WELSH JOINT EDUCATION COMMITTEE

General Certificate of Secondary Education

WJEC CBAC

CYD-BWYLLGOR ADDYSG CYMRU

Tystysgrif Gyffredinol Addysg Uwchradd

652/01

GCSE IN APPLIED SCIENCE (Double Award)

(LEGACY SPECIFICATION)

Unit 2: Science for the Needs of Society

FOUNDATION TIER (Grades G-C)

A.M. WEDNESDAY, 13 June 2007

(1 hour 30 minutes)

For Examiner's use only	
Section A	
Section B	
Total	

INSTRUCTIONS TO CANDIDATES

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.

No certificate will be awarded to a candidate detected in any unfair practice during the examination.

SECTION A (50 marks)

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

1. Complete the table below.   [4]

Element	Chemical symbol
Sulphur	....
....	Ca
Nitrogen	....
....	Fe

2. Manufacturers use materials to make different things.
    Here is a list of different materials:

    wool,   gold,   leather,   marble,   aluminium,   sulphur,   crude oil.

    (i)   From the list, name **two** materials obtained from living things.   [2]

    .... and ....

    (ii) From the list, name **one** mixture. ....   [1]

    (iii) From the list, name **one** metal.   ....   [1]

3. The diagrams below show the skin at different temperatures.

DIAGRAM **A**   DIAGRAM **B**

   (i)   State which diagram, **A** or **B**, shows the skin on a hot day. .... [1]

  (ii)   Give **three** reasons for your answer. [3]

       1.   ....

       2.   ....

       3.   ....

4. A builder is advising a homeowner about saving energy costs.

(a) The builder uses the diagram below to show where a house loses energy.
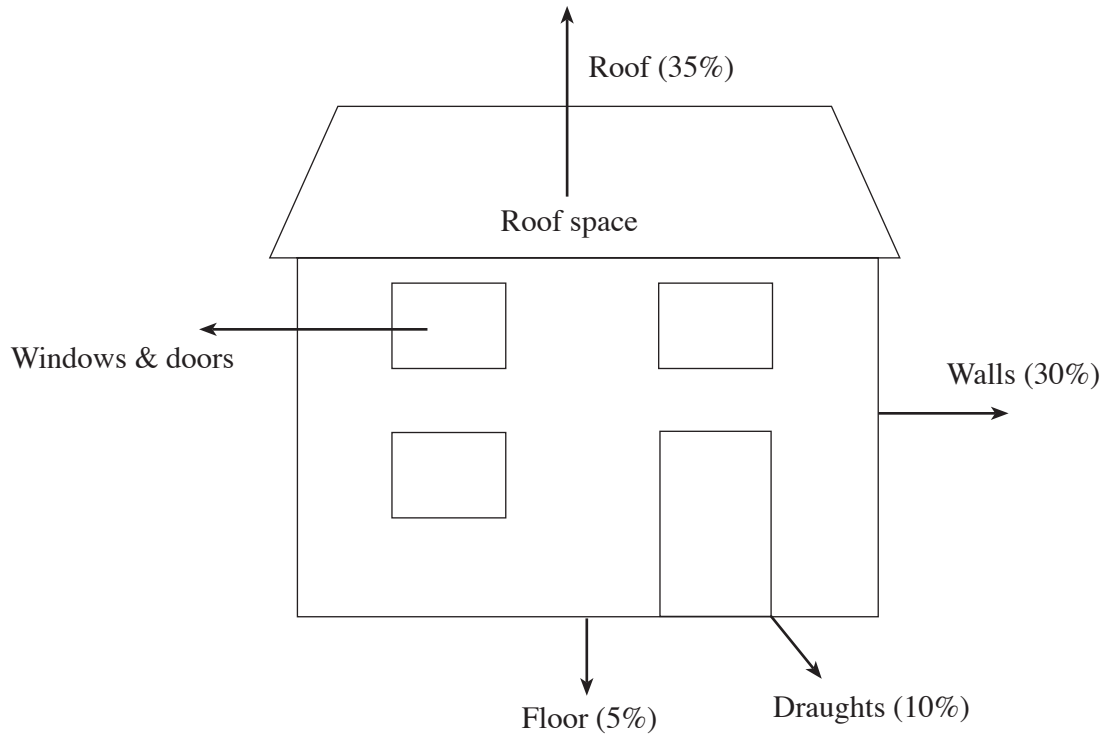
(i) Find the percentage heat loss through the windows and doors. [1]

....

(ii) Heat can be lost by conduction, convection or radiation.

1. **Name** the method of heat transfer through the walls. [1]

....

2. **Name** the method of heat transfer through the roof space. [1]

....

3. **Name** the method of heat transfer through the floor. [1]

....

(b) The builder suggests some methods of saving energy.
These are shown in the table below, together with other information.

Method	Cost	Savings per year	Payback time
Loft insulation	£360	£60	6 years
Cavity wall insulation	£1500	£50	.... years
Draught proofing	£60	....	10 years
Underlay	....	£5	20 years

(i) Complete the table. [3]

(ii) Use the information in the table to give **two** reasons why the homeowner should install loft insulation first. [2]

1. ....

2. ....

Turn over.

5. A genetics student is studying about how characteristics are passed from parent to child.
One characteristic passed from parent to child is hair colour.

(a) **B** is the gene for brown hair and **b** is the gene for blonde hair.
The gene for brown hair **(B)** is the dominant gene.
The table shows the possible combinations of gene pairs.

Complete the table to show the hair colour produced by **all** the gene pairs. [2]

|	**Gene pairs**	**Hair colour produced**
1.	**BB**	**Brown**
2.	**Bb**	....
3.	**bb**	....

(b) A child has parents with gene pairs Bb and bb.
The possible gene pairs of the child can be found using the Punnett square as shown below.

	B	**b**
b	....	....
b	....	**bb**

Complete the diagram to show the possible types of gene pairs for the child. [3]
Part of the diagram has been done for you.

A5

6. Blood is a liquid called **plasma**, containing different cells called **red blood cells**, **white blood cells** and **platelets**.

Platelets

Red blood cell

White blood cell

Plasma
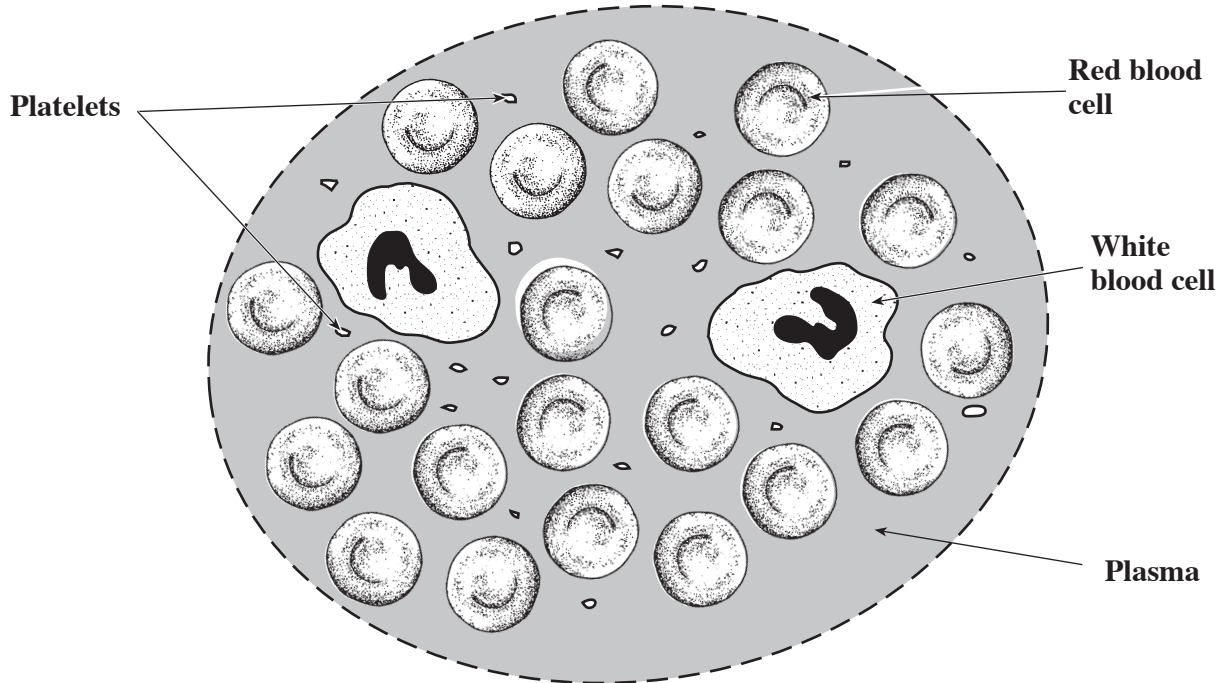
Each part of the blood has a different job to do.
The table shows some of the parts of the blood and some of the jobs they do.
Complete the table. [4]

Part of the blood	The job it does
Red blood cell	....
....	Destroys germs
Platelets	....
....	Carries digested food

A4

7. Scientists study the properties of materials.

(a) The table shows the properties of some materials.

Material	Hard	Malleable	Brittle
A	Yes	No	Yes
B	No	No	No
C	Yes	Yes	No
D	No	Yes	No

(i) Which material, **A**, **B**, **C** or **D**, is likely to be a metal? .... [1]

(ii) Which material, **A**, **B**, **C** or **D**, is likely to be glass? .... [1]

(b) Some materials in use today are:

polyvinyl chloride (pvc),   glass,   copper,   plywood.

(i) Which material from the list is a composite? .... [1]

(ii) Which material from the list is a polymer? .... [1]

(iii) Give **one** reason why electrical wiring is made from copper. [1]

....

A5

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Turn over.

8. Some farmers use **intensive farming methods** to increase their crop production.

(a) Tick (✓) the boxes next to the **two** methods of intensive farming. [2]

Using pesticides	
Using a tractor	
Removing weeds by hand	
Using insecticides	

(b) The farmer decides to use artificial fertilisers.
He divides his fields into six equal sections.
He adds no fertiliser to one section and different amounts of fertiliser to the other sections.

The graph below shows the crop production from each section of field with the different amounts of fertiliser added.

A2
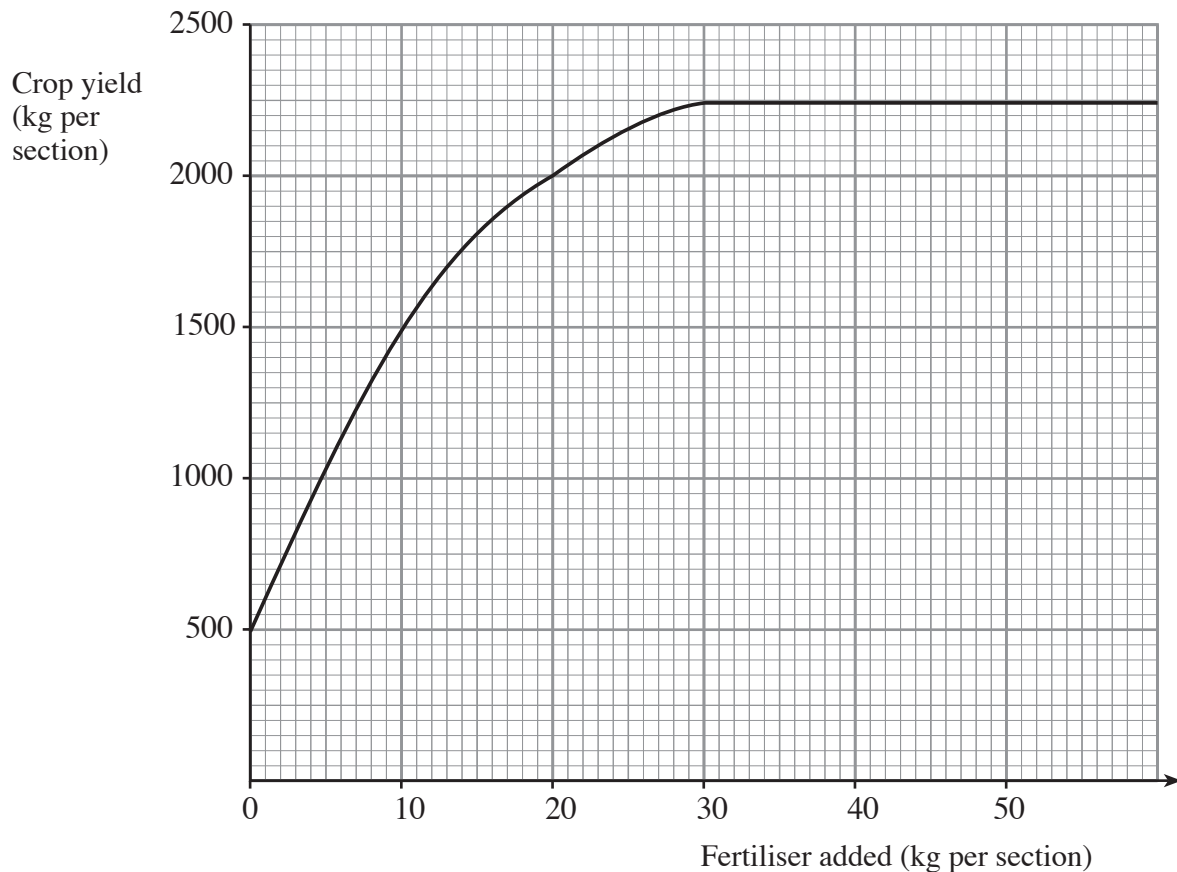
(i) Use the graph to find the crop production when no fertiliser is added. [1]

.... kg

(ii) Use the graph to find the amount of fertiliser needed for a crop production of 2000 kg per section.

.... kg [1]

(iii) The farmer expected the crop production to increase if he used more fertiliser. **Explain** whether the graph shows this to be true. [2]

....

....

....

A4

Turn over.

9. Crude oil is a mixture of many substances called **fractions**.
These fractions are used by industry, motorists, airlines, roofers and road layers.
The names of some of the fractions and some of their properties are shown in the table below.

Name of fraction	Carbon chain length	Boiling range (°C)
Gases	1-4	Less than 5
Naphtha	5-9	20-180
Petrol	5-10	20-200
Kerosene	10-16	180-260
Diesel	14-20	260-340
Bitumen	>70	

(a)   (i)   Name **one** fraction used by jet engines. .... [1]

(ii)   Give **one** use of bitumen. .... [1]

(iii)   Name **two** fractions used as fuels for cars. [2]

.... and ....

(iv)   **Name the fraction** with the largest molecules. .... [1]

(v)   **State** what happens to the **'Boiling range'** shown in the table as the carbon chain length increases. [1]

....

(vi)   Name **one** fraction produced at 190°C. .... [1]

(b)   Petrol is a mixture of hydrocarbons.
Part of the structure of one hydrocarbon is shown below.

$$\begin{array}{ccccc} & H & & H & & H \\ & | & & | & & | \\ - & C & - & C & - & C & - \\ & | & & | & & | \\ & H & & H & & H \end{array}$$
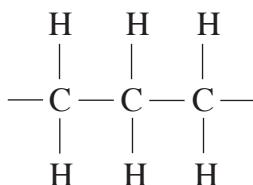
Name the **two** elements in the hydrocarbon. [2]

1. ....

2. ....

SECTION B (40 marks)

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

10. A forensic scientist is given a sample to examine.
She must look at the cells under a light microscope to find out if the sample is from a **plant** or an **animal**.

(a) Name **two** structures she would see in **both** plant **and** animal cells. [2]

   (i) ....

  (ii) ....

(b) Name **two** structures that would **only** be seen if the sample was from a **plant**. [2]

   (i) ....

  (ii) ....

Turn over.

B4

11. There are many types of mixtures.
There are solutions, suspensions, gels, emulsions, foams and aerosols.
They are made by mixing different combinations of solids, liquids and gases.

(i) Complete the table below.
The first row has been completed for you. [3]

Example	Type of mixture	Mixture made from
Ice cream	Suspension	Solid and liquid
Hair spray	Aerosol	Liquid and ....
Whipped cream	Foam	Gas and ....
Sea water	Solution	Solid and ....

(ii) **Describe** the **difference** between a solution and a suspension. [2]

....

....

....
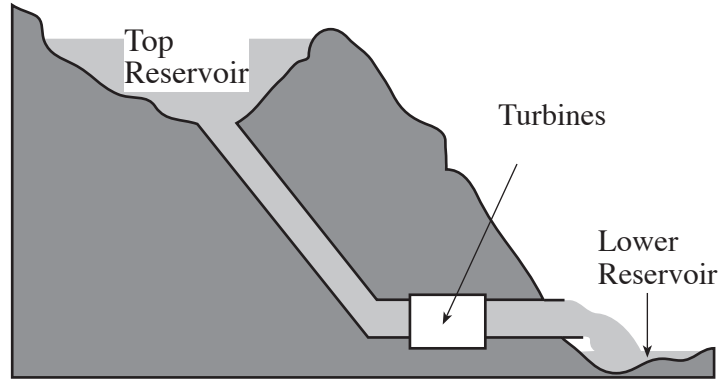
12. A power company is producing a poster to explain how a hydroelectric power station produces electricity.
The diagram of the power station is shown below.

(a) Describe how electricity is produced at the power station. [2]

....

....

....

(b) Give **two** advantages of using hydroelectric power stations **instead of** oil burning power stations to produce electricity. [2]

(i) ....

(ii) ....

(c) Give **two** disadvantages of building a hydroelectric power station. [2]

(i) ....

(ii) ....

(d) Electricity can also be produced by nuclear power stations.

Give **two** reasons why people may object to nuclear power. [2]

(i) ....

(ii) ....

Turn over.

B8

13. A health visitor is explaining to schoolchildren how microorganisms can cause disease.

(i) Name **two** types of microorganisms. [2]

.... and ....

(ii) Name **one** disease caused by microorganisms. [1]

....

(iii) The health visitor told the schoolchildren they were to be given a vaccination.
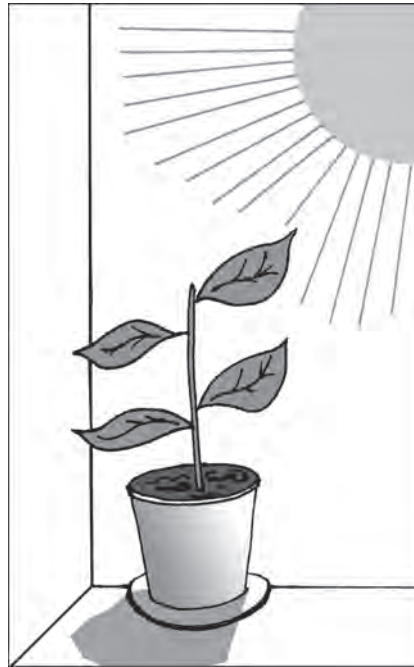**Explain** the purpose of giving vaccinations to schoolchildren. [2]

....

....

(iv) The health visitor told the children that some of the types of microorganism that cause illness can be killed by antibiotics.

Name the type of microorganism killed by antibiotics. .... [1]

14. A plant scientist is investigating photosynthesis in plants.

(a) (i) Give **one** reason why plants carry out photosynthesis. [1]

....

(ii) **Name** the part of the plant in which photosynthesis occurs. [1]

....

(iii) **State** the purpose of chlorophyll in photosynthesis. [1]

....

(iv) The scientist decreases the brightness of the light shining on the plant.
State what effect this has on the rate of photosynthesis. [1]

....

(b) The photosynthesis reaction is shown by the chemical equation below:

$$6CO_2 + 6H_2O \longrightarrow C_6H_{12}O_6 + 6O_2$$

(i) **Name** the **two** compounds needed by plants to carry out photosynthesis. [2]

1. ....

2. ....

(ii) **Name** the gas produced by the plant during photosynthesis. .... [1]

Turn over.

B7

15. An electrician was comparing the power produced by different appliances.
He took measurements of voltage and current for each appliance.
He calculated the power for some of the appliances.
These are shown in the table below.

(a) Complete the table. [2]

Appliance	Voltage in volts	Current in amps	Power in watts	Power in kilowatts
Table lamp	230	0.3	69	0.069
Tumble drier	230	10.0	2300	....
Hair drier	230	5.0		
Microwave	230	3.0	....	0.69

(b) (i) Write down, **in words**, an equation connecting power, voltage and current. [1]

....

(ii) Calculate the power of the hair drier. [2]

Power = ... W

(c) The electrician calculated the power of the tumble drier.
The tumble drier was used for 30 minutes.
Using the equation:

energy = power (kW) × time (h)

find the energy used by the tumble drier in **kilowatt-hours**, during this time. [3]

Energy = ... kWh

(d) (i) Using the information in the table, state which appliance uses the most amount of energy in 30 minutes.

.... [1]

(ii) Using the information in the table, state which appliance uses ten times as much energy as the table lamp in 30 minutes.

.... [1]

B10