GCSE

0682/01

ADDITIONAL APPLIED SCIENCE
Unit 2: Science at Work in Applied Contexts
FOUNDATION TIER

A.M. TUESDAY, 15 May 2012

45 minutes

Suitable for Modified Language Candidates

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	6	
2.	5	
3.	4	
4.	5	
5.	16	
6.	12	
Total	**48**	

ADDITIONAL MATERIALS

In addition to this examination paper, you may require a calculator and a ruler.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the necessity for good English and orderly presentation in your answers.

You are reminded to show all your working. Credit is given for correct working even when the final answer given is incorrect.

SECTION A (36 marks)

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

1. Kitchen staff have to take care that they do not cause food poisoning.

    (i) State **three** precautions they will take to prevent this happening.   [3]

    1. ....

    2. ....

    3. ....

    (ii) When bacteria grow, what do they produce that can cause food poisoning?   [1]

    ....

    (iii) Tick (✓) the boxes next to **two** symptoms of food poisoning.   [2]

    Chest pains ☐

    Vomiting ☐

    Diarrhoea ☐

    Headache ☐

2. Competitors in the London Olympics know that their skin will help to control their body temperature so that they will not become too hot.
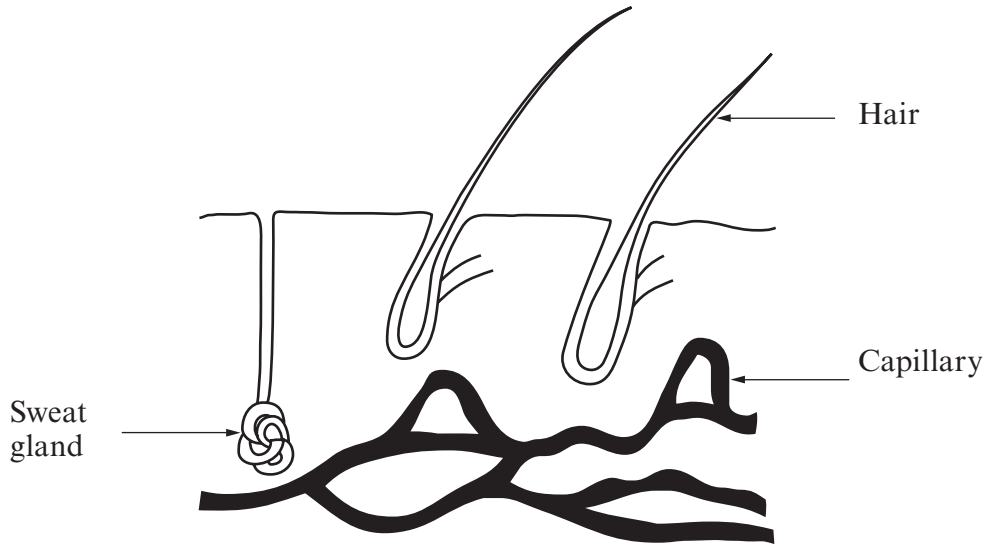
(i) State **three** changes to the skin that stops body temperature rising. [3]

1. ....

2. ....

3. ....

(ii) A competitor's mass before training was 61.0 kg. It was 60.6 kg after training. How much water did she lose from her body during training? [2]

Mass of water loss = ... g

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3. Identify the vitamin or mineral from the list by its description below.

Vitamin A	Vitamin C	Vitamin D	Calcium	Potassium

(i) High levels of this vitamin are found in red berries, tomatoes, broccoli and spinach. It is also in juices made from grapefruit and orange. [1]

....

(ii) This vitamin is made when you get sunlight on your skin. You can also get it from egg yolks, fish oils and milk. [1]

....

(iii) This mineral keeps our teeth and bones healthy. [1]

....

(iv) This vitamin helps the body absorb iron and keeps our blood vessels strong. [1]

....

4. Scientists are collecting samples of a colourless powder. They think it comes from a bomb factory. They carry out a series of tests to identify the powder. These include precipitation reactions.

(a) Use words from the box to complete the sentences. [2]

soluble	solutions	insoluble

In a precipitation reaction, two .... are mixed together.

A precipitate is formed because one of the products is ....

(b) The powder was proved to be silver nitrate which can be used to make bombs.
Name **one** of the products formed when silver nitrate solution is mixed with sodium chloride solution. [1]

....

(c) Sodium chloride is an ionic compound. It contains positive sodium ions.

(i) What is the charge on chloride ions? .... [1]

(ii) State what holds the sodium and chloride ions together in the solid. [1]

....

....
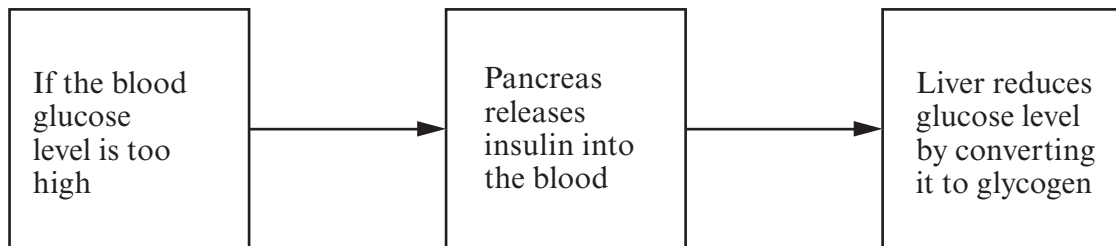
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5. To prepare for the London Olympics, athletes learn about how they can change their diet to help improve their performance.

© Stu Forster/Getty Images

They learn how to control the storage of glucose as glycogen.

If the blood glucose level is too high	→	Pancreas releases insulin into the blood	→	Liver reduces glucose level by converting it to glycogen

(a) Study the information in the diagram. Answer the questions below.

(i) **Name** the hormone that controls the blood glucose level. .... [1]

(ii) **Name** the body organ that produces this hormone. .... [1]

(iii) Where is glycogen stored in the body? .... [1]

(iv) If blood glucose levels fall too low during exercise, what happens to the production of insulin?   [1]

....

(v) During exercise the blood glucose level decreases. What happens in the liver to increase this level?   [1]

....

(b) Marathon runners often experience 'hitting the wall'. Almost all of the athlete's glucose stores are used up at around the 20-mile (32 km) point. This can be delayed by fasting and then changing the diet a few days before the race.

Diet	Liver glycogen level (units)
24h fast	7.5
Fast then 24h high protein	21.5
Fast then 24h high carbohydrate	67.8
Fast and 24h high fat	7.0

(i) What is the liver glycogen level after a 24h fast? [1]

.... units

(ii) What is the best diet for a marathon runner before a race? [1]

....

Give **one** reason for your answer. [1]

....

....

(c) (i) The chemical formula for glucose is $C_6H_{12}O_6$. **Name** the elements that combine to make glucose. [3]

C ....

H ....

O ....

(ii) The energy supply for exercise is provided by aerobic respiration. Complete the **word** equation for this type of respiration. [2]

Glucose + oxygen $\longrightarrow$ .... + ... + energy

(d) Each athlete will have a different energy requirement during training. This is given by the equation below:

Personal Energy Requirement = Basic Energy Requirement + Extra Energy Requirement
       (PER)   (BER)   (EER)

(i) The BER is given by:
$$BER = 32 \times body\ mass$$

Calculate the BER for an athlete of mass 70 kg. [1]

BER = ... units

(ii) The EER is given by:

$$EER = 8.5 \times Number\ of\ hours\ training \times body\ mass$$

Calculate the EER for an athlete of mass 70 kg who trains for 2 hours. [1]

EER = ... units

(iii) Now calculate the total PER for the athlete of mass 70 kg on a 2 hour training day. [1]

PER = ... units

16

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 Turn over.

SECTION B (12 marks)

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

6. Cyclists competing in events in the London Velodrome carefully select their equipment to help them to go faster.

(a) Explain why a lycra body suit **and** the shape of the helmet allows the cyclist to reach higher speeds. [3]

....

....

....

....

(b) Cycle frames can be made of steel, aluminium, carbon fibre, or titanium. Some properties of these materials are shown in the table below. Use the information to answer the questions that follow.

Material	Density (g/cm^3)	Strength (MPa)	Stiffness (GPa)
Steel	7.8	420	200
Aluminium	2.7	200	70
Carbon fibre	1.8	3000	240
Titanium	4.5	434	110

(i)   The volume of steel used to make a frame is 900 cm³. Its mass is 7 kg.

Use the equation below to show the density of steel is 7.8 g/cm³.

$$\text{density} = \frac{\text{mass (g)}}{\text{volume (cm}^3)}$$

[2]

Density = ... g/cm³

(ii) Use the information in the table. Estimate the mass of the same size frame (900 cm³) made from carbon fibre.   [2]

Mass = ... g

(iii) In the table there are four cycle frames of the same size. They are each made from a different material. Arrange them in order from heaviest to lightest.   [1]

.... Heaviest

....

....

.... Lightest

(iv) Use the information in the table. State **two** advantages of a carbon fibre frame. Do not use having a lighter mass.   [2]

1. ....

2. ....

Please turn over for next question.

(c)   Part of a velodrome track is shown below.

Explain why it is important for the cycle tyres to have a good tread.   [2]

....

....

....