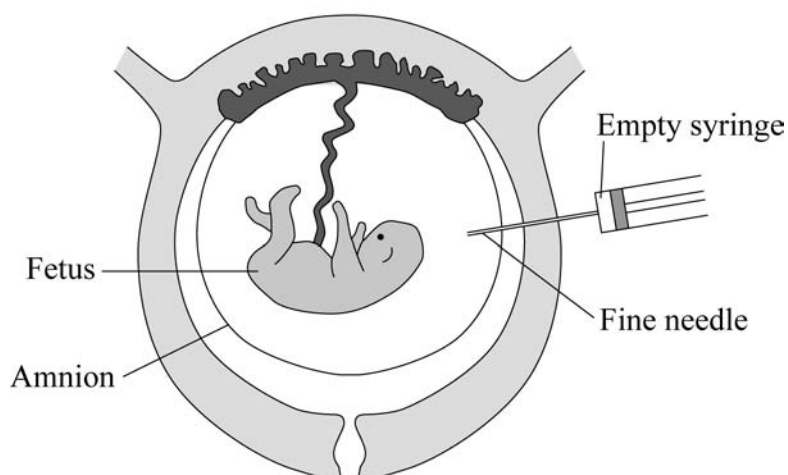
- 12 (b)** To identify certain medical conditions, cells of the fetus may be examined before birth.

The photograph shows an obstetrician obtaining fetal cells.



The diagram shows how the fetal cells are obtained.

It is important that the obstetrician does not allow the syringe needle to touch the fetus.



- 12 (b) (i)** Suggest how this method allows the obstetrician to obtain cells of the fetus.

.....

.....

(1 mark)



12 (b) (ii) Suggest arguments for and against the screening of a fetus for a medical condition.

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(4 marks)

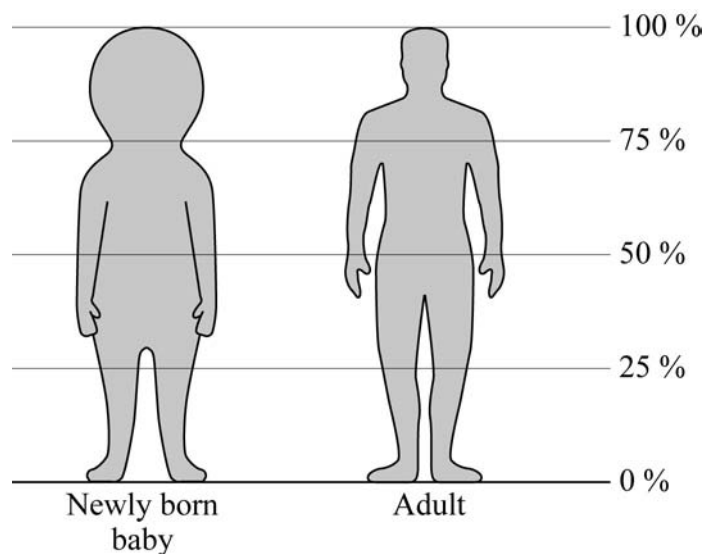
7



Barcode

Turn over ►

13 The diagram shows the relative sizes of different parts of the body of a newly born baby and of an adult.



13 (a) In the newly born baby, about what proportion of the body consists of the head?

.....
(1 mark)

13 (b) In the adult, about what proportion of the body consists of the head?

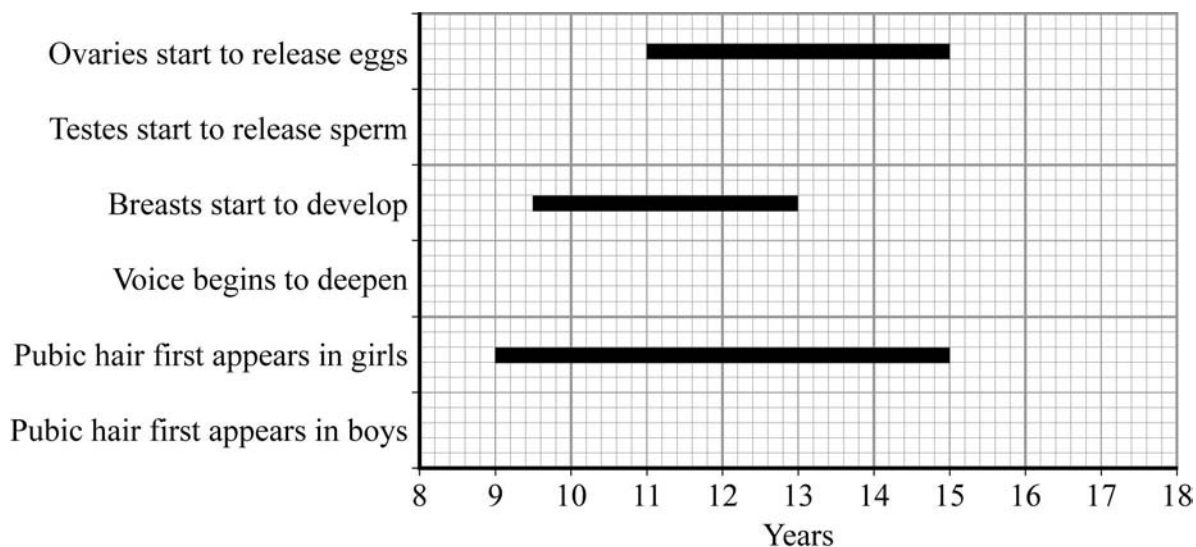
.....
(1 mark)

13 (c) What happens to the relative rate of growth of the head and of the legs as a person grows up?

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

- 13 (d) The changes that occur in adolescence were studied in a group of girls and in a group of boys.

The chart shows the age when some of these changes take place in girls.



The table gives information on the age when some changes take place in boys.

	Earliest age (years)	Latest age (years)
Testes start to produce sperm	12	16.5
Voice begins to deepen	14	17.6
Pubic hair first appears	11	15

- 13 (d) (i) Add the information given in the table to the chart. (3 marks)

- 13 (d) (ii) Use the data to give **one** general conclusion about the different timing of puberty in boys and girls.

.....

(1 mark)

END OF QUESTIONS



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