Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
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12	
TOTAL	

General Certificate of Secondary Education
Foundation Tier
June 2014

Human Health and Physiology 44151F

Unit 1 Topics in Human Health and Physiology

F

Monday 23 June 2014 1.30 pm to 3.30 pm

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

Time allowed
- 2 hours

Instructions
A
- 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 maximum mark for this paper is 120.
- The marks for questions are shown in brackets.
- 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.

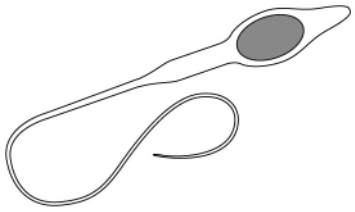
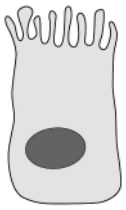
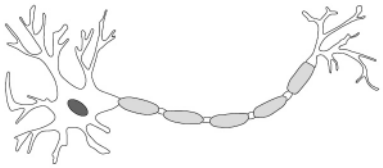
Advice
- In all calculations, show clearly how you work out your answer.

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

1 The human body is made of cells. The cells are parts of the organ systems in the body.

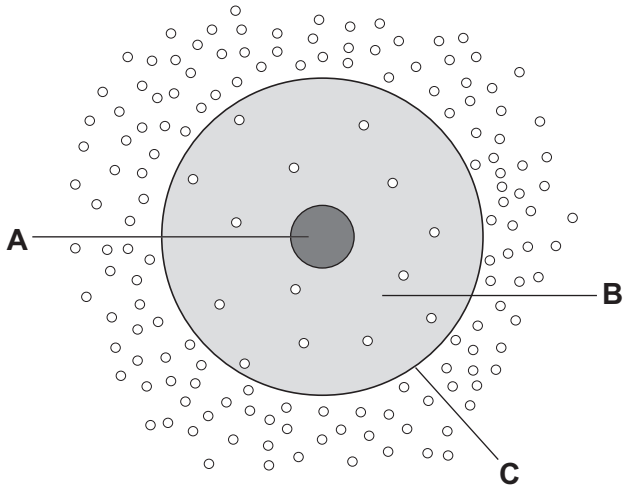
1 (a) Draw **one** line from each type of cell to its organ system.

[3 marks]

Type of cell	**Organ system**
 Sperm cell	Circulatory
 Cell in lining of small intestine	Digestive
 Cell in spinal cord	Nervous
	Reproductive

1 (b) **Figure 1** shows a cell. Substance **P** is found in the cell and in the fluid surrounding the cell.

Figure 1



Key

○ = Molecule of substance **P**

1 (b) (i) Name the parts of the cell labelled **A** and **B**.

[2 marks]

A .....

B .....

1 (b) (ii) Which part of the cell, **A**, **B** or **C**, controls the movement of substances into and out of the cell?

[1 mark]

1 (b) (iii) Substance **P** will diffuse **into** the cell.

Give a reason for this direction of movement.

[1 mark]

.....

.....

.....

1 (b) (iv) Name **one** substance that will diffuse into most body cells from the blood.

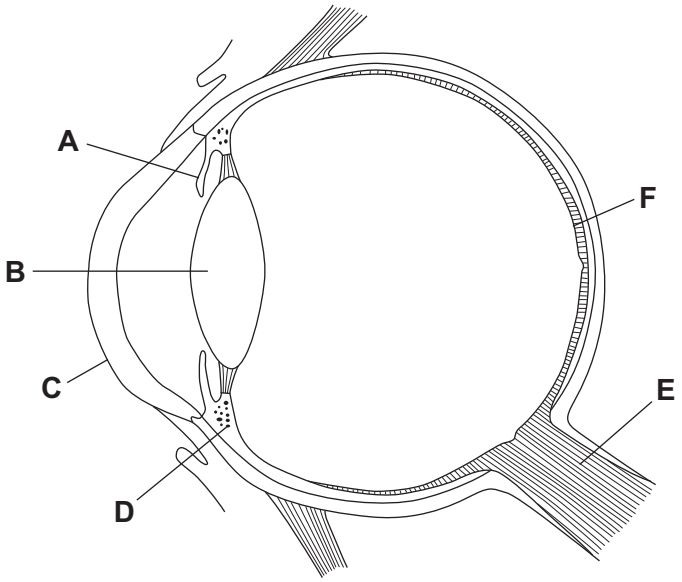
[1 mark]

.....

8

2 **Figure 2** shows a section through the human eye.

Figure 2



2 (a) Which letter on **Figure 2** shows each of the following parts of the eye?

2 (a) (i) Optic nerve ☐

[1 mark]

2 (a) (ii) Retina ☐

[1 mark]

2 (a) (iii) Iris ☐

[1 mark]

2 (a) (iv) Lens ☐

[1 mark]

2 (b) **Figure 3** shows how the eye changes when a bright light is shone into it.

Figure 3

2 (b) (i) Name the part of the eye that gets smaller in bright light.

[1 mark]

.....

2 (b) (ii) This change in the eye is an involuntary action.

Name this type of involuntary action.

[1 mark]

.....

2 (b) (iii) This involuntary action is an advantage to a person in a workplace with bright lights.

Explain why.

[2 marks]

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8

3 The menstrual cycle occurs in human females.

3 (a) (i) What is the average number of days of **one** complete menstrual cycle?

[1 mark]

.....

3 (a) (ii) On approximately which day of the average cycle does ovulation occur?

[1 mark]

.....

3 (b) Contraception can be used to prevent pregnancy. There are many different methods of contraception available in the UK.
Some methods are more reliable than others.

Table 1 shows the failure rates of four different methods of contraception.

Table 1

Method of contraception	**Number of failures per 100 women per year**
Combined pill	0.25
Condom	8.50
Implanon (a small device implanted under the skin)	0.10
Mirena coil	0.09

3 (b) (i) Which method of contraception has the lowest failure rate?

[1 mark]

.....

3 (b) (ii) A thousand women used Implanon for 1 year.

How many of these women would become pregnant?

Use information from **Table 1**.

[2 marks]

.....

.....

Number of women becoming pregnant = ...

3 (b) (iii) Some methods of contraception given in **Table 1** use special chemicals which prevent ovulation.

Name the chemicals that prevent ovulation.

Draw a ring around the correct answer.

[1 mark]

amino acids **enzymes** **hormones**

3 (c) A man can have a surgical operation in which a doctor cuts out a short length of each vas deferens (sperm duct). This operation is called a vasectomy. This operation can act as a method of contraception.

Explain how.

[2 marks]

.....

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8

Turn over for the next question

4 Some microorganisms cause infectious diseases.
Influenza (flu) is an example of a disease caused by a microorganism.

4 (a) Draw a ring around the correct answer to each question.

4 (a) (i) What are the microorganisms that cause infectious diseases called?

[1 mark]

pathogens **toxins** **vectors**

4 (a) (ii) Which type of microorganism causes flu?

[1 mark]

bacterium **fungus** **virus**

4 (a) (iii) How is flu spread?

[1 mark]

by droplet infection **by food and water** **by sexual contact**

4 (b) Common symptoms of flu are a runny nose and sneezing.

The Department of Health has launched a campaign called 'Catch it. Bin it. Kill it.' This campaign encourages the public to use paper tissues when they cough or sneeze.

Figure 4 shows part of a poster issued by the Department of Health.

Figure 4

Suggest how the Department of Health campaign 'Catch it. Bin it. Kill it.' will reduce the spread of the flu infection.

[3 marks]

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Question 4 continues on the next page

4 (c) Older people are advised to be vaccinated against flu.

Draw a ring around the correct answer to each question.

4 (c) (i) Which body system responds when a vaccine is given?

[1 mark]

endocrine **immune** **nervous**

4 (c) (ii) What does the body produce in response to the vaccine?

[1 mark]

antibodies **antigens** **hormones**

4 (c) (iii) What is this type of response called?

[1 mark]

artificial **natural** **passive**

9

5 Blood contains cells in a liquid.

5 (a) (i) Name the liquid part of the blood.

Draw a ring around the correct answer.

[1 mark]

bile **plasma** **synovial fluid**

5 (a) (ii) Name **two** types of blood cell.

[2 marks]

1 .....

2 .....

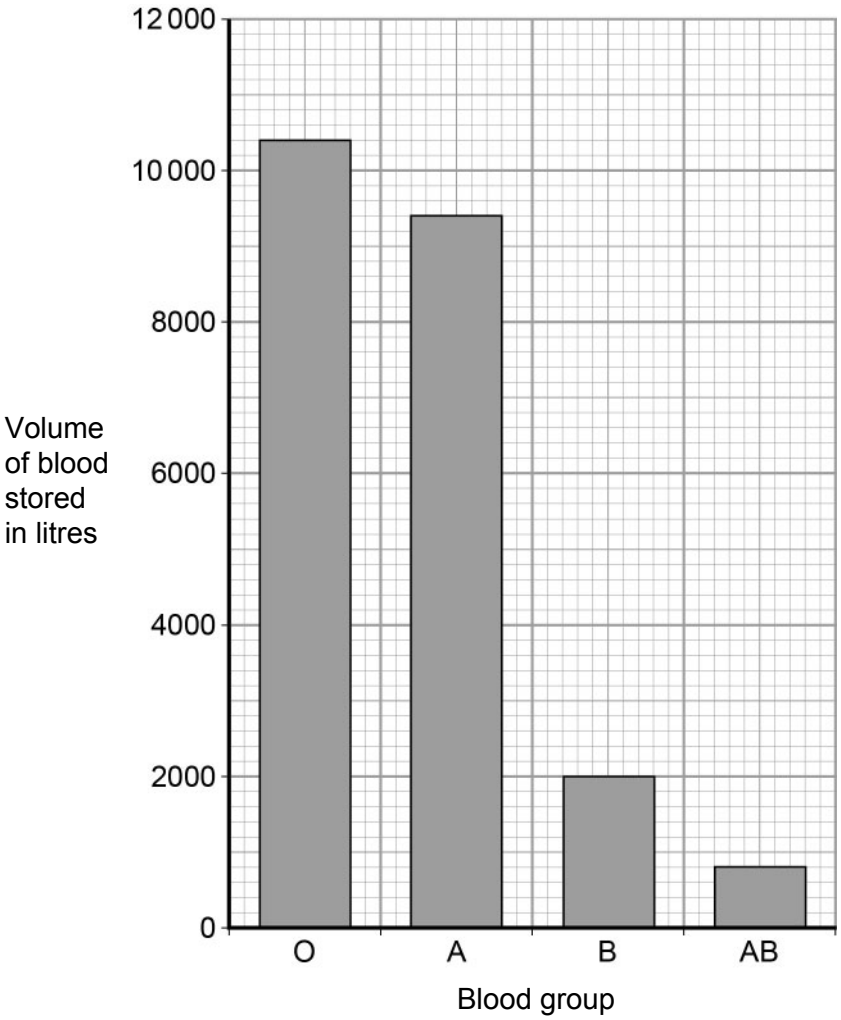
Question 5 continues on the next page

5 (b) The National Blood Service of England and Wales collects and tests blood. The blood can then be used in hospitals when needed.

There are four main blood groups, **O**, **A**, **B** and **AB**.

Figure 5 shows how much blood of each group was stored in January 2013.

Figure 5



5 (b) (i) What volume of group **O** blood was stored?

[1 mark]

.....litres

5 (b) (ii) There was much more group **O** blood stored than group **AB** blood.

How much more?

[2 marks]

.....

.....

.....litres

5 (b) (iii) There is more group **O** blood stored than any other group.

Suggest **one** reason for this.

[1 mark]

.....

.....

.....

5 (c) Scientists working in the National Blood Service test the blood to find out its blood group.

Give **one other** reason why blood and blood products are tested by the National Blood Service. Explain your answer.

[2 marks]

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.....

9

6 Genes control inheritance.

6 (a) Draw **one** line from each term used in genetics to its correct meaning.

[4 marks]

Term used in genetics	Meaning
Chromosome	A strand of genetic material
Genotype	Which alleles a person has for a characteristic
Heterozygous	When a person has two different alleles of one gene
Recessive	A characteristic caused by an allele
	An allele which causes a characteristic only if a person has two copies of the allele

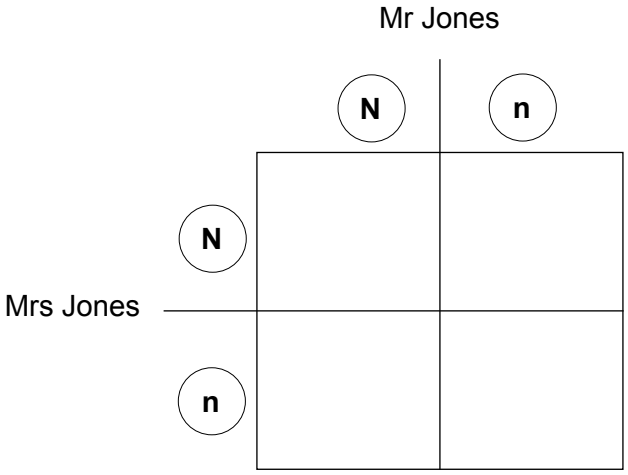
6 (b) Cystic fibrosis (CF) is an inherited disorder caused by a recessive allele, **n**.

Mr and Mrs Jones do **not** have CF.
They have two children, Gemma and Megan.
Gemma has CF. Megan does **not** have CF.

6 (b) (i) Complete the genetic diagram to show how Mr and Mrs Jones can have some children with CF and some children without CF.

Use the following symbols: **N** = allele for **not** having CF
n = allele for having CF

[3 marks]



6 (b) (ii) **On the diagram**, draw a ring around Gemma's alleles.

[1 mark]

6 (c) Mrs Jones is pregnant with a third child.
She asks a health professional what the chance is that this child will have CF.

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

6 (c) (i) Mrs Jones would ask a health professional called a

chiropractor.
genetic counsellor.
physiotherapist.

[1 mark]

6 (c) (ii) The health professional would advise Mrs Jones that the chance of her unborn child having CF is

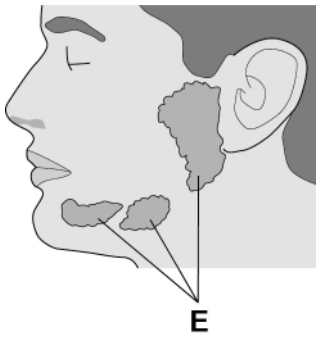
1 in 4.
2 in 4.
3 in 4.

[1 mark]

10

7 **Figure 6** shows the positions of some structures in a man's head.

Figure 6



7 (a) The structures labelled **E** release saliva into the mouth.

7 (a) (i) Name the structures labelled **E**.

[1 mark]

.....

Saliva starts the digestion of food in the mouth.

In parts **(a)(ii)** and **(a)(iii)**, draw a ring around the correct answer to complete each sentence.

7 (a) (ii) Saliva contains an enzyme called

carbohydrase.

lipase.

protease.

[1 mark]

7 (a) (iii) The enzyme in saliva starts the breakdown of

fat

protein

starch

into sugars.

[1 mark]

7 (a) (iv) Give **one other** function of saliva.

[1 mark]

.....

.....

.....

7 (b) A student investigated the effect of pH on tooth decay.

The student:

- added a range of liquids with different pH to test tubes containing healthy teeth
- left the test tubes for 14 days
- recorded the percentage loss of tooth enamel.

Table 2 shows the student's results.

Table 2

Liquid	pH of liquid	Percentage (%) loss of enamel
Water	7	0
Black coffee	6	5
Lemonade	3	45
Vinegar	2	90

7 (b) (i) Which liquid caused the highest percentage loss of enamel?

[1 mark]

.....

7 (b) (ii) What conclusion can the student make about the effect of pH on tooth decay?

[1 mark]

.....

.....

.....

Question 7 continues on the next page

7 (c) (i) Name a type of health professional who can advise people on tooth care.

[1 mark]

.....

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

A health professional gave advice about tooth care. He said:

- brush your teeth after every meal using a toothpaste containing fluoride
- have your teeth checked every 6 months by a health professional
- do not eat sugary snacks between meals
- eat food rich in calcium and vitamin D, such as milk, cheese and eggs.

How will following this advice help a person to prevent tooth decay?

[5 marks]

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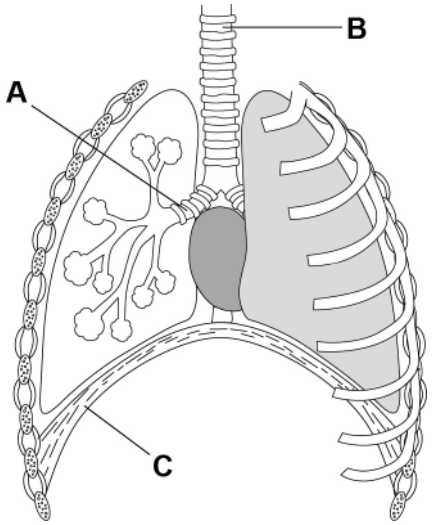
12

8 **Figure 7** shows the breathing system.

Figure 7



8 (a) Use words from the box to name structures **A**, **B** and **C**.

[3 marks]

alveoli	**bronchus**	**diaphragm**	**trachea**

A .....

B .....

C .....

8 (b) The lungs are a main excretory organ.

Name the gas that the lungs excrete.

[1 mark]

.....

Question 8 continues on the next page

8 (c) When air enters the breathing system it is cleaned before passing to the lungs.

Describe how the air is cleaned.

[2 marks]

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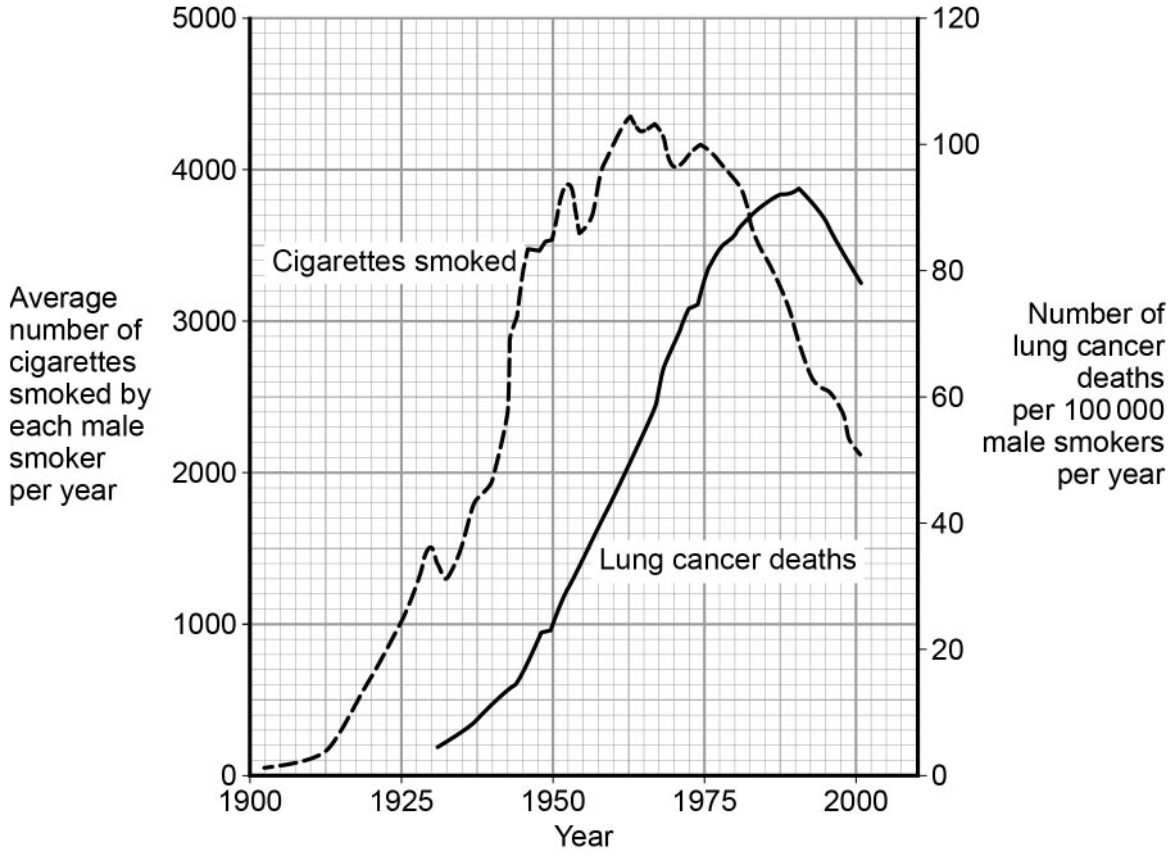
.....

8 (d) **Figure 8** shows the pattern of cigarette smoking and of lung cancer deaths for male smokers in the USA during the 20th century.

Figure 8



8 (d) (i) Give evidence from **Figure 8** that cigarette smoking may cause lung cancer.

[1 mark]

.....

.....

.....

8 (d) (ii) Scientists concluded that a person may smoke cigarettes for 15–25 years before dying from lung cancer.

Give evidence from **Figure 8** for this conclusion.

[1 mark]

.....

.....

.....

8 (d) (iii) Between 1960 and 2000 the average number of cigarettes smoked decreased.

Suggest **two** reasons why.

[2 marks]

1 .....

.....

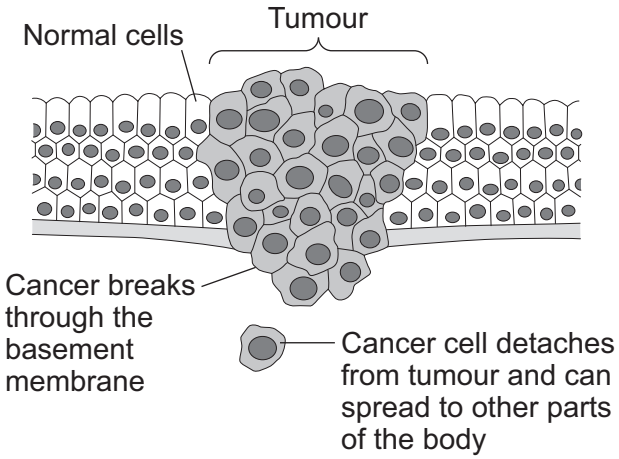
2 .....

.....

Question 8 continues on the next page

8 (e) **Figure 9** shows a cancer in the wall of an airway in the lung.

Figure 9



8 (e) (i) Give **two** characteristics of cancer cells.

Use information from **Figure 9** and your own knowledge.

[2 marks]

1 .....

2 .....

8 (e) (ii) Draw a ring around the correct answer to complete each sentence.

A normal cell may change into a cancer cell because cigarette

smoke causes a change in the

cell membrane.

DNA.

enzymes.

This change in the cell is called a

filtration.

mutation.

secretion.

[2 marks]

8 (f) **Table 3** describes three different methods of treating lung cancer.

Table 3

Method	Description
Surgery	The patient is given a general anaesthetic. A surgeon removes the part of the lung that contains the tumour.
Radiotherapy	The patient is given a local anaesthetic. The doctor passes a small piece of radioactive metal down a tube into the lung. The radioactive metal is left next to the tumour for a few minutes and is then taken out of the lung.
Chemotherapy	Drugs that are toxic to cancer cells are either injected into the blood or are taken as tablets.

Suggest **one** problem that might occur with each of these methods of treatment.

[3 marks]

Surgery .....

.....

Radiotherapy .....

.....

Chemotherapy .....

.....

17

Turn over for the next question

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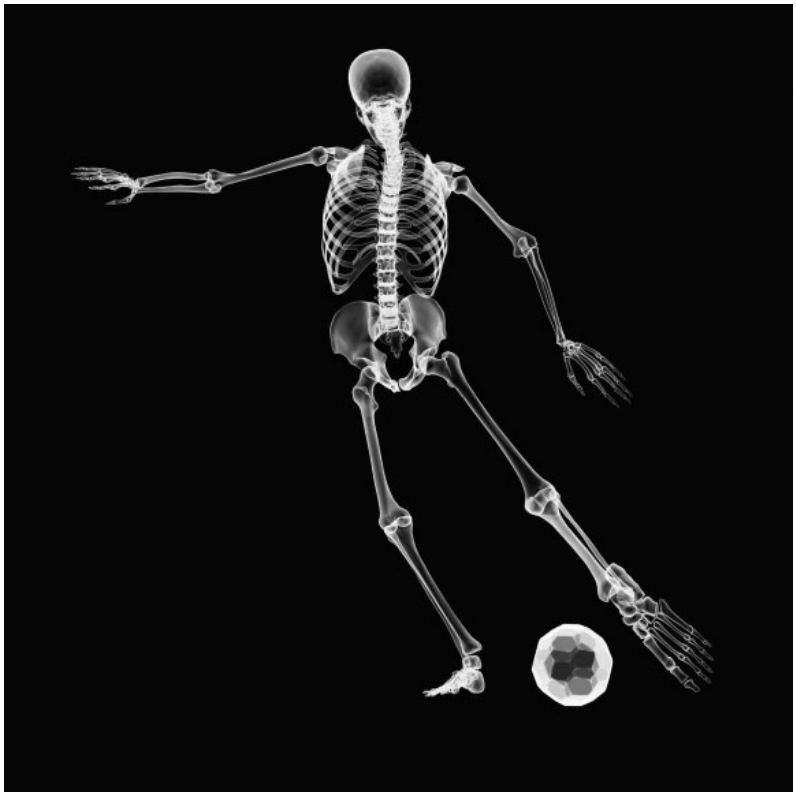
ANSWER IN THE SPACES PROVIDED

9 **Figure 10** shows the skeleton of a boy playing football.

Figure 10



9 (a) Give **two** important functions of the skeleton which help the boy to play football.

[2 marks]

1 .....

2 .....

9 (b) A number of physical injuries can occur to the bones, muscles and tendons when a person plays sport.

Give **two** examples of these injuries.

[2 marks]

1 .....

2 .....

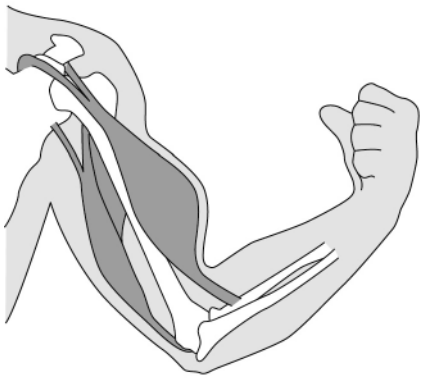
Question 9 continues on the next page

9 (c) Muscles are attached to bones of the skeleton. The muscles are arranged in antagonistic pairs.

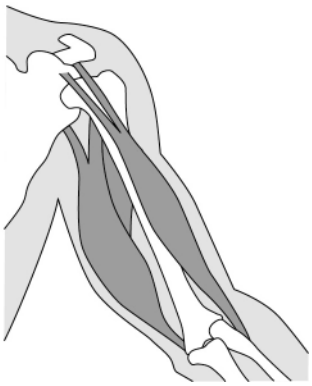
Figure 11 shows the muscles that cause movement at the elbow.

Figure 11

Biceps contracted, triceps relaxed



Triceps contracted, biceps relaxed



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

9 (c) (i) Which of the following contracts to **bend** your arm?

[1 mark]

Extensor ☐

Flexor ☐

Tendon ☐

9 (c) (ii) Which of the following contracts to **straighten** your arm?

[1 mark]

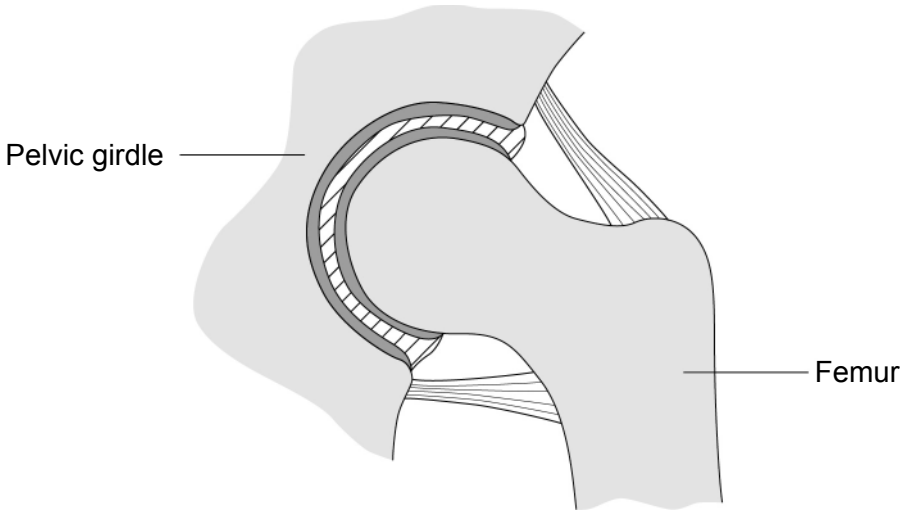
Extensor ☐

Flexor ☐

Tendon ☐

9 (d) **Figure 12** shows the hip joint.

Figure 12



When a person gets older, the hip joint can get damaged and be very painful. Surgery may be needed.

Apart from pain, suggest **one** problem that a damaged hip joint could cause.

[1 mark]

.....

.....

.....

Question 9 continues on the next page

9 (e) **Table 4** gives information about two different types of surgery for treating hip problems.

Table 4

Hip replacement	Hip resurfacing
This operation is usually for older people, between 60 and 80 years old.	This can only be done if a person has strong bones, so it is usually only suitable for younger adults.
The surgeon cuts into the hip, takes out the damaged hip joint and puts in an artificial joint.	The whole joint is not removed. The surgeon just scrapes off the surface of the femur and the surface of the pelvic cavity.
The artificial joint can be made of metal or ceramics.	The pelvis surface and the top of the thigh bone are both covered with metal.
After 2–3 months, most people can do their normal activities. It may be a year before all the benefits are felt.	People recover within a few weeks.
After the operation, most people can move better.	People have a large range of movement.
A modern joint should last about 15 years, so a person might need another operation later.	This is a new type of surgery so we do not know how long the metal surface will last.

Use information from **Table 4** to answer the questions.

9 (e) (i) Give **two** advantages of hip resurfacing rather than hip replacement.

[2 marks]

1 .....

.....

2 .....

.....

9 (e) (ii) Give **two** advantages of hip replacement rather than hip resurfacing.

[2 marks]

1 .....

.....

2 .....

.....

9 (e) (iii) A person with hip damage may prefer to take painkillers instead of having surgery.

Give **one** reason why.

[1 mark]

.....

.....

.....

12

Turn over for the next question

10 **Figure 13** shows a pregnant woman.

Figure 13

10 (a) Apart from the GP (family doctor), name **one** type of health professional who would help care for this woman during her pregnancy.

[1 mark]

.....

10 (b) The woman wants to make sure she has a healthy pregnancy.
Suggest **two** lifestyle changes this woman may need to make.

[2 marks]

1 .....

2 .....

10 (c) When the baby is born, the health professional may advise the woman to breastfeed her baby.
Give **two** benefits to the **baby** of breastfeeding rather than bottle feeding.

[2 marks]

1 .....

2 .....

10 (d) **Table 5** shows how birth rates in England and Wales have changed between the years 2000 and 2010.

Table 5

	2000	**2001**	**2009**	**2010**
Number of live births in England and Wales	604 441	594 634	706 248	723 165

10 (d) (i) Use the data in **Table 5** to describe the changes in birth rates between 2000 and 2010.
[2 marks]

.....

.....

.....

.....

.....

10 (d) (ii) Suggest **two** ways in which a change in population affects the rest of society.
[2 marks]

1.....

.....

2.....

.....

9

Turn over for the next question

11 **Figure 14** shows a doctor measuring a man's blood pressure.

Figure 14

11 (a) The doctor reads the blood pressure as '128 over 87'. These numbers give the highest and lowest blood pressure measurements in an artery in the upper arm.

Which number, 128 or 87, gives the pressure when the ventricles of the heart contract? Give the reason for your answer.

[1 mark]

Number .....

Reason .....

.....

11 (b) The man then walked at a steady speed on a treadmill.
His blood pressure increased to 140 over 90.

11 (b) (i) Give **one** change in the man's heart that caused the increase in blood pressure during the exercise.

[1 mark]

.....

.....

.....

11 (b) (ii) Give the names of **two** substances the muscles will need in larger amounts during exercise than at rest.

[2 marks]

1 .....

2 .....

11 (b) (iii) Why are the substances you named in part **(b) (ii)** needed by the muscles in larger amounts during exercise?

[2 marks]

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6

Turn over for the next question

12 **Table 6** and **Table 7** show nutritional information from a packet of breakfast cereal.

Table 6

Typical nutritional information			
	per 100 g	**per 27 g**	**per 27 g + 180 ml semi-skimmed milk**
Energy in kJ	1557	420	760
Protein in g	11.0	3.0	8.9
Carbohydrate in g of which sugars	58.9 1.0	15.9 0.3	24.1 8.4
Fat in g of which saturates	7.7 1.3	2.1 0.3	5.0 2.3
Fibre in g of which beta glucan	10.5 3.7	2.8 1.0	2.8 1.0
Sodium (salt) in g	trace	trace	0.2

Table 7

Guideline daily amounts for adults	
Energy in kJ	8400
Protein in g	45
Carbohydrates in g	230
Total sugars in g	90
Fat in g	70
Saturates in g	20
Fibre in g	24
Salt in g	6
Average values. Individual requirements may vary.	

12 (a) The information from the cereal packet shows that the cereal contains protein, carbohydrate, fat (lipid), fibre and mineral ions. Milk is mainly water.

One other major type of nutrient is **not** mentioned on the cereal packet.
Name this type of nutrient.

[1 mark]

.....

12 (b) (i) Which type of nutrient, listed on the cereal packet, is the body's main supply of energy?

[1 mark]

.....

12 (b) (ii) What percentage of the daily amount of energy for adults is provided by a 27 g serving of the cereal and 180 ml of semi-skimmed milk?

Use information from both **Table 6** and **Table 7**.

[2 marks]

.....

.....

Percentage provided = ...%

12 (b) (iii) Some adults require **more** energy each day than the value given in **Table 7**.
Give **two** reasons why.

[2 marks]

1 .....

.....

2 .....

.....

Question 12 continues on the next page

12 (c) **Table 6** shows that the cereal contains protein.

12 (c) (i) Describe how you would test some of the cereal for protein.
Include a description of the result you would expect to see.

[3 marks]

Method .....

.....

.....

.....

Expected result .....

12 (c) (ii) Give **one** function of protein in the body.

[1 mark]

.....

12 (d) The manufacturer claims that eating this breakfast cereal helps to lower cholesterol and so maintain a healthy heart.

How does reducing cholesterol help to maintain a healthy heart?

[2 marks]

.....

.....

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.....

.....

12

END OF QUESTIONS

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