Surname		Other Names	
Centre Number			Candidate Number				
Candidate Signature							

General Certificate of Secondary Education
June 2004

SCIENCE: SINGLE AWARD (MODULAR) 346013
Life and Living Processes (Module 13)

Tuesday 29 June 2004 Morning Session

In addition to this paper you will require:
- a black ball-point pen;
- an answer sheet.

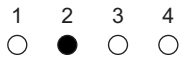
You may use a calculator.

Time allowed: 30 minutes

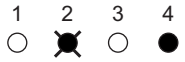
Instructions
- Fill in the boxes at the top of this page.
- Check that your name, candidate number and centre number are printed on the separate answer sheet.
- Check that the separate answer sheet has the title "Life and Living Processes" printed on it.
- Attempt **one Tier only**, **either** the Foundation Tier **or** the Higher Tier.
- Make sure that you use the correct side of the separate answer sheet; the Foundation Tier is printed on one side and the Higher Tier on the other.
- Answer **all** the questions for the Tier you are attempting.
- Record your answers on the separate answer sheet only. Rough work may be done on the question paper.

Instructions for recording answers

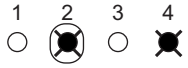
- Use a **black ball-point pen**.
- For each answer **completely fill in the circle** as shown:



- Do **not** extend beyond the circles.
- If you want to change your answer, **you must** cross out your original answer, as shown:



- If you change your mind about an answer you have crossed out and now want to choose it, draw a ring around the cross as shown:



Information
- The maximum mark for this paper is 36.

Advice
- Do **not** choose more responses than you are asked to. You will lose marks if you do.
- Make sure that you hand in both your answer sheet and this question paper at the end of the test.
- If you start to answer on the wrong side of the answer sheet by mistake, make sure that you cross out **completely** the work that is not to be marked.

You must do **one Tier** only, **either** the Foundation Tier **or** the Higher Tier.

The Higher Tier starts on page 14 of this booklet.

FOUNDATION TIER

SECTION A

Questions **ONE** to **FIVE**.

In these questions match the words in the list with the numbers.

Use **each** answer only **once**.

Mark your choices on the answer sheet.

QUESTION ONE

The diagram shows a section through the human eye.

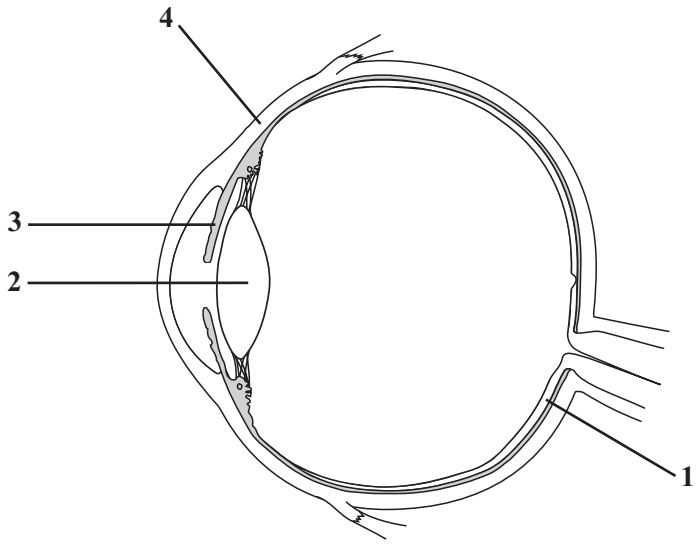
Match words from the list with the labels **1– 4** on the diagram.

iris

lens

retina

sclera



QUESTION TWO

The drawing shows a horse.

The horse has organs which contain different receptors.

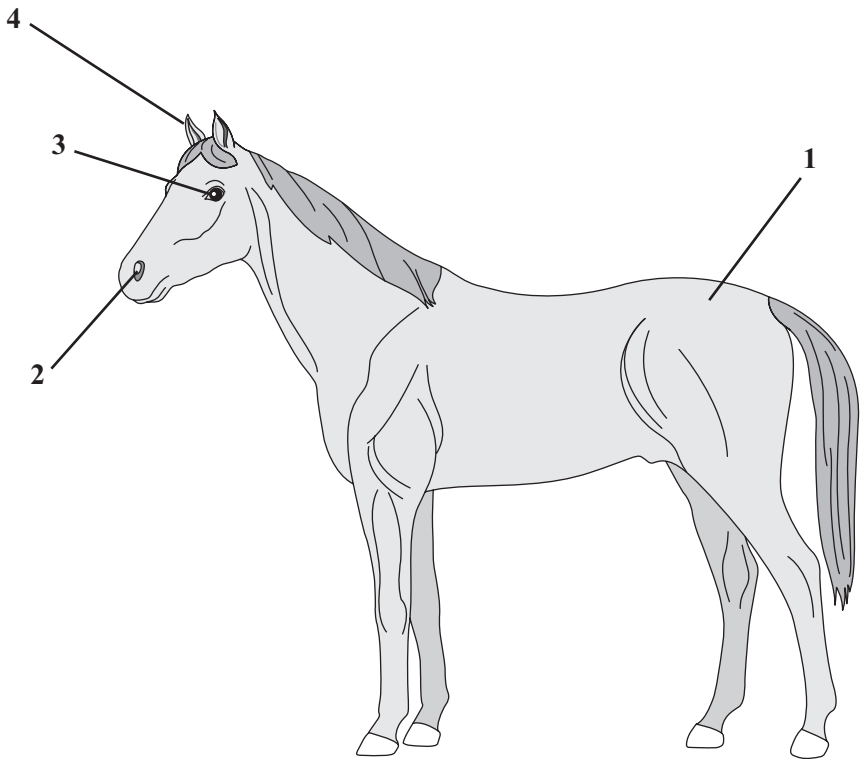
Match words from the list with the labels **1–4** on the drawing.

contains light receptors

contains receptors sensitive to chemicals

contains sound receptors

contains temperature receptors



TURN OVER FOR THE NEXT QUESTION

QUESTION THREE

Waste materials are produced by the body.

Match words from the list with the numbers **1– 4** in the table.

carbon dioxide

ions

urea

urine

Waste	Information
1	lost from body when we breathe out
2	produced mainly by the liver
3	stored in the bladder
4	excess lost via the kidneys

QUESTION FOUR

The diagram shows a sperm cell. This cell can swim towards an egg.

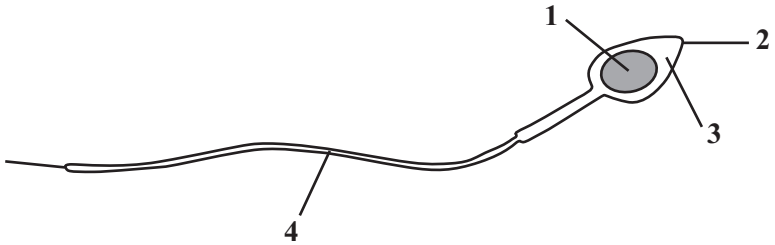
Match words from the list with the labels **1– 4** on the diagram.

cell membrane

controls the activities of the sperm

moves the sperm

where most chemical reactions take place



QUESTION FIVE

The diagram shows part of the digestive system.

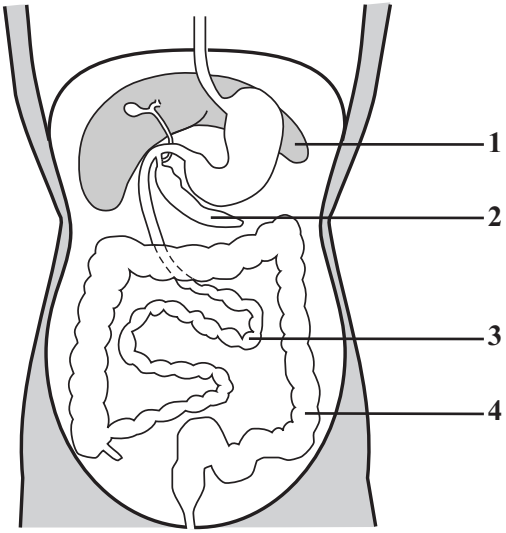
Match words from the list with the labels **1–4** on the diagram.

produces bile

produces protease but does not absorb food

where digestion of starch takes place

where most water is absorbed



TURN OVER FOR THE NEXT QUESTION

NO QUESTIONS APPEAR ON THIS PAGE

SECTION B

Questions **SIX** and **SEVEN**.

In these questions choose the best **two** answers.

Do **not** choose more than two.

Mark your choices on the answer sheet.

QUESTION SIX

Bacteria are microorganisms.

Which **two** of the following are features of bacteria?

cell membrane

cell wall

nucleus

protein coat

reproduce only in living cells

QUESTION SEVEN

Drinking alcohol and sniffing solvents can harm the body.

Which **two** of the following are most likely to be caused by alcohol and solvents?

abnormal behaviour

damage to the heart

damage to the liver

diseases of the blood vessels

emphysema

SECTION C

Questions **EIGHT** to **TEN**.

Each of these questions has four parts.

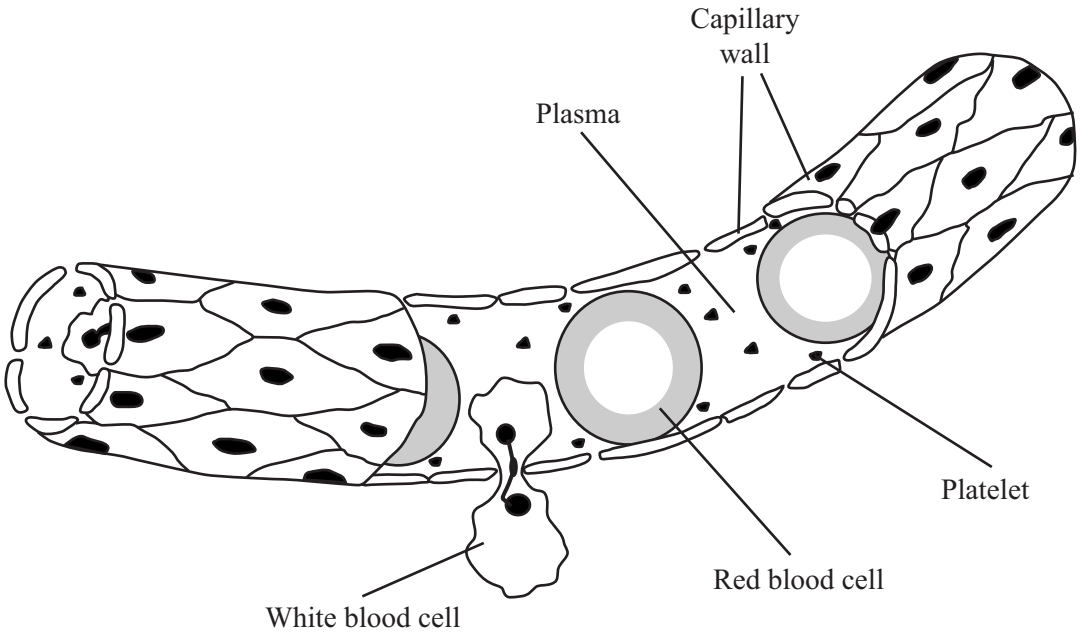
In each part choose only **one** answer.

Mark your choices on the answer sheet.

QUESTION EIGHT

Blood flows through the organs of the body in blood vessels called capillaries.

The drawing shows blood in a capillary.



8.1 Red blood cells transport mainly . . . . .

A antitoxins.

B oxygen.

C sugar.

D urea.

8.2 Plasma transports . . . . .

A most of the carbon dioxide from the lungs to the muscles.

B most of the oxygen from the lungs to the muscles.

C sugars from the small intestine to the muscles.

D urea produced by the kidneys to the liver.

8.3 The white blood cells . . . . .

A ingest microorganisms that have entered the body.

B produce antibodies to counteract the toxins released by microorganisms.

C produce clots that seal cuts.

D transport amino acids to the liver.

8.4 Which of the parts shown in the drawing have a nucleus?

A The cells of the capillary walls only

B The platelets only

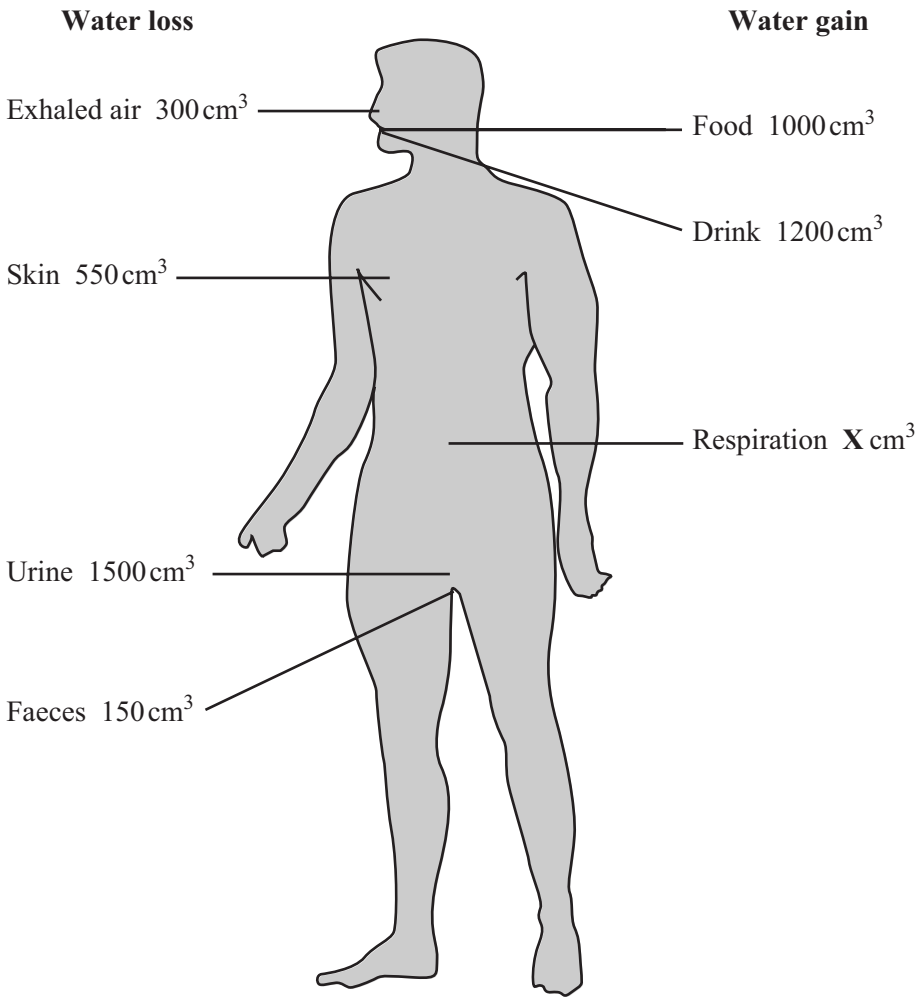
C The white blood cells only

D The white blood cells and capillary wall cells

TURN OVER FOR THE NEXT QUESTION

QUESTION NINE

The drawing shows the daily gain and loss of water for an adult. The total water loss is equal to the total water gain.



9.1 How much water (**X**) did the person gain from respiration?

A 30 cm^3

B 200 cm^3

C 300 cm^3

D 2500 cm^3

9.2 What proportion of the total water loss was via urine?

A $\frac{1}{10}$ (10 %)

B $\frac{3}{10}$ (30 %)

C $\frac{1}{2}$ (50 %)

D $\frac{3}{5}$ (60 %)

9.3 Which organ maintains the correct amount of water in the body?

A Bladder

B Kidney

C Liver

D Skin

9.4 Sweat contains water and . . . . .

A amino acids.

B glycerol.

C ions.

D urine.

TURN OVER FOR THE NEXT QUESTION

QUESTION TEN

People can be vaccinated against some diseases.

10.1 When people are vaccinated, they are injected with . . . . .

A dead or weakened microbes.

B drugs to destroy the microbes.

C microbes to destroy toxins.

D white blood cells.

The table shows the concentration of antibodies in the blood of a person after a first and second injection of vaccine. The first injection was given at the start (0 weeks) and the second injection (booster dose) at a later time during the 12 weeks.
The person was considered to be immune when the antibody concentration exceeded 34 arbitrary units.

Time in weeks	Antibody concentration in arbitrary units
0	0
1	2
2	5
3	15
4	9
5	20
6	50
7	65
8	60
9	58
10	56
11	54
12	52

10.2 It takes a number of weeks after the first injection for the concentration of antibodies to rise above 5 arbitrary units.

This is because . . . . .

A it takes time for the white blood cells to produce the antibodies.

B microorganisms are increasing rapidly in the blood.

C platelets destroy antibodies.

D toxins are being produced to destroy poisons.

10.3 The most likely time when the second injection was given was . . . . .

A during week 2.

B during week 4.

C during week 7.

D during week 12.

10.4 How many weeks after week 12 is it likely to take for the antibody concentration to reach the minimum level for immunity? (Assume the rate of fall of antibody concentration remains constant.)

A 6 weeks after week 12

B 9 weeks after week 12

C 17 weeks after week 12

D 21 weeks after week 12

END OF TEST

You must do **one Tier** only, **either** the Foundation Tier **or** the Higher Tier.

The Foundation Tier is earlier in this booklet.

HIGHER TIER

SECTION A

Questions **ONE** and **TWO**.

In these questions match the words in the list with the numbers.

Use **each** answer only **once**.

Mark your choices on the answer sheet.

QUESTION ONE

The diagram shows part of the digestive system.

Match words from the list with the labels **1– 4** on the diagram.

produces bile

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where digestion of starch takes place

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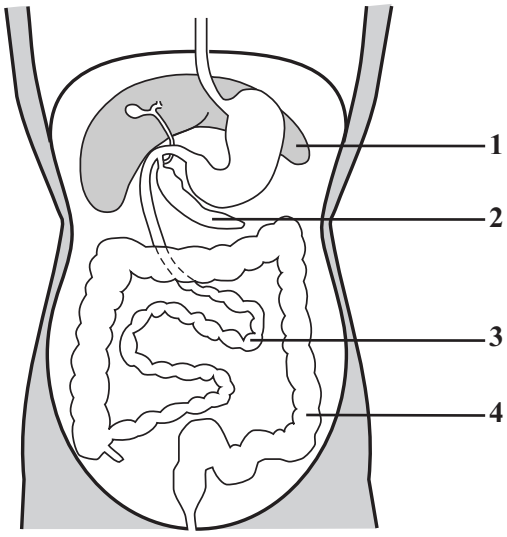

QUESTION TWO

The table is about chemicals that affect the body.

Match words from the list with the numbers **1–4** in the table.

ADH

carbon monoxide

haemoglobin

nicotine

Chemical	Feature
1	combines reversibly with oxygen in the body
2	increases the water reabsorption by the kidneys
3	is the addictive substance in tobacco smoke
4	may lead to a reduced growth rate in a fetus

TURN OVER FOR THE NEXT QUESTION

NO QUESTIONS APPEAR ON THIS PAGE

SECTION B

Questions **THREE** and **FOUR**.

In these questions choose the best **two** answers.

Do **not** choose more than two.

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QUESTION THREE

Drinking alcohol and sniffing solvents can harm the body.

Which **two** of the following are most likely to be caused by alcohol and solvents?

abnormal behaviour

damage to the heart

damage to the liver

diseases of the blood vessels

emphysema

QUESTION FOUR

The kidneys filter many substances from the blood.

Which **two** of the following substances are reabsorbed by the kidneys?

ADH

carbon dioxide

dissolved ions

sugars

urea

SECTION C

Questions **FIVE** to **TEN**.

Each of these questions has four parts.

In each part choose only **one** answer.

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QUESTION FIVE

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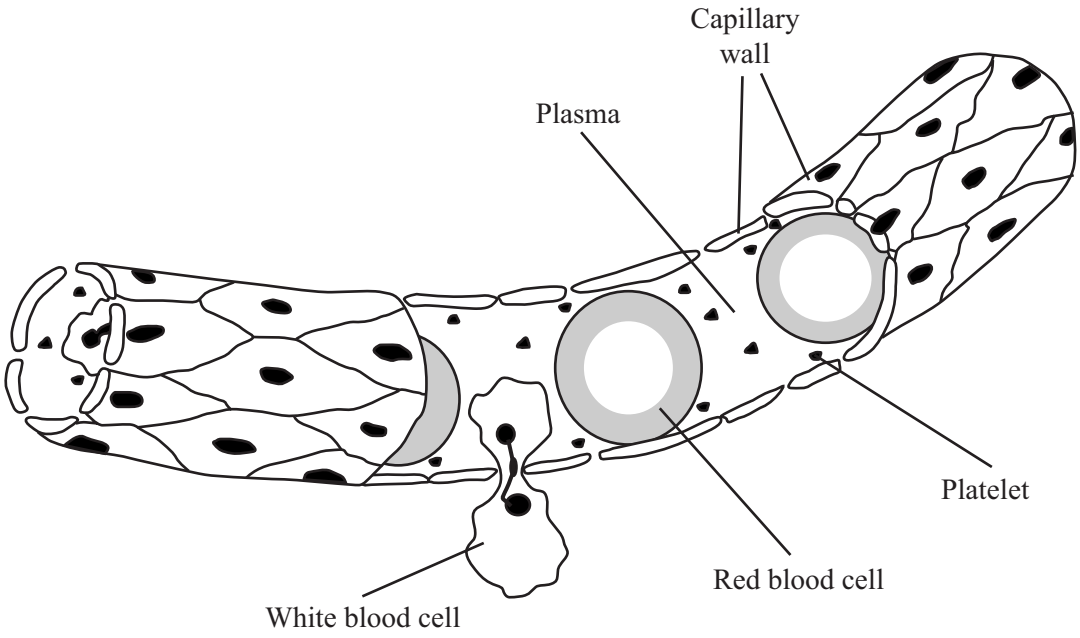

5.1 Red blood cells transport mainly . . . . .

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B oxygen.

C sugar.

D urea.

5.2 Plasma transports . . . . .

A most of the carbon dioxide from the lungs to the muscles.

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C sugars from the small intestine to the muscles.

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C produce clots that seal cuts.

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A The cells of the capillary walls only

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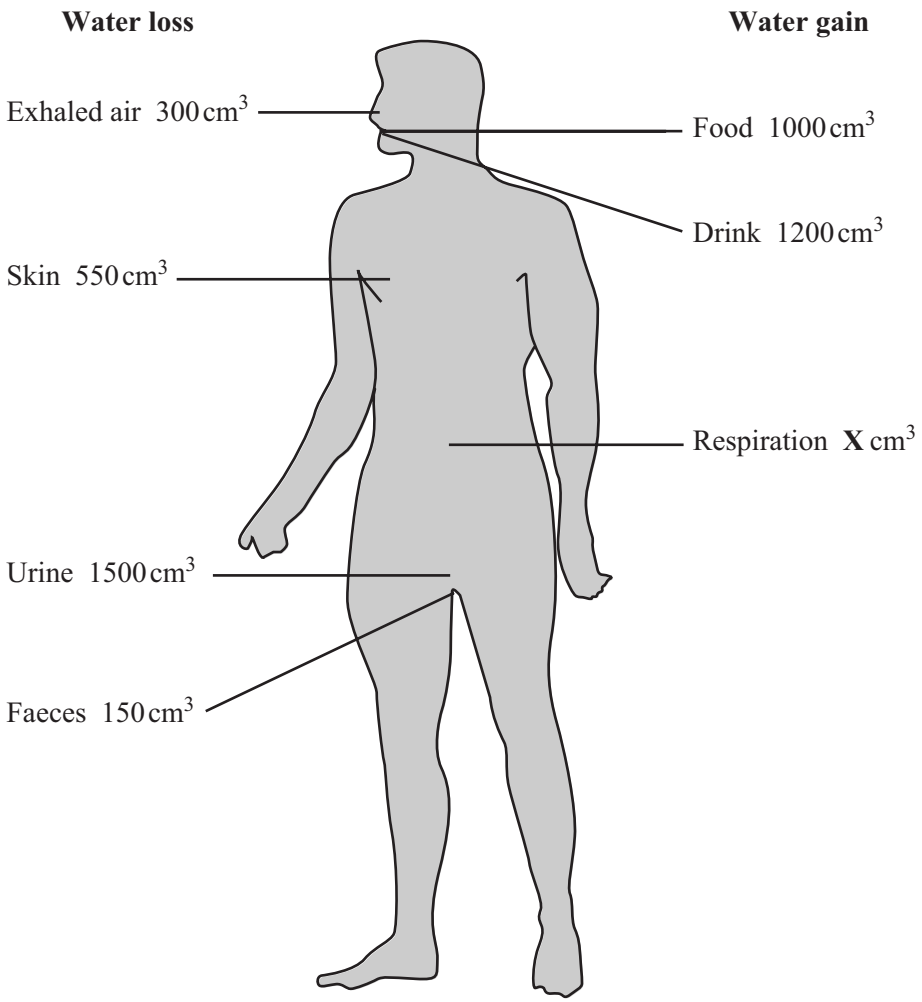
QUESTION SIX

The drawing shows the daily gain and loss of water for an adult. The total water loss is equal to the total water gain.



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QUESTION SEVEN

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A 6 weeks after week 12

B 9 weeks after week 12

C 17 weeks after week 12

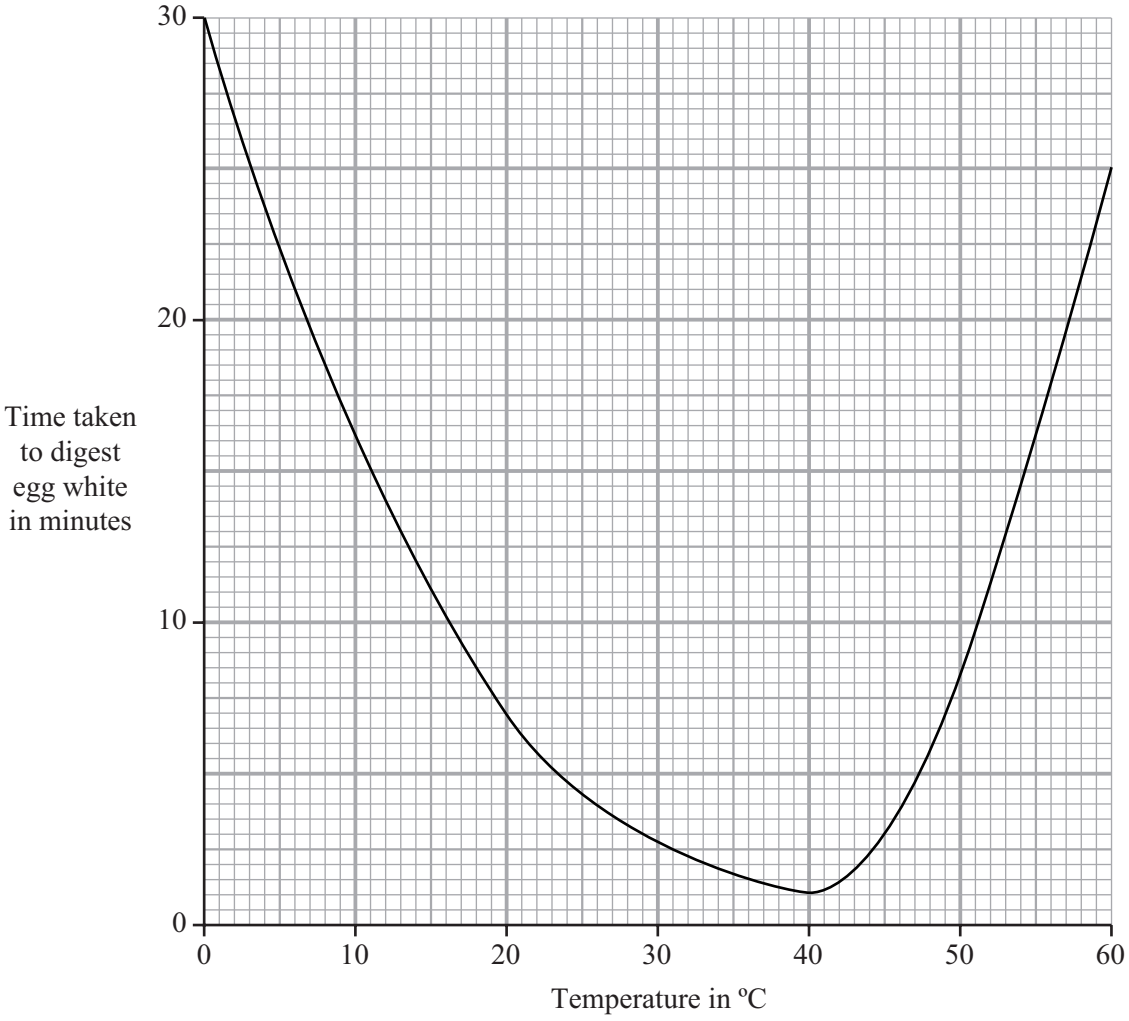
D 21 weeks after week 12

TURN OVER FOR THE NEXT QUESTION

QUESTION EIGHT

Egg white is a protein.
Protease enzymes digest boiled egg white.
In an investigation, equal sized cubes of egg white were placed in tubes containing water.
The tubes were kept at different temperatures ranging from 0 ºC to 60 ºC.
The same volume of protease solution was added to each tube.
The time taken for the egg white to be digested was recorded.

The results are shown in the graph.



8.1 How long would it take for the cube of protein to be digested at 15 ºC?

A 8 minutes

B 10 minutes

C 11 minutes

D 12 minutes

8.2 The cube of protein is digested fastest at . . . . .

A 0 ºC

B 37 ºC

C 40 ºC

D 60 ºC

8.3 Protein is digested by protease enzymes . . . . .

A in acid conditions only.

B in alkaline conditions only.

C in both acid and alkaline conditions.

D in neutral conditions only.

8.4 The cubes of protein had a mass of 1 gram.

What is the rate of digestion of a cube of protein at 20 ºC?

A 0.14 g per minute

B 0.20 g per minute

C 0.35 g per minute

D 14.28 g per minute

QUESTION NINE

A girl passes a baker's shop.
She detects the smell of freshly baked bread in the air.
Shortly afterwards, she notices that the amount of saliva in her mouth has increased considerably.

9.1 This automatic response is called . . . . .

A a motor action.

B a reflex action.

C a relay action.

D a stimulus.

9.2 In this response the smell of freshly baked bread is . . . . .

A the co-ordinator.

B the effector.

C the receptor.

D the stimulus.

9.3 In this response the effector is . . . . .

A the brain.

B the central nervous system.

C the nose.

D the salivary gland.

9.4 A chemical is released when impulses are sent . . . . .

A across the gap between a sensory neurone and a relay neurone.

B along a sensory neurone.

C from a motor neurone to a relay neurone.

D from one end of a relay neurone to the other.

QUESTION TEN

During his summer holiday, a boy was caught in a rain shower.
His wet clothes felt cool against his skin as they dried in the breeze.
He also began to feel cold.
He noticed that his fingers looked pale and he began to shiver.

10.1 The boy began to feel cold because . . . . .

A more blood was flowing to his pituitary gland.

B the breeze had caused sweating to increase.

C the breeze had caused water to evaporate from his skin and clothes.

D the rain water had caused the blood vessels in his skin to constrict.

10.2 His fingers looked pale because . . . . .

A sweat glands in the skin had released more salt on to the skin surface.

B the blood vessels had moved deeper into his skin.

C the blood vessels in the skin had constricted, reducing the blood flow to the skin surface.

D the rain water had caused his skin to wrinkle.

10.3 The boy's body temperature is monitored and controlled by . . . . .

A a regulatory centre in the brain.

B cells in the spinal cord.

C hormones secreted by the pancreas.

D receptor cells in the skin.

10.4 Shivering helps to raise the boy's core body temperature by . . . . .

A increasing the respiration rate in his muscles.

B keeping blood away from his skin.

C making blood flow more rapidly through the capillaries in his skin.

D releasing more sweat on to his skin surface.

END OF TEST

THERE ARE NO QUESTIONS PRINTED ON THIS PAGE