

Oxford Cambridge and RSA Examinations
General Certificate of Secondary Education

APPLIED SCIENCE: DOUBLE AWARD
UNIT 2: Science for the needs of society

1497/F

FOUNDATION TIER

Specimen Paper

Additional materials: Pencil, Ruler (cm/mm), Electronic Calculator

TIME 1 hour 30 minutes

Candidate Name	Centre Number	Candidate Number												
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%; height: 20px;"></td> <td style="width: 15%; height: 20px;"></td> <td style="width: 15%; height: 20px;"></td> <td style="width: 15%; height: 20px;"></td> <td style="width: 15%; height: 20px;"></td> <td style="width: 15%; height: 20px;"></td> </tr> </table>							<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%; height: 20px;"></td> <td style="width: 15%; height: 20px;"></td> <td style="width: 15%; height: 20px;"></td> <td style="width: 15%; height: 20px;"></td> <td style="width: 15%; height: 20px;"></td> <td style="width: 15%; height: 20px;"></td> </tr> </table>						

INSTRUCTIONS TO CANDIDATES

- Write your name, Centre number and candidate number in the spaces above.
- Write your answers, in blue or black ink, in the spaces provided on the question paper.
- Answer **all** the questions.
- Read each question carefully and make sure you know what you have to do before starting your answer.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is **70**.

Question number	For examiner's use only
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
TOTAL	

- 1 (a) Here is a list of substances. Scientists and engineers may use these substances to make useful things.

Use the list to answer the following questions.

A substance can be used once, more than once or not at all.

- ceramic
- gold
- iron
- plywood
- polyethene

- (i) Which substance is a polymer? _____ [1]
- (ii) Which substance is a composite material? _____ [1]
- (iii) Which is a metal that is found uncombined in nature? _____ [1]
- (iv) Which substance is formed by baking clay? _____ [1]
- (v) Which two substances conduct electricity?
_____ and _____ [2]

- (b) Polyethene is better than iron for making washing up bowls.

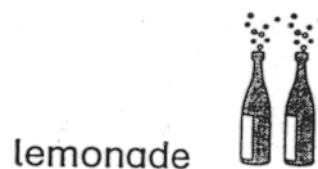
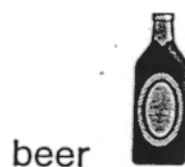
Write down **two** reasons why.

- (i) _____ [1]
- (ii) _____ [1]

- 2 Micro-organisms are used to manufacture some foods. Micro-organisms can also cause problems.

- (a) Yeast is a micro-organism. It is used to make some foodstuffs.

Put **rings** around the two foodstuffs that are made using yeast.



[2]

- 2 (b) Micro-organisms also cause diseases such as foot and mouth. When foot and mouth disease is present people have to take precautions to avoid spreading the disease to uninfected animals.

Name **three** precautions.

(i) _____ [1]

(ii) _____ [1]

(iii) _____ [1]

- 3 (a) Sally works for a firm selling solar panels. She finds out about energy resources. She knows that some energy resources are renewable but others are non-renewable. She puts some of these in a table.

Finish the table. Write down these energy resources in the correct place.

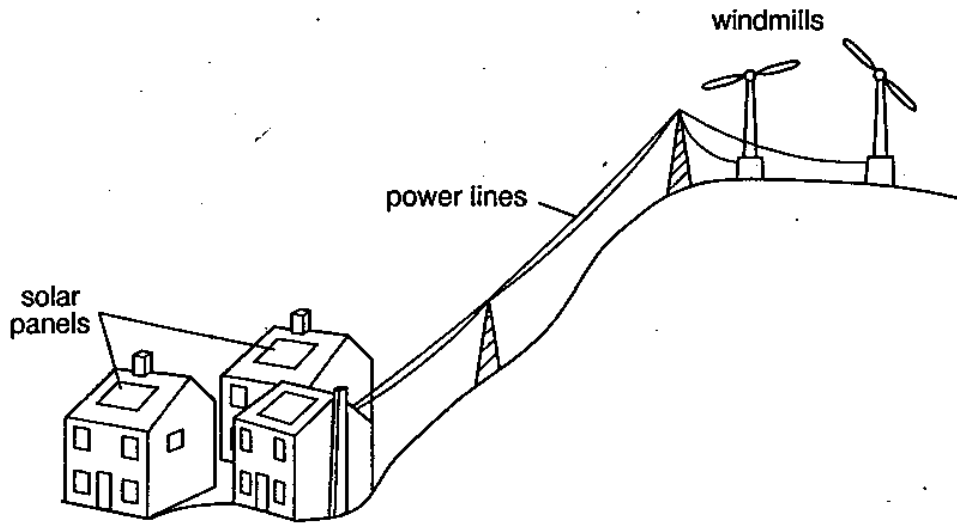
The first one has been done for you.

- coal
- natural gas
- oil
- uranium
- waves

renewable	non-renewable
	Coal

[4]

- 3 (b) Sally explains advantages and disadvantages of using solar panels and windmills in the UK. She looks at this group of houses in the UK that uses solar panels and windmills as energy sources.



- (i) Write down **two** *advantages* of using these energy resources.

1 _____ [1]

2 _____ [1]

- (ii) Write down **one** *disadvantage* of using solar panels.

_____ [1]

- (iii) Write down **two** *disadvantages* of windmills.

1 _____ [1]

2 _____ [1]

4 Many of the materials used in society consist of one substance finely dispersed in another.

A vocational GCSE student is examining some of these. She has to decide whether each is an example of:

- an aerosol
- an emulsion
- a foam
- a gel
- a solution.

She also has to decide which states of matter were used to make each mixture.

Complete the table below.

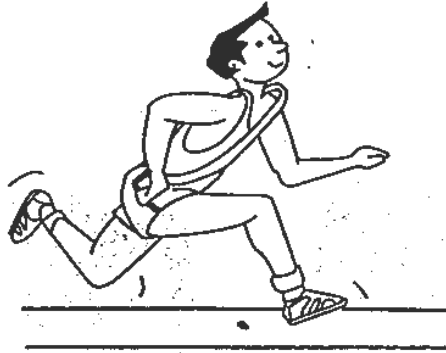
Part has been done for you. The name of each type of mixture may be used once, more than once or not at all.

example	type of mixture	state(s) of matter used to make the mixture
frothy head on a glass of beer	<i>foam</i>	<i>gas and liquid</i>
salt water		<i>solid and liquid</i>
droplets from a can of hair spray		
salad dressing		
a sponge cake		

[7]

- 5 Mr Smith works for a charity that teaches about first aid and how our bodies work. He teaches Timothy about respiration.

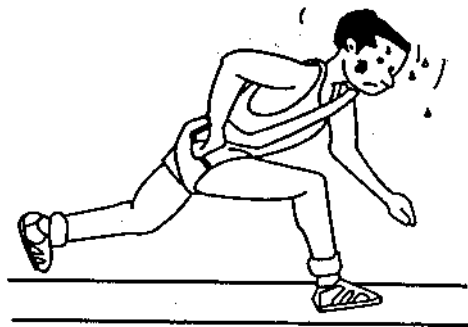
Timothy starts to run a race.



Aerobic respiration is taking place in his cells.

- (a) Complete the word equation for aerobic respiration:

glucose + _____ → _____ + water + energy [2]



- (b) Towards the end of the race Timothy's muscles feel tired and painful.

Another type of respiration is taking place in Timothy's muscle cells.

- (i) Write down the name of this other type of respiration.

_____ [1]

- (ii) Complete the word equation for this other type of respiration.

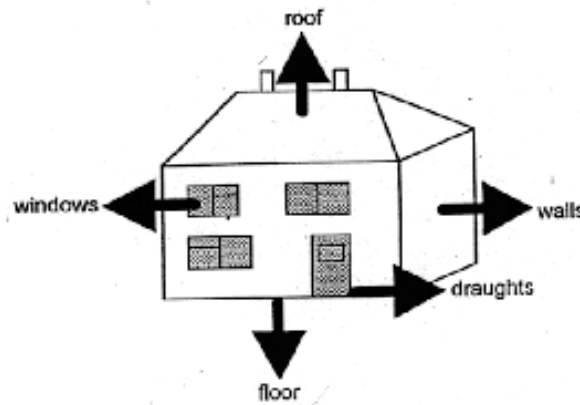
Glucose → _____ + energy [1]

- (c) Describe the movements made by Timothy's rib cage and diaphragm to draw air *into* his lungs.

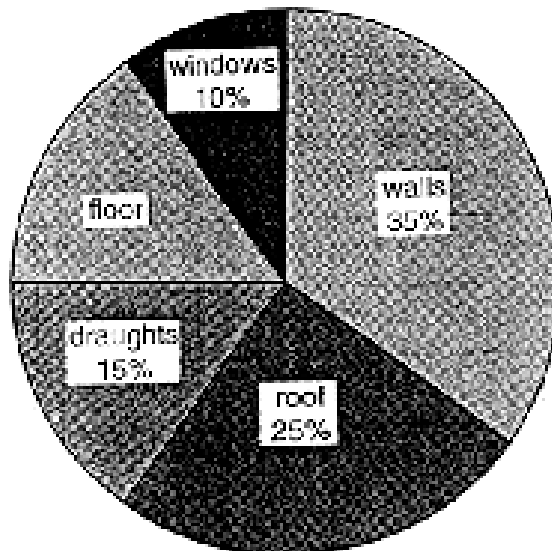
_____ [3]

6 John works as an adviser on house insulation. He explains to Mary where energy is lost from her house.

He uses this diagram to help.



(a) Look at this pie chart about the energy loss.



(i) Where is *most* energy lost?

_____ [1]

(ii) How much of the energy is lost through the *floor*?

_____ [1]

(b) (i) How could the amount of energy lost through the floor be reduced?

_____ [1]

(ii) Explain how this reduces energy loss.

_____ [2]

- 6 (c) John shows Mary information about **four** methods of reducing energy loss.

He explains that it costs £1000 to install double-glazing. This saves £25 each year so it will take 40 years to recover the cost.

Finish the last column of the table. *There are two spaces.*

method	cost	saving each year	payback time
double glazing	£1000	£25	40 years
draught proofing	£30	£30	1 year
roof insulation	£300	£100	_____ years
wall insulation	£250	£50	_____ years

[1]

- (d) Mary's father suggests fitting double-glazing. John explains that this is *not* the best way to reduce energy loss.

Use the pie chart and the table to explain why.

[2]

- 7 Chalton Ltd is a company that extracts *rock salt* from the ground in Cheshire.

- (a) The company can sell the rock salt to local councils to use directly on roads in winter. It *cannot* sell the rock salt directly to the local supermarket to use in packets of table salt.

Explain these facts.

[2]

7 (b) The sodium chloride in rock salt can be separated out. It has the chemical formula NaCl.

(i) State whether sodium chloride is called an *inorganic* substance or an *organic* substance.

_____ [1]

(ii) Explain your answer.

_____ [1]

(iii) Explain why sodium chloride is described as a compound.

_____ [2]

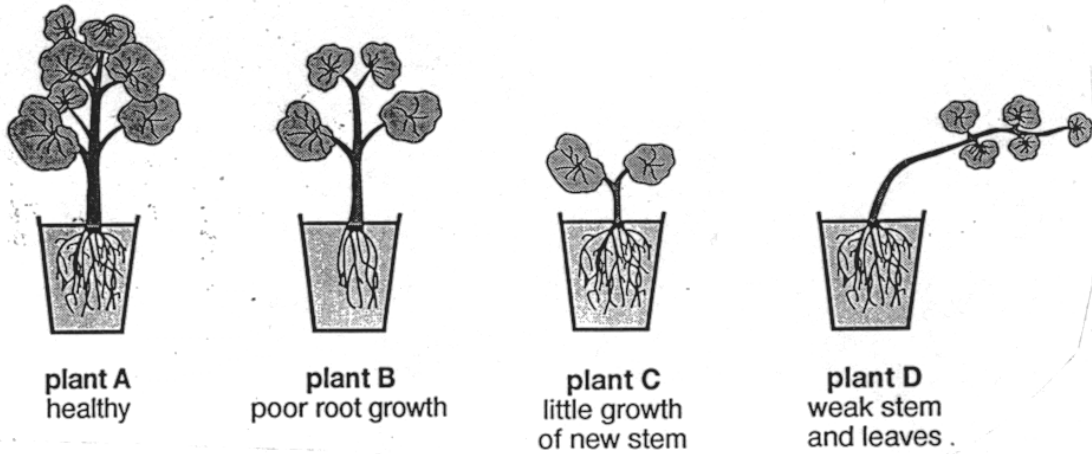
(c) Sodium chloride is used in industry to make the gas hydrogen chloride. Hydrogen chloride is called a *bulk chemical*.

State what this means.

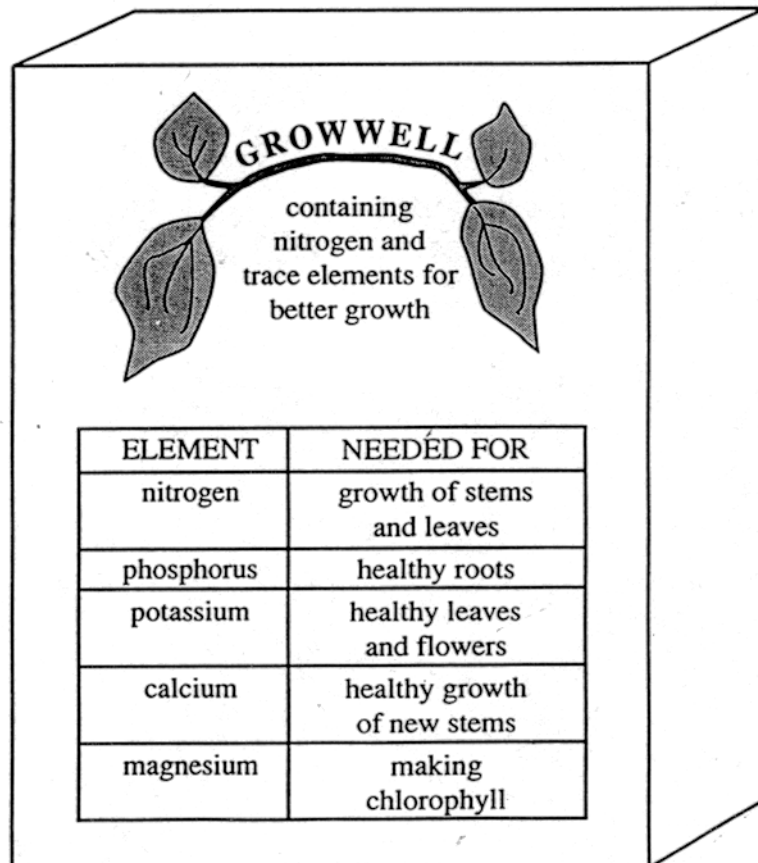
_____ [1]

- 8 Jody is a plant scientist. She explains to some gardeners about what is needed for plants to grow well. She uses some plants and a packet of fertiliser to help explain.

The diagrams show the plants. Some are showing signs of poor growth.



Here is the packet of fertiliser.



- 8 (a) Plants B, C and D each seem to be lacking a different element.

Finish the table by writing down the name of the element that each plant needs for healthy growth.

Use the information shown on the packet to help you.

plant	element needed
B	
C	
D	

[3]

- (b) Explain why magnesium is needed to produce strong healthy plants.

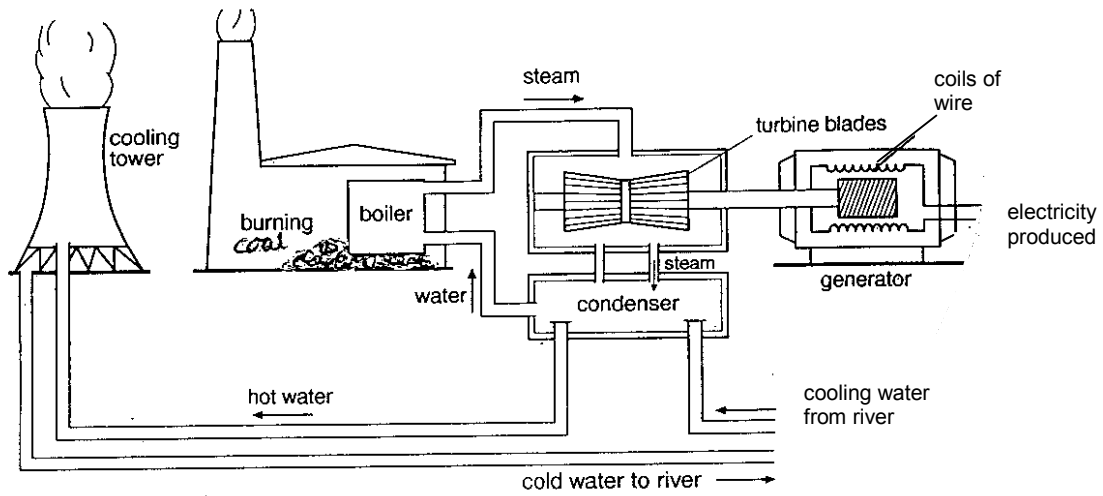
[3]

- (c) State whether adding Growwell to the plants is an example of using an *artificial* fertiliser or a *natural* fertiliser and explain your answer.

[1]

9 Marcus visits a coal burning power station. He has to present a summary of his visit to say how electricity is generated.

He uses this diagram to help him.



The first **two** parts of his summary are shown below.

Finish his summary about how the power station produces electricity.

1. The coal burns.

2. The energy from this boils the water in the boiler.

3.

4.

5.

6.

[4]

10 Ted is a fuel scientist. He finds some data about the products from UK oil refineries in 1997.

Product	Thousands of tonnes produced
liquid petroleum gases, propane and butane	2 000
naphtha	3 000
motor fuel	30 000
kerosene	12 000
diesel	30 000
fuel oil	12 000
bitumen	2 000
other products	9 000
Total:	

(a) Finish the table to show the total produced. [1]

(b) (i) Which **two** products from the refinery were in greatest demand?
_____ and _____ [1]

(ii) Suggest why these products were in the greatest demand.

_____ [1]

(c) All of the products, except for 'bitumen' and 'other products', are burned as fuels.

(i) Calculate the percentage of oil products burned as fuels in the UK.

_____ [2]

(ii) Explain why this causes concern to fuel scientists such as Ted.

_____ [3]

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MARK SCHEME

Advice to examiners on marking scripts

- 1 Please ensure that you use the *final* version of the marking scheme.
You are advised to destroy all draft versions.
- 2 Please mark all post standardisation scripts in red ink. A tick should be used for each answer judged worthy of a mark. The tick should be placed at the point in the answer where the mark has been awarded. The number of ticks should be the same as the number of marks awarded. If two (or more) responses are required for one mark, use only one tick. Half marks should never be used.
- 3 No comments should be written on scripts.
Remember that scripts may be returned to Centres.
- 4 The marks awarded for each part question should be indicated in the margin provided on the right hand side of the page. The mark total for each question should be ringed at the end of the question, on the right hand side. These totals should be added up to give the final total on the front of the paper.
- 5 Correct answers to calculations should gain full credit even if no working is shown unless otherwise indicated in the mark scheme. (An instruction on the paper to 'Show your working' is to help candidates who may then gain partial credit even if their final answer is not correct.)
- 6 Strike through all blank spaces and/or pages in order to give a clear indication that the whole of the script has been considered.
- 7 An element of professional judgement is required in the marking of any written paper and candidates may not use the exact words that appear in the mark scheme. If the essence is correct *and* answers the question, contact your Team Leader/Principal Examiner for guidance.

Question	Answer	Mark	Grade	AO
1(a)(i) 1(a)(ii) 1(a)(iii) 1(a)(iv) 1(a)(v)	Polyethene Plywood Gold ceramic gold and iron	6x1	6G	AO1
1(b)	<i>Two from:</i> <ul style="list-style-type: none"> polyethene is easily moulded polyethene is less dense/allow lighter (ora) polyethene does not rust (ora) polyethene can be coloured (ora) polyethene does not chip china. 	2x1	2G	AO1
2(a)	<ul style="list-style-type: none"> bread beer 	2x1	2G	AO1
2(b)	<i>Three from:</i> <ul style="list-style-type: none"> disinfect footwear/use disinfectants do not walk near the infected areas/do not move animals about /idea of isolation immunisation/culling. 	3x1	2F 1E	AO1
3(a)	renewable: waves non-renewable: natural gas oil uranium	4x1	2G 2F	AO1
3(b)(i)	<i>Two from:</i> <ul style="list-style-type: none"> clean non-polluting 'free' energy saves fossil fuels renewable a qualified reference to cost. <i>Reject 'environmentally friendly'/'cheaper'/'cheaper source of electricity'</i>	2x1	1F 1E	AO2
3(b)(ii)	sun does not always shine	1	1F	AO2
3(b)(iii)	<i>Two from:</i> <ul style="list-style-type: none"> not always windy noisy unsightly very large very large land area required. 	2x1	1F 1E	AO2

Question	Answer	Mark	Grade	AO	
4	solution	7x1	1F 6E	AO1	
	aerosol				gas + liquid
	emulsion				liquid (+ liquid)
	foam				gas + solid
5(a)	<ul style="list-style-type: none"> oxygen carbon dioxide 	2x1	2E	AO2	
5(b)(i)	anaerobic (respiration)	2x1	1E	AO1	
5(b)(ii)	lactic acid		1D	AO2	
5(c)	rib cage: moves upwards/rises moves outwards diaphragm: moves downwards/flattens	3x1	1C 2D	AO1	
6(a)(i)	walls	1	G	AO2	
6(a)(ii)	15(%)	1	F	AO2	
6(b)(i)	<i>One from:</i> <ul style="list-style-type: none"> carpet underlay (underfloor) insulation 	1	F	AO1	
6(b)(ii)	<ul style="list-style-type: none"> trapped air reduces draughts/is an insulator/reduces conduction 	1	1D	AO1	
		1	1D		
6(c)	3 and 5 (<i>both needed</i>)	1	1D	AO2	
6(d)	<ul style="list-style-type: none"> least energy loss longest payback period/saves least amount of money 	1	1D	AO2	
		1	1D		
7(a)	<ul style="list-style-type: none"> idea that rock salt is not pure sodium chloride (salt) idea that this is not a problem for salting roads but is when a high degree of purity is required 	2x1	2D	AO1	
7(b)(i)	inorganic	1	1C	AO1	
7(b)(ii)	it does not contain carbon atoms <i>OR</i> it was formed from non-living things	1	1C	AO1	
7(b)(ii)	<ul style="list-style-type: none"> it contains more than one element (chemically) combined/joined/bonded 	2x1	2C	AO1	
7(c)	it is manufactured on a large scale	1	1C	AO1	

Question	Answer	Mark	Grade	AO
8(a)	<ul style="list-style-type: none"> phosphorus calcium nitrogen 	3x1	3D	AO2
8(b)	<ul style="list-style-type: none"> magnesium helps to make chlorophyll which is needed for photosynthesis/chlorophyll traps light so that plants can produce their own food/make sugar/make new cells/make new leaves 	1 1 1	1D 1C 1C	AO1
8(c)	(it is artificial) because it has been made by people/it is not found naturally like this	1	1C	AO1
9	<ul style="list-style-type: none"> steam turns blades of the turbine turbine is connected to a shaft which turns a magnet inside the generator magnet (in generator) turns inside coils of wire an electric current is induced in the coils. <i>[if more than one answer is in a single box, give credit]</i>	4x1	1D 3C	AO1
10(a)	100 000 (tonnes)	1	F	AO2
10(b)(i)	motor fuel and diesel	1	E	AO2
10(b)(ii)	used for more popular modes of transport	1	E	AO2
10(c)(i)	mass = 89 000 (tonnes) 89%	1 1	E C	AO2 AO2
10(c)(ii)	<ul style="list-style-type: none"> idea of CO₂ produced causing global warming [allow 'pollution'] idea of using up limited reserves 	1 1 1	C C C	AO2

Total mark available: 70

